ASSESSING THE IMPACT OF INCREASED POLICE OFFICER PRESENCE IN MICRO HOT SPOTS

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ABSTRACT

Crime reduction is a central role of policing in America. To better facilitate an understanding of a hot spot policing approach, the current study defines the specific policing style and how it was used throughout the duration of the project. With this in mind, the Kansas City Missouri Police Department (KCPD) implemented a hot spot policing strategy in the East Patrol Division, which is known for its high volume of calls for service and violent crimes year around. This effort was part of the Kansas City Strategies for Policing Innovation (SPI) that ran from 2017 through 2019. The study specifically sought to provide enough evidence to support this policing style beyond the finality of the project. Sixteen micro hot spots were identified using two years of crime and call for service data from the KCPD. Randomization assigned the hot spots to the treatment or control areas. Specifically included in the thesis are five treatment areas alongside six control areas. The treatment period consisted of a 60-day period with two different shift times for officers deployed to the treatment areas. Analysis and Results are discussed to better understand the impact of the intervention. Policy implications and future research are also discussed.

APPROVAL PAGE

The faculty listed below, appointed by the Dean of College of Arts and Sciences, have examined a thesis titled "Assessing the Impact of Increased Police Officer Presence In Micro Hot Spots," presented by Bridgette Marie Bryson, candidate for the Master of Science degree, and certify that in their opinion it is worthy of acceptance.

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CHAPTER 1

INTRODUCTION

Crime reduction is a central role of policing in America. Over time, there have been many different types of policing implemented and studied. However, this thesis will focus on a hot spot policing approach. Before describing hot spot policing, it is important to establish the foundation of policing and how it led to this specific form of policing. Weisburd and Eck (2004) describe the struggles that law enforcement faces every day in addressing crime, especially violent crime. The 'standard model' of policing is an approach that has drawn criticism over the years and has been described as ineffective. Due to the "one size fits all" approach that this model of policing employs, its focus has not been on reducing crime, but rather on the allocation of policing resources. To better focus on the reduction of crime, especially violent crime, different forms of policing have branched off from this standard model. The form discussed in this thesis is hot spot policing, which is just one of the new strategies that aim to fix the problems within the standard model.

Hot spot policing is a specific type of policing that has been defined in many different ways throughout the literature. An overarching description is a form of policing that adds police resources in very concentrated geographic areas and in return seeks to reduce crime in the specific area. Hot spot policing came from the standard model and added police resources trying to reduce crime. This type of policing is not exactly like the standard model, however there have been studies to show that it can work and should be researched further (Telep & Weisburd, 2014; Braga, Weisburd, Waring, Mazerolle, Spelman, & Gajewski, 1999; Weisburd & Green, 1995; Mazerolle, Price, & Roehl, 2000; Braga & Bond, 2008; Taylor, Koper, & Woods, 2011; Ratcliffe, Taniguchi, Groff, & Wood, 2011).

Hot spot policing has taken a variety of forms, including problem-oriented policing, foot-patrol, offender focused, and others. However, the most common method of hot spot policing employed is simply increasing the level of police presence in small geographic areas. In other words, an increase in officer 'dosage' in hot spots yields crime reduction benefits. Koper (1995) suggests that when using this approach, a 15-minute threshold should be met of time spent in the area. This threshold helps to maximize resources without losing benefits by not being there long enough or by being there for too long. This increased police dosage can have measurable impacts if implemented correctly in the micro areas.

With this in mind, the Kansas City Missouri Police Department (KCPD) implemented a hot spot policing strategy in a patrol district that experiences a high level of violent crime. This research will examine the impact of a 'micro hot spots' policing initiative in the East Patrol Division of KCPD. This effort was part of the Kansas City Strategies for Policing Innovation (SPI). This SPI study, and the innovation it examines, is funded by a grant provided by the Bureau of Justice Assistance's Strategies for Policing Innovation program. The East Patrol Division area is known for its high volume of calls for service and violent crimes year-round, making it a particularly suitable environment to implement and evaluate the impact of hot spots policing. There have been many efforts that were previously implemented in this area to try to combat this issue. However not all have been successful, and none of these efforts were being implemented at the same times or in the same places as the hot spot effort. This study seeks to provide enough evidence to support the use of the micro hot spot approach beyond the duration of this project. The SPI project was implemented in 2017 with plans to end in 2019 and seeks to find out how hot spot policing

can help in this area by employing hot spots, as well as control hotspots to measure the effectiveness of increased patrol in these areas.

The goal of the intervention is to reduce violent crimes in highly violent areas. To do this, sixteen micro hot spots were identified using two years of crime and call for service data from the KCPD.[1] These sixteen areas were randomly assigned to treatment and control groups. The first group consisted of the control areas in the project where there were no enhancement policing activities. The second group consisted of the directed patrol hot spots (DPHS). The current research will examine the impact of DPHS on crime.

The micro hot spots are very small areas that were selected based on certain criteria. The area of each of the micro hot spots is .25 square miles. They were identified from the Kansas City Police Department's records of areas with historically high levels of crime. The calls for service from both 2015 and 2016 were used to define these areas that were going to be labeled as the micro hot spots, and 2016 data were weighted more heavily because they are more recent than the data from 2015. This meant that any areas that were no longer experiencing high volumes of crime or were not actually areas of high crime were excluded. Before random assignment, hot spots were visually inspected to determine whether they were adequate for policing intervention. For instance, hospitals could have shown up due to the number of calls made to the police there to report gunshots or other injuries that require reports to be made. A hospital is not an area of high crime; it is just an area that is required to make many calls to the police. After the micro hot spot areas were chosen, they were randomly assigned to the different groups to eliminate bias. They were equally distributed between the treatment conditions and the control condition. After being distributed to the

[1] It is important to note that 'hot spots' and 'micro hot spots' have sometimes been used interchangeably within the research and application of this strategy.

groups, buffer zones were then created to capture any geographic displacement that might have occurred. It was very important to make sure that no hot spots or buffers were overlapping anywhere on the map. While there is no universally accepted definition of how large buffer zones should be, the current research utilized the recommendation first forwarded by Green (1995) of approximately two city blocks.

For Directed Patrol Hot Spots (the treatment group referenced by SPI staff as 'Group B') there was an enhanced police presence in the areas assigned to this treatment condition. Certain officers were chosen to be designated for the specific shifts that relied solely on adding police presence in micro areas in hopes of reducing violent crimes in violent areas. In accordance with Koper's (1995) suggestion, the added police presence was on average required to be fifteen-minute periods. Officers were not supposed to intervene in the area unless a crime was occurring or something required their attention; however; officers were not given any specific direction on what they did while at hot spots. Therefore, this evaluation will determine whether the quantity (or dosage) of police presence impacted crime, and does not attempt to evaluate the impact of specific policing activities (e.g., foot patrol, problem-solving, community policing, crackdowns, etc.) The data from the officers patrolling the Directed Patrol Hot Spot (DPHS) areas will then be compared to the control areas to determine whether or not the directed patrol approach had an impact on crime in these violent areas.

In this study, the unit of analysis is micro hot spots of violent crime. The treatment is enhanced directed patrol in hot spots over 60 days. Fidelity of this treatment was monitored by observations of officers in the hot spots, reconciliation of information from Computer Aided Dispatch (CAD) (a comparison of KCPD's records on the number of visits in the areas

compared to the researcher's field notes), and debriefing officers. The outcome variables are crime and calls for service in the hot spots.

Finally, the analysis will also include strategies to detect harmful displacement of crime. Spatial displacement of crime is a threat in all place-based crime prevention strategies, and if present, can compromise the total net effect of policing strategies. To account for this displacement, buffer zones were created surrounding hot spots and conscious efforts were made to account for any possible displacement of crime when interpreting the effects of the strategy.

Next, this thesis will present an overview of hot spot policing, different studies used to evaluate this approach, the issue of displacement, and the idea of the 'Koper Curve'. Then this thesis will describe the details of the methodological approach and analytic plan. Finally, the results of the study are presented alongside a discussion of these results.

CHAPTER 2

REVIEW OF LITERATURE

This chapter will present an overview of the history of hot spots policing and what we know about this policing innovation today, by looking at many studies previously conducted in cities across the country. Next, it will look at the work of Koper (1995) in regards to his "Koper Curve" and how it deems what officers should or should not be doing in hot spots, as well as the length of time they should be in the area. Lastly, this chapter will introduce displacement and how it is perceived in the law enforcement industry, as well as how statistically significant it has been in the past or will be in the future.

What Is Hot Spots Policing?

Sherman, Gartin and Buerger (1989) first observed crime and disorder concentration in small geographic units of analysis. They noted that more than 50% of calls for crime and disorder in Minneapolis occurred in just 3% of all places (including parcels, street segments, and intersections). Sherman and colleagues referred to these areas as 'hot spots' of crime. Subsequently, policymakers labored to identify strategies that could be implemented in hot spots to reduce crime, reasoning that concentrating efforts in hot spots would be both an effective and efficient use of resources. The connection between hot spots and policing efforts is, therefore, inevitable. This type of policing has been defined in many different ways by different distinguished scholars, all for different reasons (Sherman, Williams, Ariel, Strang, Wain, Slothower, & Norton, 2014). Weisburd and Telep (2014) defined the areas for this type of policing strategy as 'micro-units of geography' or smaller units of an area that are experiencing high volumes of crime. In Sherman and Weisburd's (1995) article they "defined hot spots operationally as small clusters of addresses with frequent 'hard' crime calls as well

as substantial 'soft' crime calls for service" (Sherman & Weisburd, 1995, p. 630; Reiss 1985). Just like Sherman et al. (2014) said, Telep, Mitchell, and Weisburd (2014) explained that the definition does vary. However, it typically involves very concentrated geographic areas that have high levels of crime. This could include street blocks, or it could also include groups of these blocks. These definitions are just a few of the definitions of micro hot spots that distinguished scholars have used in previous studies.

To fully understand how to combat crime by using a hot spot policing approach, it is important to understand the theoretical foundation that helped to establish this approach. Cullen, Agnew, and Wilcox (2014) discuss Routine Activities Theory with three criteria for when crimes of opportunity occur:

1) motivated offenders,
2) suitable targets, and
3) the absence of capable guardians (p. 470).

This theory suggests that altering one of these elements can assist in the reduction of crime. Hot spot policing aims to add police presence, therefore altering the level of capable guardianship. The police cannot be everywhere at once, therefore deploying officers' resources to high-risk places can reduce crime due to the enhance guardianship that the hot spot policing efforts employs.

What We Know About Hot Spots Policing

In the past few decades, policing has evolved immensely due to ineffectiveness or previous practices. Weisburd and Eck (2004) discussed the ineffectiveness of the 'standard model' of policing and how it has led to many changes within the policing community. They describe the 'standard model' as a practice of policing that uses a "one size fits all" approach.

This specific model focuses on policing more than focusing on reducing crime and therefore, has drawn much criticism. What the critics mean by this, according to Weisburd and Eck (2004) is that this type of policing generally has an approach that believes fits all types of crimes across all areas. This can draw criticism because different cities have different demographics and different types of crimes that occur at very different rates, Therefore, an approach that seeks to reduce crime without taking these demographics into account is not as efficient. An improvement to this model is hot spots policing. Hot spots policing is just one of the new policing strategies developed from the ineffectiveness of the previous model. "This new openness to innovation and widespread experimentation in new practices were part of a renewed confidence in American policing that could be found among not only police professionals but also scholars and the general public" (Weisburd & Eck, 2004, p. 43). Regaining confidence among not only the officers but also the community is a huge step in a positive direction for policing.

Hot spots policing is a 'place-based policing' approach that links together certain small areas and focuses resources strictly in those areas (Telep & Weisburd, 2014; Weisburd & Telep, 2014). At the time, hot spots policing was being conducted in different areas and assessed by different studies. One study that examined random patrol was the KC Preventive Patrol Experiment (KCPPE) (Kelling, Pate, Dieckman, & Brown, 1974). The KCPPE sought to analyze how effective routine preventive patrol could be. This analysis was based on 15 beats that employed routine preventive patrol. According to Kelling et al. (1974), "The experiment found that the three experimental patrol conditions appeared not to affect crime, service delivery and citizen feelings of security in ways the public and the police often assume they do" (p. 3). Due to this study, many researchers now believed that random patrol

approach was not effective or beneficial to a police department. This is particularly frustrating because patrol was referenced as the backbone of policing (Kelling et al., 1974), and the core crime prevention tool in the officer's tool belt.

However, this study had many methodological limitations that masked any impact that policing scholars were hoping to see. Sherman and Weisburd (1995) discussed the statistical and measurement problem of the KCPPE. They concluded that the KCPPE had weak statistical power and that there was no exact determination of the dosage employed in the treatment areas. There were statistical and measurement problems with the KCPPE, specifically there was the bias that was incorporated within the study, while the measurement problem was not accurately measuring how much dosage was actually delivered to each area of treatment. In the hot spots policing context, dosage refers to the number of activities or treatment added to the geographic area. For example, the KCPPE had three different dosage levels. These three dosage levels were the removal of officers from some beats, staffing double in other beats, and no change in staffing in the remaining beats. However, the KCPPE did not report exactly how much police presence was added or removed from the experimental beats. Doubling or removing staffing of officers in these areas did not paint a complete picture of how much treatment or dosage was actually implemented. Therefore, accurately tracking dosage is extremely important to fully understand treatment administered in geographic areas (Kelling et al., 1974). A measurable impact was not found in the study because the dosage was not being accurately recorded. Due to these issues, many scholars were persuaded to believe that the presence of officers in any fashion would not deter crime from the area. Sherman and Weisburd (1995) designed their experiment alongside the Minnesota study mentioned above. This experiment sought to fix the previous

methodological as well as implementation problems and have an impact on the future of policing. Due to these methodological issues, Sherman, Gartin, and Buerger (1989) conducted a study in Minnesota that aimed to better understand the relationship between crime and place, and in doing so, also address the methodological issues related to the KCPPE.

Empirical Examinations of Hot Spots Policing Efforts

Since the KCPPE, there have been many studies that have shown hot spots policing as an effective crime prevention strategy. Braga (2007) conducted a meta-analysis that consisted of an overview of the treatment each study employed, the specific definition the authors used for a 'hot spot' and the research design employed. All of the studies in the analysis were studies specifically targeted to hot spots policing. He concluded the "extant evaluation research seems to provide fairly robust evidence that hot spots policing is an effective crime prevention strategy" (Braga, 2007, p.18). Telep & Weisburd (2014) reviewed some studies that were in this meta-analysis. However, they went into greater detail. Some of the effective studies included the Jersey City Problem-Oriented Policing in Violent Places experiment (Braga et al., 1999), Jersey City Drug Market Analysis Program experiment (Weisburd & Green, 1995), Oakland Beat Health Study (Mazerolle et al., 2000), a problem-oriented policing intervention in Lowell, Massachusetts (Braga & Bond, 2008), an experimental study in Jacksonville, Florida (Taylor et al., 2011), and a study regarding foot patrol in Philadelphia and Kansas City (Ratcliffe et al., 2011; Novak, Fox, Carr, & Spade, 2016). All of the above studies employed hot spots policing in different manners, however, all of the outcomes showed the strategy as an effective movement towards crime prevention.

The following section provides a brief overview of the extant research on hot spots policing in order to place the current study into proper context.

Jersey City Problem-Oriented Policing in Violent Places Experiment

In Jersey City, 24 different areas were determined to be violent crime areas. Problem-oriented policing was implemented by enforcement as well as responses to crime in some situations. This study showed statistically significant changes among the treatment areas (hot spots) when comparing to the control areas. Depending on the exact hot spot, the changes did vary. However, the responses to the study were significant and mostly contained a positive outcome (Braga, 1997; Braga et al., 1999; Braga, Papachristos, & Hureau, 2012; Telep & Weisburd, 2014).

Jersey City Drug Market Analysis Program Experiment

This study employed a problem-solving model that was carried out in a three-stage intervention. The first stage consisted of planning and gathering data on the area. The second stage was the actual implementation stage, where the officers conducted crackdowns at the targeted hot spots. The final stage consisted of the officers trying to maintain the impact their previous treatment had on the areas. A problem-oriented approach was used in 56 hot spot areas identified by certain criteria. This approach was followed by a preventive patrol approach, as well. This study did show a statistically significant impact on calls coming in from the public. However, there was no change in calls related to violent or property crimes. (Braga et al., 2012; Weisburd & Green, 1995; Telep & Weisburd, 2014).

Oakland Beat Health Study

This intervention took a different approach to the hot spots in their treatment area. It examined a civil remedies initiative to try and improve the site. An officer and technician

would visit the sites and make a note of the changes needed. In the areas where the conditions of the property were being improved, there was a statistically significant change in the number of drug calls compared to the control areas, however there was not a statistically significant difference among call types that were not drug calls (Braga et al., 2012; Mazerolle et al., 2000; Telep & Weisburd, 2014).

Problem-Oriented Policing Intervention in Lowell, Massachusetts

This problem-oriented policing strategy was an intervention to address disorder in the city. This 12-month intervention consisted mostly of enforcement alongside some reactive responses in certain situations. There was a statistically significant decrease in crime calls, as well as disorder calls when comparing to the control areas. The study also looked into which hot spots strategies were the most beneficial for a study. They found that a situational prevention strategy had the strongest effect on the outcome (Braga & Bond, 2008; Braga et al., 2012; Telep & Weisburd, 2014). This means that researchers should concern their studies with the "physical, organizational, and social environments that make crime possible" (Telep & Weisburd, 2014, p. 2358).

Experimental Study in Jacksonville, Florida

This study was the first of its kind, as it employed different hot spot treatments. A problem-oriented approach was implemented as well as a directed patrol approach. This study did not show statistically significant changes in crime. However, it did open up the idea that just the increase of patrol in high crime areas may not be the answer. The problem-oriented policing approach did show a slight statistically significant reduction in violent crime on the streets, although the directed patrol approach did not show statistically significant reductions. However, employing other aspects of enforcement along with the

increased patrol may be the future of hot spots policing (Braga et al., 2012; Taylor et al., 2011; Telep & Weisburd, 2014).

Foot Patrol Experiment in Philadelphia and Kansas City

This study examined how foot patrol impacted different hot spots in Philadelphia, Pennsylvania. Ratcliffe et al. (2011) showed that foot patrol does not just decrease the fear of crime happening, but it can help to decrease actual crime if employed correctly. When looking at the treatment areas compared to the control areas, there was a significant decline in violent crimes in the foot patrol areas (Ratcliffe et al., 2011; Telep & Weisburd, 2014). In a similar effort, violent crime areas employed added foot patrol in Kansas City. The results showed that there were decreases in crime even though the impact quickly stopped after the treatment ended. However, this leads to a larger discussion pinpointing that focusing police resources in certain areas can and will lead to decreases in crime in these areas (Novak et al., 2016).

Patrol Beats vs. Hot Spots

Traditionally, police deploy officers within patrol beats. Beats are arbitrary governmentally defined areas within a larger city, and typically are created based on numerous factors including geographic size, population size, neighborhood boundaries, and police workload (e.g., calls for service and crime). Beat boundaries tend to be very stable over time, and police organizations resist altering beat boundaries because there are often significant expenses associated with doing so. Beat boundaries are correlated with Computer Aided Dispatch (CAD) systems, which aid in record keeping as well as dispatching officers; revising CAD systems involves significant costs associated with programming. Additionally, beats have geographic relevance to officers (Herbert, 1997) and officers commonly advise

dispatch and other officers of their location based on beat numbers and nearby intersection. However, hot spots have been increasingly popular as compared to the traditional approach, due to the strategic value of their small size. “Hot spots are smaller than the units that police departments typically use for dividing up patrol resources such as patrol beats, zones, or sectors” (Telep & Weisburd, 2014, p. 2352). This brings up the debate posed in Sherman and Weisburd (1995) of why we should choose to patrol in beats or why we should choose hot spots. They found that employing added presence in very small but highly crime concentrated areas provided the best results, rather than patrolling an entire beat or neighborhood. Research has shown that hot spots tend to stay stable over a period of time (Telep & Weisburd, 2014). They explained that a highly crime concentrated area would be an area that consistently has crime over a period of time, rather than an area that crime comes and goes. Also, the reasoning for focusing on these smaller, highly concentrated areas is because, “analyses tend to show that 50% of calls or incidents are concentrated in less than 5% of places in a city” (Telep et al., p. 907, 2014; see also: Pierce, Spaar, & Briggs, 1988; Sherman et al., 1989).

Types of Treatment and Dosage Levels

Previous studies have not always been specific on exactly what officers should be doing in the treatment areas. There are many different versions of treatment that can be used in a hot spots study: problem-oriented policing, third-party policing, or simply increased police presence for the treatment. Making sure that dosage is measured correctly and accurately becomes increasingly important with these strategies. Telep et al. (2014) conducted a study that examined how officers can optimize directed patrol dosage at hot spots. Some of the critics in the Sacramento Police Department were concerned that

proactivity by officers would decrease because they would be spending too much time in the hot spots rather than having a proactive policing approach. The results of the study reflect the opposite. They show that officers were engaging with the community in the specified areas, thereby creating a very proactive approach (Telep et al., 2014). Those results have helped to shape opinions among officers when concerns with proactivity arise around the talk of future implementation of a hot spots policing approach.

Even though the preponderance of research does show that this type of approach can work, the researchers have not been detailed in regards to exactly what officers should or should not be doing when visiting the hot spots. Future research needs to examine exactly how long an officer should stay in a specified area, how to have a more proactive approach, and whether or not they can still take other calls for service while in one of the treatment areas. Some research has quickly talked about these areas of questions, but Koper (1995) is the only researcher who gives specific guidance in this area.

Koper Curve

In Koper's (1995) study, he set out to answer whether or not there is an optimal length for police to be present at a hot spot and if there is a point when the officer's presence is no longer providing an added benefit to the area. Koper found that stops must hit a threshold of 10 minutes to be effective. Longer than 15 minutes, however, seemed to be an ineffective use of resources and officers' time. He concluded, "the optimal length for police presences is about 14 to 15 minutes" (Koper, 1995, p. 668). Koper's arguments closely align with Sherman's (1990) "crackdown-backoff rotation strategy". Both Sherman and Koper believe that there is a point at which the added presence is not beneficial and resources should be put to better use. Building off of this idea from Sherman, Koper tested this out and

came up with the 10-15 minute threshold that has proven to be an effective strategy within hot spots policing methods.

However, Koper (1995) notes that his study has produced a good baseline of the duration of proactivity stops but it has not clarified exactly what officers are to be doing at hot spots. Weisburd and Telep (2014) set out to answer this question that the Koper curve poses. These medium-length stops are only beneficial if officers are adequately patrolling the areas. In the study conducted in Sacramento, the authors stated, "the experiment in Sacramento was designed to minimize boredom (and maximize effectiveness) by using a rotation strategy in which officers would not be spending long periods in the same place" (Telep et al., 2014, p. 911). The department chose a hot spot policing strategy with the use of the Koper curve because it has shown to be efficient while also being effective. With Koper's recommendations, incorporating these details into a hot spots strategy can help with not only calls but also serious and violent crimes. Agreeing with these points, Telep et al. (2014) explained that after the 15-minute threshold (Koper, 1995) "there were diminishing returns and increased time did not lead to greater improvements in residual deterrence" (Telep et al., 2014, p. 909). The dosage levels are extremely important in a study and Sherman et al. (1995) point out that the failure to have accurate dosage levels alone could have caused the differing results of the KCPPE. The outcomes of a study can be greatly affected if not measured correctly or carried out efficiently.

Even with such success, Koper's (1995) arguments may not always be successful in the overall application to hot spots policing approach. Telep et al. (2014, p. 906) stated that "although not every treatment group hot spot showed declines in calls and incidents, the overall results suggest the benefits of using Koper's (1995) arguments to guide hot spots

policing." While this statement was made in regards to their particular study, it is generalizable across all studies. There may not always be a statistically significant impact showing a decrease in calls or crimes. However, there are many visible benefits that Koper's ideas have shown in studies across the country.

The application of the above arguments into a hot spot policing approach is extremely beneficial. Having correct measures of dosage, meeting the correct threshold of dosage, and employing a proactive approach is essential to the effectiveness of this specific policing method. Even with all of the positives, however, it would be a stretch to say there were not any limitations or criticisms among this method.

The Threat of Spatial (Geographic) Displacement

There are many different types of displacement. However, this chapter focuses on spatial or geographic displacement. Lab (2010) defines this type of displacement as 'territorial displacement,' meaning that crime just moves to a different area. Bowers and Johnson (2003) defined geographic displacement (p. 277) in regards to burglary as "the geographic displacement of crime is said to have occurred when, as the result of some type of intervention or tangible change in a particular target area, offenders modify their criminal behavior such that they choose to commit burglaries that they would have committed in the target area elsewhere." This definition is generalizable to all types of crimes, not just burglary. This type of displacement could be a crucial negative side effect of a hot spots study because it could cause the results to not show a statistically significant change (Bowers & Johnson, 2003). Sherman and Weisburd (1995) also explained that one of the leading arguments against a hot spots policing strategy is that crime will just move from one location to another and the intervention would not have any impact on crime.

Although there are criticisms out there, studies show that displacement is not as prominent as it may seem. "In any case, displacement is merely a rival theory explaining why crime declines at a specific hot spot if it declines" (Sherman & Weisburd, 1995, p. 629). Looking at the meta-analysis conducted by Braga, there was relatively little evidence to suggest that spatial displacement had occurred in the hot spots interventions studied (Telep et al., 2014; Braga, 2007). With so much evidence leaning towards the notion that displacement is not typically statistically significant in evaluations of hot spot policing strategies, this seems to be an area we may not need to worry about as much.

With the chance that displacement does occur, it becomes apparent how difficult measuring displacement can be. Bowers and Johnson (2003) listed the three common issues that coincide with measuring displacement:

1. "-attributing changes in the displacement zones to treatment that has taken place in the intervention area-"
2. "-problem of defining the area to which crime is likely to be displaced-"
3. "-displacement contamination, which occurs when displacement zones overlap with each other, with other treatment areas, or with control groups-" (Bowers and Johnson, 2003, p. 277-278; Weisburd & Green, 1995b).

Researchers have to be cognizant of harmful displacement so they know what to look for and how to measure for its existence. Therefore, buffer zones are crucial to examine within any place-based policing strategy. One strategy to detect spatial displacement is to create a buffer zone (or catchment area) surrounding the treatment area. "The purpose of the buffer zones is to test for any displacement of crime or incidents into the immediate surrounding areas, or (to the contrary) and 'diffusion of benefits' of reduction in crime and disorder in areas

surrounding treatment hot spots" (Gibson, Slothower, & Sherman, 2017, p. 6). Making sure the buffer zone is the right size is also crucial. It is important for the buffer zones not to be so big that the researchers would be unaware of an increase in crime in a specific area. However, they need to be big enough to make certain that a change would be detectable (Bowers and Johnson, 2003). It is important for buffer zones to not overlap or if they do, it needs to be minimally. By keeping them separate, the researchers can note a detectable change if there is one. The extant literature in this area lacks agreement on exactly how large a buffer area should be, though Bowers and Johnson (2003) note that buffer areas that are too small may not adequately detect spatial displacement (false positives), while buffer areas that are too large may not detect displacement occurring (false negatives). While defining buffer areas may be unique to each strategy, commonly adopted buffer areas typically are two city blocks wide (Green, 1995).

Measuring displacement and identifying buffer zones has also led researchers to believe there is a diffusion of crime control benefits occurring in the targeted areas. It is defined as "the spread of the beneficial influence of an intervention beyond the places which are directly targeted, the individuals who are the subject of control, the crimes which are the focus of intervention or the time periods in which an intervention is brought" (Clarke & Weisburd, 1994, p. 169). The National Research Council of the National Academies looked at many different studies for displacement, and the only study that had a statistically significant amount of displacement was the Hope study in 1994. Rather than displacement in the studies, the diffusion of crime control benefits was found to be more prominent and have a larger impact than displacement (Skogan & Frydl, 2004). Even in foot patrol studies, a

diffusion of crime control benefits seems to be apparent after the implementation of the treatment (Novak et al., 2016).

This chapter focused on what we know about hot spot policing and the different studies that have examined this specific approach. Although the KCPPE began the widespread research of this approach, many studies have been implemented since that has shown a focused approach to be effective. However, with focusing on micro areas, the issue of displacement becomes a problem. Therefore it is important to account for that with the use of buffer zones to measure geographical displacement. The next chapter will describe the hot spot strategy implemented in Kansas City and the methodology used to examine its impact.

CHAPTER 3

METHODOLOGY

This chapter discusses the methodology that was used in this study of the KCPD's SPI micro hot spots intervention. The following sections will describe the hypothesis tested, the process of selecting the hot spots, the description of the treatment administered, the data collected, the dependent and independent variables, and the analytical strategy used to understand the outcomes of the study.

The Kansas City SPI project utilized a micro hot spot policing approach designed to lower crime in small, geographically concentrated (high-violence concentration) areas, with a specific focus on the reduction of violent crime calls for service and violent crime offenses. Here, Kansas City applied treatment to micro-geographic units, which is a departure from some traditional criminological references to 'place' (Weisburd, Groff, & Yang, 2012). Smaller micro units represent a more important 'behavior setting' for social activities – certainly more appropriate than arbitrary governmentally defined areas like beats, neighborhoods, or Census tracts. There is a practical rationale for this as well. One of the lessons learned from the KCPPE is that increased officer dosage in large areas is unlikely to generate a crime prevention benefit because people would not likely know that police deployment (or guardianship, in routine activities vernacular) is any different. Therefore, Kansas City adhered more strictly to Weisburd et al.'s (2012) recommendation of micro-geographies. At times this thesis uses the term 'hot spot' and 'micro hot spot' interchangeably for ease of presentation, but to be clear – the geographic unit of analysis was a relatively small area.

Due to the high concentration of crime in the East Patrol Division of KCPD, this division was chosen as the area that efforts were focused in. However, within this division, crime was even more concentrated in smaller areas. Because of this, hot spots were chosen to represent these smaller concentrated areas of crime located within a larger concentrated area of crime. There are six patrol divisions within KCPD, with the focus of this thesis being on the East Patrol Division. According to their 2017 annual report, this division accounted for 36% of criminal homicides, 31% of assaults, and 26% of drug/narcotic offenses across all of KCPD's patrol area. These are just a few crime statistics to show the high numbers of crime in this division. Table 1 describes basic demographics and some social characteristics of this division according to the East Patrol Division's area profile (2012) that were based on the 2010 Census.

Table 1. East Patrol Division 2012 Demographics

Population	82,997	
Race		
White	31,446	37.8%
African American	34,256	41.2%
Hispanic Origin	20,319	24.5%
Other	17,295	20.8%
Housing Units	38,537	
Single Family	30,621	79.5%
Multifamily	7,916	20.5%
Households	30,774	
Family Households	19,361	62.9%
Married Couples	9,800	50.6%
Female Householder, No Husband	7,214	37.3%
Male Householder, No Wife	2,347	12.1%
Non-Family Households	11,413	37.1%
Median Income	$29,705	

Dependent and Independent Variables

In this study, it is hypothesized that the mean number of violent crimes per week will decrease in the treatment areas between pretreatment and the treatment period compared to the control areas. The dependent variables are the average number of crimes and calls for

service reported within the hot spot areas across the times stated above. The independent variable is the focused patrol occurring in the hot spots (treatment areas).

Selection Process of Hot Spots in Treatment and Control Areas

To determine the treatment and control area micro hot spots, violent crime data were pulled from 2015 and 2016. These data were queried by the KCPD analyst designated to the grant for the duration of the study. The analyst weighted the more recent data more heavily than the data that were not as recent. Incident offenses and calls for service were mapped in ArcGIS to help identify 20 potential hot spot areas for the directed patrol treatment. These specific areas were composed of a variety of land uses - (e.g., residences, businesses, apartment complexes). Map Algebra (Spatial Analyst tool within ArcGIS) was used to overlay the calls for service with incident offenses to ultimately create one layer in the weighted form. Next, the analyst used ArcGIS to map and create a kernel density layer.

After creating the kernel density map, the areas that had high concentrations of incident offenses and calls for service were then determined to be hot spots. The hot spots were to be a quarter square mile area that could not overlap with each other. Additionally, these areas had a one-block buffer around them that also could not overlap with (or be immediately adjacent to) one another. Face blocks, which divided the boundary where backyards were to keep the street intact, were used in this process. This is a minor, but important detail – often arbitrary governmental boundaries (such as beat boundaries) run along street centerlines. This creates challenges when reporting crime rates in geographic areas because incidents occurring on opposite sides of the street may be attributed to entirely different beats. The utilization of face blocks rather than street centerlines mitigates this problem. Buffer areas were created to help measure for any evidence of displacement during

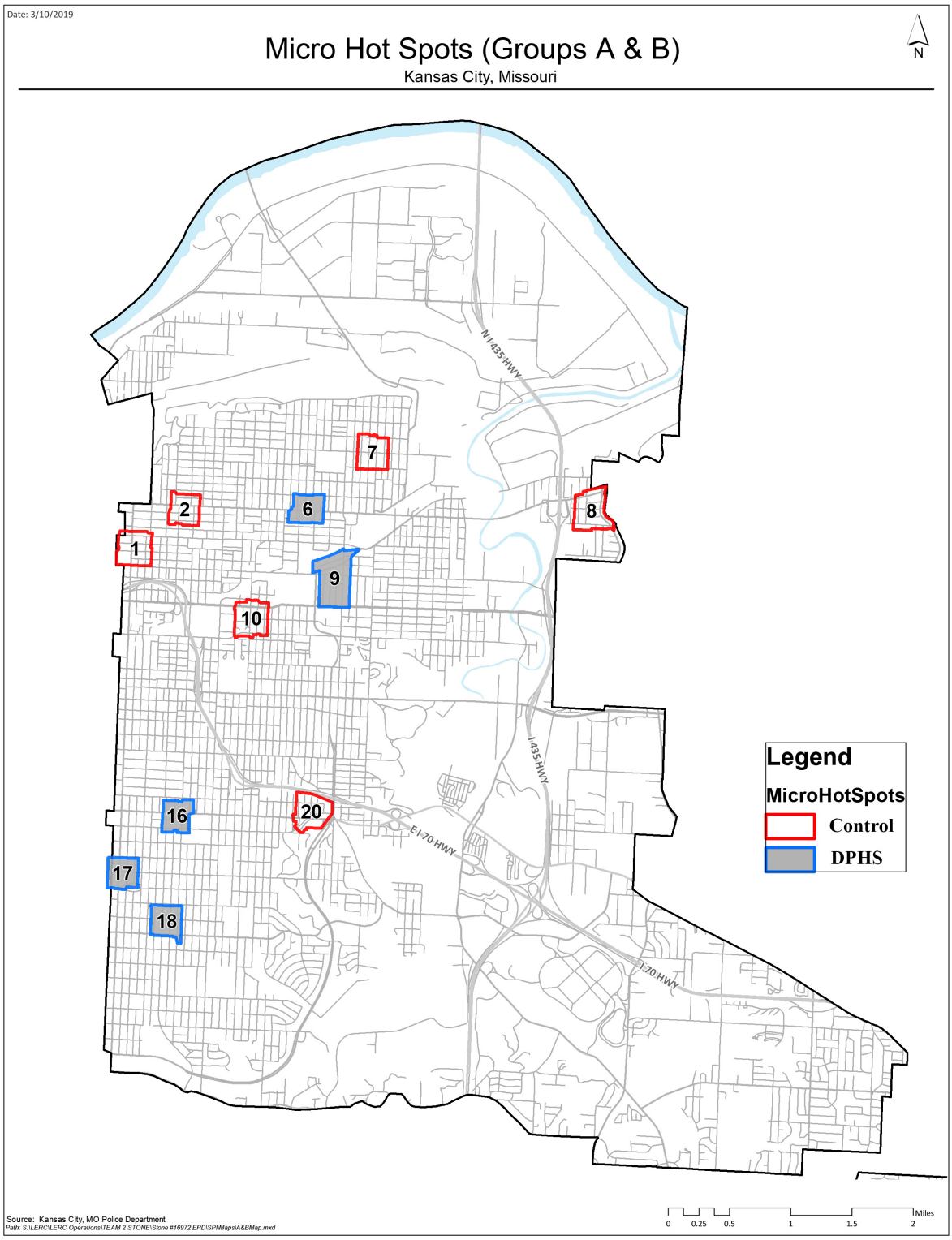
the treatment period, as well as after the treatment period. Buffer areas were about two city blocks in length, or about 650'.

After the mapping process and coming up with 20 potential hot spots, each hot spot was assigned a number between 1 and 20 for tracking purposes (these labels do not reflect how 'hot' or how much crime historically occurred within the hot spot, i.e., hot spot 1 does not have more crime than hot spot 2). Then – the team (consisting of two researchers, two police officers, and an assistant prosecutor) conducted visual inspections to ensure that none of these were areas where the crime was not represented factually. For example, a hospital has to report offenses and would, therefore, have a skewed number of calls and offenses. This could be highly concentrated by definition, but should not be included as a hot spot area in this study. After visual inspection, four of the 20 areas were excluded as unsuitable for the strategy.

The last step in the selection process was a meeting to determine the hot spots as well as assign them to their respective groups. A random number table was used to determine if the areas were to be designated to one of the treatment groups or the control group. It should be noted that the current study is part of a larger research project that includes two different treatments: 1) directed patrol hot spots, which is the focus of this thesis, and 2) network-based intervention, where individuals within deviant social networks operating in a hot spot were targeted for intervention with enhanced enforcement and/or access to services and social resources. Due to the fact the latter treatment is part of an ongoing strategy, this thesis will only examine the former treatment. Six areas were assigned to the control group while five areas were assigned to the hot spot policing group, and five additional hot spots were selected for network-based intervention. Areas 1, 2, 7, 8, 10, and 20 were selected as the

control areas, while areas 6, 9, 16, 17, and 18 were selected as the treatment (DPHS) area. It was important to limit the number of people who knew where the control areas were. Therefore the officers conducting the treatment were not aware of the exact locations; however, they were aware that they existed. This step was important to the validity of the study because if officers knew where the control areas were then it could affect how they enforce those specific areas. If that occurred, the results of the study could be altered and harm the validity of the study as a whole. Figure 1 presents a map of the East Patrol Division in Kansas City, Missouri, with the control hot spots ("A") and the directed patrol treatment hot spots ("B") highlighted. Note none of these hot spots (or their buffer areas) overlap or were even contiguous to each other.

Figure 1. Micro Hot Spots (Groups A & B)



Treatment

The treatment implemented here is directed patrol in micro hot spots. The overarching logic of this strategy is that by deploying officers to small geographic areas (rather than assigning officers to engage in routine patrol in larger areas, like beats) will enhance capable guardianship in these micro hot spots, which interrupts opportunities for crime. Micro hot spots were selected because the areas have demonstrated higher levels of crime (particularly violent crimes) over time, therefore this strategy is expected to decreased crime in the micro hot spots.

The Kansas City SPI Project utilized officers on an overtime basis for different patrol shifts in the hot spot areas. The 60-day treatment began on August 1, 2017, and was conducted until September 30, 2017. There was at least one shift every day, with two shifts occurring Thursday through Saturday. On Sunday through Wednesday, the shift was from 7:00 pm to 12:00 am. On Thursday through Saturday, the shifts were from 3:00 pm to 8:00 pm with a second overlapping shift from 7:00 pm to 12:00 am. Because officers signed up for overtime shifts on a volunteer basis, there were a few instances where no officer covered the shift, therefore causing a limitation to this study. The exact dosage of the additional police presence will be discussed further in chapter 4, but at this point, it is important to highlight that the plan called for ten 4-hour shifts per week for approximately nine weeks.

In the treatment areas, officers were instructed to enhance police presence in the directed patrol areas. They were given beat books with descriptions of the areas, as well as a map to see the five areas in proximity to each other. They were told to conduct an 'area presence' (e.g. 'be visible') for 15 minutes on average in each of these areas ideally at least twice per shift. The desired 15-minute threshold was determined based off of Koper's (1995)

findings. Officers were not given specific tasks or activities to complete. Other examinations of hot spots evaluated specific activities, including foot patrol (Ratcliffe et al., 2011; Novak et al., 2016), problem-oriented policing (Groff, Ratcliffe, Haberman, Sorg, Joyce, & Taylor, 2014; Braga & Bond, 2008), or drug market interventions (Weisburd & Green 1995), but here officers utilize their discretion on the specific activities in which they engage. This will be described further in chapter 4 of this thesis. The increased directed patrol will be the treatment examined in this study.

It is important to monitor and track treatment fidelity – in other words, it is important to document that the treatment was implemented correctly. Fidelity was monitored by conducting observations of officers, reconciling records from CAD information, and debriefing with officers. After conducting four observations during the treatment period (e.g., ride-alongs) in these areas with the assigned police officers, data were collected to see how closely the records matched the minute-to-minute duration of the officer's presence. Field notes were kept determining the time each movement occurred to reconcile with the department's CAD system to watch for any errors that could cause problems later on. This is the dispatching system that KCPD uses and records every call for service. The timing was very similar and only had relatively minor discrepancies. Also, from the social observations, a more established picture of the areas was imprinted, allowing for a better understanding of the crimes going on in these areas. After the treatment, officers were debriefed by researchers. The officers were asked questions about their thoughts on the intervention, things they wish they would have known, what they would have done differently, and many other questions. Overall, the officers stated that they would have a preference for a two-person unit, they would avoid hot spots in primarily residential areas, they believe that

incorporation of hot spots into patrol would be difficult, they thought the priorities of the activities in the hot spots should be articulated in advance of a study like this, and overall they felt that the hot spots were identified correctly. Fidelity checks will be discussed further in Chapter 4. The shifts for the directed patrol were every day, and two shifts occurred daily on the weekends. One officer was on shift at a time; however, there was some overlap occasionally throughout the sixty-day duration of the treatment, which occurred from August 1, 2017-September 30, 2017.

The control group consisted of six micro hot spots, whereas the DPHS treatment group consisted of five hot spots. The control areas were unknown to the police officers to ensure that contamination did not occur. The control areas received no treatment and were handled by police officers how they normally would be.

Data

To understand the impact of increased patrol presence, violent crimes reports were pulled for priority calls for service and incident offense data for 2015 through 2018. Priority 1, 2, and 3 calls were used for calls for service because they more fully represented the violence we were looking at compared to Priority 4-9 calls for service. Violent crimes were the main focus of the study to determine whether this strategy could make an impact on not only crime but on violent crimes in geographically concentrated areas.

To accurately determine whether calls for service decreased in the treatment areas relative to the control areas, a crime analyst from KCPD pulled all of the data from 2015 through 2018, detailed in Chapter 3. Before proceeding it is important to briefly discuss challenges related to the CAD systems because these real-world challenges impacted how and which CFS data were analyzed. When the study began, the system being used was

Tiburon, however, on May 9, 2018, the system changed to Hexagon. This caused many reconciliation issues that were unable to be fixed. When the department switched to Hexagon, they aimed to define call types in a more "plain English" manner, and they lumped different calls into categories that were not together previously in Tiburon. We were unable to reconcile the two systems because they were not comparable. Due to this issue, instead of using the different call types, Priority 1, 2, and 3 calls were identified and used to better represent the types of calls we were looking for when reconciling the two systems together. While it would be advantageous to examine CFS for specific offenses, problems, etc., the change to CAD systems limited the ability to do this. Some call types migrated from Tiburon to Hexagon, while others did not. Some definitions of call types changed when the system changed, as well.

Like most police departments, KCPD triages calls for service by the severity of the call. Dispatchers prioritize calls on a scale from 0-10, where 0 is the most serious and ten is the least serious. This study analyzes Priority calls 1, 2, and 3. Priority 0 is 'officer needs assistance, and very few of these circumstances were observed in the hot spots. Priorities 4 and five are assigned to situations where police responses may be delayed without impacting service or investigations – essentially these are translated as 'send an officer whenever available,' and Priorities 1, 2 and 3 will always take precedent. Priorities 6 through 10 are codes for self-initiated activities, administrative activities, or other activities like transporting suspects.

Priority 1 calls are calls for service where extreme, known, or potential danger to human life has occurred or is in progress. Examples of this call would be shootings or a rape occurring right now. Priority 2 calls are calls for service where there is a potential for harm.

However it has not occurred yet. Examples of this call would be bomb threats or domestic violence assaults. Priority 3 calls are calls for service where the issue at hand is not life threatening. However the police are still needed. Examples of this call would be checking the welfare of an individual or responding to calls where 911 was called but was followed by a hang-up.

Examining Priority call classifications is preferred to examining call types because dispatchers have the discretion to assign calls of similar classifications to different priority levels based on details obtained from citizens. A good example is 'disturbances': A citizen complaining of unruly juveniles in a park may be classified as a disturbance but assigned Priority 3. Another call may indicate two individuals are actively engaged in a fight, and this would be dispatched as a disturbance but assigned Priority 1. In practice, there is great variation in the label assigned to each call. However, priority level tends to be more consistent and a valid indication of the seriousness of calls. Additionally, Priority 1, 2 and 3 calls represent significant commitments of police resources because officers are responding quickly and often with backup officers responding. The goal of this project was to address violent (serious) crime, and therefore it makes sense to focus on high-priority calls that provide more information on whether the hot spot approach impacted these emergency calls.

The data that were included in the analysis was comprised of data from KCPD for 208 weeks (January 4, 2015, through December 23, 2018, which is weeks 1-208; treatment period falls on August 1, 2017, through September 30, 2017, which is weeks 135-143). For Priority calls, information on which type it was, the date the call was made, location of the call, and other information not needed for this analysis were included in the 208 weeks. For Incident Offense data, information on what the offense was, the date reported, address where

the offense occurred, and other information not needed for this analysis were included in the 208 weeks.

A series of analyses were conducted to determine the impact of hot spot policing in Kansas City. The first set of analyses for Priority calls for service conducted were based upon a comparison of the pre 104 weeks before intervention (T_0) and the post nine weeks during the intervention (T_1). The analysis was then broken down into different sections:

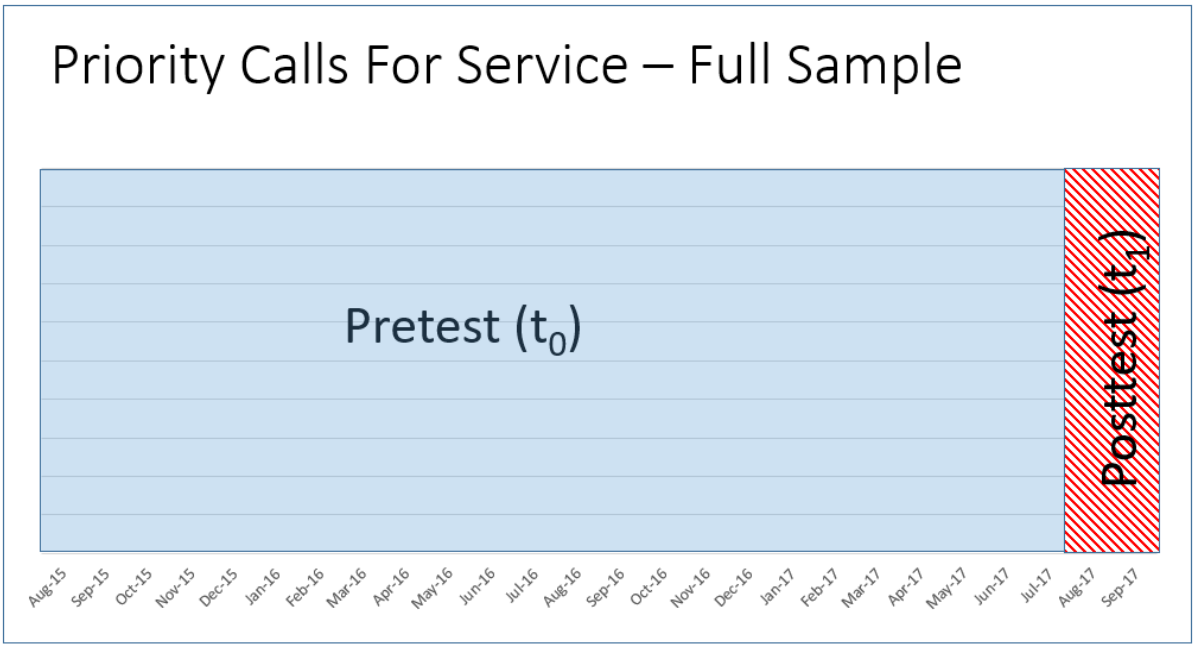
Y_1: Priority 1 calls,

Y_2: Priority 2 calls, and

Y_3: Priority 3 calls.

All three were analyzed in the 104-week comparison to the 9-week intervention analyses. Figure 2 presents a visual depiction of the pre- and post-intervention periods for this first set of analyses.

Figure 2. Pre- and Post-Test visualization for Calls for Service



The second set of analyses conducted examined 9-week equivalence comparison to the treatment period using the same analysis breakdown as listed above for Priority calls. The intervention occurred between August 1 and September 30, 2017: this analysis compares weekly outcome variable counts during comparable times in previous and subsequent calendar years. This decision was made to account for natural seasonal fluctuation in crime (Telep et al., 2014). From 2015 thru 2018, the equivalent nine weeks of the treatment were analyzed: Weeks 31 through 39 (T_0), weeks 83 through 91 (T_0), and the treatment period of weeks 135 through 143 (T_1). Just like the full sample detailed above, all three sections of priority calls were analyzed in the 9-week equivalence comparison to the 9-week intervention analyses. Figure 3 presents a visual depiction of the pre- and post-intervention periods for this first set of analyses.

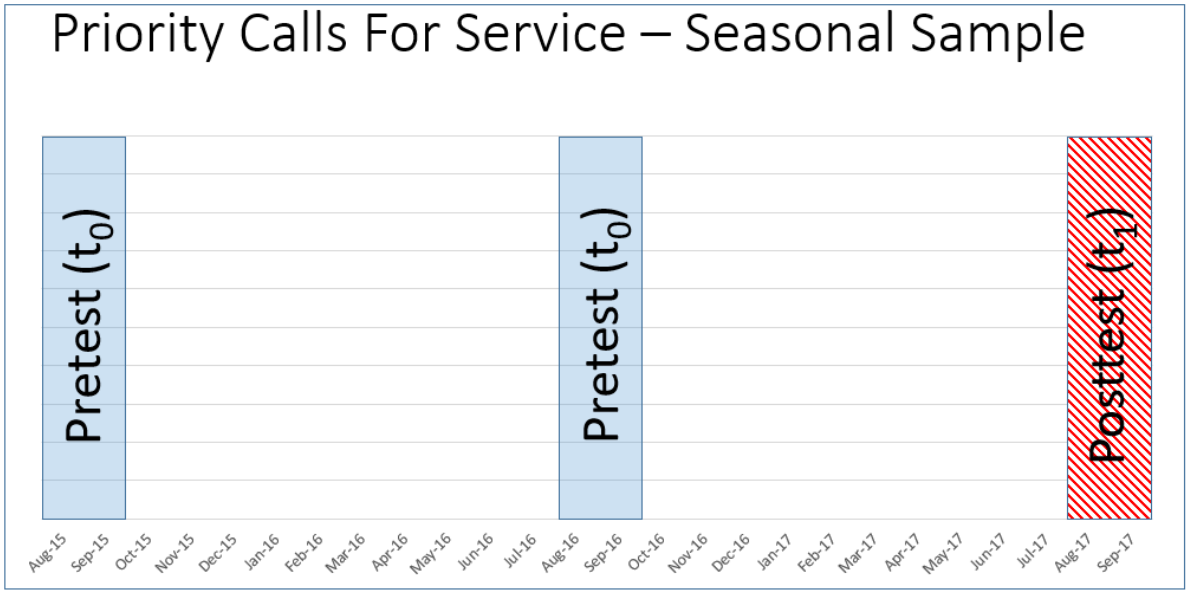


Figure 3. Pre- and Post-Test visualization for Calls for Service – Seasonal Analysis

The next set of analyses for incidents/offenses proceeded similar to the aforementioned CFS analyses in that a comparison of the pre 104 weeks prior to intervention(T_0) and the post 9 weeks during intervention (T_1). The analysis was then broken down into different sections:

Y_4: Violent offenses (murder, robbery, aggravated assault, simple assault, etc.),

Y_5: Theft (motor vehicle theft, pocket-picking, purse snatching, etc.),

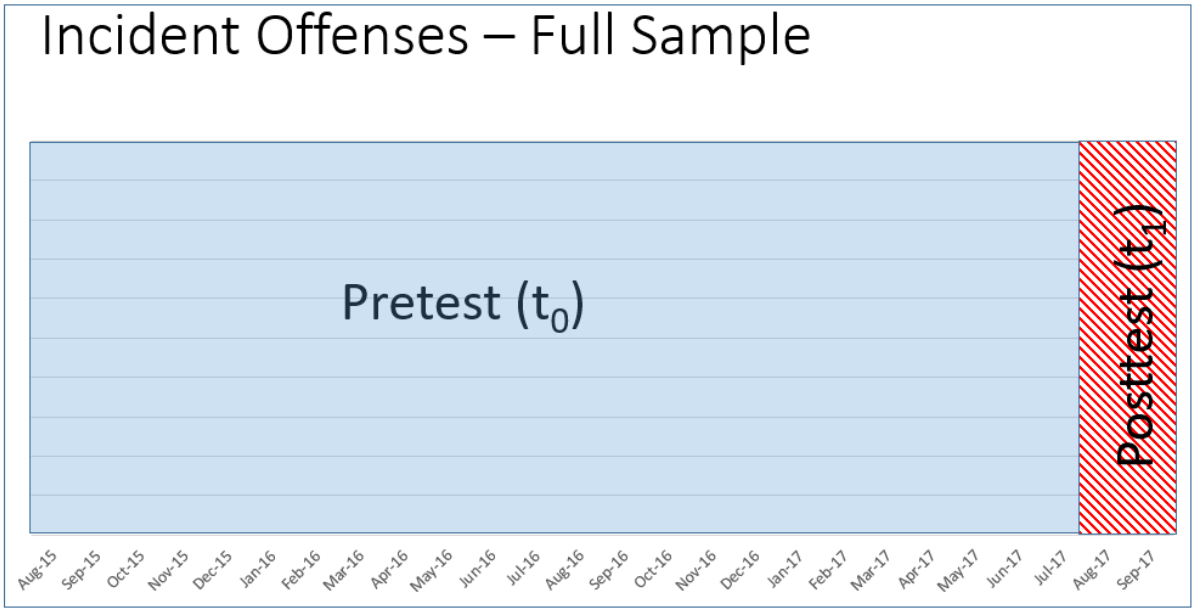
Y_6: Disorder (DUI, Intimidation, Liquor Law Violation, etc.),

Y_7: Destruction (Arson and Vandalism), and

Y_8: Drugs (Drug Equipment and Narcotics Violation).

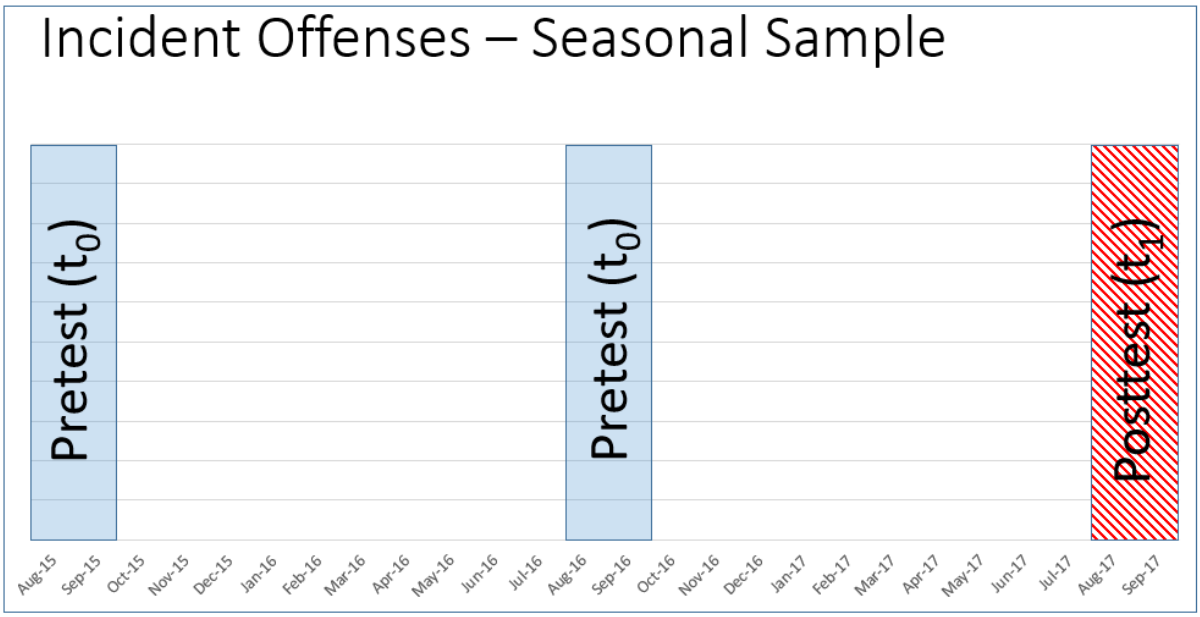
All five were analyzed in the 104-week comparison to the 9-week intervention analyses. Figure 4 presents a visual depiction of the pre- and post-intervention periods for this next set of analyses.

Figure 4. Pre- and Post-Test visualization for Offenses



The second set of analyses conducted were based upon a 9-week equivalence comparison to the treatment period using the same analysis breakdown as listed above for incident offenses. The intervention occurred between August 1 and September 30, 2017 – this analysis compares weekly outcome variable counts during comparable times in previous and subsequent calendar years. This decision was made to account for seasonal fluctuation in crime. From 2015 thru 2018, the equivalent nine weeks of the treatment were analyzed: Weeks 31 through 39 (T_0), weeks 83 through 91 (T_0), and the treatment period of weeks 135 through 143 (T_1). Just like the full sample detailed above, all five sections of incident offenses were analyzed in the 9-week equivalence comparison to the 9-week intervention analyses. Figure 5 presents a visual depiction of the pre- and post-intervention periods for this seasonal set of analyses.

Figure 5. Pre- and Post-Test visualization for Offenses – Seasonal Analysis



Analytic Strategy

The hypothesis was tested using two separate analyses. First, t-tests were estimated comparing mean weekly outcome counts pre-intervention (T_0) to during intervention (T_1) for the full analysis and the seasonal analysis for both Priority calls for service and incident offenses. Based on the extant research, I anticipate significant reductions in outcome measures in the treatment areas during the intervention, but no observed difference in the control areas.

Additionally, 'Activity-Buffer-Control' (ABC) tests will also be estimated. These tests will be estimated using a spreadsheet calculator created by Ratcliffe (2019). Three results were estimated:

1) The actual change (whether offenses or priority calls changed in the hot spot post-treatment),

2) The relative change (whether offenses or priority calls changed in the hot spot relative to the control areas), and
3) Whether geographic displacement was detected.

Weighted Displacement Quotients (WDQ) were estimated for each analysis (Bowers & Johnson, 2003) whereas:

$$WDQ = (B_{t1}/C_{t1} - B_{t0}-C_{t0}) / (T_{t1}/C_{t1} - T_{t0}/C_{t0}).$$

In the above equation, B = buffer, C = control, T = target, t_0 = pre-intervention, and t_1 = post-intervention. This formula aims to determine whether or not there was displacement or a diffusion of benefits, and if there was, then it aims to determine how much or how little. If the formula equals a number greater than 0 but less than 1, then there was a diffusion effect and the response effects were amplified. If the formula equals a number greater than 1, then the diffusion effects were greater than the response effects of the intervention. If the formula equals a negative number less than 0, then there was a displacement effect. If the formula equals a negative number between 0 and -1, then the displacement effect was not greater than the response effects, and therefore the intervention still was able to achieve some benefits. If the formula equals a negative number that is beyond -1, then the response effects of the intervention were erased by displacement. Lastly, if the formula equals 0, then there was no displacement or diffusion detected from the intervention (Bowers & Johnson, 2003; Guerette 2009).

Also included in these analyses is a rough estimate of the change in the number of offenses and priority calls per week, also known as the Total Net Effect (TNE). Guerette and Bowers (2009) define the Total Net Effect as:

$$TNE = (T_{t0} * (C_{t1}/C_{t0}) - T_{t1}) + (B_{t0} * (C_{t1}/C_{t0})-B_{t1}).$$

In the above equation, B = buffer, C = control, T = target, t_0 = pre-intervention, and t_1 = post-intervention. The key estimate to consider is the relative change of crime in the treatment hot spots to the control areas. Neutral (or 0) values indicate no impact. If the estimate equals a positive number, then the response to the intervention was effective. Positive TNE values indicate a positive response, and the larger the absolute value the greater the effect. Conversely, negative TNE values indicate an ineffective response, and larger the absolute value of a negative TNE indicates greater ineffectiveness. For example, a value of -5 for one outcome and -7 for another outcome, then the -7 TNE was an even worse negative response than the -5 TNE. Overall, since our analyses focus on weeks, if the TNE is 4.2, then that means that there were 4.2 fewer crimes per week in the intervention area and resulted in a positive response to the intervention (Guerette, 2009).

This was repeated for all of the periods of analysis previously stated. These results will be discussed in the Results section of this paper.

Conclusion

This chapter described the methodological decisions to be used in this research, including defining and identifying micro hot spots, describing selection to treatment conditions, description of the treatment used, discussed plans to monitor treatment fidelity, and data to be used and analytic strategies to be employed. The next chapter further describes the data and presents results from the various analytic models estimated.

CHAPTER 4

RESULTS

This chapter will present the results of the study, including a description of treatment dosage, and output from calls for service, and incidents/offenses in the hot spots.

Dosage and Treatment Fidelity

Before assessing the results of the outcome measures, it is important to examine the dosage that actually occurred in these hot spots---how much additional presence was administered during the treatment period. Measuring treatment dosage is important because it helps to maintain the integrity of the study by knowing exactly how much time was spent in the areas to help determine the impact of the intervention. For this initiative, dosage is defined as the number of additional minutes of officer presence at the treatment hot spots. Dosage was monitored by the police department, as officers visiting hot spots as part of this study radioed their presence to communication/dispatchers. Dispatchers recorded the officers' location, as well as the time officers began and ended their visit. These data were then provided to the researcher, who was able to estimate the number of additional visits and the length of these visits, which provided an estimate of dosage in the hot spots.

The research team was not able to oversee every shift that took place in these hot spots; however, field observations were conducted on four different occasions. The purpose of these observations was to determine the accuracy of the police department's records portraying what was taking place in the hot spot. It was important to reconcile the police data with the field observer's data to make sure there were no large discrepancies. The researcher took detailed notes determining what time the officer arrived in each hot spot, what activities the officer performed, the officer's interactions with the community, and what time the

officer left the hot spot. Then, these field notes were examined against the department's aforementioned CAD data to determine the fidelity between their system and the researcher's field notes. Overall, there was a high level of agreement between the CAD data and field observations. Only five observations were in conflicting hot spots and there was some disagreement on one day. Overall there was a significant consistency between the department provided CAD data and the researcher's field notes, which suggests a high degree of fidelity in monitoring dosage.

To determine the dosage that actually occurred in these hot spots and how much additional presence was administered during the treatment period, KCPD's CAD data were analyzed and broken down. There were 88 shifts that were scheduled, with 60 shifts actually taking place (68.1%). Due to these shifts being conducted during officers' overtime, some scheduled shifts did not occur simply because there was not an officer to cover them. Overall there were 652 total visits to the hot spots during the treatment period that equated to 10,090 total minutes of intervention time (168 hours). These visits took place from August 1, 2017 – September 29, 2017.

The stated implementation goal was to have each hot spot visited twice daily Sunday through Wednesday and four times daily Thursday through Saturday. The only hot spot that received on average more than two visits per day was HS 17 (2.89 additional visits per day). The other areas all received on average less than two additional visits per day. This is significantly less than originally designed and is important to take note of because it could have an impact on whether crimes were reduced in these areas.

Another goal of this intervention was for officers to be in the area for 10-15 minutes per visit. This aligns with the Koper (1995) Curve discussed previously to fully reap the

benefits of the treatment without staying too long to avoid losing benefits of the treatment. There were 71 visits (10.8%) that were less than 10 minutes and did not meet the Koper threshold, while there were 200 visits (30.6%) that were greater than 15 minutes that also did not meet the wanted criteria. It is important to note that 7 of the 30.6% were larger than an hour and could be considered as outliers. These visits lasted for a period of time longer than an hour and could have been due to various reasons. For example, if an officer had to take a report due to an arrest, that could represent why they were in the area for so long. There were 381 visits that fell in the anticipated 10-15 minute threshold (58.4%), which means that our officers were operating efficiently. Overall, for all treatment hot spots, the average minutes per visit fell between 13.86 minutes and 16.65 minutes (HS 16 and 17 were the only two areas that averaged more than the threshold per visit). After removing the seven outliers, the average minutes per visit fell between 13.94 minutes and 15.70 minutes. Again, this means that officers were working efficiently and generally meeting the standards that were set for them prior to the treatment period. Figures 6 and 7 that follow depict the average number of additional minutes per day of police presence and the average number of additional visits per day in the hot spots. On average, there were 146.8 additional minutes of police presence per day. Also, there was an average of 9.61 additional visits per day in hot spots.

Figure 6. Additional Minutes of Police Presence Per Day

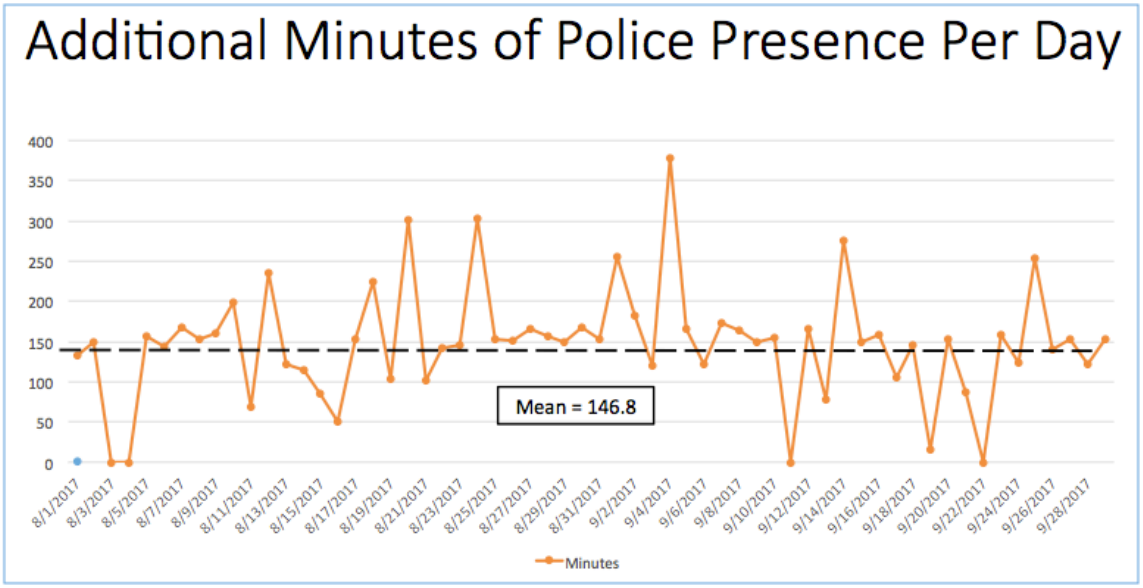
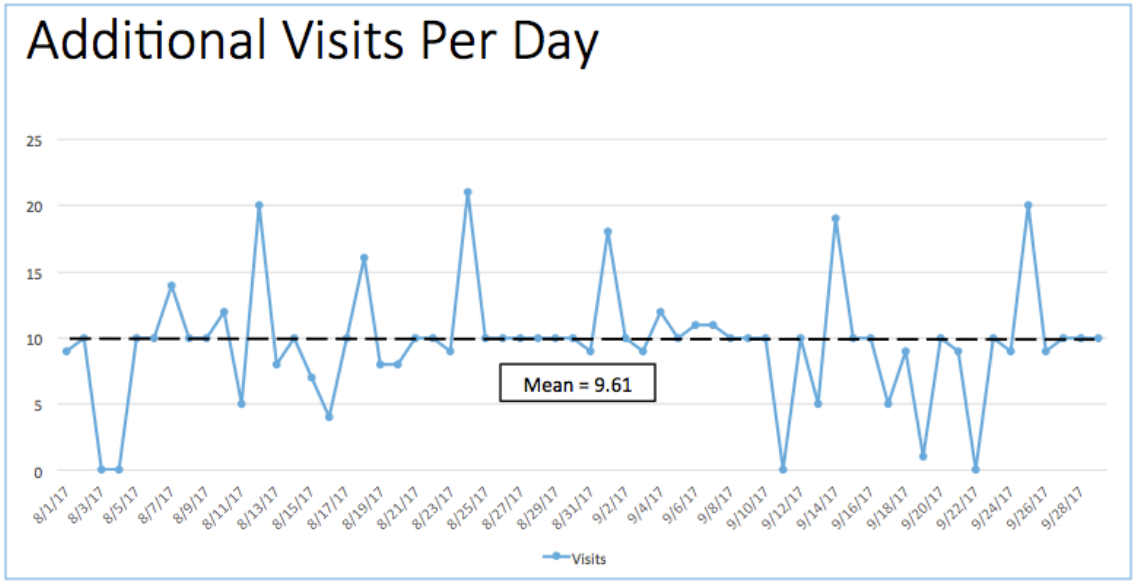


Figure 7. Additional Visits Per Day



Overall, the dosage that was recorded matched the expectations that were set, with the exception of not hitting the margin for additional visits per day. The Koper Curve was

adhered to and officers made efficient use of their time by the majority of the visits staying within the threshold of time asked of them.

Results: Calls for Service (CFS)

Table 2 displays the analyses for the full sample of priority calls for service across 3 different outcomes for three separate treatment conditions: control, treatment, and treatment buffers. The full sample includes 104 months prior to treatment compared to the nine-week intervention period. The mean number of calls for service per week is displayed pairing the pre-period compared to the post-period. The change between the two periods was calculated and displayed in a percentage to show either a positive change or a negative change among the two periods. According to Bowers and Johnson (2003), the Total Net Effect (TNE) and Weighted Displacement Quotient (WDQ) are important in analyzing a study and they detail exactly how to interpret these values. The TNE[2] is then shown to represent the overall impact of the project intervention. In order to more fully examine the net effect of this effort, the TNE helps to determine the overall effect of the project by comparing treatment and treatment buffer areas to the control group. Then the WDQ[3] is shown to represent if there was a diffusion of benefits when looking at the buffer areas. The WDQ helps to determine whether displacement occurred or if there was a diffusion of benefits between the control and treatment areas. Negative WDQ values suggest spatial displacement of crime, where positive WDQ values indicate diffusion of benefits. Lastly, the t-value is estimated to determine whether the mean number of offenses for treatment groups were statistically significant in the post-intervention.

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[2] $TNE = (T_{t0} * (C_{t1}/C_{t0}) - T_{t1}) + (B_{t0} * (C_{t1}/C_{t0}) - B_{t1})$

[3] $WDQ = (B_{t1}/C_{t1} - B_{t0}-C_{t0}) / (T_{t1}/C_{t1} - T_{t0}/C_{t0})$

Table 2. Treatment Outcomes across Priority CFS (full sample)

	Pre	Post		TNE	WDQ	T
		Priority 1				
Control	13.68	12.44	-9.1%			
Treatment	12.55	8.00	-36.3%			2.633**
Treatment Buffer	14.17	12.22	-13.8%	4.08	0.20	
		Priority 2				
Control	30.23	25.44	-15.8%			
Treatment	25.97	18.00	-30.7%			2.979**
Treatment Buffer	31.19	25.22	-19.1%	4.88	0.27	
		Priority 3				
Control	13.97	5.33	-61.8%			
Treatment	11.98	3.89	-67.5%			3.896***
Treatment Buffer	13.64	3.56	-73.9%	2.32	2.42	

Pre = 104 Weeks prior to treatment
Post = 9 weeks of treatment
TNE = Total Net Effect
WDQ = Weighted Displacement Quotient
T = T-Value
*<.05; **<.01; ***<.001

For Priority 1 calls, treatment hot spots averaged about 12.55 Priority 1 calls for service per week prior to the intervention, whereas during the intervention these same hot spots averaged about 8 Priority 1 calls for service per week. This 36.3 % decrease shows that average weekly Priority 1 calls decreased significantly post-treatment ($t = 2.633$; $p < .01$). Table 2 also indicated that Priority 1 CFS went down in the control area from 13.68 per week to 12.44 per week. This represents a 9.1% decrease. Also, Priority 1 calls in the buffer area decreased by 13.8%. Therefore, when taken in totality, there was a greater decrease in Priority 1 CFS in the treatment area than either the control or the buffer. The TNE = 4.08, which means that there was a reduction of 4.08 calls per week in the intervention areas. Additionally, the WDQ estimate is 0.20, which suggests that there was a diffusion effect while the response effects were amplified.

For Priority 2 calls, treatment hot spots averaged about 25.97 Priority 2 calls for service per week prior to the intervention, whereas during the intervention these same hot spots averaged about 18 Priority 2 calls for service per week. This 30.7 % decrease shows that average weekly Priority 2 calls decreased significantly post-treatment ($t = 2.979$; $p < .01$). Table 2 also indicated that Priority 2 CFS went down in the control area from 30.23 per week to 25.44 per week. This represents a 15.8% decrease. Also, Priority 2 calls in the buffer area decreased by 19.1%. Therefore, when taken in totality, there was a greater decrease in Priority 2 CFS in the treatment area than either the control or the buffer. The TNE = 4.88, which means that there was a reduction of 4.88 calls per week in the intervention areas. Additionally, the WDQ estimate is 0.27, which suggests that there was a diffusion effect while the response effects were amplified.

For Priority 3 calls, treatment hot spots averaged about 11.98 Priority 3 calls for service per week prior to the intervention, whereas during the intervention these same hot spots averaged about 3.89 Priority 3 calls for service per week. This 67.5% decrease shows that average weekly Priority 3 calls decreased highly significantly post-treatment ($t = 3.896$; $p < .001$). Table 2 also indicated that Priority 3 CFS went down in the control area from 13.97 per week to 5.33 per week. This represents a 61.8% decrease. Also, Priority 3 calls in the buffer area decreased by 73.9%. Therefore, when taken in totality, there was a greater decrease in Priority 3 CFS in the buffer area than either the control or the treatment. However they were all very similar in their decreasing trend. The TNE = 2.32, which means that there was a reduction of 2.32 calls per week in the intervention areas. Additionally, the WDQ estimate is 2.42, which suggests that there was a diffusion effect that was greater than the

response to the effect of the intervention. It is also important to note that all of the outcome measures were statistically significant with Priority 3 being the most significant to the study.

CFS Seasonal Analysis

Table 3 displays the analyses for the seasonal sample of priority calls for service across three different outcomes for three separate treatment conditions: control, treatment, and treatment buffers. The seasonal sample includes two nine-week time periods equivalent to treatment time prior to treatment compared to the nine-week intervention period. The table can be interpreted just like the previous table on Priority calls.

Table 3. Treatment Outcomes across Priority CFS (seasonal)

	Pre	Post		TNE	WDQ	T
		Priority 1				
Control	15.28	12.44	-18.6%			
Treatment	16.67	8.00	-52.0%			4.163***
Treatment Buffer	15.11	12.22	-19.1%	5.65	0.01	
		Priority 2				
Control	32.56	25.44	-21.9%			
Treatment	29.78	18.00	-39.6%			5.128***
Treatment Buffer	29.17	25.22	-13.5%	2.84	-0.46	
		Priority 3				
Control	15.33	5.33	-65.2%			
Treatment	13.11	3.89	-70.3%			3.648***
Treatment Buffer	15.33	3.56	-76.8%	2.44	2.65	

Pre = Two 9 week time periods equivalent prior to treatment
Post = 9 weeks of treatment
TNE = Total Net Effect
WDQ = Weighted Displacement Quotient
T = T-Value
*<.05; **<.01; ***<.001

For Priority 1 calls, treatment hot spots averaged about 16.67 Priority 1 calls for service per week before the intervention, whereas during the intervention these same hot

spots averaged about 8 Priority 1 calls for service per week. This 52.0 % decrease shows that average weekly Priority 1 calls decreased significantly post-treatment ($t = 4.163$; $p < .001$). Table 3 also indicated that Priority 1 CFS went down in the control area from 15.28 per week to 12.44 per week. This represents an 18.6% decrease. Also, Priority 1 calls in the buffer area decreased by 19.1%. Therefore, when taken in totality, there was a greater decrease in Priority 1 CFS in the treatment area than either the control or the buffer. The TNE = 5.65, which means that there was a reduction of 5.65 calls per week in the intervention areas. Additionally, the WDQ estimate is 0.01, which suggests that there was virtually no diffusion or displacement effects.

For Priority 2 calls, treatment hot spots averaged about 29.78 Priority 2 calls for service per week before the intervention, whereas during the intervention these same hot spots averaged about 18 Priority 2 calls for service per week. This 39.6% decrease shows that average weekly Priority 2 calls decreased significantly post-treatment ($t = 5.128$; $p < .001$). Table 3 also indicated that Priority 2 CFS went down in the control area from 32.56 per week to 25.44 per week. This represents a 21.9% decrease. Also, Priority 2 calls in the buffer area decreased by 13.5%. Therefore, when taken in totality, there was a greater decrease in Priority 2 CFS in the treatment area than either the control or the buffer. The TNE = 2.84, which means that there was a reduction of 2.84 calls per week in the intervention areas. Additionally, the WDQ estimate is -0.46, which suggests that there was minor displacement, but it was not greater than the response effects, and the intervention still achieved some benefits.

For Priority 3 calls, treatment hot spots averaged about 13.11 Priority 3 calls for service per week before the intervention, whereas during the intervention these same hot

spots averaged about 3.89 Priority 3 calls for service per week. This 70.3% decrease shows that average weekly Priority 3 calls decreased significantly post-treatment ($t = 3.648$; $p < .001$). Table 3 also indicated that Priority 3 CFS went down in the control area from 15.33 per week to 5.33 per week. This represents a 65.2% decrease. Also, Priority 3 calls in the buffer area decreased by 76.8%. Therefore, when taken in totality, there was a greater decrease in Priority 3 CFS in the buffer area than either the control or the treatment. However they were all very similar in their decreasing trend. The TNE = 2.44, which means that there was a reduction of 2.44 calls per week in the intervention areas. Additionally, the WDQ estimate is 2.65, which suggests that there was a measurable diffusion effect that was greater than the response to the effect of the intervention. It is also important to note that all of the outcome measures were very highly statistically significant to the study.

Results: Offenses

Table 4 displays the analyses for the full sample of incident offenses across five different outcomes for three separate treatment conditions: control, treatment, and treatment buffers. The full sample includes two years before the intervention compared to the nine-week intervention period. The mean number of offenses per week is displayed pairing the pre-period compared to the post-period. The change between the two periods was calculated and displayed in a percentage to show either a positive change or a negative change among the two periods. Lastly, the t-value is estimated to determine whether the mean number of offenses for treatment groups were statistically significant in the post-intervention.

Table 4. Treatment Outcomes across Offenses (full sample)

	Pre	Post		TNE	WDQ	T
		Violence				
Control	3.93	4.56	16.0%			
Treatment	4.05	6.44	59.0%			-2.925**
Treatment Buffer	4.68	4.44	-5.1%	-0.75	-0.57	
		Theft				
Control	2.74	3.44	25.5%			
Treatment	1.99	2.56	28.6%			-1.06
Treatment Buffer	3.95	3.44	-12.9%	1.46	-24.66	
		Disorder				
Control	1.19	0.89	-25.2%			
Treatment	1.32	0.89	-32.6%			1.01
Treatment Buffer	0.88	0.56	-36.4%	0.20	1.01	
		Destruction				
Control	1.27	1.22	-3.9%			
Treatment	1.03	0.67	-35.0%			1.052
Treatment Buffer	1.57	1.56	-0.6%	0.27	-0.16	
		Drugs				
Control	0.87	1.56	79.3%			
Treatment	0.87	1.33	52.9%			-1.377
Treatment Buffer	1.65	1.33	-19.4%	0.27	-0.16	

Pre = 104 Weeks prior to treatment
Post = 9 weeks of treatment
TNE = Total Net Effect
WDQ = Weighted Displacement Quotient
T = T-Value
*<.05; **<.01; ***<.001

For violent offenses, treatment hot spots averaged about 4.05 offenses per week prior to the intervention, whereas during the intervention these same hot spots averaged about 6.44 offenses per week. This 59.0% increase shows that average weekly violent offenses increased significantly post-treatment ($t = 2.925$; $p < .01$). Table 4 also indicated that violent offenses increased in the control area from 3.93 per week to 4.56 per week. This represents a 16.0% increase. Also, these offenses in the buffer area decreased by 5.1%. Therefore, when taken in totality, there was only a decrease in violent offenses in the buffer area and the offenses

increased per week in the control and treatment area. The TNE = -0.75, which means that there was an increase of 0.75 crimes per week in the intervention areas. Additionally, the WDQ estimate is -0.57, which suggests that there was displacement but it was not significant.

For theft offenses, treatment hot spots averaged about 1.99 offenses per week before the intervention, whereas during the intervention, these same hot spots averaged about 2.56 offenses per week. This 28.6% increase shows that average weekly violent offenses increased post-treatment (t = -1.06). Table 4 also indicated that theft offenses increased in the control area from 2.74 per week to 3.44 per week. This represents a 25.5% increase. Also, these offenses in the buffer area decreased by 12.9%. Therefore, when taken in totality, there was only a decrease in theft offenses in the buffer area, and the offenses increased per week in the control and treatment area. The TNE = 1.46, which means that there was a decrease of 1.46 crimes per week in the intervention areas. Additionally, the WDQ estimate of -24.66 should be interpreted with caution. Taken at face value, this would suggest that rates of theft in the buffer areas went down, but it is challenging to understand how this would occur when thefts within the area receiving treatment went up.

For disorder offenses, treatment hot spots averaged about 1.32 offenses per week before the intervention, whereas during the intervention, these same hot spots averaged about 0.89 offenses per week. This 32.6% decrease shows that average weekly disorder offenses decreased post-treatment (t = 1.01). Table 4 also indicated that disorder offenses decreased in the control area from 1.19 per week to 0.89 per week. This represents a 25.2% decrease. Also, these offenses in the buffer area decreased by 36.4%. Therefore, when taken in totality, there was a greater decrease in disorder offenses in the buffer area than either the control or

the treatment. The TNE = 0.20, which means that there was a decrease of 0.20 crimes per week in the intervention areas. Additionally, the WDQ estimate is 1.01, which suggests that there was a diffusion effect that was greater than the response effects.

For destruction offenses, treatment hot spots averaged about 1.03 offenses per week before the intervention, whereas during the intervention, these same hot spots averaged about 0.67 offenses per week. This 35.0% decrease shows that average weekly destruction offenses decreased post-treatment (t = 1.052). Table 4 also indicated that destruction offenses decreased in the control area from 1.27 per week to 1.22 per week. This represents a 3.9% decrease. Also, these offenses in the buffer area decreased by 0.6%. Therefore, when taken in totality, there was a greater decrease in destruction offenses in the treatment area than either the control or the buffer. The TNE = 0.27, which means that there was a decrease of 0.27 crimes per week in the intervention areas. Additionally, the WDQ estimate is -0.16, which suggests that there was displacement, but it was not greater than the response effects, and the intervention still achieved some benefits.

For drug offenses, treatment hot spots averaged about 0.87 offenses per week before the intervention, whereas during the intervention these same hot spots averaged about 1.33 offenses per week. This 52.9% increase shows that average weekly drug offenses increased post-treatment (t = -1.377). Table 4 also indicated that drug offenses increased in the control area from 0.87 per week to 1.56 per week. This represents a 79.3% increase. Also, these offenses in the buffer area decreased by 19.4%. Therefore, when taken in totality, there was only a decrease in offenses in the buffer area, and there were increases in the control and treatment area. The TNE = 0.27, which means that there was a decrease of 0.27 crimes per week in the intervention areas. Additionally, the WDQ estimate is -0.16, which suggests that

there was displacement but it was not greater than the response effects and the intervention still achieved some benefits.

It is important to note that these estimates should be interpreted with caution because it is unusual that there would be a diffusion of benefits to contiguous areas without a direct impact in the treatment areas. Typically, the trends would not be that a buffer area receives benefits while the treatment area receives the opposite. Due to this, these numbers in Table 4 should be cautiously interpreted.

Offenses: Seasonal Analysis

Table 5 displays the analyses for the seasonal sample of incident offenses across 5 different outcomes for three separate treatment conditions: control, treatment, and treatment buffers. The seasonal sample includes two nine-week periods equivalent to treatment time before the intervention compared to the nine-week intervention period. The table can be interpreted as the previous table on the full sample of incident offenses.

Table 5. Treatment Outcomes across Offenses (seasonal)

	Pre	Post		TNE	WDQ	T
		Violence				
Control	3.83	4.56	19.1%			
Treatment	4.67	6.44	37.9%			-1.516
Treatment Buffer	5.72	4.44	-22.4%	1.49	-2.70	
		Theft				
Control	2.39	3.44	43.9%			
Treatment	2.11	2.56	21.3%			-0.84
Treatment Buffer	4.78	3.44	-28.0%	3.92	7.21	
		Disorder				
Control	1.33	0.89	-33.1%			
Treatment	2.39	0.89	-62.8%			2.796**
Treatment Buffer	0.83	0.56	-32.5%	0.70	-0.01	
		Destruction				
Control	1.17	1.22	4.3%			
Treatment	1.22	0.67	-45.1%			1.261
Treatment Buffer	1.72	1.56	-9.3%	0.84	0.39	
		Drugs				
Control	1.00	1.56	56.0%			
Treatment	1.06	1.33	25.5%			-0.655
Treatment Buffer	2.44	1.33	-45.5%	2.80	7.65	

Pre = Two 9 week time periods equivalent prior to treatment
Post = 9 weeks of treatment
TNE = Total Net Effect
WDQ = Weighted Displacement Quotient
T = T-Value
*<.05; **<.01;***>.001

For violent offenses, treatment hot spots averaged about 4.67 offenses per week before the intervention, whereas during the intervention these same hot spots averaged about 6.44 offenses per week. This 37.9% increase shows that average weekly violent offenses increased post-treatment (t = -1.516). Table 5 also indicated that violent offenses increased in the control area from 3.83 per week to 4.56 per week. This represents a 19.1% increase. Also, these offenses in the buffer area decreased by 22.4%. Therefore, when taken in totality, there was only a decrease in violent offenses in the buffer area and the offenses increased per

week in the control and treatment area. The TNE = 1.49, which means that there was a decrease of 1.49 crimes per week in the intervention areas. Additionally, the WDQ estimate is -2.70, which suggests that there was displacement and it erased any response effects to the intervention.

For theft offenses, treatment hot spots averaged about 2.11 offenses per week prior to the intervention, whereas during the intervention these same hot spots averaged about 2.56 offenses per week. This 21.3% increase shows that average weekly violent offenses increased post-treatment (t = -0.84). Table 5 also indicated that theft offenses increased in the control area from 2.39 per week to 3.44 per week. This represents a 43.9% increase. Also, these offenses in the buffer area decreased by 28.0%. Therefore, when taken in totality, there was only a decrease in theft offenses in the buffer area and the offenses increased per week in the control and treatment area. The TNE = 3.92, which means that there was a decrease of 3.92 crimes per week in the intervention areas. Additionally, the WDQ estimate is -7.21, which suggests that there was displacement and it erased any response effects to the intervention.

For disorder offenses, treatment hot spots averaged about 2.39 offenses per week prior to the intervention, whereas during the intervention these same hot spots averaged about 0.89 offenses per week. This 62.8% decrease shows that average weekly disorder offenses decreased significantly post-treatment (t = 2.796). Table 5 also indicated that disorder offenses decreased in the control area from 1.33 per week to 0.89 per week. This represents a 33.1% decrease. Also, these offenses in the buffer area decreased by 32.5%. Therefore, when taken in totality, there was a greater decrease in disorder offenses in the treatment area than either the control or the buffer. The TNE = 0.70, which means that there was a decrease of 0.70 crimes per week in the intervention areas. Additionally, the WDQ estimate is -0.01,

which suggests that there was displacement, but it was not greater than the response effects, and the intervention still achieved some benefits.

For destruction offenses, treatment hot spots averaged about 1.22 offenses per week before the intervention, whereas during the intervention, these same hot spots averaged about 0.67 offenses per week. This 45.1% decrease shows that average weekly destruction offenses decreased post-treatment (t = 1.261). Table 5 indicated that destruction offenses increased in the control area from 1.17 per week to 1.22 per week. This represents a 4.3% increase. Also, these offenses in the buffer area decreased by 9.3%. Therefore, when taken in totality, there was a greater decrease in destruction offenses in the treatment area than either the control or the buffer and offense actually increased in the control area. The TNE = 0.84, which means that there was a decrease of 0.84 crimes per week in the intervention areas. Additionally, the WDQ estimate is 0.39, which suggests that there was a diffusion effect with the response effects amplified.

For drug offenses, treatment hot spots averaged about 1.06 offenses per week before the intervention, whereas during the intervention these same hot spots averaged about 1.33 offenses per week. This 25.5% increase shows that average weekly drug offenses increased post-treatment (t = -0.655). Table 5 also indicated that drug offenses increased in the control area from 1.00 per week to 1.56 per week. This represents a 56.0% increase. Also, these offenses in the buffer area decreased by 45.5%. Therefore, when taken in totality, there was only a decrease in offenses in the buffer area, and there were increases in the control and treatment area. The TNE = 2.80, which means that there was a decrease of 2.80 crimes per week in the intervention areas. Additionally, the WDQ estimate is 7.65, which suggests that there was a diffusion effect that was greater than the response effect of the intervention.

Summary

This chapter provided details on how the researchers aimed to enhance the integrity of the study through field observations to ensure the dosage occurring was the amount that was needed and it also provided the results for priority calls for service and incident offenses when broken into a full sample analysis and a seasonal analysis. Overall, results indicated that priority calls decreased in the treatment areas while violent offenses overall were not decreasing. Some of the offense types were showing a benefit in the buffer area while there was no benefit in the control or treatment. Therefore these results should be interpreted with caution. There was some displacement overall but not enough that the results seemed to be altered.

CHAPTER 5

DISCUSSION

This chapter will present the discussion of the findings. An overview of the study will be discussed with policy implications, followed by limitations of the study, and recommendations for future research.

Overview

The purpose of this research was to determine whether increased officer presence in micro hot spots for short periods decreased high-priority calls for service and offenses. This project utilized an experimental design that involved 16 micro-hot spots areas - five of these areas were randomly assigned to the treatment areas (DPHS), and six of these areas were part of the control area (while the five remaining areas received a different treatment not related to this thesis). In the DPHS areas, officers were instructed to intervene in 10-15 minute periods, consistent with the Koper Curve, throughout five-hour shifts that occurred daily. Sunday through Wednesday had one shift where officers performed the intervention, whereas Thursday through Saturday there were two shifts daily that overlapped for an hour. The intervention took place for 60 days beginning on August 1, 2017 and ended on September 30, 2017. The five DPHS areas were compared using priority calls for service and incident offense data. Total net effects and analyses to detect harmful displacement to geographically contiguous areas were estimated. Analyses proceeded in two ways – first, the treatment was compared to two full years of pre-treatment time (e.g., full sample), and then seasonal analyses were conducted comparing the treatment time to similar time periods in the previous two years (e.g., seasonal sample). It was important to conduct a seasonal analysis to ensure that a seasonal fluctuation in crime was accounted for.

The examination of this intervention using a hot-spots policing approach overall showed that there was a significant decrease in priority calls for service. The results for offense are not as straightforward due to some mixed results that were not expected.

For priority calls under the full sample, initial repeated measures t-tests did reveal that there was a statistically significant decrease in the mean number of priority 1, 2, and 3 calls, with priority 3 being highly statistically significant. The benefits for priority 1 and 2 were very similar, while there was a relatively big jump when compared to priority 3 calls. It is important to note the diffusion of benefits that did occur when analyzing the benefits of the intervention for priority 3 calls. The t-test showed the effect was highly statistically significant, however there was diffusion of benefits that is important to take into consideration. Therefore, when analyzing the full sample, the results from the t-tests confirmed that priority 1, 2, and 3 calls for service did decrease.

For priority calls under the seasonal sample, the results found in the full sample are very similar. Priority 1, 2, and 3 calls decreased and the results from the repeated measures t-tests did show a statistically significant decrease in the mean number of priority 1, 2, and 3 calls for service, with priority 3 again being highly statistically significant. Again, there was a relatively big jump when analyzing priority 3 calls for service. It is important to note the diffusion of benefits that occurred, just like in the full sample. The t-tests confirmed that priority 1, 2, and 3 calls for service did decrease when analyzing the seasonal sample.

The results for the offense data are a mixed bag of results leading to results that were not initially expected and some that to my knowledge cannot be explained. For incident offenses under the full sample, repeated measures t-tests revealed that there was a statistically significant increase in the mean number of violent offenses. This result was surprising, as the

purpose of the study was to use a policing approach that would reduce violent crime in these highly violent areas. An important finding to note in the full sample was that the buffer area actually received benefits from the treatment, while the control and treatment areas did not receive any benefits. After measuring for displacement and finding that there was no significant findings of displacement, it left this finding to be very odd. Additionally, one would typically expect priority calls for service and violent crime to trend in the same direction. However, this was not the case with this finding. While priority calls for service were decreasing, the violent crimes were increasing among the full sample. One possible explanation for this could be that the calls for service were coming in less because more officers were around for civilians to walk up to them. However, after debriefing with the officers, it was found that it was not the case. There were no indications that this was occurring out in the field. Another possible explanation for the increase in violent crime could be that the crimes were not occurring during the times when officers were intervening in the areas. This is important because the intervention could be helping, but as soon as the officer leaves then the crimes could begin again.

Among the full sample, the other models (theft, disorder, destruction, and drugs) all were trending down, but none of them were statistically significant according to the t-tests. Theft and drugs showed a similar finding to violence where the buffer received benefits while the control and treatment areas did not receive benefits. Again, they were not significant, but it is important to note that discrepancy when attempting to understand what this means for future studies. Additionally, theft showed a high amount of displacement, which was the only model that detected this. With the buffer receiving benefits and the other areas not, again this is a mixed result. If the crime were moving out of the immediate areas,

then you would not expect the buffer to receive the benefits, also. One possible explanation could be that people not living in these hot spots started coming into the buffer areas and committing these crimes and were not pushing out further and therefore showing a displacement effect. Overall, the results of the t-tests did show that violence increased when analyzing the full sample, while the other four models showed decreases but were not statistically significant.

For the seasonal sample of incident offenses, the results again showed a relatively mixed bag, however the results were more promising compared to the full sample. Violence was the only model that was trending up, however it was not statistically significant. The four other models (theft, disorder, destruction, and drugs) all decreased, while disorder had statistically significant results from the repeated measures t-tests. Violence, theft, and drugs showed benefits being received in the buffer while no benefits were received in the control and treatment areas. Just like in the previous samples, this finding was not expected and is difficult to understand why this occurred. Theft and drugs did show significant amounts of diffusion of benefits and is important to note even though they were not significan to the study. Both of those models showed the sole benefits in the buffer and it seems that there could be a relationship between those two findings. One possible explanation could be that the buffer area is not the immediate target area, so the crimes could have been in those areas while the benefits could have also spread to those areas. Disorder decreased significantly and the t-tests revealed that disorder decreased when analyzing the seasonal sample of incident offenses.

Overall, the results showed that priority 1, 2, and 3 calls for service all decreased significantly while the results for incident offenses showed an increase in violence for both

samples. It is unknown why some buffer areas received benefits while the control and treatment areas did not. The few instances where displacement was detected and diffusion of benefits were detected were limited and would not have altered the results of the study. Even with mixed findings, these findings are crucial to the body of literature because it strongly suggests that a hot spots policing approach significantly affect priority calls for service and has a slight effect on different incidents. Under this specific approach, an effect in the desired direction on violent crime was not found. That is not to say that a hot spots policing approach cannot have that type of effect on violent crime, but for this specific study the results did not reflect that. These results from the Kansas City SPI study give a better understanding for the future of strategies for crime prevention and they add to the body of existing literature on hot spots policing. Although the results did not match consistently with previous literature (i.e. Braga Meta-Analysis), the results still showed a positive effect for priority calls for service, and that result should not be taken lightly. By using the Koper Curve (Koper 1995), the short interventions were effective and efficiently used the department's resources to reduce some offenses and reduced the calls for service.

Reflections

The results of this experimental field trial were far from consistent. For policy-makers, perhaps the most disappointing observation was that violent crime was not impacted in the desired direction by the hot spot approach, and in fact, there were measurable increases in violent offenses in the treatment areas that were statistically significant in the full sample analysis. This is frustrating because the micro hot spots were selected because they historically experienced a disproportionate amount of violent crime. The explicit goal of this strategy was to impact violent crime, and there is no evidence from the analyses conducted

here to suggest this goal was achieved. This calls into question the efficacy of increasing officer presence in violent micro hot spots to reduce violence.

On the other hand, all other crime types trended in a beneficial direction, though only theft in the seasonal analysis achieved statistical significance. Treatment hot spots experienced a positive total net effect for these offenses (theft, disorder, destruction, and drugs) without harmful spatial displacement. It is important to not diminish the importance of these results because these offenses represent noteworthy quality of life issues impacting citizens.

Most noteworthy here is the consistent impact of hot spot policing in Kansas City had on calls for service. Calls for service went down as a result of increased officer presence in violent micro hot spots. These changes were statistically significant across all three high-priority call types and were consistent in both the full and seasonal sample analysis. These results translate to a more efficient use of policing resources. For example, recall that officers in the hot spots visited the hot spots on average 9.61 times per day (or about 1.9 visits per hot spot per day) and this translates to about 146.8 additional minutes of police presence per day (or about 27.4 minutes per hot spot). Each of these was one-officer units. Using the seasonal analysis from Table 3 as an example, this translates to a total net effect reduction of about 5.65 Priority 1, 2.84 Priority 2, and 2.44 Priority 3 calls per week across the hot spots (or about 2.2 high-priority calls per hot spot per week). KCPD, like many police departments, require by policy that two-officer units respond to high-priority calls, and in reality, often multiple two-officer units respond to calls. Further, an analysis of CFS data used in this study reveals that high-priority calls average about 31 minutes. Using these rough estimates, each

high-priority call represents approximately 62 minutes of officers' time, assuming backup units are not involved.

KCPD in general, and the East Patrol Division in particular, suffer from staffing shortages that result in 'blackout time' where no patrol units are available to respond to calls for service. The results presented here strongly suggest that strategically increasing the presence of one patrol officer for relatively brief periods result in fewer emergency calls for service that occupy two-officer units for more than twice as long. Therefore, strategic use of police presence in micro-hot spots 'frees up' officers' time, and may serve as a release valve for addressing blackout time. There is additional value here in that police departments have more control and influence on when officers are visiting hot spots to increase area presence, whereas high-priority calls for service are, by definition, emergencies that require an immediate response. If conducted strategically, this could represent a significant savings in personnel time, thereby reducing blackout time, and providing officers additional time to engage in evidence-based practices instead of running from call to call.

There is one important caveat associated with this reflection – the approach in Kansas City was implemented by assigning officers to increase area presence in hot spots on an overtime basis. Using overtime funds drastically reduces the cost-effectiveness of this approach, even if treatment officers are working alone rather than with a partner. This compromises the cost-savings realized by reducing high-priority calls for service. An alternative and preferred approach would involve officers visiting violent micro hot spots for brief periods of time in between calls (see Sherman and Weisdburd, 1995; Koper, 1995). This method takes advantages of brief periods of time in between calls or other activities to

increase police presence in specific high-risk places, and represents a potentially cost-effective alternative to random patrol.

Furthermore, reducing the practice of running call to call also can have indirect benefits on officer wellness and safety. Hickman, Fricas, Strom and Pope (2011) noted that officers' stress levels increase in responding to calls in hot spots. Their research noted that officers' heart rates increased significantly when responding in hot spots. This physiological reaction to anticipated stress is natural and may be anticipated. Strategies that reduce the occurrence of high priority responses in hot spots will have an impact on officers' well-being. One of the reasons for the body's reaction is that calls for service are inherently stressful due to the unknown nature of what officers may encounter when responding, and when coupled with the fact that a high-priority call is generated from a known violent hot spot, the stress may be compounded. In short, if increased police presence in violent crime hot spots reduces the quality of life offenses and priority calls for service, this can represent significant benefits for both citizens, police managers, and patrol officers.

Limitations

In every study, there are always limitations that arise that could have an effect on the results. The first limitation was the issue of not having every shift allotted for actually filled. The officers volunteered to take part in the intervention on an overtime basis, which meant that only officers that wanted to take the extra time participate actually signed up. Because there were a limited number of officers who participated in the study, there were shifts that never occurred. Overall, only 60 shifts were covered from the 88 that were scheduled (68%). This finding is important because it causes readers to wonder if those remaining shifts were

covered, whether or not it would have changed the impact on calls for service and crime. It is not expected that those shifts would have altered the results of the study significantly.

A second limitation to the study was the issue with the change in CAD system. It would have been logical to easily compare the data from Tiburon to the data in Hexagon. Because that comparison was not able to happen, calls for service types were not able to be used. Calls for service priority levels still give an overarching picture of the crime occurring, however it is preferable to analyze by call type rather than a category of calls grouped together. With the detailed communication with the communications team at KCPD, it is important to note that the priority calls captured represent what is needed to determine whether an impact occurred or not.

A third limitation is related to sample size of treatment and control areas. This analysis included only 11 micro hot spots (five treatment and six control), which is much less than some previous studies explicitly examining the influence of police presence (see Sherman and Weisburd, 1995; Telep et al. 2014). The outcome measures were weekly crimes and calls for service throughout these hot spots, and these were further disaggregated across priority and crime type. While this strategy permitted examination of any influence of hot spot policing by call and crime type, the reality is that some categories, when disaggregated, yielded very small and presumably unstable means.[4] These means yielded low statistical power – future research should repeat this approach with more hot spots in each experimental condition.

Future Studies

[4] This was particularly true for offenses, whereas CFS produced more stable weekly means.

This study had its limitations, and the researcher hopes to bring light to these limitations to improve them for future studies. The first suggestion is to have two-person units in the intervention areas rather than having officers by themselves. There are many different policies at KCPD that require a two-person unit. When an officer responded to a call in the DPHS areas, if they were by themselves it limited them to what they were actually able to do while there. If a call came where it was required to be in a two-person unit then they had to wait to intervene until back-up had arrived. In the future, this problem could be avoided by ensuring that all shifts were staffed with two officers.

It is important in future studies to ensure that the officers adhere to the strict treatment plan. The idea of intervening in small geographic areas for 10-15 minutes (Koper 1995) is important because it is the foundation of the treatment. Only 58.4% of the visits in the DPHS areas fell under the Koper Curve's ideal range. This probably does not reflect poor fidelity to the project, rather real-world complications that patrol officers face in evolving environments to strictly adhere to these target dosage times. Nevertheless, in the future, it is important to maintain this threshold. Related, future research can examine the efficacy of the Koper Curve standard in different contexts. The National Police Foundation deemed the Koper Curve as the gold standard since Koper presented his analyses in 1995, and there has been empirical support for this threshold in the research literature (see Telep et al., 2014; Schaefer, Hughes and Stelzig, 2019), but less is known about how well this dosage suggestion works in varying environmental contexts or across crime type, and therefore this is fertile grounds for deeper analysis.

Another suggestion for future studies is to give officers more guidance on their duties. To put it simply – this intervention measured officer presence (e.g., dosage) rather than what

officers actually did. This suggestion came from the debriefing of officers, where the researcher spoke with the officers who participated in the intervention. One of their major concerns was that they felt they were not given enough instructions on exactly what they were supposed to be doing in these areas when they were visiting the DPHS areas. However, it is important to note that giving more guidance on what they are supposed to be doing will change the outcome of the study. The study would no longer be measuring the hot spots policing method itself, but it would measure the officer's activities (see Taylor et al., 2011; Ratcliffe et al., 2011). This study was measuring the effects of the hot spots policing method in Kansas Cityin highly violent areas. If the project staff were to give more guidance, the results may have been different here. Of course, if this were the case, officers would likely need to be deployed in two-person units, as noted previously.

The last suggestion for future studies is that the researcher should conduct more field observations. Over the 60 days, the researcher only conducted observations during the first 30 days, and there were only a few. It would be beneficial to conduct more observations that fell throughout the duration of the treatment rather than only at the beginning. It would be ideal to have the researcher observe every shift. By conducting more field observations, it would give the researcher a better idea for the accuracy of the CAD data. Not only does it give an idea of how accurate the data is, it could help understand whether the crimes were occurring during the hot spot intervention times or not. In future studies, researchers should determine if the crimes occur during the intervention times or if they occur after the officer has left the area.

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