Community Engagement for Crime Reduction:

An Impact Evaluation of the East Palo Alto Police Department's Fitness Improvement Training Zone Program

A Study Conducted for the
Chief Justice Earl Warren Institute on Law & Social Policy,
University of California, Berkeley

by

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The author conducted this study as part of the program of professional education at the Goldman School of Public Policy, University of California at Berkeley. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author, and are not necessarily endorsed by the Goldman School of Public Policy, by the University of California or by any other agency.

EXECUTIVE SUMMARY

The City of East Palo Alto, California, a community of 28,155 residents spanning just 2.5 square miles, has long experienced high concentrations of crime, especially violent crime.[1] In 2012, East Palo Alto had the 13th highest rate of violent crime out of all California cities.[2] Between 2009 and 2013, nearly 9,000 shooting incidents were recorded by the city, for an average of 4.9 shooting incidents each day.[3] In addition to high rates of crime, the residents of East Palo Alto also have poor health outcomes along a range of measures when compared to other cities and counties across California. Half of all children in East Palo Alto are overweight or obese, relative to 34 percent across San Mateo County, where East Palo Alto is located, and the average age of death is 61.8—13.2 years lower than the countywide average.[4]

Responding to the twin health and public safety needs of neighborhoods in East Palo Alto, in 2011, the East Palo Alto Police Department developed the *Fitness Improvement Training Zone Program*, an anti-violence program that utilizes public health strategies to reduce violence in neighborhoods affected by high levels of violent crime. The FIT Zone program aims to reduce shootings, increase fitness and healthy eating habits of residents, and improve police-community relations in two high-crime neighborhoods in East Palo Alto—referred to here as the Jack Farrell and Martin Luther King sites.

As a part of a larger evaluation conducted by the Chief Justice Earl Warren Institute on Law and Social Policy, this study examines the impact of the FIT Zone program on shooting incidents in East Palo Alto, and looks at how the FIT Zone program affected the distribution of shootings across space and time. Using data from the ShotSpotter acoustic gunshot detection system, this

[1] US Census Bureau State & County QuickFacts
[2] Federal Bureau of Investigation. (2012). *Crime in the United States, 2012.* Available at: http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/
[3] ShotSpotter activation data for single, multiple or possible gunshot incidents, Jan 1, 2009-Dec 31, 2013, provided by the Warren Institute.
[4] Haynie, D. L., Petts, R.J., Maimon, D. and Piquero, A. R. (2009). Exposure to Violence in Adolescence and Precocious Role Exits. *Journal of Youth and Adolescence* 38(3), 269-86; Margolin, G. and Gordis, E. (2000). The Effects of Family and Community Violence on Children. *Annual Review of Psychology* 51, 445-79.

study examined change in shootings before and after the FIT Zone program began in August 2012, comparing the two FIT Zone sites, their immediate surroundings, and a control site.

FINDINGS

DID THE FIT ZONE PROGRAM REDUCE SHOOTING?

The evaluation of the impact of the FIT Zone program on shooting volume yielded mixed results. Overall, a small, marginally significant reduction in shooting was observed in the FIT Zone sites. This effect was driven entirely by a reduction in shootings in the Jack Farrell FIT Zone site. The Martin Luther King FIT Zone site did not show a significant change in the volume of shooting.

DID THE FIT ZONE PROGRAM CHANGE WHERE SHOOTINGS OCCURRED?

The evaluation of the whether the FIT Zone program changed the spatial distribution of shooting incidents also yielded mixed evidence: in the Jack Farrell site, evidence of a diffusion of crime control benefits—a reduction in shooting in two immediate surrounding buffers—was found. In the Martin Luther King site, there is evidence of an increase in shooting incidents in the area 500 ft. surrounding the FIT zone site in the year after implementation of the intervention. Because no change was found inside the Martin Luther King site, the increase in shooting around the site is not likely to be a displacement effect.

DID THE FIT ZONE PROGRAM CHANGE WHEN SHOOTINGS OCCURRED?

This evaluation found no significant change in the amount of shootings in the FIT Zone areas by time of day or day of week, relative to the control area, after the FIT Zone program began. Estimates of the impact of being a FIT Zone gathering day compared with a day where no gathering was held found no significant impact on average daily shootings.

IMPLICATIONS

The findings in this evaluation point to both the promise of the FIT Zone Program to impact public safety as well as the potential differences in program implementation, and in social and physical characteristics of the two neighborhoods. Differences in how the FIT Zone program was implemented in each site may account for the disparity found in shooting reduction in the two areas. The study found that the Jack Farrell site held more FIT Zone activities and had consistently higher rates of resident participation over the course of the study than the Martin Luther King site. This may be due to differences in the physical attributes of the FIT Zone sites in terms of location, visibility, and ease of access to the activity areas, as well as to potential differences in the levels and types of outreach conducted in the two neighborhoods. Finally, the underlying social dynamics, including residents' willingness to intervene in criminal activity or conflict and pre-existing police-community relationships, may differ in the two neighborhoods and may have contributed to differential impact of the intervention.

The FIT Zone program holds great promise for community-driven public safety initiatives, and as shown here, may result in lower rates of shooting. Future FIT Zone interventions should take care to examine the underlying physical and social drivers of criminal activity in a potential intervention location, choose the location of the interventions with an eye toward visibility and community access, and closely monitor how community behavior in public spaces and with the police change over time.

ACKNOWLEDGEMENTS

I would like to express my gratitude to Professor Steve Raphael, my research supervisor, for his enthusiastic encouragement and useful critiques of this work. I would also like to thank Sarah Lawrence for her knowledge, advice and valuable support over the course of this project. My grateful thanks are also extended to staff at the East Palo Alto Police Department and San Mateo County Office of Public Safety Communications for their assistance in data gathering. Finally, I would like to thank Kristen Burzynski for her editing prowess and unwavering support throughout this project.

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PART I. INTRODUCTION & EVALUATION CONTEXT

In 2012, a collaborative public health and public safety intervention was launched in two high crime areas in East Palo Alto, California. The program, known as the *Fitness Improvement Training ("FIT") Zone Program*, aims to address two pressing issues confronting residents of East Palo Alto: high levels of crime and gunfire, high rates of chronic health conditions, and poor fitness and eating habits.

East Palo Alto, a small city of just 28,155 residents spanning just 2.5 square miles, has long experienced high concentrations of crime, especially violent crime.[5] In 2012, East Palo Alto had the 13th highest rate of violent crime out of all California cities.[6] Between 2009 and 2012, over 8,000 shooting incidents were recorded by the city, for an average of 5.5 shooting incidents each day.[7] Direct and indirect exposure to violence has been associated with a host of negative health and social outcomes, including depression, anxiety, and suicide, as well as truancy, increased sexual activity, and criminal behaviors.[8] Exposure to violence may also exacerbate existing health issues. High levels of crime can increase residents' fear of crime and violent victimization, which may inhibit outdoor physical activities, such as walking, jogging or bicycling.[9]

In addition to exposure to crime and criminal victimization, the residents of East Palo Alto also have poor health outcomes along a range of measures when compared to other cities and

[5] US Census Bureau State & County QuickFacts
[6] Federal Bureau of Investigation. (2012). *Crime in the United States, 2012.* Available at: http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/
[7] ShotSpotter activation data for single, multiple or possible gunshot incidents, Jan 1, 2009-Dec 31, 2012, provided by the Warren Institute.
[8] Haynie, D. L., Petts, R.J., Maimon, D. and Piquero, A. R. (2009). Exposure to Violence in Adolescence and Precocious Role Exits. *Journal of Youth and Adolescence* 38(3), 269-86; Margolin, G. and Gordis, E. (2000). The Effects of Family and Community Violence on Children. *Annual Review of Psychology* 51, 445-79.
[9] Sampson, Robert J., Jeffrey Morenoff, and Thomas Gannon-Rowley. (2002) "Assessing Neighborhood Effects: Social Processes and New Directions in Research," Annual Review of Sociology, v28: 443-478.

counties across California. Half of all children in East Palo Alto are overweight or obese, relative to 34 percent across San Mateo County, where East Palo Alto is located, and the average age at death is 61.8—13.2 years lower than the countywide average.[10] The reasons for this are numerous: almost one-fifth (18%) of residents live below the Federal Poverty Level ("FPL"), and nearly half (48%) earn less than 185 percent of the FPL.[11] Over 80 percent of residents in East Palo Alto are Hispanic or Black, and 70 percent speak a language other than English at home.[12] Health research has established that these populations are at a higher risk of developing diet or lifestyle-related diseases, such as obesity and diabetes.[13]

Responding to twin health and public safety needs of neighborhoods in East Palo Alto, in 2011, the East Palo Alto Police Department ("EPAPD") began to develop an anti-violence program that utilizes public health strategies to reduce violence in neighborhoods affected by high levels of violent crime. The FIT Zone program aims to improve public safety in high-crime areas, to increase healthy behavior of residents living in high-crime areas, and to improve police-community relations. To address those needs, a series of fitness, health, and community-building activities were launched in two high-crime areas in East Palo Alto. The EPAPD began the initiative in March 2012 in collaboration with the California Endowment, the San Mateo County Health System, the Ravenswood Family Health Center, the Ravenswood School District, and the Chief Justice Earl Warren Institute on Law and Social Policy ("Warren Institute"). The FIT Zone program was formally launched in August 2012.

As part of a larger evaluation effort conducted by the Warren Institute, I was asked to study the public safety impact of the FIT Zone program. Specifically, this study examined the impact of

[10] Babey, S. H., et al. (2011). A patchwork of progress: Changes in overweight and obesity among California 5th-, 7th-, and 9th-graders, 2005-2010. UCLA Center for Health Policy Research and California Center for Public Health Advocacy
[11] U.S. Census Bureau: State and County QuickFacts, East Palo Alto.
[12] Ibid.
[13] Diamant, A., Babey, S.H., Wolstein, J. and Jones, M. August 2010, "Obesity and Diabetes: Two Growing Epidemics in California," UCLA Center for Health Policy Research.

the FIT Zone program on the levels of shooting in the intervention areas. Stakeholders were also interested in whether and to what degree the FIT Zone program resulted in the displacement of criminal activity either across space (e.g., around the corner) or over time.

STRUCTURE OF THE REPORT

The remainder of this report will detail the FIT Zone intervention, describe the methodology and data used to evaluate the program, and explain the results of the impact evaluation. Part II describes the FIT Zone program history and components. Part III discusses the evaluation purpose, scope, and methodologies. Part IV describes the results of the analytic approaches, and Part V discusses the implications of the findings for the FIT Zone intervention.

PART II. PROGRAM BACKGROUND

In 2011, the East Palo Alto Police Department received a "mini-grant" from The California Endowment to design an anti-violence intervention using public health strategies in East Palo Alto. Under the leadership of Chief Ronald Davis, the EPAPD developed a public health and public safety initiative, entitled Fitness Improvement Training ("FIT") Zone Program, comprised of a range of targeted health and fitness activities, community engagement and stakeholder collaboration components. In March 2012, the EPAPD received a one-year grant from the California Endowment to build partnerships, engage residents, implement the program and assess performance measures. The intervention was officially launched in two sites in East Palo Alto in August 2012, and is ongoing as of the date of this report.

PROGRAM GOALS & THEORY

The FIT Zone program targets two related issues in East Palo Alto: high rates of shooting violence and poor health among residents. The links between victimization and poor health outcomes are well-documented. Direct exposure to violence has been associated with a host of negative health and social outcomes, including depression, anxiety, Post Traumatic Stress Disorder ("PTSD"), and suicide, as well as truancy, increased sexual activity, and engagement in criminal behaviors.[14] Indirect exposure to violence, such as living in a community with high rates of homicide and other violent crime, has also been associated with negative health outcomes, including heightened levels of stress, anxiety, low birth weight, and PTSD. Exposure to violence may also exacerbate existing health issues. High levels of crime can increase residents' fear of crime and violent victimization, which may inhibit outdoor physical activities, such as walking, jogging or bicycling.[15]

[14] Haynie, Dana L., Richard J. Petts, David Maimon, and Alex R. Piquero. (2009) "Exposure to Violence in Adolescence and Precocious Role Exits." Journal of Youth and Adolescence 38(3):269-86; Margolin, Gayla and Elana B. Gordis. (2000) "The Effects of Family and Community Violence on Children." Annual Review of Psychology 51:445-79.

[15] Sampson, Robert J., Jeffrey Morenoff, and Thomas Gannon-Rowley. (2002) "Assessing Neighborhood Effects: Social Processes and New Directions in Research," Annual Review of Sociology, v28: 443-478.

The FIT Zone program has three main goals: (i) to reduce shootings in targeted neighborhoods; (ii) to increase healthy behavior of residents living in high-crime areas; and (iii) to improve police-community relations and bolster police legitimacy. In the long-term, the program aims to change collective, or community, norms around health and fitness. Through a review of program documents, and interviews with program staff, a logic model was developed to delineate the program's theory of change (see Appendix A). Underlying the program model are several assumptions about *how* the FIT Zone intervention should yield a decline in shooting activity:

(1) The regular presence of sworn and civilian staff from the East Palo Alto Police Department in the FIT Zone sites will lead to a reduction in crime;
(2) The FIT Zone program will increase in outdoor physical activity by residents inside the FIT Zone areas. Increased visibility and pro-social interaction among community members in public spaces will lead to an increased presence of "capable guardians" over those spaces (i.e., persons may be able to intervene in or deter crime) and lead to a reduction in crime.

PROGRAM MODEL

The FIT Zone program has four primary components: (i) planning and governance, (ii) community engagement and outreach, (iii) fitness and health interventions, and (iv) evaluation. The FIT Zone program is a neighborhood-level intervention, targeted specifically at all residents living in areas characterized by high rates of crime and shooting. The intervention sites will be discussed in detail in the following section (see Intervention Sites).

Planning and Governance

Project governance in the first year of the FIT Zone project was comprised of three components: (i) an Executive Committee, (ii) two Community Steering Committees, and (iii) project management by the Police Department. The Executive Committee was formed to oversee and guide the direction of the project and monitor its progress, and is comprised of a diverse set of stakeholders from East Palo Alto, including representatives from the school district, an elected

official, leaders of community-based organizations, and a representative from the faith-based community. Two Steering Committees were formed, each overseeing one of the FIT Zone intervention sites, responsible for determining which fitness, health and educational activities take place at each site. Day-to-day management of the project is primarily conducted by the Police Department, who is responsible for planning and coordinating the committees and program activities. This structure was used for the first year of the program, but as the program has progressed, the governing structure has become more fluid—the EPAPD has begun to transition ownership of the program from the Department to community members.

Community Engagement & Outreach

A key focus of the FIT Zone program is engagement across a diverse range of community stakeholders in order to achieve the program's goal of improving police-community relations and bolstering police legitimacy. Partnerships and shared governance of the FIT Zone program between the Police Department and a range of community-based organizations and community leaders comprise the first component of community engagement. The second component is outreach and engagement with residents in the two targeted neighborhoods. To inform community members of the program, Police Department staff conducted presentations at community beat meetings, distributed pamphlets and informational flyers in both English and Spanish within each targeted site, and conducted door-to-door outreach activities within the boundaries of each neighborhood (see Figures 1 and 2). Outreach activities began prior to the official launch of the program activities in August 2012, as well as during the first several months of program implementation. Police Department staff also met with community-based organizations, schools, faith-based organizations and other groups operated in the two neighborhoods.[16]

Intervention Activities

In order to increase fitness and healthy eating habits of targeted neighborhoods, at each FIT Zone site, fitness activities and health education activities are conducted on a once- or twice-

[16] No systematic data was available on the type and frequency of outreach activities.

weekly basis. FIT Zone gatherings are typically held in the late afternoon or early evening and last between 1 and 1.5 hours. To implement these activities, the EPAPD purchased bicycles and helmets for children, bicycles and Segways for Police Officers, and exercise equipment. The Ravenswood Community Health Center hired Health Navigators to conduct health lectures on a range of diet, lifestyle and wellness topics. In the early weeks of implementation, four to five uniformed Police Officers were present at each FIT Zone gathering in the two hot spots. After several months of implementation, the number of Police Officers present at each gathering was reduced to two. In addition to the sworn officers, one to three civilian staff members from the EPAPD were also present at each FIT Zone gathering.

Evaluation

The Warren Institute was contracted by the EPAPD to conduct formative evaluation, examining changes in shootings and crime in the target neighborhoods; measuring residents' levels of physical activity, fear of crime, and relationships with police; and evaluating resident attitudes and participation in FIT Zone activities.

INTERVENTION SITES

In order to identify sites for the FIT Zone interventions, the EPAPD partnered with an epidemiologist at the San Mateo County Health System in early 2012 to locate shooting hot spots using the ShotSpotter acoustic gunshot location detection system. Using gunshot density analyses, researchers identified two areas, or "hot spots," in East Palo Alto with stable and consistently high spatial clustering of shootings over a three-year period prior to the beginning of the intervention. Within each targeted hot spot, project leaders selected two locations, one outdoor space and one indoor space, in which to conduct fitness and health activities. Outside of the FIT Zone activity locations, outreach by the EPAPD was conducted within the confines of each hot spot. Below is a description of each hot spot and FIT Zone activity space.

HOT SPOT 1

Located in the northern part of East Palo Alto, Hot Spot 1 is bordered by University Avenue to the west, Purdue Avenue to the north, Pulgas Avenue to the east and weeks Street to the South. These borders served as the boundaries for outreach activities within Hot Spot 1.Within these lines, the EPAPD identified Jack Farrell Park as the location for the FIT Zone intervention activities for Hot Spot 1. The park, outlined in green in Figure 1, has a baseball diamond, a large open field area, a playground structure and a walking path. An alternate location for indoor activities, Costano Elementary School, is shown in light pink in Figure 1.

Jack Farrell Park has two entrances—one on the north side of the park through the cul-de-sac on Gonzaga Street, and the entire west side of the park that opens on to Fordham Street. The park itself is visible to passersby on both Fordham Street and at the end of Gonzaga Street. The park and school are surrounded by residential areas, comprised primarily of single-family homes.

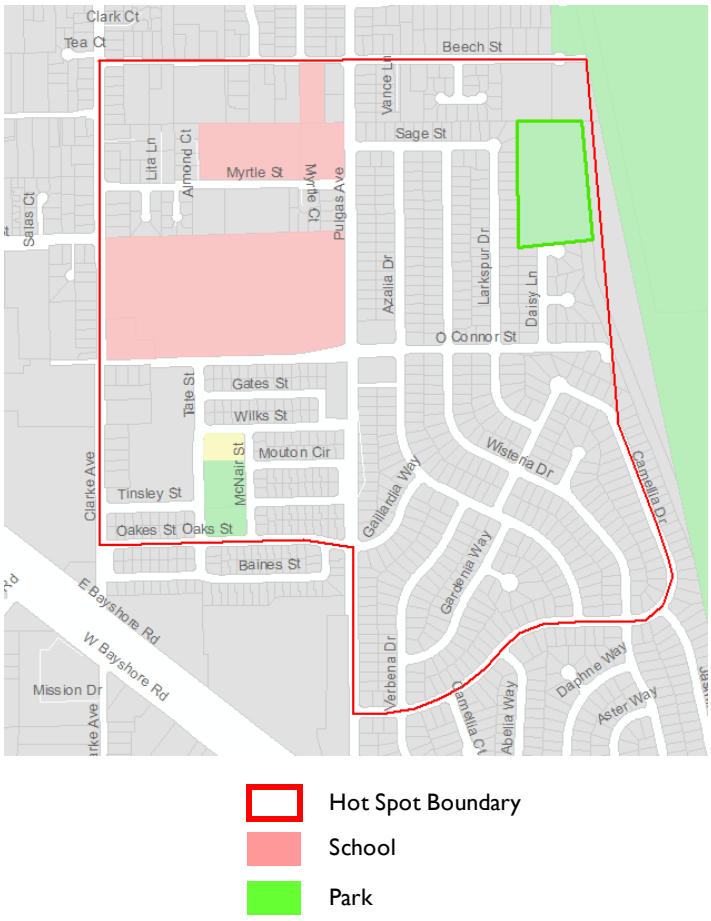
FIGURE 1. HOT SPOT 1 - JACK FARRELL

HOT SPOT 2

The second hot spot targeted by the FIT Zone intervention is located along the southern edge of East Palo Alto, and is centered around two schools and Martin Luther King Park. Hot Spot 2 is framed by Beech Street to the north, Clark Avenue to the west, Oakes and Camelia Streets to the South, and by the Ravenswood Open Space Preserve to the east. Within these boundaries, the EPAPD selected Martin Luther King Park, outlined in green in Figure 2, as the FIT Zone intervention location. The park is equipped with a baseball diamond, a basketball hoop, a soccer

field, a barbeque and seating area and a path that leads into the Ravenswood Open Space Preserve. McNair Middle School located on Pulgas Ave and O'Connor Street, shown in light pink, serves as the alternate location for indoor activities. Martin Luther King Park is located at the end of a cul-de-sac on Daisy Lane, and has no other entrances accessible by car. The park is only visible from the Ravenswood Open Space Preserve, which borders the San Francisco Bay, and the end of Daisy Lane. There are no entrances to the north or west of the park.

FIGURE 2. HOT SPOT 2 - MARTIN LUTHER KING



INTERVENTION ACTIVITIES AT EACH SITE

The FIT Zone program consists of two main types of interventions: (i) fitness activities, led in collaboration between officers from the EPAPD and resident volunteers, and (ii) health and safety lectures, conducted by Health Navigators who work for the Ravenswood Family Health Center. Fitness activities include walking tours, bicycling, Zumba, yoga, field sports, volleyball and others. For the intervention, the EPAPD purchased two Segways and four Police bicycles, 31 bicycles for participants, helmets and safety vests, and nets, balls, mats and other equipment for the fitness activities. Health education talks cover topics such as bicycle safety, healthy eating and cooking, diabetes, the dangers of sugary drinks, and female health, among others. In both sites, bicycling and field sports were the most common fitness activities, and healthy eating and cooking lectures were the most common educational talk. Program activity data collected by the EPAPD provided a description of activities and participation at each FIT Zone

gathering. Tables 1 and 2 below shows the frequency of fitness activities and health lecture topics; a single FIT Zone gathering can have several activity types.

TABLE 1. EXERCISE ACTIVITY TYPE BY FIT ZONE SITE, AUGUST 2012-DECEMBER 2013

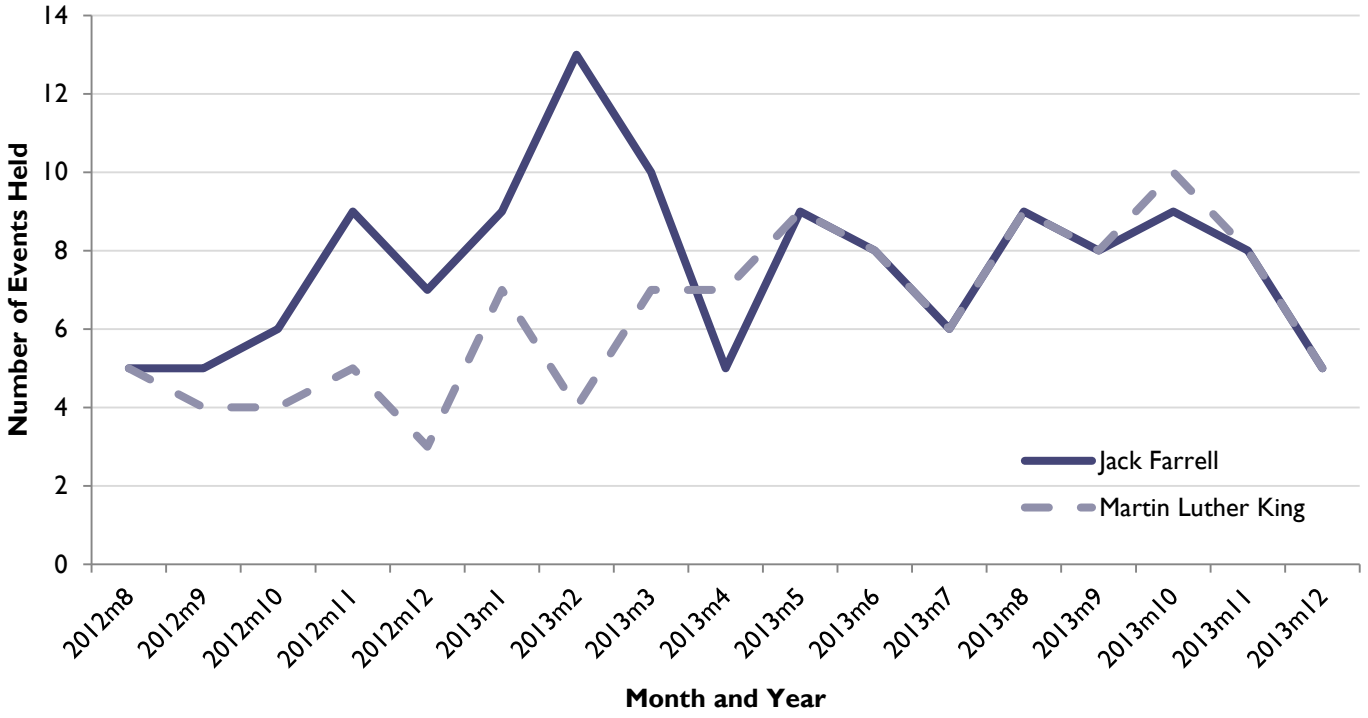
Exercise Activity Type	FIT Zone Site		
	Jack Farrell	Martin Luther King	Total
Field Sports	53	57	110
Bike	55	41	96
Volleyball	22	14	36
Walking	7	9	16
Indoor Sports	10	0	10
Zumba	7	2	9
Yoga	5	2	7
Kickball	1	1	2
Total	**160**	**126**	**286**

TABLE 2. HEALTH LECTURE TOPICS BY FIT ZONE SITE, AUGUST 2012-DECEMBER 2013

Lecture Topic	FIT Zone Site		
	Jack Farrell	Martin Luther King	Total
Healthy Eating and Cooking	11	10	21
Other	12	6	18
BMI, Cholesterol, Diabetes	5	6	11
Sugar and Energy Drinks	4	3	7
Female Health	4	2	6
Stress	2	2	4
Safety	3	0	3
Total	**41**	**29**	**70**

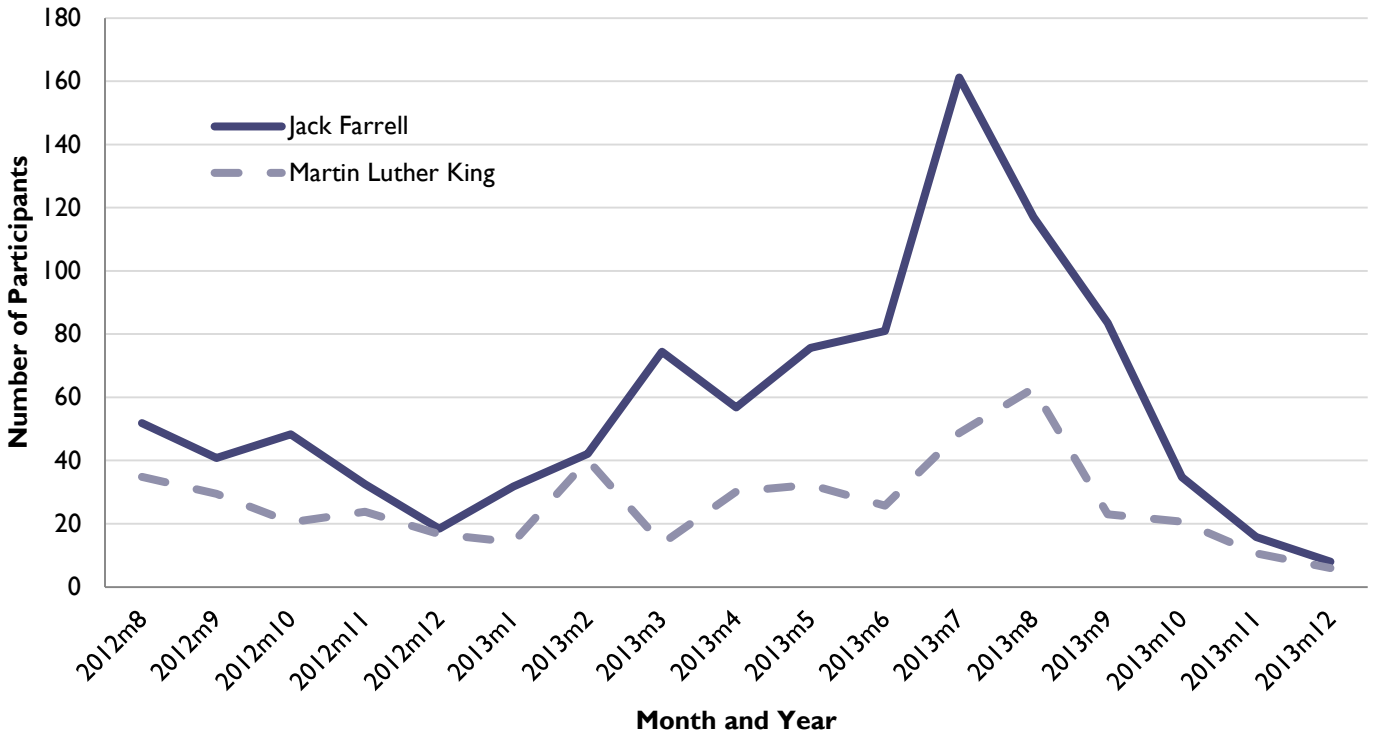
Between August 2012 and December 2013, 160 FIT Zone gatherings were held at the Jack Farrell site and 126 gatherings were held at the Martin Luther King site. Implementation of the FIT activities differed by site: time series analysis of program activity data found that more FIT gatherings were held at the Jack Farrell site than at the MLK site in first eight months of implementation. By May 2013, the tenth month of implementation, monthly levels of FIT Zone gatherings equalized across the two FIT Zone sites (see Figure 3).

FIGURE 3. NUMBER OF FIT ZONE GATHERINGS BY MONTH AND FIT ZONE SITE



Resident participation at FIT Zone gatherings also differed by intervention site. At the Jack Farrell site (Hot Spot 1), the average number of residents participating each month between August 2012 and December 2013 was 58, compared with an average of 27 participants at the Martin Luther King site. Figure 4 displays the average number of participants per month at each site.

FIGURE 4. AVERAGE NUMBER OF PARTICIPANTS BY MONTH AND FIT ZONE SITE



PART III. EVALUATION PURPOSE, SCOPE AND METHODOLOGY

The purpose of this evaluation, as part of a larger study, was to address the impact of FIT Zone program on public safety. This study aimed to answer three key research questions:

1. To what degree has the EPAPD's FIT Zone program affected shooting activity in East Palo Alto?
2. To what degree has the EPAPD's FIT Zone program affected the *spatial* distribution of shooting activity in East Palo Alto?
3. To what degree has the EPAPD's FIT Zone program affected the *temporal* distribution of shooting activity in East Palo Alto?

DATA SOURCES

QUANTITATIVE DATA

The study utilized two main sources of quantitative data: (i) ShotSpotter gunshot location detection system data, and (ii) FIT Zone activity data.[17] Additional data on street, city and parcel boundaries was obtained from San Mateo County GIS[18] and the Census Bureau.

GUNSHOT LOCATION DATA

ShotSpotter ("SST") is an acoustic gunshot location detection location system, which was piloted in part of the City of East Palo Alto in 2007, and launched citywide in 2009. Acoustic sensors were installed across the City, which are activated by a range of noise events, including gunshots, firecrackers, and cars backfiring. In order for an activation to be recorded and its location to be triangulated by the system, a minimum of three sensors must be activated by a noise event. Noise events resulting in an activation of the SST system can range from gunfire, firecrackers, cars backfiring, and construction noise, among others. The SST system utilizes an

[17] The original research design intended to utilize police calls for service data to compare with the ShotSpotter data. After discussions with staff from the San Mateo County Public Safety Communications Department, it was determined that call for service data would not be appropriate to compare owing to methods used to integrate ShotSpotter activations into the County's CAD data system.
[18] Available here: http://www.co.sanmateo.ca.us/portal/site/gis

algorithm to differentiate activations resulting from gunfire from activations resulting from other non-gunfire noise events. Further, an employee of the ShotSpotter Corporation manually reviews each gunshot, or possible gunshot activation.[19] The SST data include the date, time, latitude and longitude of the activation, and the activation type. These data were collected for the period encompassing January 1, 2009 through December 31, 2013. This analysis is restricted to all SST activations that are categorized as "single gunshot," "multiple gunshots," or "possible gunshots." All other activation types were excluded from the analysis. While a single SST activation may include multiple rounds of gunfire, the unit of analysis for this study is the activation, or shooting incident. This report uses the terms "shooting activation," "shooting incident," and "shooting" interchangeably.

Program Activity Data

Data on FIT Zone activities were obtained from the EPAPD, and included information on the date(s), start and end time(s), activity type(s), and location(s) of each program activity held between August 1, 2012 and December 31, 2013.

Qualitative Data

Qualitative data on intervention sites and activities were collected via interviews with staff from the EPAPD. A site visit was conducted, which included gathering observational data on FIT Zone areas and surrounding regions. This information was used to inform the definition of target site boundaries and buffer areas for use in the analyses. Staff from the EPAPD and Warren Institute provided documents and information on program development, outreach documents, program activity information, and interim implementation evaluation results. A document analysis was conducted to develop a program logic model and delineate the underlying program theory of change.

[19] As of July 2012, the manual review process for SST activations is handled by the ShotSpotter Corporation. Prior to July 2012, emergency dispatchers at San Mateo County Public Safety Communications were responsible for reviewing all SST activations.

RESEARCH DESIGN

In order to examine the impact of FIT Zones on shootings and look for possible displacement or diffusion of shooting activity, three spatial areas were defined: (i) the treatment area(s), where the FIT Zone interventions take place, (ii) buffer areas, where potential displacement or diffusion may occur, and (iii) control areas, where the intervention did not take place.

DEFINING TREATMENT SITE BOUNDARIES

Unlike other place-based, or hot spot, policing interventions, which are generally targeted at narrowly defined places (e.g., heightened enforcement activities on particular street corners or specific houses on a block), the FIT Zone program is targeted at the "neighborhood" level, and program intervention activities primarily took place at two locations within each police-designated hot spot area, but frequently spilled over into other community spaces. This introduced difficulty when trying to define rigid boundaries between the "treatment" area—places where the intervention took place—and areas which did not receive the treatment—buffer or control areas.

Defining clear boundaries for a treatment area of each FIT Zone proved difficult for two reasons: (i) while the majority of activities took place within the confines of a park within each intervention site, 26 percent of activities in the Jack Farrell FIT Zone were held at a nearby elementary school and 7 percent of activities in the Martin Luther King site were held at a nearby middle school; and (ii) biking tours were frequently not confined to the boundaries of the park , but were led out to the Ravenswood Open Space Preserve, a county park bordering the Bay. Because the actual intervention activities were not narrowly targeted at a single discrete place, and considerable movement of participants, officers and other program staff occurred in locations around the park locations, the treatment areas were defined more broadly to include "plausible sphere of influence" around the parks and school locations.[20] In consultation with EPAPD staff and a policing expert, two treatment site boundaries were drawn

[20] Anthony Braga, Personal Interview. March 7, 2014.

to include areas surrounding the two park and school activity locations within each FIT Zone site, as well as places connecting these areas to minimize the potential "contamination" between the target areas and surrounding buffer zones.[21] Figures 5 and 6 display the treatment areas for each FIT Zone site that were used in the analysis. The areas defined as treatment sites for this analysis are considerably smaller than the earlier hot spot areas as defined by the EPAPD. Table 3 summarizes the demographic and geographic characteristics of each FIT Zone site, and the control area.

Defining Buffer Areas

In order to locate potential spatial displacement of crime, one needs to define an area where crime might be expected to occur if pushed out of the treatment area. Three considerations must be contemplated when identifying suitable displacement areas: (i) proximity to the treatment area, (ii) size of the displacement area, and (iii) contamination.[22]

The first consideration is the physical proximity of the displacement area to the treatment area. Displacement may occur either near to, or far from, the treated area, though there is reason to believe that should displacement occur, it is mostly likely to occur in the immediate surrounding areas. Research on journey-to-crime suggests that offenders tend to commit crime within close proximity to their homes.[23] Eck (1993) argues that offenders are less likely to choose targets of crime that they are unfamiliar with, arguing that should displacement occur, it is

[21] "Contamination" refers to the spillover of treatment activities to an area that is being considered a control or buffer area.

[22] Bowers, K. and Johnson, S. (2003). Measuring the Geographical Displacement and Diffusion of Benefit Effects of Crime Prevention Activity. *Journal of Quantitative Criminology* 193, 275-301; Weisburd, D., and Green, L. (1995a) Measuring immediate spatial displacement: Methodological issues and problems. In: Eck, J. E., and Weisburd, D. (eds.), *Crime and Place. Crime Prevention Studies* (Vol. 4), Criminal Justice Press, Monsey, NY.

[23] Brantingham, P.L. & Brantingham, P.J. (1993) Toward a Pattern Theory of Crime. *Advances in Criminological Theory* 5, 259-294; Guerette, R. T., & Bowers, K. J. (2009). Assessing the extent of crime displacement and diffusion of benefits: a review of situational crime prevention evaluations*. *Criminology*, 47(4), 1331-1368

more likely that offenders will target familiar places, times or targets over unfamiliar ones.[24] Given this, we should expect to observe greater displacement in areas that are closer to the treatment area over areas at farther distances. Bowers & Johnson (2003) suggest that there may be a "displacement gradient," where displacement decreases as distances from the target area increases.[25] Conversely, we may expect to see a diffusion of crime control benefits, where crime decreases in the areas near a treatment site that did not directly receive any intervention.

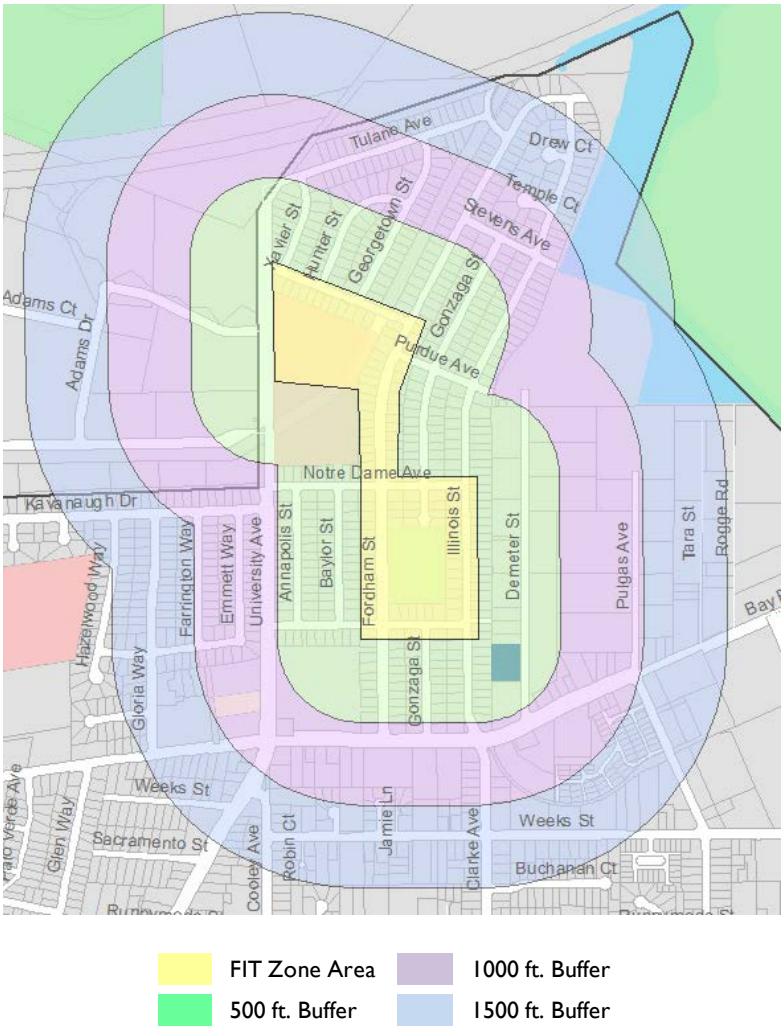
The second concern in identifying displacement areas is the size of the buffer area. The size of the buffer area can affect the analysis of displacement in several ways: if the displacement area is too small, levels of crime or shooting in the area may be too volatile or erratic to detect any reliable displacement. Conversely, if the area is too large, any displacement may be diluted or "washed out."[26] Additionally, if the area is too large, a small displacement effect may be interpreted as noise in the data.[27]

With these concerns in mind, a set of concentric displacement ("buffer") rings were constructed around the target and control areas.[28] The buffer zones include three non-overlapping concentric rings, each 500ft in width, extending concentrically out from the treatment area, or the previous ring. For example, the first buffer zone extends from 0 – 500 ft. from the target area, the second buffer ring extends 501 – 1000 ft. from the treatment zone, and the third extends from 1001 – 1500 ft. outside the treated area. The 500 ft. width is roughly the size of two city blocks, measured from east to west. The "two-block" catchment has been used in previous

[24] Eck, John E. (1993). The Threat of Crime Displacement. *Criminal Justice Abstracts* 253, 527-546.
[25] Bowers, K. and Johnson, S. (2003).
[26] Weisburd, D. and Green, L. (1995a).
[27] Bowers, K. and Johnson, S. (2003).
[28] A second 'set' of concentric rings were constructed to examine a "displacement gradient" in smaller increments than the first set. This second, smaller set of buffer rings was chosen to minimize concerns of "washing out" any displacement effects owing to the chosen size of the buffer, the second set includes four non-overlapping concentric buffer rings, each at a width of 260 ft. This size was chosen in order to capture smaller displacement effects that may be diluted by the first, larger set of bands. Results from the impact and displacement analyses for the 260 ft. buffer areas are found in Appendix C.

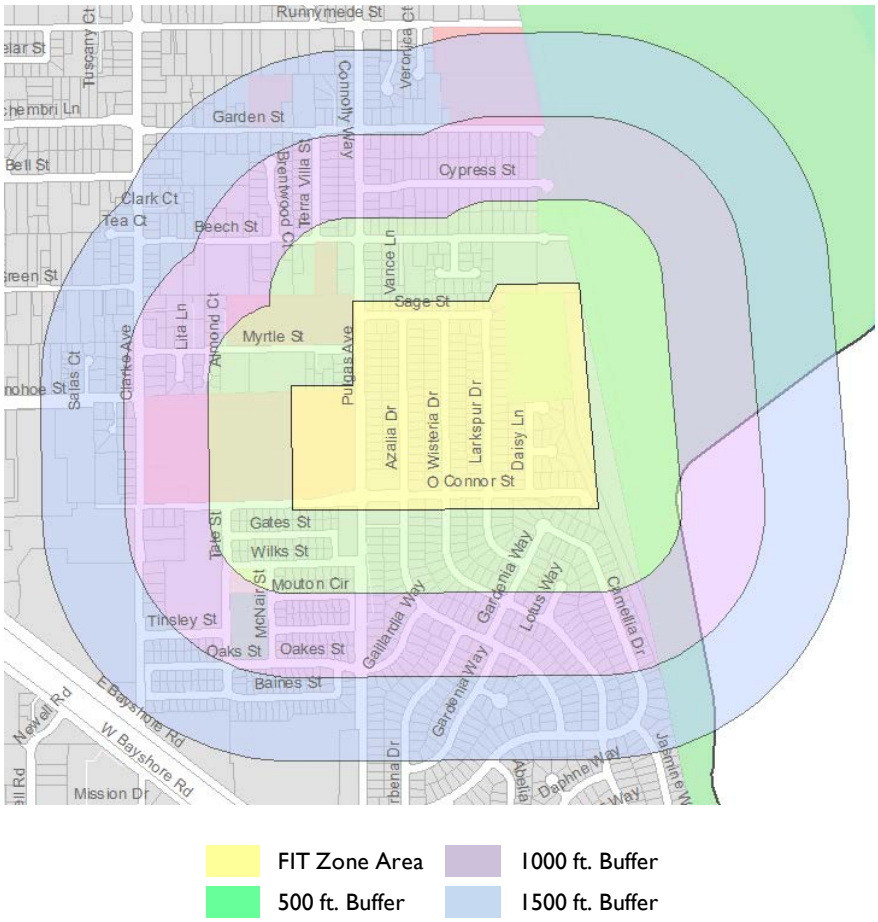
evaluations of hot spots policing interventions and crime displacement.[29] Multiple rings were chosen in order to examine any displacement gradient that may occur over increased distances from the treatment area. Figures 5 and 6 show the three 500 ft. buffer areas for each FIT Zone.

FIGURE 5. JACK FARRELL FIT ZONE SITE, 500 FT. BUFFER AREAS



[29] Braga, A. A., Weisburd, D. L., Waring, E. J., Mazerolle, L. G., Spelman, W. & Gajewski, F. (1999), Problem-oriented policing in violent crime places: A randomized controlled experiment. *Criminology*, 37 (3), 541-580; Weisburd, D., and Green, L. (1995b). Policing drug hot spots: The Jersey City drug market analysis experiment. *Justice Quarterly* 12(4): 711–735.

FIGURE 6. MARTIN LUTHER KING FIT ZONE SITE, 500 FT. BUFFER AREAS



CONTROL AREA

Finally, to provide a comparison area against which to measure the change in shooting, a third area in East Palo Alto was identified. This area, roughly .057 square miles in size, represents the third largest shooting hot spot in the City, behind the two targeted neighborhoods, but was not chosen as a site for the FIT Zone intervention. Like the two FIT Zone sites, a series of non-overlapping concentric 500ft. buffer rings were also constructed around the comparison site. This was done to serve as a falsification test for displacement in the treated areas; if the FIT Zone intervention is responsible for either crime displacement or diffusion of crime control in the treatment areas, we would expect to *not* observe similar patterns of crime in the buffers surrounding the control area. Table 3 displays a comparison of demographic characteristics of the two treatment sites and the comparison area. ShotSpotter activation data, treatment, buffer and control regions were mapped and coded using ArcGIS 10.2.

TABLE 3. DEMOGRAPHIC CHARACTERISTICS, FIT ZONE SITES AND CONTROL AREA

	Jack Farrell FIT Zone Neighborhood		Martin Luther King FIT Zone Neighborhood		Control Area Neighborhood		East Palo Alto, California	
Total Population	2,313		1,980		2,447		28,332	
Area (Land, sq. miles)	.047		.075		.057		2.51	
Sex								
Male	1,104	47.7%	1,027	51.9%	1,385	56.6%	13,958	49.3%
Female	1,209	52.3%	953	48.1%	1,062	43.4%	14,374	50.7%
Age								
Under 18	769.5	33.3%	567	28.6%	685	28.0%	8725	30.8%
18 to 24 Years	320.5	13.9%	369	18.6%	277	11.3%	3,726	13.2%
25 to 34 Years	367.5	15.9%	203	10.3%	447	18.3%	5,152	18.2%
35 to 44 Years	288	12.5%	274	13.8%	380	15.5%	4,424	15.6%
45 to 54 Years	244.5	10.6%	193	9.8%	205	8.4%	2,814	9.9%
55 to 64 Years	169	7.3%	195	9.9%	125	5.1%	1,772	6.3%
65 and Older	154	6.7%	179	9.0%	328	13.4%	1719	6.1%
Race and Ethnicity								
White	842.5	36.4%	582	29.4%	1,599	65.4%	14,962	52.8%
Black or African American	619	26.8%	759	38.3%	565	23.1%	4,816	17.0%
American Indian and Alaska Native	0	0.0%	59	3.0%	0	0.0%	112	0.4%
Asian	28.5	1.2%	42	2.1%	53	2.2%	892	3.2%
Native Hawaiian and Other Pacific Islander	255	11.0%	309	15.6%	24	1.0%	2,654	9.4%
Some Other Race	534	23.1%	218	11.0%	139	5.7%	4,464	15.8%
Two or More races	34	1.5%	11	0.6%	67	2.7%	432	1.5%
Hispanic or Latino	1366.5	59.1%	1,137	57.4%	1,798	73.5%	18,147	64.1%
Median Household Income								
	$61,878		$75,461		$66,357		$47,950	
Ratio Of Income In 2012 To Poverty Level								
Under 1.00 (Doing Poorly)	222.5	9.9%	122	6.2%	493	20.9%	5,035	18.0%
1.00 to 1.99 (Struggling)	779	34.5%	527	26.6%	456	19.3%	9,272	33.1%
Under 2.00 (Poor or struggling)	1,001.5	44.4%	649	32.8%	949	40.2%	14,307	51.1%
2.00 and over (Doing Okay)	1,253.5	55.6%	1,331	67.2%	1,414	59.8%	13,692	48.9%

Note: ACS and Census figures are presented at the block group level.

Source: ACS 2008 to 2012 (5-Year Estimates) (SE), ACS 2008 -- 2012 (5-Year Estimates), 2010 Census, U.S. Census Bureau

ANALYTIC METHODS

ESTIMATING THE IMPACT OF FIT ZONES ON SHOOTINGS & SPATIAL DISPLACEMENT

The first step in the evaluation was to determine whether shootings dropped in the treated areas, and whether any search for displacement or diffusion was appropriate.[30] If no effect of the intervention is found in the treated sites, then no displacement of shooting activity can occur. To do this, three evaluation strategies were employed.

STRATEGY ONE: BEFORE-AFTER CHANGE IN MONTHLY CRIME

The first evaluation strategy was to conduct a descriptive analysis of before-after change in rates of shooting activations in the FIT Zone sites and compare them with the before-after changes in activations across each set of buffer rings, as well as with the before-after change in the comparison area.

Using ShotSpotter activation data from January 2009 through December 2013, the before-after change in average monthly shootings ($SHOT_t$) is estimated for 17 months prior to the FIT Zone implementation and 17 months after the FIT Zone intervention started in August 2012. These before and after changes in average monthly shootings were compared for each FIT site, buffer area, and control site.

There are several limitations to this estimation strategy. One is the presence of some other intervention, process or event that occurred near or at a FIT Zone site during the implementation period but not at the comparison site that may affect the dependent measure independently of the FIT Zone intervention. To minimize this threat, qualitative interviews were conducted with EPAPD staff to ascertain whether any there were any major changes in policing tactics in the hot spot locations. Other changes in policing occurred during the study period, including a citywide "crime emergency" that last for four weeks in early 2013, and three

[30] As a reminder, the unit of analysis for the SST activation data is a single activation, or shooting incident.

Operation Ceasefire call-ins. Importantly, neither of these efforts were place-based, nor were they targeted at the FIT Zone sites specifically.[31]

The second key threat to validity is instrumentation. Between its initial implementation and June 2012, the San Mateo County Public Safety Communications, which handles all law, fire, and medical dispatch services for San Mateo County and for the City of East Palo Alto was responsible for the ShotSpotter activation system. Each time the ShotSpotter system was "activated," dispatch operators were responsible for confirming via audio review whether the activation was a gunshot. In June 2012, the responsibility for determining which activations were gunfire-related was transferred to the ShotSpotter Corporation. Since June 2012, whenever the ShotSpotter system is activated, ShotSpotter employees first examine activations that are coded by the ShotSpotter system as single, multiple or possible gunshots to determine their credibility. If deemed credible, the activation is forwarded to the ShotSpotter Flex system, an end-user program that displays information on the gunshot time, location, and the number of rounds for those activations determined to be shootings. Staff at San Mateo County Public Safety Communications have dedicated monitors for the ShotSpotter Flex system, and when an activation occurs, dispatch staff manually open a record in their Computer Aided Dispatch ("CAD") system and record the information from ShotSpotter Flex.

To deal with these threats to validity, a series of difference-in-difference estimates were generated in a multivariate regression framework, with fixed effects for both place and time.

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[31] The Crime emergency was issued citywide from May 21, 2013 to June 10, 2013 and resulted in increased enforcement and police visibility across the entirety of East Palo Alto, meaning expected decreases in shooting activity related to the Crime emergency are likely to affect the entire City and not just the FIT Zone area. The Crime emergency resulted in 27 arrests (See Van Susteren, E. (June 10, 2013). "East Palo Alto Police Call off Crime Emergency," *Palo Alto Online.* Available at: http://www.paloaltoonline.com/news/2013/06/10/east-palo-alto-police-call-off-crime-emergency). Operation Ceasefire is an offender-based policing tactic, where police and social service agencies specifically target individuals who generate high volumes of crime for enforcement and services. While information on the residences of such offenders was not available, in 2012, only three Ceasefire call-ins were conducted, totaling approximately 80 offenders, and the call-ins did not specifically target those living in either of the FIT Zone neighborhood.

Strategy Two: Difference-in-Difference Regression Estimation

The second evaluation strategy was to estimate difference-in-difference model in a regression framework. A difference-in-difference model takes the before-after difference in means of shooting activations in the treatment areas, and subtracts the before-after difference in means of shooting activations from the control area. The difference of the two differences is the estimated effect of the treatment. The regression models also included fixed effects for location and time. By using fixed-effects models, each location is effectively being compared to itself over time by calculating the deviations of each observation from the location-specific mean for all time periods for each variable of interest. The fixed-effects model has the advantage of controlling for all observed and unobserved time-invariant variables within each location. Month and year fixed effects were included to control for long-term trends in crime and control for seasonal variation in shootings. Further, the inclusion of month fixed effects reduces some of the error variance due to the change in instrumentation over the course of the study period. However, this remains a serious threat to the validity of the conclusions.[32] The full model specification can be found in Appendix B.

Strategy Three: Weighted Displacement Quotient

One method for examining spatial displacement is the Weighted Displacement Quotient ("WDQ"), developed by Bowers and Johnson (2003). The WDQ is a descriptive tool: it provides a measure of whether displacement or diffusion of crime has occurred. However, the WDQ does not provide a measure of the magnitude of displacement, nor does it identify the causal story behind the change in relative crime rates. Like other methods for examining displacement, the WDQ utilizes crime rates from three geographic areas: (i) a target or treatment area (T), (ii) a buffer or catchment area (B), and (iii) a control area (C). The WDQ requires at least two time periods of data (pre- and post-intervention) of equal length. The formula for the WDQ is as follows:

[32] A second regression model was estimated as above for the second set of 260ft non-overlapping buffer areas, but including four interaction terms for each of the four 260ft-buffer areas. Results are presented in Appendix C.

$$WDQ = \frac{\frac{B_{post}}{C_{post}} - \frac{B_{pre}}{C_{pre}}}{\frac{T_{post}}{C_{post}} - \frac{T_{pre}}{C_{pre}}}$$

where T_{post} is the crime count in the target area post-intervention, T_{pre} is the crime count in the target area pre-intervention, C_{post} is the crime count in the control area post-intervention, C_{pre} is the crime count in the control area pre-intervention, B_{post} is the crime count in the buffer area post-intervention, and B_{pre} is the crime count in the buffer area pre-intervention. Because the treatment, buffer and control areas all differ in size and population, the ratios were all log transformed to allow for comparisons of relative change rather than absolute change.

There are two elements of the WDQ: (i) the denominator of the ratio, or the "success measure," and (ii) the numerator of the ratio, or the "displacement measure." The denominator of the WDQ is the measure the of "success" of the intervention, which indicates how crime in the treatment area changed relative to control area between two periods. If the denominator of the WDQ is negative, this suggests that shooting in the treatment area fell more in from $time_0$ to $time_1$ than in the control area. However, if the denominator is positive, this suggests that the intervention was unsuccessful in reducing shootings, and any decrease in shooting in the surrounding buffer areas should not be attributed to the intervention. The numerator of the WDQ is measure of potential "displacement," indicating how crime in the buffer area changed relative to the control area between the two periods. If the numerator is positive, this suggests possible displacement of crime in one of the buffer areas. If it is negative, this is suggestive of a possible diffusion of crime control benefits from the treatment area into the buffer areas.

Finally, the displacement measure is weighted by the success measure, and provides for easy interpretation: a positive WDQ (i.e., greater than zero) indicates that there was a potential diffusion effect. If the WDQ greater than one, then the diffusion effect was greater than the treatment effect. Conversely, a WDQ of less than zero indicates there was displacement. A negative number between zero and negative one means that the displacement did not outweigh

the treatment effect, and the intervention still achieved some benefit. However, a negative number greater than negative one indicates that the treatment effect was eclipsed or erased by displacement. Finally, if the WDQ is zero, this indicates that there was no effect.

The WDQ was calculated for each FIT Zone site separately, using four different before and after time periods to examine whether displacement or diffusion occurred at each site, and to examine whether these patterns *changed* over time. WDQ's were calculated for 3, 6, 12, and 17 months before and after the FIT Zone program was implemented.

Estimating the Impact of FIT Zones on Temporal Displacement

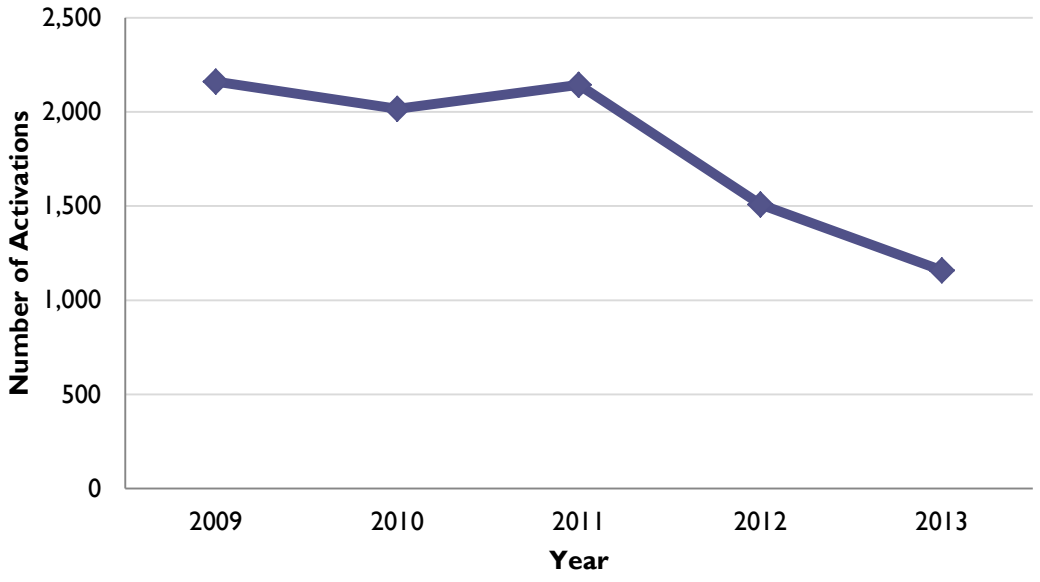
To address whether the FIT Zone program affected the temporal patterns of shooting in and around the two FIT sites, two strategies were employed. First, descriptive characteristics of the time of shootings, such as time of day and day of week, were compared for each FIT site and control area before and after the FIT Zone program began. Second, program activity data collected by the EPAPD was merged with ShotSpotter shooting incident data, and a dummy variable was created for each shooting activation to indicate whether it occurred on a day with a FIT Zone gathering or not. The data were censored to include only observations in the post-implementation period (August 2012 to December 2013), and regression analyses were conducted to estimate the impact of FIT Zone activities on average daily shootings in each treatment, buffer, and control region.

PART IV. RESULTS

SHOOTING ACTIVATIONS, 2009-2013: DESCRIPTIVE RESULTS

Between January 1, 2009 and December 31, 2013, the City of East Palo Alto experienced 8,988 shooting activations listed as gunfire or possible gunfire.[33] In 2009, the first year in which SST system was launched citywide, the SST system registered 2,161 shooting activations, for an average of 180 shooting activations per month, or 6.2 activations per day. The overall amount of gunfire remained relatively stable throughout 2010 and 2011, but in 2012, shooting activations fell by nearly 30 percent compared to previous years—to 1,508 annual activations, or 125.7 activations per month and 4.8 activations per day. In 2013, shooting activations across the City fell again, to 1,158 activations, or 96.5 activations per month and 4 activations per day. Figure 7 displays the total number of shooting activations across East Palo Alto per year, and Table 4 displays the mean monthly and daily activations by year, with standard deviations.

FIGURE 7. SHOOTING ACTIVATIONS BY YEAR, EAST PALO ALTO, 2009-2013



[33] The total number of activations between 2099 and 2013 was 9,062. The analysis was conducted on activations listed as "single gunshot", "multiple gunshots" or "possible gunshot." 74 activations were excluded from the sample—these activations were identified false positive activations relating to construction of a school between July 2010 and July 2012. All analyses were conducted using a final sample of 8,988 activations.

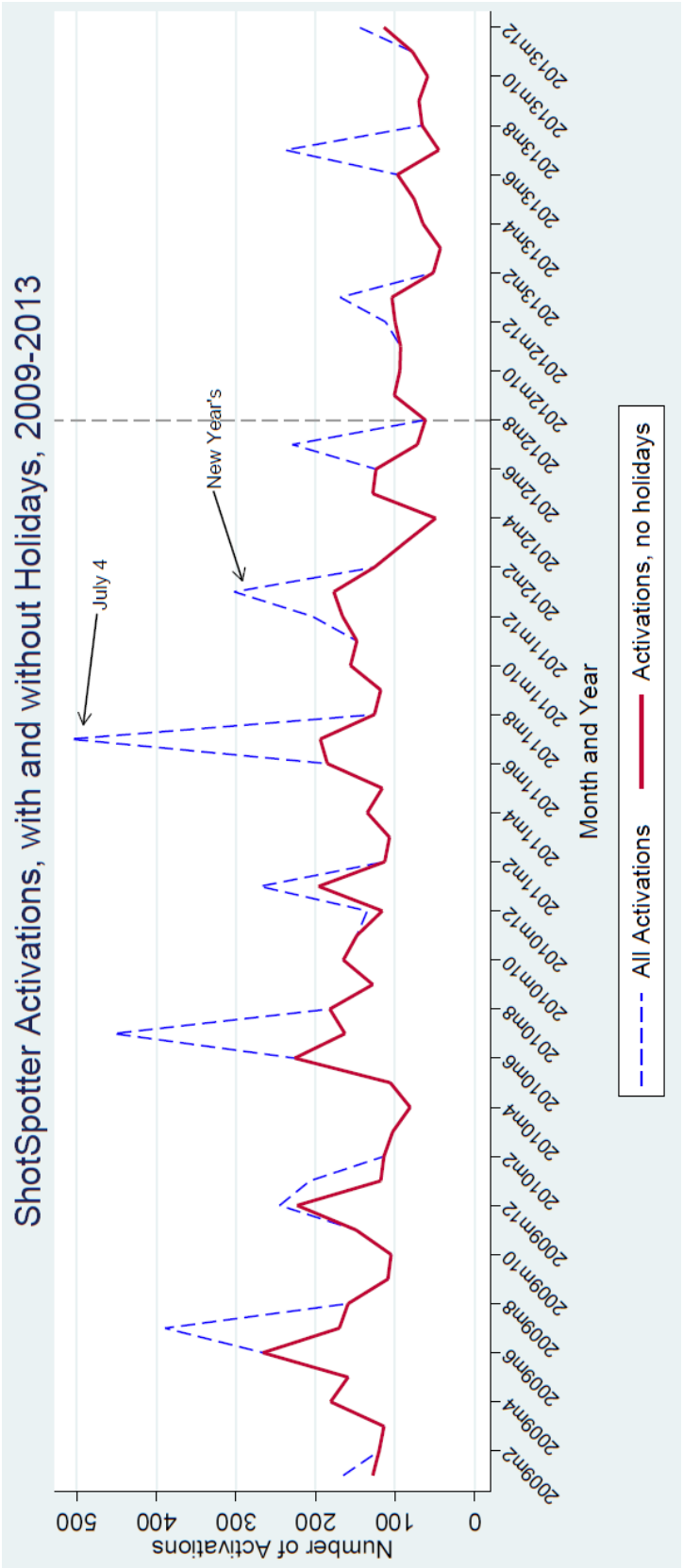
TABLE 4. AVERAGE SHOOTING ACTIVATIONS PER MONTH AND DAY, EAST PALO ALTO, 2009 – 2013

	Shooting Activations per Month		Shooting Activations per Day	
	Mean	SD	Mean	SD
2009	180.08	83.12	6.16	6.80
2010	168.08	100.09	5.83	10.66
2011	178.67	112.58	6.14	9.89
2012	125.67	71.35	4.80	9.48
2013	96.50	58.21	4.01	10.26
Total	**149.80**	**90.66**	**5.45**	**9.51**

Shooting activations across East Palo Alto exhibit considerable seasonal variation. Activations peak in two distinct and consistent periods each year: at the end of one calendar year and the beginning of the next (New Year's Eve) and around the 4th of July (see Figure 8). Shooting activations on and around these holidays across the five years study period accounted for nearly 19 percent of all activations in the data.[34] One explanation for the seasonal spikes in shooting activations is celebratory gunfire; interviews with staff from the EPAPD confirmed the occurrence of celebratory gunfire around certain holidays. However, concerns remain that some activations around these holidays were not *actual* gunshots, but were firecrackers registered by the SST system as shootings. To assuage these concerns, activations occurring around these two seasonal holiday peaks were flagged and all analyses were conducted on data twice—once with holiday peaks included and once with holiday shooting activations excluded from the data. Because results of the analyses with and without holiday gunfire did not differ significantly, only results from the data including holiday shooting activations are reported here.

[34] Days identified as 'holiday' peaks include December 31, January 1, and July 1 through July 6.

FIGURE 8. SHOOTING ACTIVATIONS, WITH AND WITHOUT HOLIDAYS, 2009-20013



Evaluation Question 1: Did the FIT Zone Program Affect the Amount of Shooting in FIT Zone Areas?

Did the FIT Zone Program reduce shooting?

The evaluation of the impact on shooting volume yielded mixed results. Overall, a small, marginally significant reduction in shooting was observed in the FIT Zone sites. However, the effect was driven entirely by a reduction in shootings in the Jack Farrell FIT Zone site. The Martin Luther King FIT Zone site did not show a significant change in the volume of shooting.

Evaluation Strategy I: Before and After Change in Monthly Shooting Activations

The first evaluation strategy was to compare the pre-intervention and post-intervention change in the number of shooting activations in each of the target, buffer band, and control areas, and conduct statistical tests to examine whether the means differed significantly. The average monthly shooting rate was calculated for each FIT Zone target area, each surrounding set of 500 ft. buffer areas, and the control area. Within each buffer area, the pre-post change in average monthly shooting activations was tabulated, and a test of whether this change is statistically significant was performed. Table 5 displays the average monthly shooting rates before and after the beginning of the Program for each FIT Zone and sequential 500 ft. buffer area.

TABLE 5. AVERAGE MONTHLY SHOOTING ACTIVATIONS BY LOCATION, 17 MONTHS BEFORE/AFTER FIT ZONE IMPLEMENTATION

Location	Before		After					
	Mean	SD	Mean	SD	Difference	SD	Percent Change	p value
Jack Farrell	7.06	1.65	2.53	0.41	-4.53	1.70	-64.2%	0.02
0-500 ft.	12.65	2.53	6.19	1.78	-6.46	3.10	-51.1%	0.05
500-1000 ft.	15.06	2.49	5.77	1.06	-9.29	2.71	-61.7%	0.00
1000-1500 ft.	9.00	1.85	7.12	1.30	-1.88	2.26	-20.9%	0.41
Martin Luther King	15.74	2.25	7.65	0.99	-7.82	2.46	-51.4%	0.00
0-500 ft.	5.59	0.83	4.82	0.52	-0.76	0.98	-13.7%	0.44
500-1000 ft.	9.82	1.47	5.00	0.69	-4.82	1.63	-49.1%	0.01
1000-1500 ft.	5.77	0.86	4.33	1.24	-1.43	1.51	-24.9%	0.35
Control	8.56	2.03	5.06	0.62	-3.50	2.12	-40.9%	0.12
0-500 ft.	7.41	1.65	5.24	0.76	-2.18	1.82	-29.4%	0.24
500-1000 ft.	10.41	1.60	7.88	1.62	-2.54	2.27	-24.4%	0.27
1000-1500 ft.	11.00	2.68	5.81	1.08	-5.19	2.90	-47.2%	0.09

The before-after statistical tests indicate that the average number of monthly shooting incidents fell significantly in both FIT Zone sites.[35] Additionally, the average number of shooting incidents per month fell significantly in the two 500 ft. buffers surrounding the Jack Farrell site, but only in the area between 500 and 1000 ft. from the MLK site. There was not a significant drop in the number of shootings per month in the control area, or its surrounding buffers.

Alone, these results are insufficient to indicate that the FIT Zones are the cause of the decline in the average number of monthly shootings in the treatment areas relative to the control areas. The decline in shootings in the FIT Zone sites might be due to another factor, or omitted variable, that occurred during the same time as the FIT Zone program was implemented.

[35] T tests for difference in means.

EVALUATION STRATEGY II: DIFFERENCE-IN-DIFFERENCE REGRESSION RESULTS

To control for the influence of omitted variables, difference-in-difference regression models were run to estimate the impact of the FIT Zone treatment on the number of shooting incidents per month. The regressions estimated the natural log of shooting activations per month at time *t* and location *i.* In each model, a full set time and place fixed effects were added to control for all time-invariant observable and unobservable characteristics in each place that could affect the amount of shooting, as well as to control for seasonal or secular time trends. Because the absolute area of each sequential buffer area is larger than the last, a buffer area with a larger area may capture a larger number of absolute shooting incidents than a buffer area with a smaller area. To account for differences in the size of the target, buffer and control areas, monthly shooting activations were log transformed. As the dependent variable is in logarithmic form, the coefficients on the regressors may be interpreted as the percentage change in the dependent variable for a one-unit increase in the independent variable.[36]

COMBINED TREATMENT SITE MODEL RESULTS

The first set of models collapses both FIT Zone sites into a single "treated" area, estimating an overall average treatment effect. Two regression models were run sequentially (see Table 6). Model 1 includes a dummy variable coded as 1 for being located in a treatment area ($Treatment_i$), a dummy coded 1 for being after the beginning of the intervention ($Post_t$), and an interaction effect – the difference-in-difference estimator – coded 1 for being in a treated area and in the post-implementation period ($Treatment_i * Post_t$). This model considers all other areas, including all buffer and control areas, as the reference group. The coefficient on the difference-in-difference estimator is negative and marginally significant, indicating that average monthly shooting activations in the two FIT Zone sites dropped by 27 percent relative to all buffer and control areas, after the FIT Zone program began. Model 2 displays regression results for comparison of combined FIT sites, with only the control area as the reference group. Relative to

[36] Regression analyses conducted using the 260 ft. concentric buffer areas yielded the same basic results as the larger 500 ft. bands, and are not reported here. Regression tables for the 260 ft. bands may be found in Appendix C.

the control site, average monthly shootings dropped nearly 58 percent, controlling for time and place fixed effects.

FIT ZONE IMPACT BY FIT SITE

To provide FIT Zone site-specific difference-in-difference estimates, two additional regression models were estimated using disaggregated data. Models 3 and 4 in Table 5 above provide the results of the site-specific regressions. The first fixed effects regression (model 3) includes one dummy variable for the post period, dummy variables for each FIT site, and two interaction effects for each FIT Zone site in the post period (*Jack Farrell * Post* and *MLK * Post*). The model also includes a full set of fixed effects for location and time. Model 3 considers all control and buffer areas outside of the two FIT Zone sites as the reference group. Model 4 restricts the regression to the two FIT Zone sites and the control area, and considers only the control area as the reference group. As Table 6 indicates, both models observe a significant, negative effect on the difference-in-difference estimator for the Jack Farrell site, but no significant effect for the Martin Luther King site. These results indicate that the reduction in shootings in the Jack Farrell FIT Zone is the main driver of the effect of the treatment estimated in models 1 and 2.

TABLE 6. DIFFERENCE-IN-DIFFERENCE REGRESSION RESULTS, MAIN FINDINGS

Model Variables	(1) FIT v. All Other Areas *ln*(Monthly Shootings)	(2) FIT v. Control *ln*(Monthly Shootings))	(3) FIT v. All Other Areas *ln*(Monthly Shootings)	(4) FIT v. Control *ln*(Monthly Shootings)
Post	-0.167	0.0676	-0.164	0.0802
	(0.131)	(0.274)	(0.131)	(0.273)
Treatment	-0.251**	0.0765		
	(0.120)	(0.140)		
*Treatment*Post (Interaction)*	-0.270*	-0.586***		
	(0.139)	(0.208)		
Jack Farrell FIT Zone			-0.160	0.169
			(0.125)	(0.146)
Martin Luther King FIT Zone			0.329***	0.658***
			(0.113)	(0.132)
*Jack Farrell * Post (Interaction)*			-0.621***	-0.945***
			(0.186)	(0.244)
*MLK * Post (Interaction)*			0.0507	-0.263
			(0.167)	(0.221)
Constant	2.697***	2.393***	2.698***	2.396***
	(0.124)	(0.202)	(0.124)	(0.200)
Month FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes
Observations	710	176	710	176
R-squared	0.476	0.536	0.482	0.557

Robust standard errors in parentheses
*** *p<0.01*, ** *p<0.05*, * *p<0.1*

EVALUATION QUESTION 2: DID THE FIT ZONES DISPLACE SHOOTING TO NEARBY AREAS?

Did the FIT Zone Program change *where* shootings occurred?

The evaluation of the whether the FIT Zone program resulted in the spatial displacement or diffusion of shooting found mixed evidence: in the Jack Farrell site, evidence of diffusion of crime control benefits in two immediate surrounding buffers was found. In the Martin Luther King site, there is evidence of an *increase* in shooting activation in the area 500 ft. surrounding the FIT zone site in the year after the implementation of the intervention began; however, this increase may not be the result of displacement.

EVALUATION STRATEGY I: DIFFERENCE-IN-DIFFERENCE REGRESSION RESULTS

To examine displacement or possible diffusion of crime control benefits in areas surrounding the FIT Zone sites, the first evaluation strategy was to estimate difference-in-difference regression models as above, but with additional difference-in-difference estimators for each buffer area (i.e., for each 500 ft. buffer zone).

Building off the regression framework in the previous section (model 1), interaction terms for the buffer areas surrounding both the treatment and control sites are added to models 5 and 6, respectively. Note that the addition of the buffer area interaction terms changes the reference groups for the difference-in-difference estimator of interest ($Treatment_i * Post_t$). In model 5, the reference group is the control area and its buffers, and in model 6, the reference group is only the control area. The effect of the difference-in-difference estimator ($Treatment_i * Post_t$) in both models 5 and 6 is negative, significant, and larger than model 1. The effect of the first buffer ring around the treatment areas (*500 ft. Buffer Treatment*Post)* is negative but not significant, indicating no change in the number of shootings per month in the immediate areas surrounding the FIT Zone sites. Notably, the effect of the second buffer ring (*1000 ft. Buffer Treatment*Post*) is negative and significant, indicating a drop on the number of shootings in the area between 500 and 1000 ft. outside of the FIT Zone areas.

In model 6, interaction terms for the buffer areas surrounding the control site are included as a falsification test for the displacement or diffusion hypotheses. It is expected that, for the site that did *not* receive the FIT Zone programming, no observable displacement or diffusion of shooting activity would take place. Coefficients on all three interaction terms for the control buffer rings are not statistically significant, indicating that none of the buffer areas surrounding the control site experienced a change in average number of shooting incidents per month in the post-implementation period. Table 7 displays the regression results for models 5 and 6.

TABLE 7. DIFFERENCE-IN-DIFFERENCE REGRESSION ESTIMATES OF SHOOTING DISPLACEMENT, COMBINED TREATMENT AREAS

Model	**(5)**	**(6)**
	LSDV	**LSDV**
Variables	***ln*(Monthly Shootings)**	***ln*(Monthly Shootings)**
Post	0.696***	0.750***
	(0.120)	(0.131)
Treatment	-0.0370	0.147
	(0.146)	(0.198)
*Treatment*Post (Interaction)*	-0.400**	-0.584***
	(0.158)	(0.204)
*500 Buffer * Post (Interaction)*	-0.0977	-0.282
	(0.170)	(0.213)
*1000 Buffer * Post (Interaction)*	-0.442***	-0.626***
	(0.154)	(0.201)
*1500 Buffer * Post (Interaction)*	-0.105	-0.289
	(0.170)	(0.213)
*Control 500 Buffer * Post (Interaction)*		-0.180
		(0.235)
*Control 1000 Buffer * Post (Interaction)*		-0.247
		(0.283)
*Control 1500 Buffer * Post (Interaction)*		-0.315
		(0.245)
Constant	2.421***	2.367***
	(0.131)	(0.141)
Month FE	Yes	Yes
Year FE	Yes	Yes
Location FE	Yes	Yes
Observations	710	710
R-squared	0.483	0.484

Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

DISPLACEMENT BY FIT ZONE SITE

In model 7, additional site-specific buffer interaction effects are added to model 5. Again, these regression show a significant, negative effect for the Jack Farrell FIT site and no significant effect for the Martin Luther King FIT Zone site. The coefficients on two interaction terms for the first and second buffer rings around the Jack Farrell FIT Zone site are significant and negative, indicating a possible diffusion effect of the FIT Zone program in this area. No significant change is observed in the buffers surrounding the Martin Luther King site; however, the coefficient on the first buffer ring (the 500 ft. buffer) is positive, indicating a potential increase in shooting activations in the immediate area surrounding the Martin Luther King site. However, because no significant change in shooing activations was observed inside the Martin Luther King site, it is not clear that the increase in the 500 ft. buffer area can be attributed to displacement. Table 8 displays the FIT specific regression results for model 7.

TABLE 8. DIFFERENCE-IN-DIFFERENCE REGRESSION ESTIMATES OF SHOOTING DISPLACEMENT, BY FIT ZONE

Model Variables	(7) LSDV *ln*(Monthly Shootings)
Post	-0.0351
	(0.145)
Jack Farrell FIT Zone	-0.125
	(0.127)
Martin Luther King FIT Zone	0.365***
	(0.115)
*Jack Farrell * Post (Interaction)*	-0.752***
	(0.200)
*MLK * Post (Interaction)*	-0.0800
	(0.183)
*JF, 500 Buffer * Post (Interaction)*	-0.512**
	(0.221)
*JF, 1000 Buffer * Post (Interaction)*	-0.816***
	(0.186)
*JF, 1500 Buffer * Post (Interaction)*	0.0148
	(0.193)
*MLK, 500 Buffer * Post (Interaction)*	0.301
	(0.194)
*MLK, 1000 Buffer * Post (Interaction)*	-0.0680
	(0.183)
*MLK, 1500 Buffer * Post (Interaction)*	-0.237
	(0.249)
Constant	2.663***
	(0.126)
Month FE	Yes
Year FE	Yes
Location FE	Yes
Observations	710
R-squared	0.504

Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

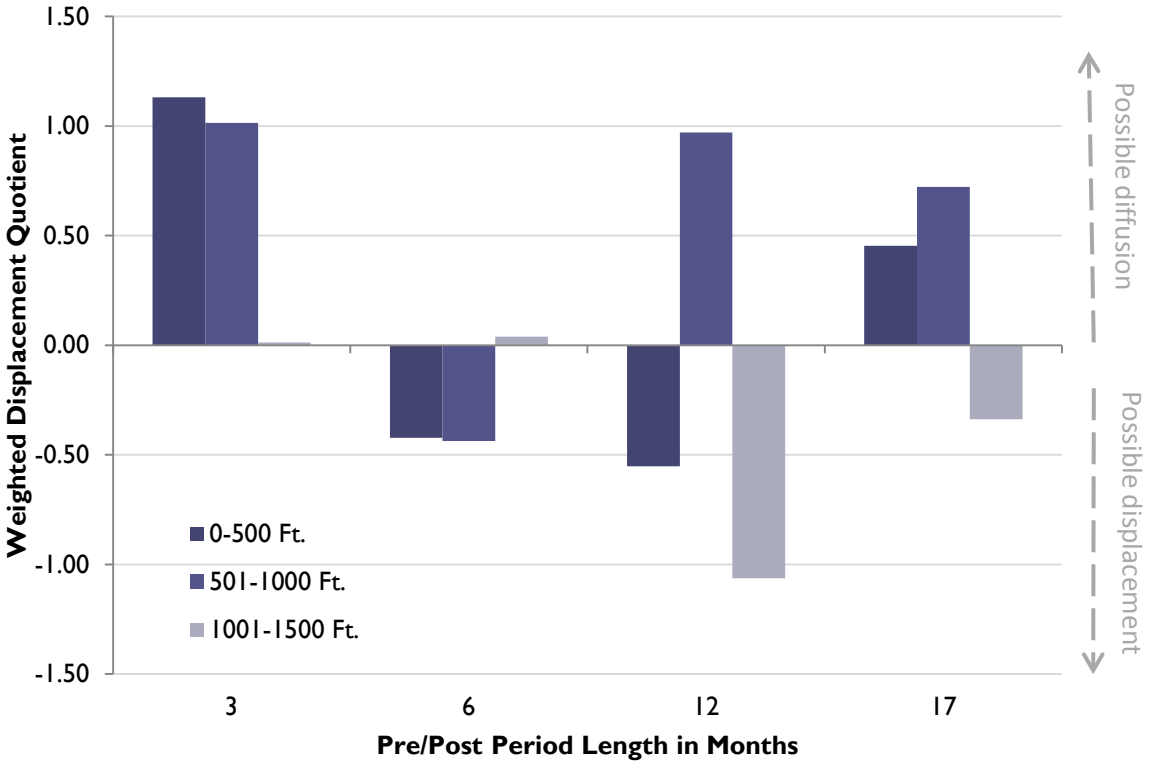
EVALUATION STRATEGY II: WEIGHTED DISPLACEMENT QUOTIENT

The second evaluation strategy employed to assess potential spatial displacement of shooting or diffusion of crime control benefits is the Weighted Displacement Quotient ("WDQ"). To calculate the WDQ, one first needs to define the time period during which to look for spatial displacement. The WDQ requires that both the pre-intervention period and the post-intervention period be of the same length. Owing to the timing of the implementation of the FIT Zone Program relative to the coverage of the shooting activation data obtained for this study, WDQs could only be calculated for a maximum of 17 months before and after the FIT Zone Program began. To examine whether displacement or diffusion effects changed over different time periods, WDQ's were calculated for four time periods: 17, 12, 6 and 3 months before and after implementation. WDQs were calculated separately for each of the two FIT Zone sites, and for each individual buffer surrounding each FIT Zone site.

FIT ZONE SITE 1: JACK FARRELL

For the Jack Farrell FIT Zone site, the WDQs indicate that displacement and diffusion impacts were not consistent over time or across buffer areas. In the first three months, there is evidence of potential diffusion crime control benefits in the first two buffer areas, extending 500 and 1000 ft., respectively. No effect was found in the 1500 ft. buffer area. In the six and twelve month periods before and after the FIT Zone began, there is evidence of slight displacement in the first and third buffer band, with evidence of a diffusion effect in the second band. This evidence is consistent with the findings in the regression models (model 5), indicating a significant decrease in shootings in first two buffer areas surrounding the Jack Farrell site. Results of the WDQs for the Jack Farrell site and surrounding buffers are shown below in Figure 9.

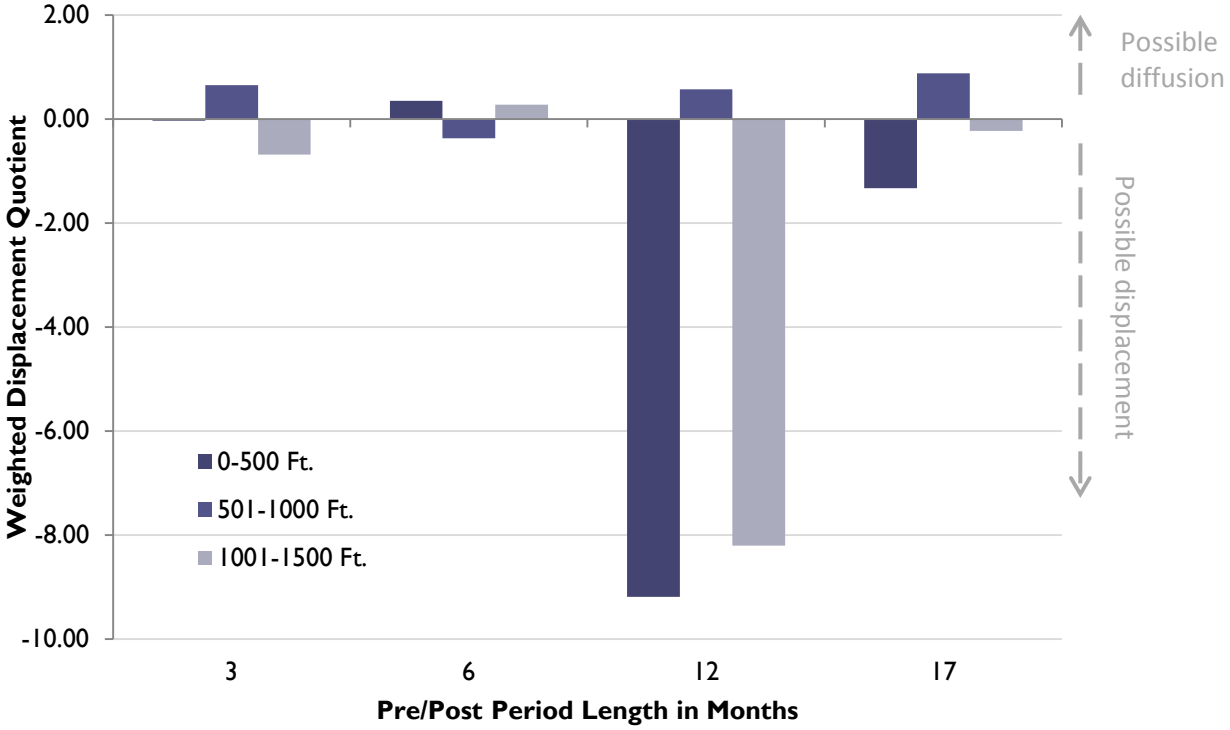
FIGURE 9. JACK FARRELL SITE: WEIGHTED DISPLACEMENT QUOTIENTS BY PERIOD AND BUFFER



FIT ZONE SITE 2: MARTIN LUTHER KING

At the Martin Luther King site, the WDQ results find a different pattern. In both the three- and six-month periods, the WDQ indicates almost no effect—neither displacement nor diffusion—in the first 500 ft. buffer, and indicates a slight diffusion effect in the second 500 ft. band, as well as a slight displacement in the third, 1001-1500 ft. band. However, during the 12 months before and after the beginning of the FIT Zone Program, in both the first (0-500 ft.) buffer and the third (1001-1500 ft.) buffer, there is a sharp increase in shootings in the two buffer areas. However, because the FIT Zone program did not appear to have an effect inside the FIT Zone site, it is not clear that the spike in activations is due to displacement. This sharp increase is not sustained over time, as the spike disappears once the WDQ period is expanded to 17 months before and after. Results of the WDQ for the Martin Luther King site and surrounding buffers are shown below in Figure 10.

FIGURE 10. MARTIN LUTHER KING SITE: WEIGHTED DISPLACEMENT QUOTIENTS BY PERIOD AND BUFFER



Evaluation Question 3: Did the FIT Zone Program Affect the Temporal Pattern of Shootings in the FIT Zone Sites?

Did the FIT Zone Program change *when* shootings occurred?

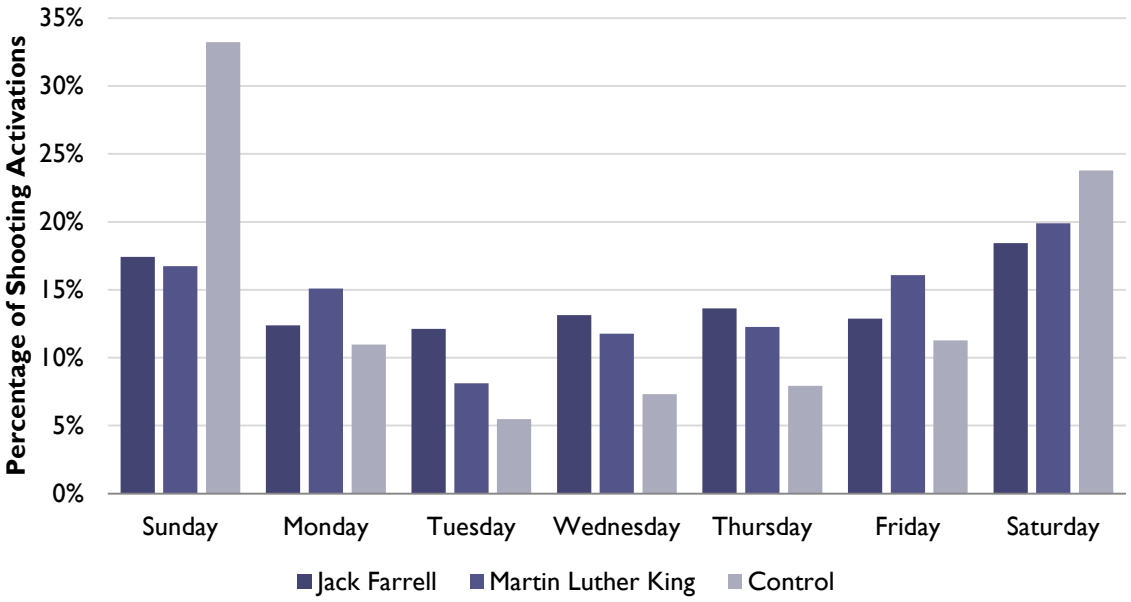
Analysis of the temporal distribution of shooting activity found no significant differences in the amount of shootings in the FIT Zone areas by time of day or day of week, relative to the control area. Regression estimates of the impact of being a FIT Zone event day vs. a day where no event was held found no significant impact on average daily shootings.

To address whether the FIT Zone program affected the temporal patterns of shooting in and around the two FIT sites, two strategies were employed. First, descriptive characteristics of the time of shootings, such as day of the week and hour of the day, were compared for each FIT site and control area before and after the FIT Zone program began. Next, a series of regression models were estimated to assess the impact of FIT Zone days on the average number of shooting incidents per day.

Day of the Week

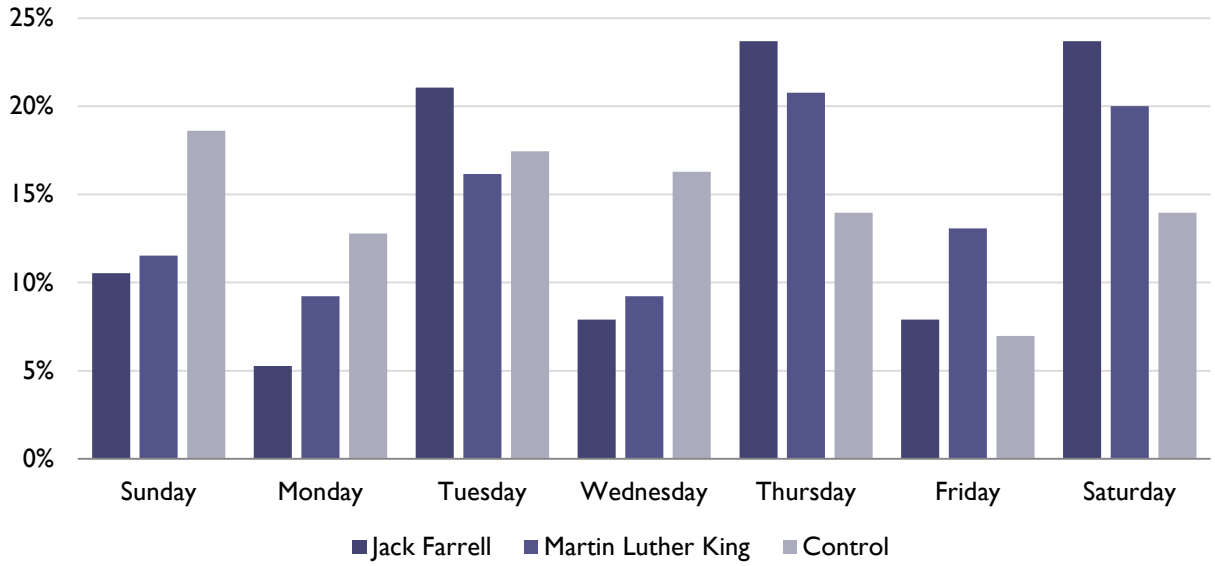
Figure 11 displays the distribution of shootings by day of the week in each FIT Zone site and in the control site before the FIT Zone program was implemented. In the 43 months prior to the implementation of the FIT Zones, the majority of shootings in each area occurred on a Friday, Saturday or Sunday, with the fewest shootings occurring in the middle of the week. This pattern was more pronounced in the control area, and least pronounced in the Jack Farrell FIT Zone site.

FIGURE 11. SHOOTINGS BY DAY OF WEEK, PRE-IMPLEMENTATION PERIOD



In the 17 months after the FIT Zone program implementation, shootings did not follow the same pattern across the week. Figure 12 displays shootings by day of the week for each FIT Zone site and the control area in the post-implementation period. In both the Jack Farrell and Martin Luther King sites, shootings in the post-implementation period were highest on Tuesdays, Thursdays and Saturdays, while in the control area, shootings appeared more evenly dispersed across the days of the week.

FIGURE 12. SHOOTINGS BY DAY OF WEEK, POST-IMPLEMENTATION PERIOD

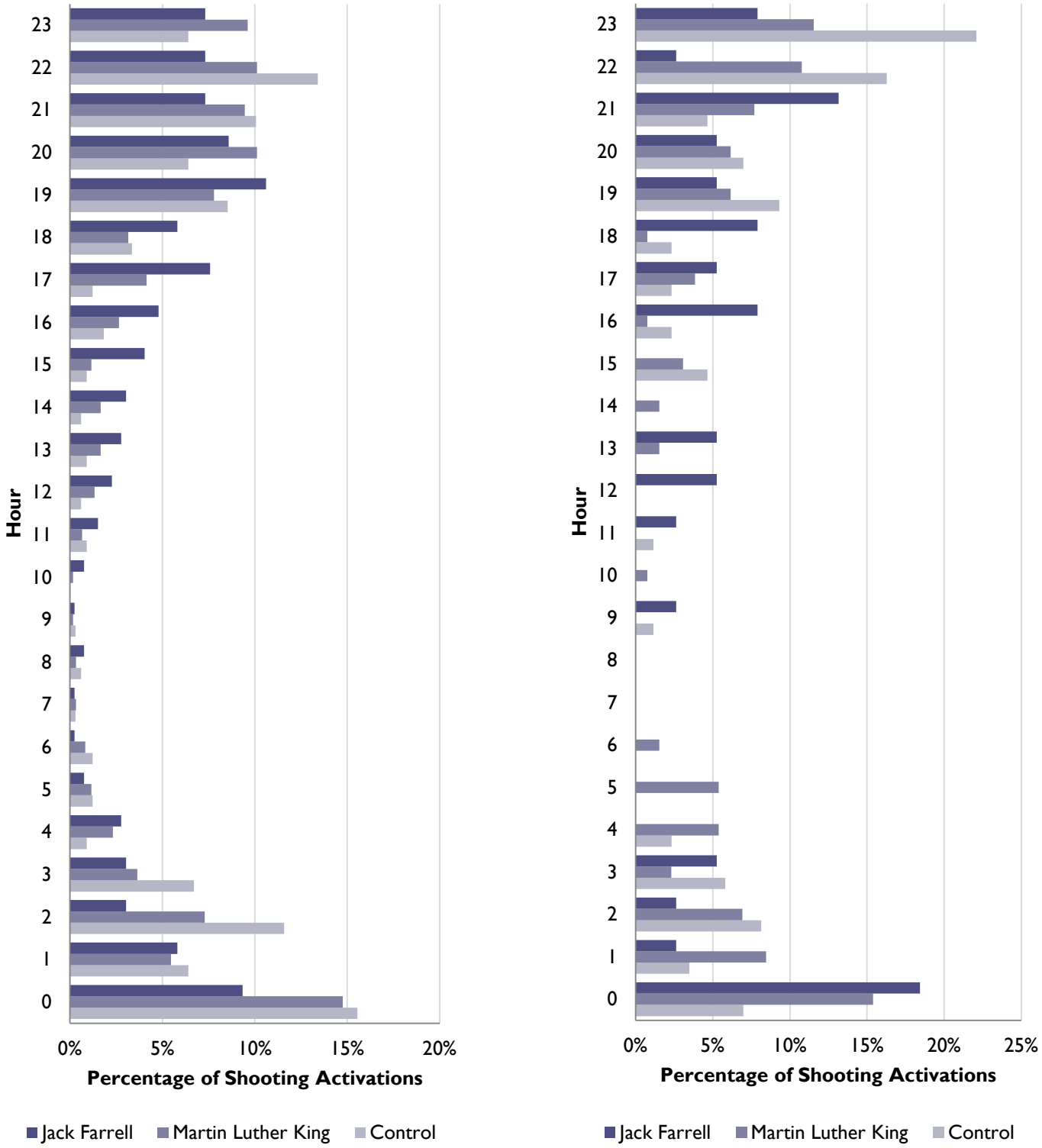


TIME OF DAY

Figure 13 displays the distribution of shootings by hour for each shooting activation within the FIT Zone sites and control area, in the pre- and post-implementation periods, respectively. Prior to the implementation of the FIT Zone program, the distribution of shooting by hour was very similar across the FIT Zone sites and the control area, with more than half of shootings occurring between the hours of 8pm and 3am. In the post-implementation, the distribution of shots by hour in each site appears roughly similar to the pre-implementation period, with the majority of shots taking place in the late-night and early-morning periods. Visual analysis of the two distributions does not reveal any significant shifts in shootings by time of day between the pre- and post-implementation periods.

FIGURE 13. SHOOTING ACTIVATIONS BY HOUR OF THE DAY

PRE-IMPLEMENTATION PERIOD **POST-IMPLEMENTATION PERIOD**



REGRESSION ESTIMATES: EFFECT OF FIT ZONE DAY ON AVERAGE DAILY SHOOTINGS

To estimate the impact of FIT Zone gatherings on the number of shooting activations that occur on FIT days, a series of difference-in-difference regressions were run on a full location-day panel dataset. A series of regression models were estimated to test for the impact of being in a FIT Zone site on a day where a FIT gathering occurred on the natural log of average daily shooting activations. Regression results are shown in Table 9 below. This estimation strategy found no significant effect on average daily shooting incidents for the FIT Zone sites on a FIT Zone gathering day.

TABLE 9. DIFFERENCE-IN-DIFFERENCE REGRESSION ESTIMATES, IMPACT OF FIT ZONE DAY ON AVERAGE DAILY SHOOTING ACTIVATIONS

Variables	(1) *ln*(Daily Shootings)	(2) *ln*(Daily Shootings	(3) *ln*(Daily Shootings	(4) *ln*(Daily Shootings
FIT Zone Day	-0.133***	-0.140***	-0.214***	-0.222***
	(0.0314)	(0.0342)	(0.0518)	(0.0520)
Treatment Area		-0.0503	-0.0631	-0.196**
		(0.0612)	(0.0596)	(0.0975)
*Treatment Area * FIT Zone Day (Interaction)*		0.0456	0.0488	0.0487
		(0.0868)	(0.0859)	(0.0849)
Constant	0.267***	0.275***	0.317***	0.323***
	(0.0241)	(0.0268)	(0.0890)	(0.103)
Day of the Week FE	No	No	Yes	Yes
Month FE	No	No	Yes	Yes
Year FE	No	No	Yes	Yes
Location FE	No	No	No	Yes
Observations	748	748	748	748
R-squared	0.018	0.019	0.121	0.135

Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

PART V. DISCUSSION

The results above provide mixed evidence on the impact of the FIT Zone program on shooting activity inside the FIT Zone areas, and on whether shooting was displaced from the FIT Zone sites to surrounding areas. One FIT Zone site, Jack Farrell, and area extending 1000 ft. around the site saw a significant decline in shooting after the FIT Zone program was implemented. However, the other FIT Zone site, Martin Luther King, did not see an impact on shooting. In the 500 ft. surrounding the Martin Luther King site, there is evidence of potential spike in shooting. However, because the FIT Zone intervention did not appear to impact the volume of shooting within the FIT Zone site, it is not clear that the spike in the surrounding areas constitutes evidence of spatial displacement. For the Jack Farrell site, which saw the large decline in shooting incidents, little evidence of displacement was found—a finding that comports with previous studies on hot spots policing and spatial displacement.[37] Despite early fears that offenders would just "move around the corner" in response to focused policing interventions, studies that have explicitly examined the question of displacement have largely found little evidence of spatial displacement of crime, especially of violent crime.[38] Conversely, some studies have shown evidence of the *diffusion* of crime control benefits resulting from hot spots policing interventions.[39] In the Jack Farrell site, this study found evidence of this diffusion benefit.

[37] Eck (1993); National Research Council. (2004). *Fairness and effectiveness in policing: The evidence.* W. Skogan & K. Frydl (Eds.). Washington, D.C.: The National Academies Press; Braga, A. A., Papachristos, A., & Hureau, D. (2012). Hot Spots Policing Effects on Crime. *Campbell Systematic Reviews*, 8(8), 1-96; Braga, A. A., & Bond, B. J. (2008). Policing Crime and Disorder Hot Spots: A Randomized Controlled Trial. *Criminology*, 46, 577–607; Bowers, K., Johnson, S., Guerette, R.T., Summers, L., Poynton, S. (2011) Spatial Displacement and Diffusion of Benefits among Geographically Focused Policing Initiatives. *Campbell Systematic Reviews.*

[38] Bowers, Johnson, Guerrette, Summers, and Poynton (2011); Weisburd, D., L. Wyckoff, J. Ready, J. Eck, J.C. Hinkle and F.S. Gajewski. (2006) Does Crime Just Move Around the Corner? A Controlled Study of Spatial Displacement and Diffusion of Crime Control Benefits. *Criminology* 443, 549-591; Braga & Bond (2008).

[39] Bowers et al. (2011).

WHY DID SHOOTINGS DROP IN ONE FIT ZONE SITE AND NOT THE OTHER?

This evaluation did not examine the *mechanisms* underlying the impact of the FIT Zone program on shooting in East Palo Alto. However, it is important to explore potential reasons for why shootings occur in these two areas, and why shootings declined in one place and not the other. Both the physical and social dynamics driving shooting in the FIT Zone sites, as well as the implementation of the intervention itself may hold explanatory power for the results of this evaluation. This discussion is framed around three elements: (i) the dosage, or amount, of the intervention activities in each site, (ii) how well the program was implemented relative to the model; and (iii) the physical characteristics of the environment and social dynamics of both FIT Zone sites.

FIT ZONE IMPLEMENTATION: DOSAGE & FIDELITY

One explanation for the differential impact of the FIT Zone intervention in each of the sites may be related to the *how* the FIT Zone program was implemented in each site. For example, factors such as what intervention activities occurred in each site, the number of residents who participated, the types and intensity of outreach activities, whether police officers were consistently present, and how police officers and health navigators engaged with residents may affect the impact of the FIT Zone program in each site. While a detailed process evaluation was beyond the scope of this evaluation, program activity data collected for the two FIT Zone sites provide some insight into how the implementation of the intervention differed across the sites. The two FIT Zone sites differed in both the number of FIT Zone gatherings held during the period of study, as well as in the number of residents who participated at the FIT Zone gatherings. The Jack Farrell site held more gatherings over the 17-month period than the Martin Luther King site, and on average, participation was higher at all gatherings at the Jack Farrell site than at the Martin Luther King site. It may be the case that the dosage of the intervention (i.e., the number of gatherings held each week and the number of engaged residents who participate) at the Martin Luther King site was not enough to induce a decrease in shootings in that site, whereas the amount of the intervention at the Jack Farrell site might be associated with the reduction in shootings. This assumption was not directly tested in the intervention, but is

offered here as a potential contributing factor for the difference in the impact of the FIT Zone program across sites.

While program activity and participation data show that more gatherings were held and more participants were present at the Jack Farrell site, data on *how* actual gatherings were conducted was inconclusive. Potential differences in how activities were conducted at each site may explain the some of the difference in results. For example, were there differences in the behavior of police officers at each FIT site? Were some officers more engaged with community members than others? Did officers remain at the activity site for the duration of the FIT Zone gatherings? Did police officers have different relationships with community members in one site versus another? Police officers and staff were the same for FIT Zone interventions at both sites, which minimizes some concern over differences in implementation, however more detailed observation of the implementation of the FIT Zone gatherings may yield important insights into *how* gatherings were conducted at each site, and may assist in understanding why the public safety impact of the intervention differed across sites.

Finally, differences in community engagement and outreach in the two FIT Zone sites may play a role in the differential impact of the program between the two sites. While it was not possible to collect systematic information on the outreach activities conducted over the course of the FIT Zone intervention, it is possible that the amount of outreach conducted by the EPAPD and other actors affected the magnitude of the overall treatment effect. Importantly, this could have differed in the two FIT Zone sites. The types of outreach, frequency of outreach and other elements of outreach efforts (such as overcoming language or cultural barriers) may be related to the different rates of participation in each FIT Zone site, and warrants closer examination.

Characteristics of Places

Places are heterogeneous along a range of physical and social domains, and the two sites selected as FIT Zones are no different. The Jack Farrell site is centered on a park located in the middle of a residential area, surrounded by single-family homes on all sides. It is accessible via two different entrances. Activities taking place inside the park, and the park itself, are visible from both the west and the north. The Martin Luther King site differs significantly from the Jack

Farrell site in terms of location, access and visibility of the park. The Martin Luther King Park, where the majority of the FIT Zone activities were held for that site, is located on the eastern edge of East Palo Alto, at the end of a cul-de-sac, adjacent to an open space preserve that neighbors the San Francisco Bay. The park is accessible through only one entrance at the end of the cul-de-sac, and through a smaller entrance through the open space preserve. It is only visible from the entrances.

The two neighborhoods in which the FIT Zone program takes place may also differ along social dynamics, as well. Relationships among residents and relationships between residents and the police department may differ in the two areas, and may impact the success of the FIT Zone program. Research on the social capital of a neighborhood, specifically the "collective efficacy" of a neighborhood, has been shown to be related to the amount of violent crime and victimization in an area.[40] Collective efficacy refers to the "social cohesion among neighbors combined with the willingness to intervene on behalf of the common good."[41] Controlling for other predictors, the greater amount of collective efficacy in a neighborhood, the lower the amount of violent crime.[42] To the degree that mutual trust, common values, and willingness to intervene in criminal behavior (e.g., interceding in an conflict before it escalates to violence) differs in the neighborhood around Jack Farrell park relative to the neighborhood around Martin Luther King, the potential impact of the FIT Zone program may differ as well.

The relationship between the police and communities may be an important factor for citizen compliance with the law and the willingness of communities to control crime.[43] When citizens view police as concerned, respectful and possessing legitimate authority, they are more likely to have favorable attitudes toward the police officers and are more likely to comply with the law.[44]

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[40] R.J. Sampson, S.W. Raudenbush, F. Earls. (1997). Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science*, 277 (5328), 918–924; Morenoff, J., Sampson, R. & Raudenbush, S. (2001). Neighborhood Inequality, Collective Efficacy, and the Spatial Dynamics of Urban Violence. *Criminology* 39(3), 517-58.
[41] Sampson et al. (1997).
[42] Ibid.; Morenoff et al. (2001).
[43] Tyler, T. R., & Fagan, J. (2008). Legitimacy and cooperation: Why do people help the police fight crime in their communities? *Ohio State Journal of Criminal Law, 6*, 231–275.
[44] Ibid.

Police-citizen encounters that are perceived as "legitimate" may indirectly contribute to the control of crime and disorder problems and reduced reoffending within communities.[45] While examining police-community relationships was beyond the scope of this evaluation, the tenor of the relationship between the EPAPD and residents in each hot spot may differ. This difference may relate to levels of participation and visibility of the FIT Zone program at each site.

Criminological theory may lend insight into why the visible presence of police or other residents and levels of collective efficacy may be important to criminal offending in a certain place. One useful framework for understanding why crime happens in certain places and not others is "routine activity theory," which focuses on the environmental context of crime and the risks of victimization/criminal offending in particular places. Routine activity theory posits that in order for a crime to occur, three elements must converge in space and time: (i) a motivated offender who intends to commit a crime, (ii) a suitable target for the offender (e.g., a person or property), and (iii) the absence of a "capable guardian," who might otherwise stop the crime from happening (e.g., a security guard or business owner). With these three basic elements, routine activities theory argues that as motivated offenders go about their daily routines, they come across different criminal opportunity structures – the convergence of the offender and a suitable target – and make decisions about whether to commit a crime based on the perceived value of the target and the presence or absence of a capable guardian.[46] Many crime problems are a combination of either repeat offenders, repeat victims, and repeat locations.[47] Analysis using routine activity framework has been employed by researchers and police departments alike to identify which dimension of the crime problem is most dominant. These analyses have led to the development of interventions geared at changing the criminal opportunity structures

[45] Jackson, J., Bradford, B., Stanko, B., & Hohl, K. (2012). *Just authority? Trust in the police in England and Wales*. Abingdon, UK: Routledge.; Mazerolle, L., Bennett, S., Davis, J., Sargeant, E., & Manning, M. (2013). Legitimacy in policing: A systematic review. *Campbell Systematic Reviews, 1*.
[46] Cohen, L. E., & Felson, M. (1979). Social change and crime rate trends: A routine activity approach. *American Sociological Review*, 588-608.
[47] Braga, A. A., & Weisburd, D. (2010). *Policing problem places: Crime hot spots and effective prevention*. Oxford University Press.

in certain places (e.g., through target hardening or addressing repeat offenders) with varying degrees of success.[48]

A key underlying assumption of the FIT Zone program is that the visibility or presence of police officers and residents engaging in pro-social activities in public spaces may lead to a decrease in criminal activity in those areas. Implicitly, this intervention targets the absence of capable guardians in the two shooting hot spots. Capable guardians have been thought of as "the physical or symbolic presence of an individual (or group of individuals) that acts (either intentionally or unintentionally) to deter a potential criminal event."[49] Adding police officers or residents in public spaces can be conceived of as adding capable guardians of the FIT Zone areas, which may change the opportunity structure for motivated offenders in the FIT Zone sites. This might function in several ways that act on potential offenders' real or perceived risks of getting caught. First, the visible presence of additional police officers or residents in the immediate time before, during or after FIT Zone gatherings acts as an indicator of the real increase in the probability of being apprehended. Visible police officers may have potential general deterrent effect on offenders who might otherwise engage in shooting activity or an incapacitation effect for those apprehended during these times. Second, the visibility of officers and residents during these times acts as a signal to potential offenders that the perceived risks of getting caught have increased. The degree to which the "motivated offenders," or those who might otherwise be inclined to engage in gun violence, perceive there to be an increase in guardianship of the FIT areas may be related to their proclivity to engage in criminal activity.

While the research literature on guardianship and crime is not as well-developed as other aspects of the routine activity literature, several studies have found significant effects of guardianship on crime reduction.[50] Cohen and Felson (1979), who first proposed the routine activity theory, found that increased levels of guardianship are related to lower levels of

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[48] Clarke, R. V. G. (Ed.). (1997). *Situational Crime Prevention*. Criminal Justice Press.
[49] Hollis-Peel, M., Reynald, D., van Bavel, M., Elffers, H., and Welsh, B. (2011). *Guardianship for Crime Prevention: A Critical Review of the Literature.* Crime, Law and Social Change, 56 (1),53-70.
[50] Sampson, R., Eck, J.E., & Dunham, J. (2010). Super controllers and crime prevention: A routine activity explanation of crime prevention success and failure. *Security Journal,* 23(1), 37-51.

crime.[51] Lynch and Cantor (1992) found that, increased guardianship at the block-level, was associated with a significant decrease in burglary. The authors also found that daytime occupancy had a significant effect on crime while nighttime occupancy did not, indicating that guardianship may operate differently during different times of day.[52] In the FIT Zone program context, the difference in dosage of the intervention, discussed earlier, as well as the difference in physical characteristics of each site (access, visibility, location) may contribute to or inhibit the development of guardianship over each site. Importantly, the social dynamics of the two FIT Zone areas, including neighborhood collective efficacy and perceptions of police legitimacy, may be qualitatively different, and the underlying dynamics driving shooting in one area may be different than the dynamics in another.

PROGRAM IMPLICATIONS

This evaluation sought to examine the impact of East Palo Alto Police Department's Fitness Improvement Training Zone program on shootings in the East Palo Alto. The evaluation found evidence of a significant decrease in shooting activity in the Jack Farrell FIT Zone site, but no evidence of a change in shooting activity around the Martin Luther King site. Further, the evaluation found evidence of a possible diffusion of crime control benefits in the area extending for 1000 ft. around the Jack Farrell site. However, the evaluation also found evidence of an increase in shooting activity in the immediate area around the Martin Luther King site.

This evaluation points to the promise of the FIT Zone program to impact public safety, but highlights the need to pay careful attention to the underlying characteristics of a place when developing and implementing a crime control intervention, as well as to the fidelity of implementation of an intervention in multi-site programs. Importantly, the FIT Zone program, or similar interventions aimed at changing the levels of "guardianship" of a place, should:

[51] Cohen, L.E. & Felson, M. (1979). Social change and crime rate trends: A routine activity approach. *American Sociological Review*, 44(4), 588-608.
[52] Lynch, J.P. & Cantor, D. (1992). Ecological and behavioral influences on property victimization at home: Implications for opportunity theory. *Journal of Research in Crime & Delinquency*, 29(3), 335-362.

- *Analyze underlying drivers of shooting in hot spots.* The characteristics, both social and physical, that are conducive to crime in one place may be quite different from the characteristics of another place. Future public safety and public health intervention strategies should be targeted as closely as possible to the dominant drivers of crime (e.g., presence of motivated offenders, frequency and type of contact with potential targets, and extent of pre-existing guardianship of a place, and physical characteristics of an area that contribute to crime, etc.).

- *Choose the location of intervention activities carefully*. Physical characteristics of the environment including ease of access, visibility of intervention, and distance from the center of a crime hot spot should be considered carefully for programs targeting "guardianship" of a place. A more visible presence of positive community activities in public spaces, as well as positive interactions between the police and residents, may be important to signaling the presence of capable guardians in places.

- *Monitor the fidelity of program implementation and capture outcome data on perceptions of guardianship and police-community interactions.* Although program activities are monitored by the Warren Institute and the EPAPD, ongoing monitoring should be bolstered with systematic observation of police-community interactions during program activity times, and at times outside of the FIT Zone gatherings. Social observations, resident satisfaction or feedback surveys, and other methods of capturing these data has the potential to enrich our understanding of *how* the FIT Zone intervention impacts public safety and *why* the program appeared to lower shooting in one location, but not the other.

In sum, this evaluation found that the FIT Zone Program strategy of community engagement with fitness and health activities has the potential to impact public safety in positive ways.

BIBLIOGRAPHY

Babey, S. H., et al. (2011). A patchwork of progress: Changes in overweight and obesity among California 5th-, 7th-, and 9th-graders, 2005-2010. UCLA Center for Health Policy Research and California Center for Public Health Advocacy.

Braga, A. A., Weisburd, D. L., Waring, E. J., Mazerolle, L. G., Spelman, W. & Gajewski, F. (1999), Problem-oriented policing in violent crime places: A randomized controlled experiment. *Criminology*, 37 (3), 541-580.

Braga, A. A., & Bond, B. J. (2008). Policing Crime and Disorder Hot Spots: A Randomized Controlled Trial. *Criminology*, 46, 577–607.

Braga, A. A., & Weisburd, D. (2010). *Policing problem places: Crime hot spots and effective prevention*. Oxford University Press.

Braga, A. A., Papachristos, A., & Hureau, D. (2012). Hot Spots Policing Effects on Crime. *Campbell Systematic Reviews*, 8(8), 1-96.

Brantingham, P.L. & Brantingham, P.J. (1993) Toward a Pattern Theory of Crime. *Advances in Criminological Theory* 5, 259-294 .

Bowers, K., Johnson, S., Guerette, R.T., Summers, L., Poynton, S. (2011) Spatial Displacement and Diffusion of Benefits among Geographically Focused Policing Initiatives. *Campbell Systematic Reviews.*

Bowers, K. and Johnson, S. (2003). Measuring the Geographical Displacement and Diffusion of Benefit Effects of Crime Prevention Activity. *Journal of Quantitative Criminology* 193, 275-301

Clarke, R. V. G. (Ed.). (1997). *Situational Crime Prevention*. Criminal Justice Press.

Cohen, L.E. & Felson, M. (1979). Social change and crime rate trends: A routine activity approach. *American Sociological Review*, 44(4), 588-608.

Diamant, A.L., Babey, S.H., Wolstein, J. and Jones, M. (August 2010). Obesity and Diabetes: Two Growing Epidemics in California, UCLA Center for Health Policy Research.

Eck, John E. (1993). The Threat of Crime Displacement. *Criminal Justice Abstracts* 253, 527-546.

Federal Bureau of Investigation. (2012). Crime in the United States, 2012. Available at: http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/

Guerette, R. T., & Bowers, K. J. (2009). Assessing the extent of crime displacement and diffusion of benefits: a review of situational crime prevention evaluations*. *Criminology*, 47(4), 1331-1368.

Haynie, Dana L., Richard J. Petts, David Maimon, and Alex R. Piquero. (2009). Exposure to Violence in Adolescence and Precocious Role Exits. *Journal of Youth and Adolescence* 38(3), 269-86

Hollis-Peel, M., Reynald, D., van Bavel, M., Elffers, H., and Welsh, B. (2011). *Guardianship for Crime Prevention: A Critical Review of the Literature.* Crime, Law and Social Change, 56 (1),53-70.

Jackson, J., Bradford, B., Stanko, B., & Hohl, K. (2012). *Just authority? Trust in the police in England and Wales*. Abingdon, UK: Routledge.

Lynch, J.P. & Cantor, D. (1992). Ecological and behavioral influences on property victimization at home: Implications for opportunity theory. *Journal of Research in Crime & Delinquency*, 29(3), 335-362.

Margolin, G. and Gordis, E.B. (2000) "The Effects of Family and Community Violence on Children." *Annual Review of Psychology* 51:445-79.

Mazerolle, L., Bennett, S., Davis, J., Sargeant, E., & Manning, M. (2013). Legitimacy in policing: A systematic review. *Campbell Systematic Reviews, 1.*

Morenoff, J., Sampson, R. & Raudenbush, S. (2001). Neighborhood Inequality, Collective Efficacy, and the Spatial Dynamics of Urban Violence. *Criminology* 39(3), 517-58.

National Research Council. (2004). Fairness and effectiveness in policing: The evidence. W. Skogan & K. Frydl (Eds.). Washington, D.C.: The National Academies Press .

Sampson, R., Raudenbush, S.W., Earls, F. (1997). Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science*, 277 (5328), 918–924 .

Sampson, R. J., Jeffrey Morenoff, and Thomas Gannon-Rowley. (2002). Assessing Neighborhood Effects: Social Processes and New Directions in Research. *Annual Review of Sociology*, v28: 443-478.

Sampson, R., Eck, J.E., & Dunham, J. (2010). Super controllers and crime prevention: A routine activity explanation of crime prevention success and failure. *Security Journal*, 23(1), 37-51.

Tyler, T. R., & Fagan, J. (2008). Legitimacy and cooperation: Why do people help the police fight crime in their communities? *Ohio State Journal of Criminal Law, 6*, 231–275.

U.S. Census Bureau: State and County QuickFacts, East Palo Alto.

Weisburd, D., L. Wyckoff, J. Ready, J. Eck, J.C. Hinkle and F.S. Gajewski. (2006). Does Crime Just Move Around the Corner? A Controlled Study of Spatial Displacement and Diffusion of Crime Control Benefits. *Criminology* 443, 549-591.

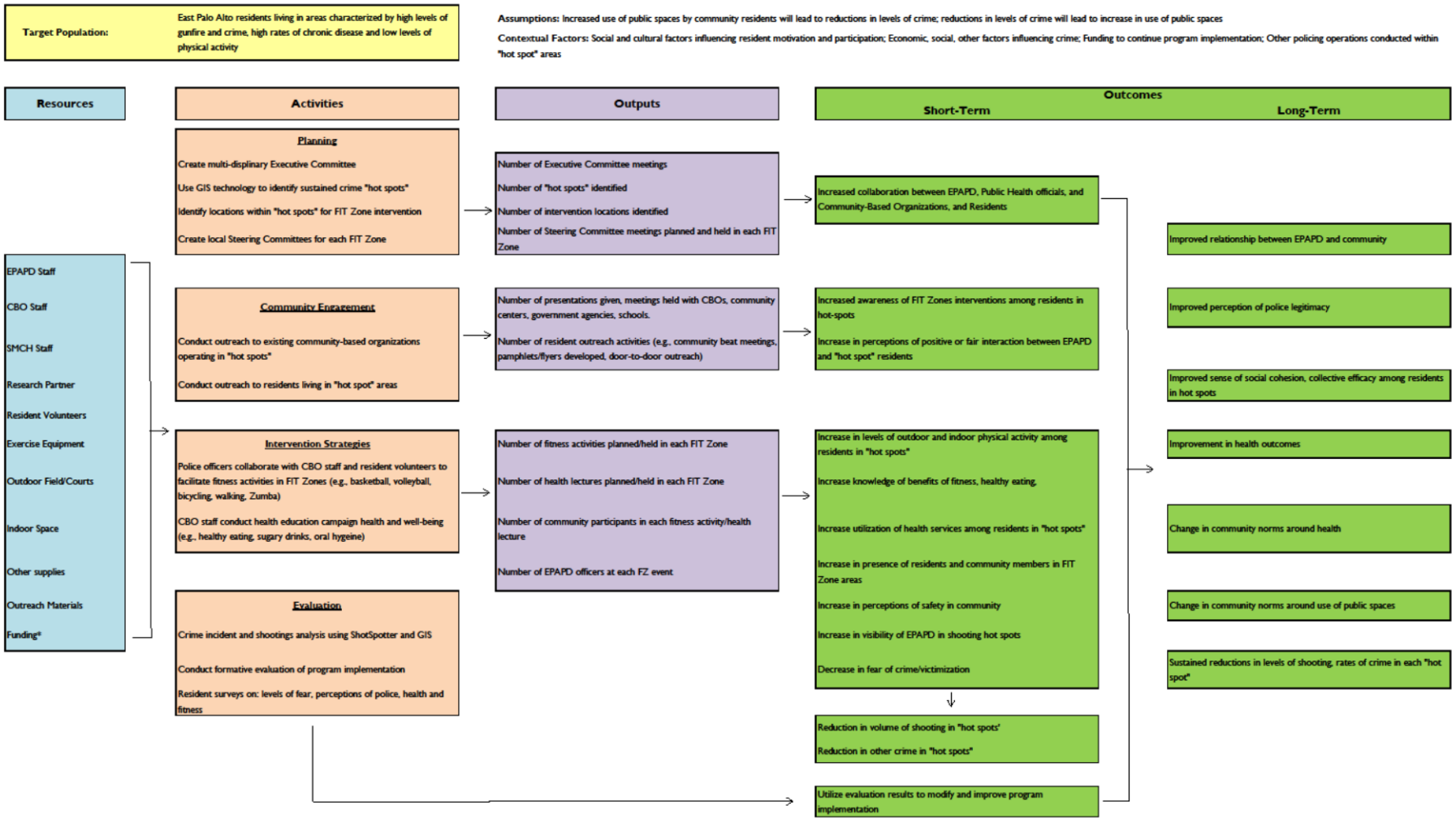
Weisburd, D., and Green, L. (1995a). Measuring immediate spatial displacement: Methodological issues and problems. In: Eck, J. E., and Weisburd, D. (eds.), Crime and Place. Crime Prevention Studies (Vol. 4), Criminal Justice Press, Monsey, NY.

Weisburd, D., and Green, L. (1995b). Policing drug hot spots: The Jersey City drug market analysis experiment. *Justice Quarterly* 12(4): 711–735.

APPENDIX A. FIT ZONE PROGRAM LOGIC MODEL

East Palo Alto Police Department Public Health/Public Safety Intervention (Fitness Improvement Training Zones)

Program Logic Model



*Note: Funding for the FIT Zone intervention is provided by the California Endowment, the East Palo Alto Police Department, and in-kind donations of staff time and resources by several community based organizations in East Palo Alto.

APPENDIX B. REGRESSION MODELS

To estimate the impact of the FIT Zone program on shootings, as well as to estimate potential displacement or diffusion effects, I estimated a series of difference-in-difference models in a regression framework. I constructed two monthly panel dataset of shooting activations in locations. The full regression model is below:

$$\ln(SHOTS)_{it} = \alpha_i + \beta_1 Post_t + \beta_2 Treatment_{it} + \beta_3 Treatment_i * Post_t + \beta_4 Buffer1_i * Post_t + \beta_5 Buffer2_i * Post_t + \beta_6 Buffer3_i * Post_t + Place_i + Time_t + \varepsilon_{it}$$

where the dependent measure, $ln(SHOTS)_{it}$, is the natural log of monthly count of shooting activations in place *i* and time *t*; $Post_t$ is a dummy variable coded 1 for the months after the FIT Zone implementation date and 0 otherwise; $Treatment_i$ is a dummy variable coded 1 if the place *i* is a treatment area and 0 otherwise; $Treatment_i * Post_t$ is the interaction term, coded 1 if the place *i* is a treatment area and is after the FIT Zone implementation date and 0 otherwise; $Buffer1_i * Post_t$ is an interaction term coded 1 if the observation falls within the first buffer area (500ft) and is in the months post-implementation; $Buffer2_i * Post_t$ is an interaction term coded 1 if the observation falls within the second buffer area (1000ft) and is in the months post-implementation; $Buffer3_i * Post_t$ is an interaction term coded 1 if the observation falls within the third buffer area (1500ft) and is in the months post-implementation; $Place_i$ represents fixed effects for location *i;* and $Time_t$ represents a full set of month and year time fixed effects, to control for seasonality and longer-term secular trends in crime. ε_{it} is the disturbance term.

The fixed effects for location control for all location-specific time-invariant characteristics that could impact the monthly count of shootings over and above the FIT Zone intervention, while the inclusion of month and year fixed effects control for secular long-term trends in crime and control for seasonal variation in shootings. Further, the inclusion of month fixed effects reduces some of the error variance due to the change in instrumentation over the course of the study period.

APPENDIX C. REGRESSION RESULTS, 260 FT. BUFFER AREAS

TABLE 10. DIFFERENCE-IN-DIFFERENCE REGRESSION RESULTS, COMBINED, 260 FT. BUFFERS

Model	(1) OLS	(2) LSDV	(3) LSDV	(4) LSDV	(5) LSDV
Variables	ln(Monthly Shootings)	ln(Monthly Shootings)	ln(Monthly Shootings)	ln(Monthly Shootings)	ln(Monthly Shootings)
Post	0.649***	0.654***	0.676***	0.727***	0.745***
	(0.0903)	(0.0758)	(0.118)	(0.120)	(0.133)
Treatment	-0.509***	-0.191	-0.182	-0.00682	0.0553
	(0.0644)	(0.124)	(0.123)	(0.131)	(0.194)
*Treatment*Post (Interaction)*	-0.332*	-0.329*	-0.341**	-0.514***	-0.577***
	(0.186)	(0.170)	(0.140)	(0.155)	(0.206)
*260 ft. Buffer * Post (Interaction)*				-0.183	-0.247
				(0.177)	(0.223)
*520 ft. Buffer * Post (Interaction)*				-0.0372	-0.100
				(0.168)	(0.215)
*780 ft. Buffer * Post (Interaction)*				-0.423**	-0.486**
				(0.175)	(0.221)
*1040 ft. Buffer * Post (Interaction)*				-0.498***	-0.561***
				(0.163)	(0.212)
*Control 260 ft. Buffer * Post (Interaction)*					0.0858
					(0.243)
*Control 520 ft. Buffer * Post (Interaction)*					-0.249
					(0.261)
*Control 780 ft. Buffer * Post (Interaction)*					-0.231
					(0.244)
*Control 1040 ft. Buffer * Post (Interaction)*					0.0734
					(0.279)
Constant	1.523***	2.124***	2.435***	2.380***	2.362***
	(0.0342)	(0.0979)	(0.123)	(0.125)	(0.138)
Month FE	No	Yes	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Location FE	No	No	Yes	Yes	Yes
Observations	844	844	844	844	844
R-squared	0.139	0.328	0.443	0.452	0.454

Robust standard errors in parentheses

**** p<0.01, ** p<0.05, * p<0.1*