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Operation Thumbs Down

A quasi-experimental evaluation of an FBI gang takedown in South Central Los Angeles

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Abstract

Purpose – The purpose of this paper is to evaluate the violence-reduction effects following an FBI-led gang takedown in South Central Los Angeles.
Design/methodology/approach – The time series impact of the intervention was estimated using a Bayesian diffusion-regression state-space model designed to infer a causal effect of an intervention using data from a similar (non-targeted) gang area as a control.
Findings – A statistically significant 22 percent reduction in violent crime was observed, a reduction that lasted at least nine months after the interdiction.
Research limitations/implications – The research method does make assumptions about the equivalency of the control area, though statistical checks are employed to confirm the control area crime rate trended similarly to the target area prior to the intervention.
Practical implications – The paper demonstrates a minimum nine-month benefit to a gang takedown in the target area, suggesting that relatively long-term benefits from focused law enforcement activity are possible.
Social implications – Longer-term crime reduction beyond just the day of the intervention can aid communities struggling with high crime and rampant gang activity.
Originality/value – Few FBI-led gang task force interventions have been studied for their crime reduction benefit at the neighborhood level. This study adds to that limited literature. It also introduces a methodology that can incorporate crime rates from a control area into the analysis, and overcome some limitations imposed by ARIMA modeling.

Keywords Intelligence-led policing, Organized crime, Hotspots, FBI, Gangs, Federal law enforcement

Paper type Research paper

Introduction

It has been estimated that there are approximately 33,000 gangs in the USA with a membership of 1.4 million. They are responsible for an estimated 48 percent of national violent crime (National Gang Intelligence Center, 2012). Gang members have a higher propensity toward crime and other deviant behaviors compared to non-members (Brattin *et al.*, 1998; Esbensen and Huizinga, 1993; Harper and Robinson, 1999; Thornberry *et al.*, 1993). Gangs also harm communities in other ways. Block (2000) found a strong relationship between the number of gangs in an area and the general level of criminal activity, and areas with increased numbers of gang members have increased rates of gun assaults, an increased risk that spreads to nearby areas (see also Cohen and Tita, 1999; Huebner *et al.*, 2016). Drug use and drug dealing are endemic among gangs (Fagan, 1989) and when gangs are involved in drug dealing, property and violent crime are higher around gang corners (Taniguchi *et al.*, 2011).

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Despite the commitment made by a variety of agencies to reduce gang violence, knowledge regarding the violence-reduction effectiveness of law enforcement interdictions is relatively limited, and almost non-existent with regard to federal law enforcement's impact. One federal group dedicated to the reduction of gang-related violence is the FBI's Violent Gang Safe Streets Task Forces. They employ nearly 2,500 people across 160 task forces nationally (FBI, 2016), and even though they arrest on average about 5,000 people a year, initiate thousands of indictments and disrupt the activities of hundreds of gangs (FBI, 2011), little is known about the impacts of these units on community violence rates.

We report on the crime reduction outcomes of Operation Thumbs Down, a gang interdiction directed against the Rollin' 30's Harlem Crips by an FBI gang task force in South Central, Los Angeles. Using the non-contiguous area of a similar gang as a control (the territory of the Rollin' 60's), this study is a quasi-experimental non-equivalent group evaluation of the violent crime changes in the wake of the gang interdiction by an FBI-led task force comprising federal agents and local officers. The impact of the intervention was estimated using a diffusion-regression state-space model. The evaluation was conducted by researchers contracted to the FBI for a related strategic development project, but who were not involved in the execution of Operation Thumbs Down. The researchers learned about the initiative through a series of meetings and discussions with people who were directly involved in the planning and execution of the initiative.

Our study heeds the call of McGarrell *et al.* (2010) for evaluations with a neighborhood focus, and adds to the literature first by conducting a rare neighborhood-level, violence-reduction evaluation of a gang takedown. Second, we introduce a new quantitative analytical method for the evaluation of crime reduction initiatives that addresses some of the limitations identified with previous studies. In the following section we examine the scope and limitations of a number of key multiagency anti-gang collaborations that have emerged during the past two decades. We then examine what role the FBI's Violent Gang Safe Streets Task Forces have in gang prevention and the influence that the FBI's Enterprise Theory of Investigation (ETI) has in focusing task force operations. This is followed by an examination of the structure of Operation Thumbs Down, the data made available to us for the evaluation, and a detailed description of the analytical methods adopted. Results and discussion conclude the study.

20 years of multiagency anti-gang initiatives

Attempts by law enforcement agencies to combat violent street gangs span a continuum from community improvement efforts to aggressive enforcement, and from local enforcement to federal levels. Few evaluations of gang crackdowns exist prior to 20 years ago (Kent *et al.*, 2000; Klein, 1995). With a perceived increase in gang problems, numerous US cities benefited from federal funds under the anti-gang initiative of the COPS office in the mid-1990s. Dallas and Detroit pursued curfew and truancy enforcement alongside saturation and suppression patrols, while the St Louis approach included intelligence gathering, and aggressive consent-to-search tactics that aimed to reduce firearm availability to juveniles. While these efforts recorded crime reductions in some targeted areas, most were not statistically significant and summarized to have little impact on crime (Bynum and Varano, 2003; Decker and Curry, 2003; Fritsch *et al.*, 1999). These evaluations had some methodological limitations, either due to an inability to account for changes in control areas (Fritsch *et al.*, 1999) or they compared the impact against control areas which were analyzed in separate models independently from the implementation sites (Bynum and Varano, 2003; Decker and Curry, 2003). These types of challenges have plagued other local collaborative gang efforts (Kent *et al.*, 2000). Furthermore, these initiatives were largely undertaken by city police departments with temporary federal funding but limited access to federal resources or to the benefits of a federal prosecution system.

In contrast, Boston Ceasefire – also referred to as the Boston Gun Project – was a multiagency initiative designed to reduce youth homicides with less emphasis on aggressive enforcement. At its foundation was an intervention designed by an interagency working group, including on the federal side the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) and the District of Massachusetts US Attorney's Office. This intervention had two main elements: increased law enforcement attention to firearms traffickers, and the use of a strategy coined "pulling levers" which was intended to generate a deterrent to gang violence (Braga *et al.*, 2001). Boston Ceasefire combined gang accountability with an extensive social services component that included linking participants to mentors, vocational training, housing, and a range of other services, as well as exposure to the community's "moral voice" regarding both care about the gang members along with outrage over the levels of violence (McGarrell *et al.*, 2013, p. 2). The program targeted the entire city, so there was no relevant control group or site available. The outcome evaluation therefore relied on a one-group time series design that had to control for seasonality and the crime trend. It was estimated that monthly youth homicides decreased by 63 percent, while monthly shots-fired counts decreased by 32 percent (Braga *et al.*, 2001).

Retaining the theme of enforcement alongside community interventions, Project Safe Neighborhoods (PSN) is an ongoing program that involves US Attorney's Offices working with state and local agencies focused on gun crime reduction. PSN is a multi-billion dollar national initiative that has been in existence since 2001 and is sponsored by the US Department of Justice. It has been modeled after Project Exile (Richmond, VA) and Operation Ceasefire (Boston, MA) (McGarrell *et al.*, 2010; Papachristos *et al.*, 2007). PSN programs included multiagency partnerships, a systematic analysis of crime patterns, communication of the deterrence message through media campaigns (similar to Boston's pulling levers strategy) and increased federal prosecution for gun crime. Evaluation of the crime reduction impact of a purposefully selected group of 10 jurisdictions found reductions in violent crime between 2 and 42 percent. It has been recognized that the evaluations were different from site to site; some places did not have equivalent control areas, and "in most sites, the comparisons were not ideal from a methodological standpoint" (McGarrell *et al.*, 2013, p. 6). Many PSN projects were not citywide initiatives but rather focused on crime hotspots, and the evaluators noted that "A more detailed methodology should attempt to discern overall target city approaches from a more discrete neighborhood focus" (McGarrell *et al.*, 2010, p. 183). One rare example of a more appropriate methodology was provided by Papachristos *et al.* (2007) in their evaluation of the effects of PSN program components at the police beat level in Chicago. They employed a quasi-experimental framework relying on multilevel growth curve modeling, and found that treatment neighborhoods experienced greater declines of homicide compared to control neighborhoods.

In all of these evaluations, federal law enforcement did not take a lead role, and the evaluations tended to emphasize the focused deterrence component and minimize the value of federal enforcement and the threat of federal prosecution. Furthermore, the contribution of the FBI has been largely absent. Federal involvement in evaluated programs is more likely to involve ATF agents and the contribution of prosecutors from the local branch of the US Attorney's Office. One exception was a multiagency task force coordinated to combat a gang in the Brightwood neighborhood in Indianapolis, Indiana (Nunn *et al.*, 2006). This task force included assistance from the FBI which increased federal personnel and the availability of resources (including the ability to file federal drug charges) against major drug dealers in the neighborhood. A 12-month covert surveillance operation involved wiretaps, aerial surveillance and drug-buys by informants, and culminated into a 21 person takedown in April 1999. None of the targets were released on bail, and all of them were sentenced to jail or prison. Using three years of data and a time series design with a control group, evaluators found that there were significant declines in weekly calls for service

following the takedown initiative (Nunn *et al.*, 2006). McGarrell *et al.* (2006) made the point that federal enforcement and prosecution of the Brightwood gang played a key communication-of-risk role in the successful pulling levers strategy subsequently employed in the Indianapolis lever-pulling initiative.

Overall, while there have been a number of evaluations exploring the effectiveness of multiagency efforts that involve federal agencies to reduce gang crime over the last couple of decades, many have had methodological limitations. These include separating the examination of treatment and control areas, and even the inability to identify suitable control locations. Furthermore, few have included any significant involvement of the FBI and the particular resources they can bring to a case. The next section examines how the FBI's involvement could enhance a gang investigation.

The FBI's ETI

The FBI's anti-gang strategy is centered on the ETI, an approach that aims to identify, disrupt and dismantle violent street gangs – predominantly through investigation and prosecution (Weisel, 2002). ETI has been described as "highly effective" as a "proactive attack on the structure of the criminal enterprise" (McFeely, 2001, p. 19). ETI combines "short term, street level enforcement activity with such sophisticated techniques as consensual monitoring, financial analysis, and Title III wire intercepts investigations" (FBI, 2016). Targeting of carefully chosen gangs followed by the deployment of surveillance and use of wiretaps is closely associated with an intelligence-led policing philosophy (Ratcliffe and Guidetti, 2008), which emphasizes "analysis and intelligence as pivotal to an objective, decision-making framework that prioritises crime hot spots, repeat victims, *prolific offenders and criminal groups*. It facilitates crime and harm reduction, disruption and prevention through strategic and tactical management, deployment, and *enforcement*" (Ratcliffe, 2016, p. 66, emphasis added). ETI requires the identification of a criminal organization, the activities they conduct, and the financial assets they possess. The ultimate aim is the dismantlement of the targeted gang, with some US Attorneys claiming that "Unless the gang, or the targeted set of the gang, is dismantled, the investigation cannot be a complete success" (Agnifilo *et al.*, 2006, p. 15).

Since the Safe Streets Violent Crime Initiative began in January 1992, FBI Violent Gang Safe Streets Task Forces have been tasked with the identification and targeting of significant groups operating as criminal enterprises (Comey, 2015). This is accomplished through the adoption of tactics employed in the fight against organized crime, including undercover operations, electronic surveillance techniques, and coordinated investigations under RICO and Continuing Criminal Enterprise statutes (Ashley, 2003). Like other federal agencies, they can also negotiate proffer arrangements to encourage gang members to provide information and testimony on associates (McCaffrey and Oebker, 2013). The theoretical mechanism to achieve a safer community is the dismantling of a gang thus rendering them ineffective, either through incarceration of the whole gang or by "eliminating the leadership structure" (Agnifilo *et al.*, 2006, p. 15). With the careful use of appropriate statutes, combined with covertly-obtained information, "investigators can expand criminal culpability for a single criminal act to all members of the enterprise, regardless of whether they actually committed the crime" (McFeely, 2001, p. 25). Furthermore, removal of the gang's financial assets is a tactic that has been used to dismantle gangs by targeting the "financial lifeline" of the group (Finklea, 2010, p. 8).

As of early 2016, the FBI employed nearly 1,000 federal agents alongside 1,500 local and state personnel across more than 160 Violent Gang Safe Streets Task Forces (FBI, 2016). Between 2001 and 2011 they arrested over 50,000 individuals, effected nearly 30,000 indictments and over 5,000 gang disruptions, and generated over 23,000 convictions (FBI, 2011). These statistics tell us a great deal about the outputs of the gang task forces in terms of arrests and convictions, but little about whether these efforts resulted in a safer

community. Given the proclivity by which gang investigations and prosecutions are conducted, it is surprising that so few crime reduction evaluations of the impacts of these operations have been conducted. While some practitioners have attributed community crime reduction resulting from gang takedowns (e.g. Agnifilo *et al.*, 2006) these claims are rarely supported by robust empirical evidence nor involve independent evaluators. Federal task forces tend to prefer reporting amounts of drugs seized, significant arrests, and length of custodial sentences handed down to offenders, rather than any community outcomes resulting from operational activities.

In summary, previous evaluations of gang interventions have had some methodological constraints. Second, the interventions were predominantly implemented by city police departments with little or no access to the specific toolkit that the FBI and federal prosecutors could bring. When FBI task forces are involved, few evaluations have been conducted independently or that report community-level violence outcomes.

Operation Thumbs Down

Operation Thumbs Down targeted the Rollin' 30's Harlem Crips (hereafter Rollin' 30's), a set of the Crips who operate in the Los Angeles Police Department (LAPD) Southwest Division in South Los Angeles, California. The Rollin' 30's had been identified by the FBI's Safe Streets and Violent Crimes task force (Los Angeles office), an FBI-based and operated task force consisting of FBI agents and intelligence analysts, and local law enforcement officers (mostly LAPD). Investigators estimated that the Rollin' 30's were responsible for a "large portion" of the violence in the division. Once identified as a target, the task force conducted covert surveillance into the Rollin' 30's for more than 12 months, using investigative tools – including surveillance, wiretaps, and the use of proffer agreements – to build a case against key members of the organization's leadership as per the ETI. The investigation culminated into a takedown which took place on August 29, 2013. The intervention included the following legal actions:

- 23 federal indictments;
- 16 federal arrests on the date of the takedown;
- 24 federal and 2 state warrants issued;
- 4 probation/parole searches executed; and
- 18 state arrests on the date of the takedown.

Furthermore, other targets were either arrested by both federal and local authorities or turned themselves into authorities in the days immediately after the takedown. After the intervention, task force officers briefly initiated a limited number of community initiatives, including community outreach and neighborhood beautification. In all, 40 alleys were cleaned and trash was removed from the area by three graffiti removal crews, bulk trash removal, and weed removal teams. The team also organized a single "community resource day" which involved 40 organizations drawn from community and government groups, healthcare and behavioral health organizations. These agencies set up for part of a day and distributed information to local residents. On completion of these projects a few weeks after the takedown, the FBI task force turned their attention to other targets in other areas of the city.

Methodology

We used multiple years of part I crime data to establish the trend of crime over a period of time prior to the interdiction. Violent crime included all homicides, rapes, robberies, aggravated assaults, and arson. Using data for multiple years helped the statistical model better incorporate the multi-year trend into the pre-intervention time series. Like many

places in the USA, the crime rate was slowly decreasing in the years prior to the gang takedown. The LAPD provided data from January 2007 to October 2014, and this allowed for 80 pre-intervention analysis months, and 14 post-intervention months, with the intervention assessed for analytical purposes from September 1[1].

The target location consists of the Rollin' 30's known turf, as mapped by the LAPD. The Rollin' 30's gang territory runs from 9th Avenue to Normandie, and Jefferson to Martin Luther King, Jr, an area of about 1.91 square miles (see Figure 1). In order to assess immediate spatial crime displacement, and in collaboration with knowledge provided by local officers, an area of approximately two blocks was drawn around the target area. This distance is consistent with other research on crime displacement (Ratcliffe and Breen, 2011). The evaluation of the intervention included a control area that was identified by FBI Safe Streets and Violent Crimes task force members assigned from the LAPD. It was decided that the Rollin' 60's gang area was an appropriate control given its similarities to the Rollin' 30's area. This gang had not been targeted by the FBI task force, and they occupied a neighborhood far enough away from the Rollin' 30's that any actions taken against the Rollin' 30's were unlikely to impact the Rollin' 60's territory. According to LAPD data, the Rollin' 60's territory runs from Overhill to Hobart, and 52nd Street to 79th Street. Following Nunn *et al.* (2006), demographic data were compared for the two areas. Data collected through the American Community Survey were examined for variables representing race, young male population, household income and owner occupied home values, using the Alchemist Tool (Azavea, 2012). Census data indicate these two areas are very similar in terms of housing tenure, socio-economic status and family structure. Though the racial composition of each area is different, with the Rollin' 30's area having a mainly Hispanic population and the Rollin' 60's area having a predominantly Black population (see Table I),

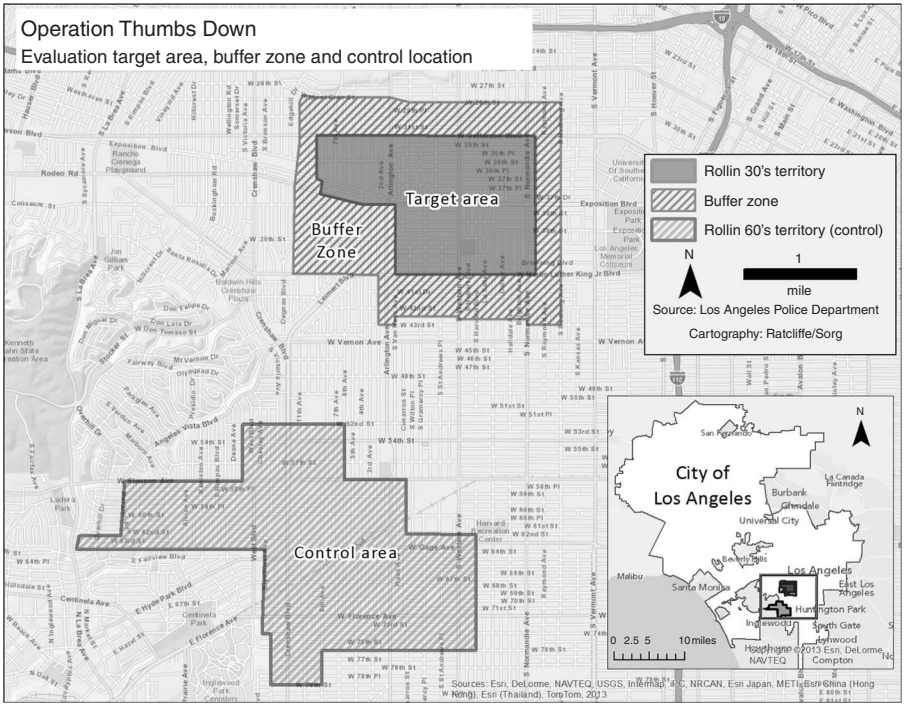

Figure 1.
Target and control areas, Operation Thumbs Down, South Central Los Angeles, CA

when pressed on this officers and leadership of the FBI Safe Streets and Violent Crimes task force reiterated that the impacts of each gang in terms of neighborhood crime were comparable. This approach of using non-contiguous control areas that have crime and socio-economic conditions similar to the target area is consistent with previous research designs (Papachristos *et al.*, 2007).

Time series methodology

The impact of the intervention was estimated using a diffusion-regression state-space model. These infer a causal effect of an intervention by generating a counterfactual prediction of the target area time series had no intervention occurred (Brodersen *et al.*, 2015). As Brodersen and colleagues explain, the process requires the creation of a counterfactual time series from candidate predictor variables that represents the unobserved values that would have occurred under null treatment conditions. The difference between the observed values and the projected counterfactual provides an indication of the impact of the intervention.

We adopted this approach for two reasons. First, while an ARIMA time series modeling approach is often considered satisfactory for longitudinal crime series research, and has been used by the criminology community previously (e.g. Bailey, 1998; Degenhardt *et al.*, 2005; Mazerolle *et al.*, 2007; Wells *et al.*, 2012), our data represent low-volume count data and ARIMA processes may be inappropriate for use with count data. Second, we sought an analytical approach that integrated the longitudinal time series from the control site into the analysis of the treatment location, rather than analyzing the control series independently as has been done in previous anti-gang evaluations (Bynum and Varano, 2003; Decker and Curry, 2003).

Regarding the issue of time series count data, while time series approaches such as ARIMA time series modeling (Box and Jenkins, 1976; Chatfield, 1989; McCleary and Hay, 1980) have been used to examine crime prevention interventions for a couple of decades, the underlying assumptions of ARIMA time series modeling create difficulties for analyses of count data. When attempting to model non-negative integer-valued data – as are found with crime counts for serious crimes that are often low frequency – ARIMA processes may be inappropriate given a key assumption of ARIMA time series modeling is an assumption of normality in the random shocks of the underlying error structures (Greenberg and Roush, 2009; Quddus, 2008).

In lieu of an ARIMA approach, we employed a process that is operationalized in a fully Bayesian time series estimation through the *CausalImpact* package available in the R statistical programming framework[2]. What follows is a brief summary of the approach but for more details see Brodersen *et al.* (2015). The constructed time series model is comprised of three main components. First, linear trends are modeled with local linear trends or generalized local linear trends, the latter being a coefficient that, importantly for time series data, exhibits first-order autoregressive variance. The second component is

Characteristic	Rollin 30s area percentages	Rollin 60s area percentages
Married couple households	34.8	29.4
Single person households	25.1	34.4
Owner occupied housing units	41.2	51.8
Males under 24 years old	17.7	16.2
Moved in before 2000	39.5	45.3
Black population	32.0	62.9
White population	18.2	17.1
Hispanic population	62.6	30.3
Household income less than $20,000	29.1	26.1
Household income less than $50,000	38.2	42.1

Table I.
Target and control area demographics

seasonality, applicable in our study with a 12-month seasonal cycle. The third and most important component is the use of contemporaneous covariates (modeled with static or dynamic coefficients) that are used to construct a counterfactual prediction. Control time series can account for variance components that are shared by the target time series, including the effects of unobserved influences that are not accounted for by the model. For example, by using a control area that is also a high crime gang area, we are able to control for any uniform implementation of a citywide anti-gang strategy as well as macro-level economic factors that are likely to affect both areas in a similar fashion. The approach operationalized in *CausalImpact* does not assume that all predictors will be appropriate and therefore examines the prior distributions of parameters in a "spike and slab" framework (Mitchell and Beauchamp, 1988). The *CausalImpact* package selects a combination of predictor series strictly in terms of how well they model the pre-treatment outcome time series, while using regularizing priors to balance goodness of fit and model complexity.

This method addresses the concerns regarding ARIMA modeling of low-volume crime data. It also integrates the longitudinal time series from the control site into the analysis of the treatment site, which was our second reason for adopting this approach.

Confirmation of the counterfactual candidate predictors

A key component of the Bayesian counterfactual process described above is the identification of appropriate contemporaneous predictors that are linearly regressed to the observed values to create the composite synthetic control series. As Abadie *et al.* (2010) point out, "Researchers often select comparison groups on the basis of subjective measures of affinity between affected and unaffected units" (p. 493). As described earlier, the control location was suggested by intelligence and case officers assigned to the operation, and their recommendation would definitely be considered subjective. The plot of monthly violent crime counts in the pre-intervention target (a) and control (b) areas indicates one significant area of concern (Figure 2). The difference in crime magnitude between the series is possibly explained by the difference in size of the two areas and can be controlled in the R package; however, both areas have a decreasing trend over time, and a concern is whether the two areas have significantly different linear trend parameters, as shown by the dotted line in Figure 2. If this were the case, then the control area violence count may not function as a suitable predictor of the target area count.

To confirm the appropriateness of the control area violent crime count, as well as the other time-varying covariates, as predictors of the pre-intervention time series (and thus their appropriateness as inputs to the counterfactual prediction), their relationship to the outcome variable was estimated with a two-level negative binomial regression. This was implemented in Stata 13.1 as follows. The response variable was the 80 monthly pre-intervention counts of violent crime in the target area, and predictors included a seasonality component (comprised of the monthly average temperature in downtown Los Angeles), a linear component (comprised of a centered linear time-varying covariate), a predictor variable (comprised on the number of days in the month), an exposure variable (comprised of the area in square miles of the target and control areas), and the control series from the monthly count of violent crime in the control area. Because the main concern is the linear trend, controlling for other variables, the linear trend was entered only at level one and allowed to be random across the treatment and control areas. Finally, a robust cluster variance estimator (the Huber/White/sandwich estimate of variance) was employed to improve standard error robustness to misspecification and (importantly for time-varying covariates) within-cluster correlation. The final combined model followed this specification:

$$\log\left(y_{tj}\right) = \log\left(area\right) + \beta_{0j} + \beta_1 + \beta_2 + \beta_{3j} + r_{tj} \quad (1)$$

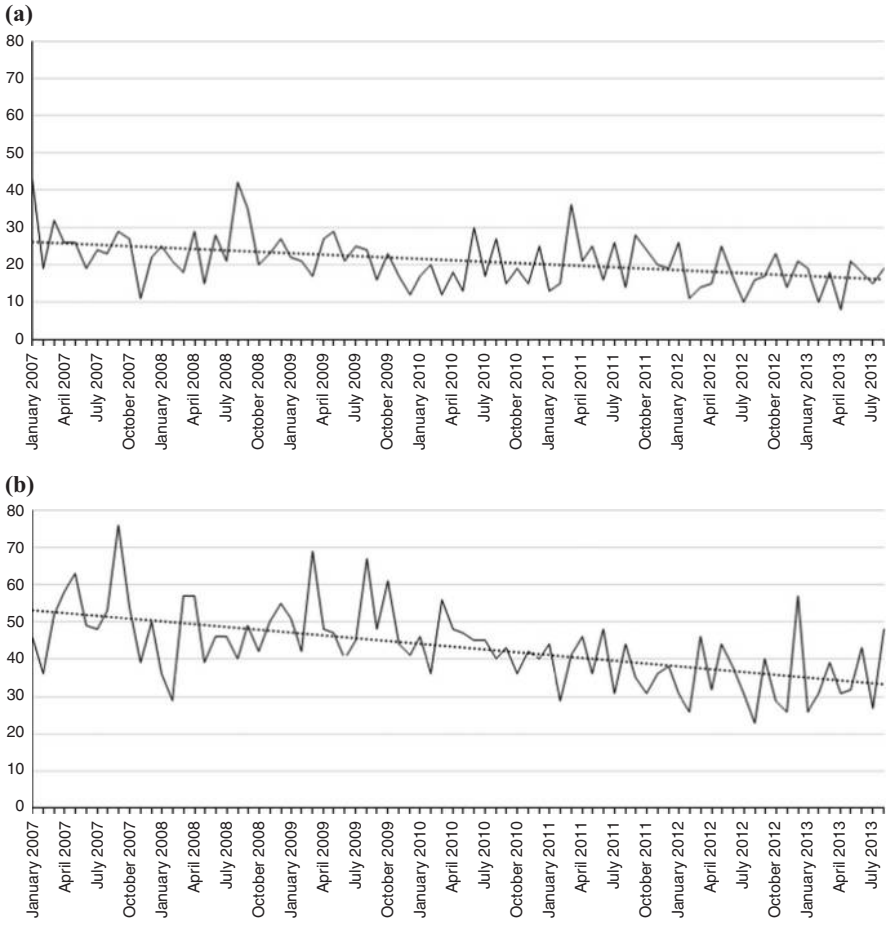

Figure 2.
(a) 80 month pre-intervention series for target area; and (b) control area, with linear trend shown as dotted line

where y_{tj} is the expected crime count for time t in area j, β_{0j} the crime count intercept in area j, β_1 the population slope coefficient for the average monthly temperature in Los Angeles in Fahrenheit, β_2 the population slope coefficient for the impact of how many days are in each month, β_{3j} the slope coefficient for the linear temporal trend in area j, log*(area)* an exposure variable comprising the area of the intervention or control site in square miles, and r_{tj} a level one random effect representing irreducible error. The model was estimated for two areas, the control area ($j = 0$) and the target area ($j = 1$).

The significance in the difference between the two regression coefficients for the linear trend variable was estimated using the formula described by Paternoster *et al.* (1998). Given the unexponentiated control area linear trend coefficient of −0.005952 (SE = 0.0009367) and target area trend coefficient of −0.0061029 (SE = 0.001165) it was determined that the linear trends for the two slopes do not differ significantly ($z = 0.10093$) and the control area is therefore a viable candidate predictor for the counterfactual. In other words, there is no significant difference in the slope coefficient for the proposed predictor candidate series (control area violent count). The fitted (i.e. expected) counts for the target (a) and control (b) areas are shown in Figure 3.

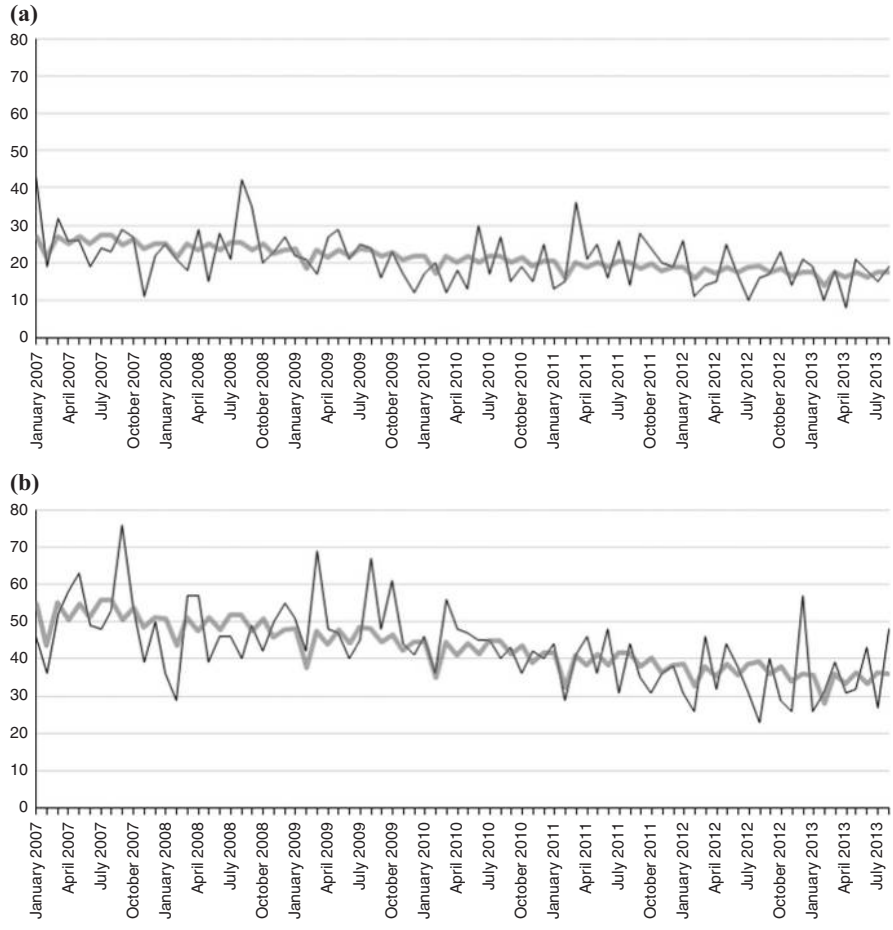

Figure 3.
(a) 80 month pre-intervention series for target area; and (b) control area, with expected counts shown as thick grey line

The *CausalImpact* package was run with a response variable comprising the monthly count of violent crimes in the target area, with two candidate predictors of the number of days in each month and the violent crime frequency in the control area. The model was structured to allow for linear trends and a seasonality parameter to reflect the impact of any yearly cyclical behavior on the observed response variable. The pre-intervention series started January 2007 to August 2013, post-intervention series from September 2013 to October 2014 (the last period for which data were available). This resulted in a pre-intervention series of 80 data points and a post-intervention series of 14 months.

Estimating displacement or diffusion of benefits

Displacement was evaluated by estimating the weighted displacement quotient (WDQ) (Bowers and Johnson, 2003), a ratio calculation that examines pre and post-intervention crime rate changes in the target and buffer/displacement area of a crime prevention operation with changes in a control site or sites acting as a denominator. The WDQ equation is shown as:

$$\mathrm{WDQ} = \frac{B_{t1}/C_{t1} - B_{t0}/C_{t0}}{A_{t1}/C_{t1} - A_{t0}/C_{t0}}$$

where A is the target area crime count, B the buffer area crime count, C the control area(s) crime count, and t_0 the pre-intervention period and t_1 the post-intervention time period. When WDQ values are greater than one, not only did crime reduce in the target area, but it also reduced even more in the buffer area, indicative of a diffusion of benefits (Clarke and Weisburd, 1994). Values between 0 and 1 indicate some diffusion of benefits as well as target area reduction. Values between 0 and −1 indicate some slight displacement. So while crime may have reduced in the target area, some of that crime displaced to the buffer area. Values near −1 indicate no benefit to the operation, and less than −1 suggests that any crime reduction in the target area was more than offset by greater crime increases in the displacement zone. The WDQ has been used for numerous crime prevention studies, including an evaluation of the impact of CCTV cameras (Ratcliffe *et al.*, 2009) and to estimate crime displacement from housing redevelopment (Cahill, 2011).

Results

Figure 4 shows at (a) the observed time series as a black line from January 2007 to October 2014, and a gray line indicating the fitted line from the model (gray). A vertical dashed line indicates when the intervention took place. The lower graph at (b) has a black line indicating the cumulative crime reduction estimated from comparison of the observed time series with the counterfactual calculated by the R package. The shaded area indicates expanding 95 percent confidence intervals. As is expected with time series predictions, the confidence intervals widen as time from the intervention increases. A small vertical arrow at June 2014 indicates the point where the 95 percent level confidence estimate for the cumulative impact line crosses the y-axis at 0. At this point caution dictates that we no longer consider the intervention has a statistically significant intervention, even though the cumulative reduction in crime continues.

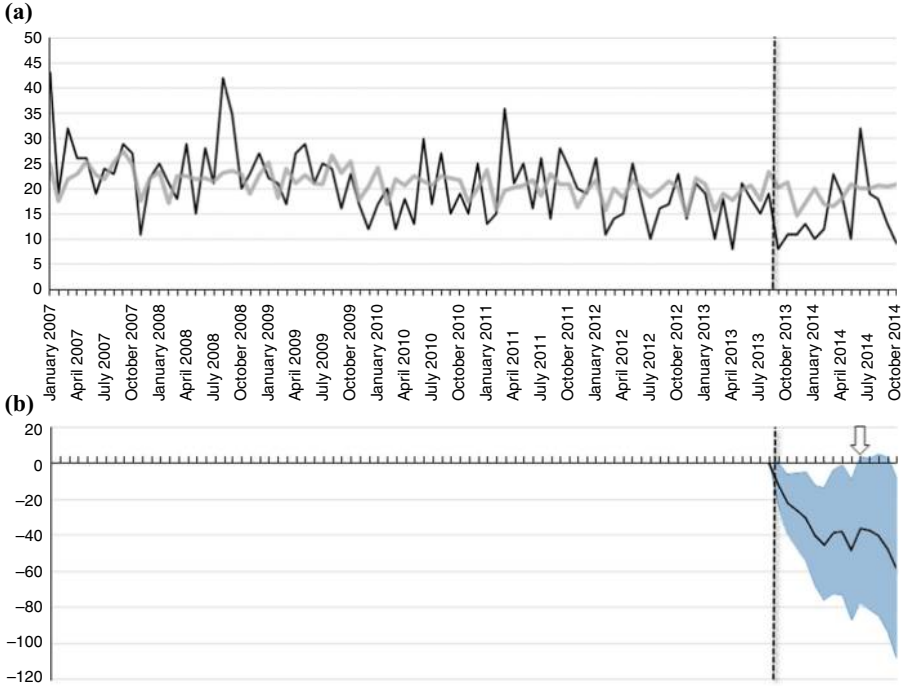

Figure 4.
(a) Observed time series (black line) with fitted series (grey line); (b) cumulative crime reduction (black line) with 95 percent confidence intervals

Examining the cumulative crime reduction across the entire series (to October 2014), this translates to an average monthly crime reduction of 4.2 crime per month (SD = 1.8) equivalent to a relative effect of a 22 percent crime reduction, with a Bayesian posterior tail-area probability $p = 0.006$, that strongly supports the inference that the observed crime reduction was statistically significant, at least until June 2014.

With regard to concerns regarding displacement, the crime reduction in the target area outperformed the crime reduction in the control area, but interestingly the buffer area crime reduction outperformed both the target and control areas. The WDQ value of 2.379 indicates that the diffusion of benefits to the buffer area reduced crime in the buffer area to a greater extent than the volume of crime that decreased in the target zone.

Discussion

The results indicate a statistically significant reduction in violence of a little more than four violent crimes per month in the gang area, translating to a 22 percent reduction. The displacement analysis found that there was a diffusion of benefits to the streets outside the target area. That being said, there are some caveats to consider. The LA County Sheriff's office had been running a burglary task force in the wider South Central LA area prior to the intervention. Their operation could have created pressure on Rollin' 30's gang members, thus reducing the overall measurable impact of Operation Thumbs Down. It is also possible that their work was more diluted and had little measurable effect. It is difficult to estimate the role of the burglary task force on the Rollin' 30's area. Our discussions around this issue with gang task force members and leaders suggested that they felt the burglary task force had no effect on rates of gang criminality and area violence.

Second, we are unable to disentangle the impact of the takedown from the brief social service interventions that took place immediately afterwards. We do, however, posit that is it unlikely that the clean-up of some alleyways and a community resource day would result in the 22 percent violence reduction that occurred from September 2013 to at least June 2014. The crime reduction is more consistent with the theory of the FBI's ETI approach that seeks dismantlement of a gang in order to effect a long-term reduction in violence. In our study, we were only able to detect a measurable effect until June 2014. At this point we cannot say that the operational impact remained statistically significant, though the cumulative impact certainly continues (see Figure 4). This is a statistical limitation of time series analysis rather than a definitive statement of the limit of the operational benefit.

Our study has employed a new methodology to examine a crime reduction intervention, but are there any benefits beyond novelty? We argue here that the *CausalImpact* approach has a significant advantage over more traditional ARIMA modeling in that the limit of the longitudinal extent of the intervention can be estimated by changes in confidence intervals. Traditionally, the decay of a temporary intervention (a pulse) was estimated in time series analysis by simply observing the time series or by hypothesis from a relevant theory, and then building dummy variables to model the estimated effect; however, frequently "there is little guidance from the relevant theory, or from trying to imagine the likely effects of an intervention using common sense" (Pankratz, 1991, p. 268). Tentative models can be estimated and tested using methods such as a Koyck lag but these have limitations, in part, because the lagged dependent variable used as a regressor is not entirely exogenous (Lagarias, 1991; Roodman, 2009). The *CausalImpact* approach we adopt that limits the estimated longitudinal impact of the intervention through interpretation of confidence intervals does not require the trial and error of estimating a pre-determined transfer function.

Claims of causality are difficult to sustain in the absence of a natural or randomized experiment, and "no amount of econometric or statistical modeling can make the move from correlation to causation persuasive" (Sekhon, 2009, p. 503). Moreover, like other real-world studies have discovered there is a challenge disentangling the broader deterrence effects from the selective incapacitation of key gang members (McGarrell *et al.*, 2006). However, if the FBI operation had an effect, how was it effective? The FBI's ETI, while central to FBI gang violence reduction, has come under little external scrutiny until now. The mechanisms by which the theory might be effective are largely opaque, beyond the stated desire of dismantling a gang entirely. One possibility is that a task force comprising members of different agencies allows for a more holistic view of the gang problem because they facilitate information sharing between agencies. With more information, task forces may be better positioned to define the necessary intervention type because they can compare gang intelligence from multiple agencies, and better identify the key leaders in the criminal organization. Studies suggest that regional information sharing networks increase law enforcement officers' abilities to make arrests, clear cases, develop investigative leads and locate persons of interest (Scott, 2006; Zaworski, 2005).

If gang members are incarcerated for many years, what would cause a return to street violence in a shorter time period? Some gang researchers argue that holistic initiatives that are designed to change the community itself are the best way to address gang violence (Klein, 2004; Spergel, 2007). Spergel (2007) emphasizes that the goal of one project was not to eliminate gangs, but simply reduce youth violence (p. 25). Similarly, Klein (2004) argues "You break up a gang not by busting its leaders, but by working on its group processes and its neighborhood context" (p. 111). In other words, the causal mechanism linking gangs and crime may not be strictly at the individual level. By only addressing individual gang members, it is possible that Operation Thumbs Down did not get at the root of the gang problem, thus explaining why the positive effects of the intervention were temporary – at least from a statistical perspective.

An alternative view might argue that the effect of the takedown decayed because the police did not go back into the community and continuously "weed out" resurgent or new gang members that became active after the takedown. It is possible that any remaining gang members not caught up in the FBI sweep reconfigured the gang and its leadership, or other offenders filled the void by moving in to take advantage of the criminal opportunities in the area.

The primary difference between these two perspectives is the causal mechanism linking gangs to crime. The first supports some degree of sociological holism, the notion that the gang dynamic is operating "above the level of individuals" (Taylor, 2015, p. 17). The second supports methodological individualism, which argues that "individuals form the bedrock […] in any sociological analysis" (Taylor, 2015, p. 17). In other words, a strict interpretation of these perspectives would suggest you either have to target communities (methodological holism) or individuals (methodological individualism).

What is more likely, however, is that both dynamics are operating simultaneously. If so, gang interventions that target the most prominent and influential members of a gang could be supplemented with targeted community focus interventions to alleviate some of the conditions that allow gangs to thrive, as was attempted with Operation Thumbs Down. Unfortunately without pre-post community surveys, it is hard to assess the added value of the community interventions undertaken after the Los Angeles operation. Future research would benefit from greater access to federally-led initiatives such as Operation Thumbs Down, especially in the pre-intervention period. Replication of this study, through evaluation of other ATF or FBI-led takedowns would add to our knowledge regarding the effectiveness of gang task forces and the longevity of any community benefits. Application of experimental methods and the development of

pre-post community survey instruments could supplement the quasi-experimental methods used in this study to better disentangle the relative benefits of law enforcement interdiction and attention to community structure.

Notes

1. Our access to data was limited by the police commander for the area granting a one-time download with no commitment to further data; hence, the limited number of post-intervention months available for the evaluation.
2. CausalImpact 1.0.3, http://google.github.io/CausalImpact/

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