

THE SALIENCE OF SOCIAL DISORGANIZATION AND CRIMINAL
OPPORTUNITY THEORIES IN EXPLAINING CHRONIC VIOLENT CRIME
PLACES: A CASE-CONTROL STUDY IN NEWARK, NEW JERSEY

by

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A dissertation submitted to the

Graduate School-Newark

Rutgers, The State University of New Jersey

In partial fulfillment of the requirements

For the degree of

Doctor of Philosophy

Graduate Program in Criminal Justice

Written under the direction of

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And approved by

Newark, New Jersey

May, 2016

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ABSTRACT OF THE DISSERTATION

The Salience of Social Disorganization and Criminal Opportunity Theories in Explaining Chronic Violent Crime Places: A Case-Control Study in Newark, New Jersey

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Most criminological research on the uneven distribution of crime across cities applies social disorganization concepts, such as collective efficacy or crime opportunity concepts, such as guardianship, to understand underlying risk factors associated with high-activity crime places. A recent longitudinal study of street segments examined why certain places experienced disproportionate amounts of crime (Weisburd, Groff, and Yang, 2012). This study analyzed readily-accessible data on varying characteristics of street segments and found support for both crime opportunity and social disorganization features. Some observers questioned whether the variables used in the study could be used to distinguish key theoretical concepts, such as the place-level application of informal social control mechanisms, in crime opportunity and social disorganization theories (see Braga and Clarke, 2014).

This dissertation research seeks to apply more robust crime opportunity and social disorganization measures at street segments in Newark, New Jersey. This research was designed to use refined measures of collective efficacy and local guardianship to shed light on criminogenic dynamics associated with persistently violent street segments. Group-based trajectory models were used to identify street segments with stable concentrations of street violence between 2008 and 2013. A matched case-control design

was then used to determine whether any statistically significant differences in a range of situational and other factors existed at the most violent segments relative to the least violent segments.

A logistic regression model was used to identify statistically significant differences between the case and control streets on variables that represented key concepts from criminal opportunity and social disorganization theories. The analyses revealed many opportunity variables, such as particular local guardianship measures, were statistically significant predictors of whether street segments had persistent violent crime problems. In contrast, none of the local collective efficacy measures were statistically significant. From a theoretical perspective, this research suggests that informal social control at very small violent crime places may best be conceptualized in terms of local guardianship dynamics common to opportunity theories, rather than collective efficacy measures common to social disorganization theories. From a practical perspective, this dissertation research suggests situational measures that increase local guardianship may be productive in controlling violence in small places.

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ACKNOWLEDGMENTS

This dissertation developed out of numerous discussions with Dr. Anthony Braga and Dr. Ronald Clarke and their guidance helped set the framework for this research. It is my hope that this research provides insight to not only researchers, but also practitioners.

I am extremely thankful for the guidance provided by my entire dissertation committee. I would first like to thank Dr. Eric Piza for getting me started on the long path that led me to completing my PhD. Thank you for agreeing to be on my committee and for answering my endless GIS questions. Dr. Bob Apel, thank you for steering me in the right direction for the analysis portion of my dissertation. I truly would have been lost without you. Dr. Ronald Clarke, thank you for your support on this and other projects. Your excitement for my research and the help you provided had a significant impact on the final product. And finally, Dr. Anthony Braga, my committee chair, my mentor, and my boss, thank you for taking a chance on me five years ago and for pushing me to complete my dissertation even when the finish line seemed so far away. The support and encouragement you have given me both professionally and academically has not only made me a better researcher but will follow me throughout my life.

To the faculty and staff at Rutgers School of Criminal Justice: thank you for your support for the past five years. Special thanks to Lori Scott-Pickens, Dennis Ng, and Phyllis Schultze for always being there to help me academically and with any other issues I experienced.

I am forever grateful for the support provided to me by the Newark Police Department. I am especially thankful to Lt. William “Bucky” Brady, who provided me with endless support in both my academic endeavors and my work responsibilities. Without your support, none of this would have been possible. I am also indebted to the many detectives who spent countless hours driving me around to conduct my site visits: Det. Ronald Soto, Det. Vincent Cosenzo, Det. Adolfo Furtado, Det. Oscar Davis, Sgt. Edgar Padilla, Det. Bryan Badim, Det. Juleesa Burgos, Det. Brian Costa, and Det. Edward Santiago. I am also appreciative of the support given to me by Sgt. Anthony Venancio and Lt. Omar Diaz in organizing portions of the data collection process.

To my friends at the police department, thank you for your friendship and for continually pushing me to do my best. Steffi, Sonji, and Ronnie, thank you for being there when I first started at the police department, it would have been very lonely without your endless laughter and jokes. And to my friends in the Real Time Crime Center “barrio”: Eddie, Elaine, Julie, Bryan, and Mike, thank you for getting me through this last year. I am lucky to have found a group of people who encouraged me to have fun, but also made sure I got all my work done.

To Sarah, Kashea, and Cory: your friendship since the start of the program helped me maintain my sanity. It would have been unbearable without you.

To my other friends in California and New Jersey: thank you for always checking up on me and for providing me with much needed distractions.

To my mom, dad, and brother: thank you for your support throughout this whole process. Thank you for listening to me complain and for offering to read everything I wrote. Your guidance is what got me to this point.

To Andrew: thank you for always being there, for your patience, and for your endless support.

Chapter 1 - Introduction

Traditional criminological research has focused primarily on why certain individuals become criminals (Bandura, 1973; Merton, 1938; Hirschi and Gottfredson, 1983). However, over the last century and a half, criminologists have tried to develop a better understanding of the geographic variation in crime locations. These criminological studies predominantly used large units of analysis such as cities and neighborhoods (Park and Burgess, 1925; Shaw and McKay, 1942). More recently, smaller units of analysis such as street segments or specific addresses have been applied to understand the variation of crime within cities (Sherman, Gartin, and Buerger, 1989; Weisburd, Groff, and Yang, 2012).

In addition to the evolution in the study of place over time, the theories applied to understand the variation in crime at different kinds of places have also continued to develop. The predominant theory used to explain crime at the neighborhood level has been social disorganization. Dating back to the Chicago School of Sociology (e.g., see Park and Burgess, 1925), social disorganization has been applied to understand neighborhood effects on crime and the theory continues to be used in novel ways today (Sampson, 2012). Opportunity theories such as routine activities (Cohen and Felson, 1979) and rational choice (Clarke and Cornish, 1983) are more commonly utilized to understand the variation in crime at smaller crime places (Sherman et al., 1989). These theories are well suited to understand local dynamics and situations that cause crime to concentrate at specific locations.

Criminologists generally examine the explanatory power of particular ideas by conducting tests of single theoretical perspectives (Weisburd et al., 2012). Unfortunately,

selecting one perspective and ignoring any others creates the risk of incomplete research. Indeed, some criminologists integrate theories to understand how differing concepts and perspectives may complement each other (Bernard and Snipes, 1996). The results of theory integration exercises have the potential to expand our understanding of important criminological issues. Weisburd et al. (2012) attempted to examine how concepts from social disorganization and criminal opportunity theories may help to explain the existence of chronic crime places in Seattle, Washington. They found concepts drawn from opportunity theories appeared to be the most powerful in explaining crime concentrations at street segments but also drew from social disorganization to understand the underlying dynamics at the street level that opportunity measures may not have captured. Their social disorganization variables experienced more variability and were concentrated throughout the city rather than in specific neighborhoods. Some observers (Braga and Clarke, 2014) suggest that Weisburd et al.'s (2012) work is promising but in need of refinement. This dissertation attempts to sharpen our understanding of opportunity and social disorganization variables that may influence the existence of specific chronic crime places within neighborhood contexts.

This introductory chapter lays the framework for the current dissertation research by briefly discussing the theoretical and empirical research which has dominated studies of the geographical distribution of crime. It begins with an overview of the two theoretical perspectives central to studies on crime places: social disorganization and opportunity theories. The third section discusses the 2012 book by Weisburd, Groff, and Yang that provided a much-needed citywide analysis of crime at the street segment level. The current study draws upon this book and an article by Braga and Clarke (2014) to

frame the research ideas. A review of the Braga and Clarke (2014) article is provided in the fourth section which focuses on ways to improve the various variables used in the analysis. Finally, an overview of the current study, the research questions, and supporting hypotheses to be tested for the dissertation are presented.

Neighborhoods, Social Disorganization, and Crime

This section briefly summarizes the neighborhoods and crime perspective (for a complete discussion, see Chapter 2). Although the study of place began in the 1800s (Balbi and Guerry, 1829; Greg, 1839), the study of neighborhood effects in the United States did not gain prominence until the 1920s when sociologists from the University of Chicago began to study neighborhoods and communities within Chicago. Robert Park (1925) was one of the first to argue for researching neighborhoods rather than administrative units or whole cities. Following Park, Ernest Burgess developed a concentric-zone model of crime and social problems (1925). Based on Burgess' model, Clifford Shaw and Henry McKay studied communities and juvenile delinquency in multiple cities and found similar patterns in the geographical distribution of crime (1942). The research that came out of the University of Chicago inspired criminologists from other cities to conduct their own neighborhood studies.

The idea of social disorganization was a key concept for Chicago School scholars who attempted to understand the variation in crime across neighborhoods. In general, “social disorganization refers to the inability of a community structure to realize the common values of its residents and maintain effective social controls” (Sampson and Groves, 1989, pg. 777). Put simply, it is believed that low economic status, ethnic heterogeneity, residential mobility, and family disruption leads to social disorganization

in a community which results in higher crime and delinquency rates (Sampson and Groves, 1989). While many scholars have studied social disorganization at the neighborhood level, one of its largest criticisms is that there is not a direct way for it to be measured (Lander, 1954; Pfohl, 1985). This and other criticisms caused the concept of social disorganization as developed by Shaw and McKay to fall out of favor with criminologists (Bursik, 1988).

The resurgence of neighborhoods and crime research began in the late 1970s and early 1980s with research by Kornhauser (1978) and Bursik and Webb (1982). Despite the criticism of Shaw and McKay's work, criminologists still applied ideas from their research. Kornhauser developed a community control argument based on their ideas and Bursik and Webb reanalyzed Shaw and McKay's data and produced similar findings although analysis of subsequent years of data did not generate consistent results. Reiss (1986) argued that not only individuals but also communities had crime careers. Sampson and Groves (1989), in one of the first direct tests of Shaw and McKay's theory found support for community social disorganization in explaining between-community criminal offending. Other work by Sampson and Wilson (1995), applied neighborhood effects to understand racial differentials in violent crime offending and victimization patterns. Their research led to increased interest in the study of neighborhood effects.

The Project on Human Development in Chicago Neighborhoods was influenced by the early research conducted by the Chicago School and is a highly influential research initiative which led to updated perspectives on how neighborhood characteristics can promote or inhibit crime. Sampson, Raudenbush, and Earls (1997) conducted interviews with thousands of residents in neighborhoods throughout the city. Their

primary interest was in an intervening variable which linked social disorganization and crime: collective efficacy. Collective efficacy is defined as “social cohesion among neighbors combined with their willingness to intervene on behalf of the common good” (Sampson et al., 1997, pg. 918). Data on collective efficacy tends to be collected through surveys or interviews and is measured by the concepts of willingness to intervene for the common good and shared expectations based on collective goals. Increased levels of collective efficacy in a neighborhood have been shown to have a positive impact on crime levels in cities throughout the world (Gibson et al., 2002; Browning, Feinberg and Dietz, 2004; Sampson and Wikström, 2008; Sampson, 2012).

Chronic Crime Places and Criminal Opportunity Theory

The observation that crime is concentrated in some areas and not others has been long established (Shaw and McKay, 1942). Early research studies focused on why certain neighborhoods had high crime levels while recent research has taken a micro approach and focuses on why certain places within neighborhoods experience crime concentrations. While researchers were once limited to basic statistical analysis and crime mapping, technological advances have created powerful computer programs which allowed for advanced statistical techniques and crime mapping down to the parcel level. One of the first and most influential studies on the concentration of crime at micro places was conducted by Sherman et al. (1989), in Minneapolis, Minnesota. Their finding that a very small proportion of addresses accounted for a majority of crime calls has been replicated in a number of studies in various locations using differing units of analysis and crime types (Eck, Gersh, and Taylor, 2000; Weisburd, Maher, and Sherman, 1992; Weisburd and Green, 1994). These cross-sectional studies observed crime concentrations

over a one year time period; however, they were unable to show that crime at these locations was consistently concentrated.

Though Sherman et al. (1989) established that a small number of places represented a disproportionate amount of crime, their analysis and other early research did not show these hot spots were stable over time. It is easier to allocate limited resources to a consistently high crime place as opposed to a place that may eventually become crime free on its own (regression to the mean). Weisburd et al. (2004), utilizing a technique first used by Nagin (1999) analyzed the crime trajectories of street segments in Seattle over a 14 year period. Their research confirmed that the majority of street segments regardless of crime level had stable trajectories. Future studies confirmed the stability of high crime places by analyzing other crime types in other cities (Braga, Papachristos, and Hureau, 2010; Yang, 2010; Braga, Hureau, and Papachristos, 2011; Curman et al., 2015). This research demonstrated that studies with a larger neighborhood focus were missing within neighborhood variation.

Sherman et al.'s (1989) study on the concentration of crime applied the routine activities approach as a key perspective in understanding the existence of hot spots. The routine activities approach developed by Cohen and Felson, (1979) explored the interactions among victims, offenders, and guardians which converged in time and place based on the lifestyle patterns of the population. Their argument was, in order for a crime event to take place, there needed to be a potential offender, a suitable target (victim), and the absence of a capable guardian. To prevent criminal activities, modifications needed to be made to impact the target or guardian rather than change the offender. Though it

was difficult to initially gain supporters due to its departure from individual motivation, routine activities is one of the most cited theories in criminology today (Felson, 2008).

Complementing the routine activity approach in understanding criminal opportunities is the rational choice perspective which can be used to understand why certain places are crime hot spots and others are not. In opposition to many traditional theories, the rational choice perspective views the desires, preferences, and motives of offenders as similar to those of the general population (Clarke and Cornish, 1985). Decision making is crucial in the path to crime and focus is placed on reducing and changing opportunities for offending. This is possible because it is argued that offenders are rational people who weigh the potential costs and benefits of their crime. When the costs outweigh the benefits, an offender will choose not to commit the crime. For situational crime prevention, this can be accomplished by reducing opportunities for crime and to increase its risks (Clarke, 1983). Opportunities can be reduced by manipulating the environment in ways such as target hardening, defensible space, and community crime prevention activities. It is this emphasis on place and making changes to specific places that allows opportunity theories such as routine activities, rational choice, defensible space, crime pattern theory, and situational crime prevention to complement each other rather than work against one another.

Integrating Social Disorganization and Opportunity Theories to Explain Chronic Crime Places

Most criminological research on the uneven distribution of crime across cities most often examines social disorganization or crime opportunity concepts in identifying risk factors associated with crime concentrations. Although researchers generally keep

competing theories separate in research, Weisburd et al. (2012), felt that scholars studying the criminology of place should not ignore the fact that social disorganization theory could complement opportunity theory. Their book analyzed sixteen years of crime data from Seattle, Washington at the street segment level and takes into account both social disorganization and opportunity theories in their analysis.

In preparation for their main analysis of the relevance of varying place-level characteristics to observable crime patterns, Weisburd et al. (2012), conducted cross-sectional and longitudinal analysis of crime at the street segment level. Their findings were consistent with previous research: crime was concentrated at certain street segments and these high crime street segments were stable over time. They believed the stability of crime concentrations was due to place characteristics being relatively constant from year to year.

Although much data germane to social disorganization concepts is available at the census tract level, these larger units of analysis were obviously inappropriate to measure specific dynamics at smaller street segments. Instead, data were collected from various city agencies and private companies to provide measures for both opportunity and social disorganization theories. Opportunity measures were grouped into motivated offenders, suitable targets, accessibility/urban form, and guardianship. The social disorganization measures were grouped by structural variables and intermediating variables.

Weisburd et al.'s (2012) initial analysis of the concentration of the variables found considerable variability at the street segment level for their motivated offender, suitable target, and urban form and accessibility measures. Their measures of guardianship were found to have a distributed concentration while their street lighting

variable did not follow any of the previous patterns and had some areas of concentration and other areas with low and similar levels of lighting. The social disorganization variables experienced more variability and were concentrated throughout the city rather than in specific neighborhoods.

Multinomial logistic regression was used to analyze the eight crime pattern trajectories identified during the trajectory analysis. The analysis indicated that the opportunity variables were more consistent with the crime patterns than the social disorganization variables. Weisburd et al.'s (2012) final analysis compared the street segments in the chronic crime pattern to the crime free street segments. The majority of the statistically significant variables had a positive relationship to crime; an increase in the variable increased the likelihood that the street segment would fall into the chronic-crime pattern. The most important variables were found to be the number of employees and number of residents on a street segment. Other important and statistically significant variables were public facilities, property value, disorder, and collective efficacy measured as active voters. While most of the variables were statistically significant, a few were not. Total retail sales, percent vacant land, racial heterogeneity, mixed land use, urbanization, and segment length were found to be not statistically significant in predicting a street segment's likelihood of falling into a chronic or crime free pattern.

Overall, Weisburd et al. (2012) emphasized five contributions of their work. First, crime is tightly concentrated at crime hot spots and by focusing on a few places; a large proportion of the crime problem can be addressed. Second, crime hot spots are stable over time which is especially promising for crime prevention strategies. Third, since there is variability of crime places at micro units of analysis, utilizing larger units misses

important variation found only at smaller units. Fourth, the social and contextual characteristics of places vary at micro units, which further stress the importance of small units of analysis. Finally, crime at place is very predictable and when it is understood why crime is concentrated at these locations, effective strategies can be developed to prevent crime. These contributions led to a several policy implications. Primarily, since crime at place is predictable, resources to prevent it can be effectively allocated. Resources can include traditional policing tactics as well as order maintenance and community building. Since social disorganization measures were found to be statistically significant, formal social control tactics may not be enough to change crime trajectories.

Although Weisburd et al.'s (2012) research provided significant contributions to the field; their work was not without its limitations. Since the analysis was conducted on the entire city, due to time and financial limitations, the researchers were restricted to readily available data. One of the primary issues related to data availability was that many of their measures were proxies for variables they would have liked to collect. This had a large impact on their guardianship variables. Additionally, they would have preferred to have more information on the people who live, work, and visit the street segments. This would have likely required surveys, interviews, or site visits, all of which are time consuming or expensive. Additional limitations were that seasonal variation was not taken into consideration, all crimes were analyzed instead of focusing on specific crime types, and they could not make statements about the causal patterns underlying the data. These limitations are discussed in further detail in Braga and Clarke (2014), presented below.

Critique of Blending Social Disorganization and Opportunity Theories to Explain Crime Places

Weisburd et al. (2012) took on the tremendous task of trying to identify the most salient factors impacting crime at street segments. Collecting citywide data to measure opportunity and social disorganization is quite the undertaking and they should be commended for their work. Their analysis found crime at place is very predictable and that both opportunity and social disorganization perspectives have a place in analysis at the micro level. While their work provided numerous contributions to the study of crime at micro places, it is not without its criticisms. In their article, Braga and Clarke (2014) acknowledged these contributions and then suggested ways for future studies to improve upon their work. One of the first contributions Braga and Clarke (2014) discussed is utilizing street segments as the unit of analysis allows for the collection of data on both social and situational variables related to the concentration of crime. Larger units of analysis would have allowed for the use of U.S. Census data but would have been inappropriate for the measurement of opportunity variables. Secondly, they believed one of the largest contributions made by Weisburd et al. (2012) is that they were the first to use trajectory analysis to identify persistent crime hot spots and then analyzed micro-level data to identify factors that increased crime at these places or aided in discouraging crime.

After acknowledging the substantial contributions to crime and place research, Braga and Clarke (2014) provided a critique of their work and focus on four key issues. Their first criticism was that the authors should have utilized a broader selection of situational variables. Due to the size of the study, Weisburd et al. (2012) were unable to

collect their own data and instead relied on readily available data. Some additional measures suggested by Braga and Clarke were juvenile hangouts, crime facilitators and attractors, street permeability and risky facilities. These measures would allow for a more complete analysis of the association between situational variables and high-crime streets. The second criticism focused on the theoretical ambiguity in some of Weisburd et al.'s measures. Weisburd et al. (2012) acknowledged the issue; however, the problem may have had an impact on their analysis and therefore their conclusions.

The third and fourth criticisms involve the application of collective efficacy to explain variability in crime across micro places. The concept of collective efficacy is generally measured as a community or neighborhood level concept. Braga and Clarke (2014) questioned whether it was appropriate for Weisburd et al. (2012) to take a concept traditionally found at a larger unit of analysis down to a micro unit. Finally, Weisburd et al. (2012) argued that programs to address the underlying social and structural characteristics of street segments should accompany more formal social control approaches. Braga and Clarke (2014) claimed it was unclear whether collective efficacy could be increased at the street level. Since most collective efficacy research is conducted at the neighborhood level, data has not been collected to see if interventions to increase collective efficacy would be successful at the street level.

The criticisms and recommendations for future research made by Braga and Clarke (2014) contributed to the framework for the current dissertation. Their first recommendation was to utilize additional and untraditional data sources to obtain more valid and direct measures of the theoretical constructs. In their response to Braga and Clarke, Weisburd, Groff, and Yang (2014), wholeheartedly agreed. While the current

research uses data from many of the same sources as Weisburd et al. (2012), additional data is collected through site visits to all of the street segments selected for study. Rather than looking at the whole city, this research focuses on certain street segments and follows Braga and Clarke's (2014) second recommendation for future research on crime concentrations at micro places: utilizing a wider variety of research designs.

In this dissertation, a matched case-controlled design was used. Since a smaller sample of street segments were selected, this design allowed for more detailed data collection. The current research also accounted for some of the broader theoretical criticisms made by Braga and Clarke (2014); primarily that Weisburd et al. (2012) did not use an accurate measure for collective efficacy at street segment. This criticism was addressed in this study by including variables on block associations, churches, and community organizations (suggested by Sampson, 2012 as key dimensions of collective efficacy). Finally, by holding neighborhood dynamics constant, this dissertation research allowed for a clearer assessment of the specific role opportunity and social disorganization measures play in mitigating or enhancing crime levels on street segments.

The Current Study

This study aims to sharpen our understanding of the theoretical determinants of violent crime concentrations at specific street segments in Newark, New Jersey. In order to accomplish this, a matched case-controlled design was used to match street segments identified as having high levels of street violence to street segments identified as having no or low street violence levels. Segments were matched based on segment length, street type, and census tract. Matching based on tract controlled for neighborhood variation

and made it possible to isolate mechanisms germane to criminogenic dynamics at specific micro places within neighborhoods. Selecting a sample of street segments allowed for systematic social observations at each segment aiding in the collection of opportunity and collective efficacy data. Overall, this study endeavors to understand, within the neighborhood context, the salience of opportunity variables and social disorganization variables in explaining chronic violent crime places. Three primary research questions help guide this study.

Research Question 1: *Are street violence incidents in Newark concentrated in specific neighborhoods, at specific places within these neighborhoods, and at the street segment level?*

In order to conduct further research on the relationship between crime and place in Newark, it must first be determined that there are in fact concentrations of violence. Prior research on the concentration of crime has focused on cities not known for their extreme levels of violence such as Minneapolis, Boston, and Seattle (Sherman et al., 1989; Weisburd et al., 2004; Braga et al., 2011). Can the same extreme concentrations of violence be found in a city with a violent crime rate over three times the national average?

This question was answered by looking at the distribution of violence in Newark in two ways: at the tract/neighborhood level and at the street segment level. It was expected that a small number of criminally active places generated the bulk of the city's street violence and that there were pockets of low violence/no violence places within some of the city's most violent neighborhoods.

Hypothesis to be tested:

H₁: Violent crime incidents are concentrated in specific neighborhoods and at specific street segments within neighborhoods.

Research Question 2: *Are there stable concentrations of violent crime at street segments in Newark over time?*

The first research question establishes the existence of street violence hot spots over time. However, yearly distributional counts do not confirm the stability of these places over time. Street violence could be concentrated in any given year but these concentrations could move around the city from year to year. This second research question aimed to confirm the stability of these active places and showed that future research on these particular places was warranted. Two supporting questions that will be answered in this study: 1. Are there distinct trajectory groupings based on the level of violence and 2. Are there distinct groups based on the trajectory?

Following the approach of Weisburd et al. (2004), trajectory analysis was used to group street segments based on their developmental trends. It was expected that a majority of street segments would have experienced no street violence incidents. Also, based on existing research, it was anticipated that a small percentage of street segments would be identified as chronically violent. Segments were grouped into categories based on their violent crime trajectories over time. The expected finding that violent street segments in Newark were stable and the groupings created from the trajectory analysis led to the third research question.

Hypothesis to be tested:

H₂: Violent crime incidents exhibit stable concentrations at specific street segments over time in Newark, with a small grouping of chronic violent street segments accounting for a disproportionate amount of street violence..

Research Question 3: *Controlling for neighborhood characteristics, do place-specific characteristics explain street-to-street variation in persistent violent crime problems?*

The bulk of the dissertation research focused on answering this question. While the previous questions were integral to determining where crime prevention efforts should focus, this question helped to answer what kinds of efforts were appropriate. This analysis attempted to improve on the seminal work of Weisburd et al. (2012) by controlling for various socio economic factors and by conducting site visits to specific street segments. In this research, neighborhood level processes were controlled for allowing for a more detailed look at how the opportunity variables and collective efficacy indicators matter above and beyond the larger neighborhood dynamics.

Using a binary response model, statistically significant opportunity and collective efficacy variables were identified at the street segment and at the neighborhood level. While Weisburd et al. (2012) used a range of measures for heterogeneity, socio economic status, and other demographic characteristics, the current research controlled for those variables by using a matched case-control design. This study explicitly tested whether selected opportunity and collective efficacy variables are statistically significant

predictors of whether a street segment experiences persistently levels of street violence or not.

Hypotheses to be tested:

H₃: Controlling for neighborhood and other factors, opportunity measures influence whether s street segment experiences chronic street violence.

H₄: Controlling for neighborhood and other factors, collective efficacy measures influence whether street segment experiences chronic street violence.

Chapter 2 - A Review of the Literature: Neighborhoods and Crime

This chapter provides an overview of the available scientific evidence on the relationship between neighborhood characteristics and crime that gained prominence in the early twentieth century through research done by scholars with the so-called “Chicago School” of sociology. Early criminological research primarily focused explaining why certain individuals became criminal offenders and how to explain criminal behavior (Clarke, 1980). However, during the 1800s, a small number of European criminologists explored the spatial variation in the distribution of crime. Balbi and Guerry (1829) were among the first scientists to map the spatial distribution of crime in France. Similar mapping techniques were used by Belgian statistician and astronomer Adolphe Quetelet (1831) who came to the conclusion that poverty did not “cause” crime. Rather, criminal behavior was influenced by a mixture of poverty, temptation, and strain that facilitated criminal acts. Other researchers in Europe began to study the relationship between neighborhoods and crime (Greg, 1839; Mayhew, 1851[1950]); however, the “neighborhoods and crime” research tradition did not begin in the United States until the 1920s.

This chapter is divided into three sections. The first section summarizes the highly influential “neighborhoods and crime” research studies produced by University of Chicago sociologists during the early to mid-1900s. Critiques of the Chicago School research, which led to a decade’s long lull in scientific inquiries exploring the relationships between neighborhoods characteristics and crime, are also discussed. The second section describes the resurgence of interest in the neighborhood effects on crime during the 1980s and early 1990s. Particular attention is paid to an important 1986

thematic volume of *Crime and Justice* entitled “Communities and Crime” as well as arguments made by Kornhauser (1978) and others. The third section reviews contemporary research on neighborhoods and crime, highlighting the influential research findings of the landmark the Project on Human Development in Chicago Neighborhoods (Sampson et al., 1997).

This chapter seeks to trace the historical development of the neighborhood and crime research tradition and highlight its important theoretical concepts and research findings. This highly influential body of research supported the further development of crime opportunity theory and paved the way for the study of crime places at micro units of analysis. The salience of concepts of informal control in neighborhoods and crime research is highlighted throughout the chapter and briefly summarized in the concluding section.

The Chicago School

The Department of Sociology at the University of Chicago began studying poverty and other social problems at the city-level and neighborhood-level in the early 1900s. Their work, which was coined “human ecology,” explored “the spatial and temporal relations of human beings as affected by the selective, distributive, and accommodative forces of the environment” (McKenzie, 1925, pg. 63-64). Instead of focusing on the characteristics of individuals, they believed crime could be understood by studying the characteristics of neighborhoods. Additionally, researchers from the school introduced the concept of “social disorganization” which referred to “a decrease of the influence of existing social rules of behavior upon individual members of the group” (Thomas, 1966, pg. 3). The impact of researchers such as Ernest Burgess, Henry McKay,

Robert Park, Clifford Shaw, William Thomas, and Louis Wirth on the study of crime and place cannot be understated and it is because of their early work, that crime and place research has evolved into such an important area study. Collectively, these highly influential sociologists and their community-based research orientation became known as the “Chicago School” of sociology.

Robert Park was one of the first Chicago School scholars to begin studying smaller areas such as cities and their neighborhoods instead of the large geographic areas used by European scholars. Rather than focusing exclusively on demographic factors such as race or poverty, Park’s early work found it was likely that “the breaking down of local attachments and the weakening of the restraints and inhibitions of the primary group under the influence of the urban environment” (1915, pg. 595) led to the increase in crime in urban areas. Although not a direct focus of his research, this idea was one of the precursors to research on informal social control which has been shown to be an important neighborhood dynamic that influences levels of crime in an area. Believing this, the movement to neighborhoods as a unit of analysis was appropriate. Individuals are influenced by their immediate surroundings - the areas where they live, work and hang out. Studying whole cities would ignore the differences present in each neighborhood.

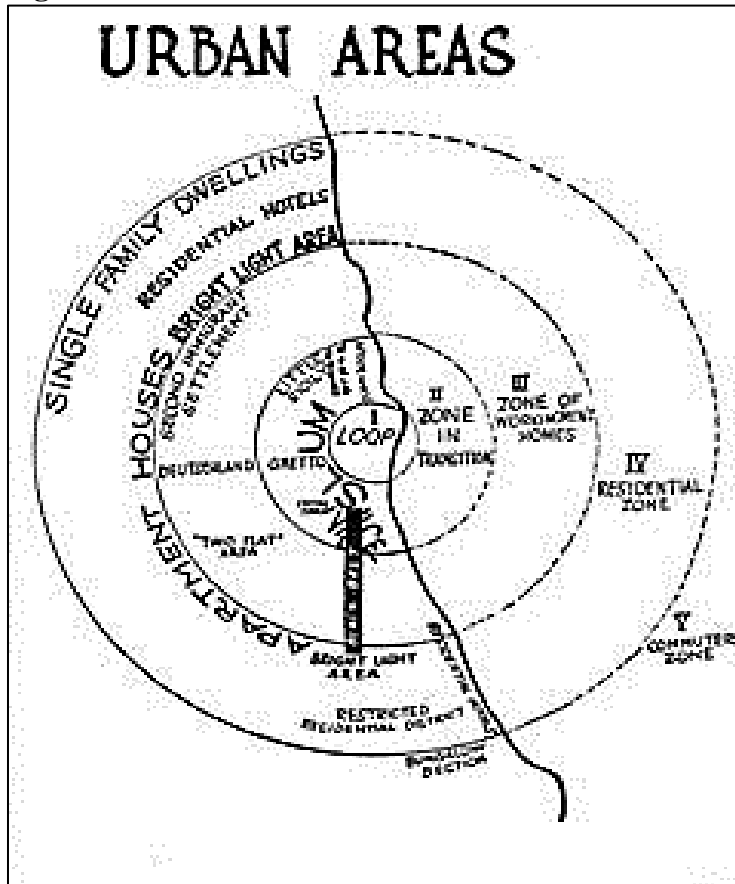
Drawing on Park’s research, Ernest Burgess (1925[1967]) developed a concentric-zone model which broke the city of Chicago into five zones (see Figure 2.1). At the center of the city, “The Loop”, was the main business area in the city. The four other zones were the Zone in Transition, Zone of Workingmen’s Homes, Residential Zone and Commuter Zone. Burgess explained that the expansion of the city can be best

understood through “a series of concentric circles, which may be numbered to designate both the successive zones of urban extension and the types of areas differentiated in the process of expansion” (Burgess, 1925 [1967], pg. 50). The Zone in Transition is historically where criminal activity occurred since it was closest to the central business district. The continual process of invasion, dominance, and succession meant there was high mobility in the area. Burgess’ research found that “areas of mobility are also the regions in which are found juvenile delinquency, boys’ gangs, crime, poverty...” (1925 [1967], pg. 59). Additionally,

“movement in the person, as from one social location to another, or any sudden changes as caused by an invention, carries with it the possibility or the probability of cultural decadence. The cultural controls over conduct disintegrate; impulses and wishes take random and wild expression. The result is immorality and delinquency; in short, personal and social disorganization” (Burgess, 1925 [1967], pg. 150).

While Burgess’ concentric zone model found a correlation between mobility and crime, Park’s research provided the link for why mobility led to crime. The high rates of mobility in the Zone in Transition led to a weakening of family and neighborhood social ties resulting in social disorganization which led to increased crime levels. Park and Burgess’ early work was significant boost to neighborhoods and crime research and led many other Chicago School sociologists to conduct similar research.

Figure 2.1: Concentric Zone Model



Source: Park and Burgess (1925)

Drawing on Burgess' concentric zone model, Clifford Shaw collected data on the geographical distribution of crime (Shaw, 1929). Shaw studied the truancy of young people, juvenile delinquents, and adult offenders, and was one of the first researchers to map the home addresses of the individuals. A decade and a half later, in 1942, Shaw and Henry McKay published *Juvenile Delinquency in Urban Areas*. Rather than only analyzing delinquency in Chicago, Shaw and McKay studied five additional cities in order to determine "the extent to which differences in the economic and social characteristics of local areas parallel variations in rates of delinquents" (1942 [1969], pg.

13). Methodologically, they employed the use of pin maps, statistical charts, and correlations to look at delinquency and other economic and social variables.

From their research, Shaw and McKay were able to make a few conclusions about delinquency in cities. First, rates of delinquency varied among Chicago's communities. Second, geography did not necessarily produce delinquency. Rather, "rates of delinquents reflect the effectiveness of the operation of processes through which socialization takes place and the problems of life are encountered and dealt with" (Shaw and McKay, 1942[1969], pg. 384). Pertaining to race, Shaw and McKay found that delinquency was not a permanent characteristic of any racial group. Instead, high rates of delinquency occurred when a particular population group occupied a new area. Delinquency of the group would decrease when the population moved on to a new area or gained increased levels of stability. Overall, Shaw and McKay used somewhat of a mixed theoretical model to explain delinquency in the city. Kornhauser explained,

"like social disorganization theories, they maintain that most delinquents are selected for delinquency on the basis of experienced strain or weak controls. Like cultural deviance theorists, they maintain that delinquency will not ensue for most youths, no matter how severely strained or inadequately controlled, without the endorsement of a delinquent subculture" (1978, pg. 63).

Though Park, Burgess, Shaw, and McKay became the most prominent of the Chicago School scholars, other important research was also coming out of the school. In addition to W.I. Thomas coining the term "social disorganization", Thomas and Znaniecki's (1918-1920) volumes on Polish immigrants were one of the first works to study immigrant culture and social organization (Zaretsky, 1996). They found that when crime occurs in immigrant groups, it is because individuals in the group have become isolated and the group no longer exerts control over the individual. One of Shaw's

research assistants, Harvey Zorbaugh, published his dissertation which compared a slum neighborhood to a wealthy neighborhood (1929). Both neighborhoods were in Chicago and were located in close proximity to one another. His research showed that demographically different areas could be located very close to one another and coexist. Finally, Louis Wirth studied urbanism and culture in Chicago and believed that city life led to the “substitution of secondary for primary contacts, the weakening bonds of kinship, and the declining social significance of the family, the disappearance of the neighborhood, and the undermining of the traditional basis of social solidarity” (1938, pg. 20-21).

Though the Chicago sociologists studied differing aspects of city life, all of their work was and continues to be influential in the social sciences. Perhaps unintentionally, many of the Chicago School sociologists were advocates for increasing informal social control in neighborhoods to decrease crime. One of the key aspects of the 20th century neighborhoods that led to increases in crime was high population turnover or the mobility of residents. Neighborhoods with stable populations, according to these scholars, should be able to stave off some of the negative effects of city living.

While the work of the Chicago School sociologists was extremely influential in sociological and criminal justice research, it was heavily criticized soon after its rise. Though Shaw (1929) and Shaw and McKay’s (1942[1969]) research was innovative in that they were among the first to map home addresses of delinquents, they failed to map addresses of where crime occurred. While it is true that individuals tend to offend in places familiar to them, Shaw and McKay’s research implied that delinquents offend extremely close to home, ignoring that they could offend in other areas (Boggs, 1965).

Another criticism was that the research had low external validity. Attempts at replicating the concentric zone model in other cities were unsuccessful (Morris, 1957; Baldwin and Bottoms, 1976) and researchers were even unable to replicate the results in Chicago decade's later (Bursik, 1984; 1986).

Additionally, an issue that continues to be a problem for researchers today is the use of official crime data which often biases the lower class since individuals in this class have a higher chance of being contacted by the police and processed in the criminal justice system (Beirne and Messerschmidt, 1991; Chilton, 1964; Gordon, 1967). Another criticism of Chicago School research persisting today is the use of larger units of analysis that may mask micro-level differences in communities (Hannan and Burstein 1974; Robinson, 1950). Understanding the importance of this criticism, the first research question in this dissertation explores the within neighborhood differences in violence levels and shows why it is important to study violence at the street segment level.

Another general criticism of the Chicago School and social disorganization research is that there is no real measure of social disorganization. Additionally, researchers did not fully understand the complex social structure in poor communities and some of their conclusions were based on visual interpretations of the data rather than statistical techniques (Kornhauser, 1978; Veysey and Messner, 1999). Though initially very popular, the criticisms of the Chicago School reduced interest in crime and place research for decades.

Resurgence of Interest in the Neighborhoods and Crime Research Tradition

Despite the many criticisms of the Chicago School and the decades' long loss of interest in crime and place research, the 1970s and 1980s saw a resurgence of interest in the study of neighborhoods and crime. In the 1970s, Berry and Kasadra (1977) and Kornhauser (1978) presented an updated and contemporary argument for the study of social disorganization. In the 1980s, a thematic edition of *Crime and Justice* renewed interest in studying the differences in crime levels within and across communities. Soon, other scholars such as Bursik and Grasmick (1993), Sampson (1985), Sampson and Groves (1989), and Stark (1987) began to focus their research interests on communities and crime. By the early 1990s, interest in communities and crime was revitalized and researchers continued to expand the notion of social disorganization.

Berry and Kasadra's (1977) *Contemporary Urban Ecology* shifted study away from traditional human ecology which was focused on competition, to contemporary human ecology which sought to understand "how a population organizes itself in adapting to a constantly changing yet restricting environment" (pg. 12). In trying to understand stability and change, they explained that contemporary human ecologists rely predominantly on four key variables: population, organization, environment and technology (1977). Additionally, they acknowledged that a more complete understanding of the relationship between man and his environment required information on economic, cultural, spatial, and behavioral dimensions of social organization.

While Berry and Kasadra (1977) updated Park's (1915) ecological approach, Kornhauser (1978) focused on Shaw and McKay's (1942[1969]) social disorganization in addition to relevant theories by other scholars. Though critiqued by other academics

(e.g., see Matsueda, 2012), Kornhauser (1978), posited Shaw and McKay's theory was a mixed model consisting of a social disorganization argument and a subcultural argument. She believed, however, that disorganized neighborhoods would have delinquency regardless of the presence of delinquent subcultures. She suggested that "the aggregative characteristics of community populations result in variation in social disorganization, which leads to the more or less weak controls that account for the variation in delinquency" (Kornhauser, 1978, pg. 82). Though other scholars such as Matsueda (2012) believe that Kornhauser's argument was flawed in that it ignored the role of culture and social structure in crime, Kornhauser did bring more attention to social disorganization theory.

In 1986, a special thematic edition of *Crime and Justice* was published called "Communities and Crime." The editors, Albert Reiss Jr. and Michael Tonry were especially interested in the idea of criminal careers of communities. Understanding the beginning and/or ending of these criminal careers could add to scholars' understanding of crime and its causes (Reiss Jr. and Tonry, 1986). While Shaw and McKay's, (1942[1969]) research detailed crime between communities, it discounted that the same community could experience different crime levels over a period of time. Some of scholars in the "Communities and Crime" edition, particularly Bursik, McDonald, and Schuerman and Kobrin recognized that communities could have crime careers and their articles detailed the ways a community could change over time.

Bursik (1984; 1986) and Bursik and Webb, (1982) in an effort to better understand Shaw and McKay's (1942[1969]) findings and conclusions, used some of Shaw and McKay's original data to analyze the stability of delinquency in Chicago's

neighborhoods since 1940. Though a portion of the original juvenile court data was available, much of it could not be found, including the boundaries for the unit of analysis. Therefore, the research was not a direct replication of Shaw and McKay's. Using seventy-five community areas, Bursik and Webb (1982) used four demographic variables to measure population redistribution: changes in population, percentage foreign-born whites, percentage of nonwhites, and levels of household density. Their dependent variable was measured as the change in the delinquency rate for males during the time period. The findings from Bursik and Webb (1982) confirmed Shaw and McKay's (1942[1969]) for their initial time period, 1940-1950. After that time period, however, they found that "neighborhoods undergoing compositional changes tend to be characterized by changing rates of delinquency" (Bursik and Webb, 1982, pg. 36).

Bursik's 1984 analysis of the data included some additional variables such as percentage of male labor force that is unemployed, the percentage of professional, technical and kindred workers, the percentage of owner-occupied dwellings, and the median education level. Bursik found similar delinquency patterns for much of the time period; however, in 1950 there was a shift that was attributed to changes in where black Chicago residents were allowed to live. Finally, Bursik's 1986 study reduced the number of variables and focused on five aspects of compositional change: change in percent nonwhite, percent foreign born, percent unemployed males, percent owner-occupied homes, and percent of households with more than one person per room. Once again, Bursik found ecological stability during the 1940-1950 time period. Later years experienced "a significant process of ecological redefinition," primarily due to suburbanization (Bursik, 1986, pg. 59). Communities experiencing the most rapid

changes also experienced increases in delinquency. Overall, the research conducted by Bursik (1984, 1986) and Bursik and Webb (1982) showed that Shaw and McKay's (1942[1969]) conclusions were not necessarily wrong. Their conclusions about the stability of delinquency in certain communities, despite population shifts, fit for the time period studied. They could not have predicted the rapid growth cities experienced in later years.

While most early neighborhoods and crime research focused on Chicago or other East Coast cities, Schuerman and Kobrin (1986) studied neighborhoods in Los Angeles over a twenty-year period, 1950-1970. They wanted to understand how and why neighborhoods turn into high-crime areas. Number of juvenile offenders by census tract of residence was used as a proxy measure for all crime as data was not available at the census tract level for all years. They measured community structure in four different ways and had multiple variables for each dimension: land use, population composition, socioeconomic status, and subculture. Schuerman and Kobrin (1986) were able to identify three stages of development in high crime areas: enduring, transitional, and emerging. Overall, they found "as neighborhoods move from a low to a high crime state, there occurs an earlier change in the ecological factors of land use and population characteristics followed later by a predominance of change in their socioeconomic and subcultural character" (Schuerman and Kobrin, 1986, pg. 86). They also found the speed at which these changes occur, not necessarily the changes themselves spur the process of a neighborhood moving from low to high crime.

Other scholars in the "Communities and Crime" volume focused on another line of inquiry, the role of formal and informal social control on neighborhood crime rates.

McGahey (1986) detailed a Vera Institute of Justice study that examined labor markets and housing patterns in three Brooklyn, New York neighborhoods. Unlike previous research that relied on preexisting data, survey and ethnographic research was conducted. It was found that persistent unemployment hindered the development of stable households which reduced opportunities for informal social control. The lack of informal social control contributed to the persistence of crime in some areas.

Alternatively, Skogan (1986) studied fear of crime and neighborhood change. He found although fear of crime may not be warranted in some declining neighborhoods, it had an impact on reducing informal social control. Low levels of informal social control and high levels of fear of crime could, in fact, quicken the deterioration of a neighborhood since it is social control that often inhibits disorder (Skogan, 1986).

Finally, Sampson (1986) studied the effects of formal and informal social control on robbery and homicide offending in 171 U.S. cities with populations greater than 100,000. Sampson (1986) came to three conclusions. First, local official sanctions (formal social control) have a significant deterrent impact on robbery. Second, family and marital disruption (informal social control) are determinants of both robbery and homicide. Finally, economically poor cities had significantly higher robbery and homicide rates.

While the 1986 thematic *Crime and Justice* volume “Communities and Crime” did not contain any groundbreaking or revolutionary research, it did help to reignite interest in studying neighborhoods and social disorganization. The authors in this volume, especially Sampson, continued to publish research in this area and greatly contributed to what is known about neighborhood crime. These authors also continued the Chicago School’s inquiry into the role of informal social control on neighborhood

crime. While the Chicago School appeared to focus more on the public sphere of social control, these scholars focused more on the private sphere with their focus on the family and the immediate household. The final section in this chapter focuses on neighborhoods and crime research published following the *Crime and Justice* volume and focuses even more explicitly on the ideas of formal and informal social control.

New Approaches to Neighborhoods and Crime

Since the mid-1980s, there has been a growing interest in better understanding what role community and individual ties play in community level crime rates. This research is based on what Kasarda and Janowitz (1974) termed “the systemic model” which “conceptualizes the local community as a complex system of friendship and kinship networks and formal and informal associational ties rooted in family life and ongoing socialization processes” (Sampson, 1991, pg. 44). Research by Sampson (1988, 1991) and Bursik and Grasmick (1993) utilized this systemic approach. Over the years, different scholars have studied this approach but none have contributed as much as Sampson who developed the concept of collective efficacy which is defined as “social cohesion among neighbors combined with their willingness to intervene on behalf of the common good” (Sampson et al., 1997, pg. 918). This section reviews the research on the systemic model of community attachment and follows with a discussion of collective efficacy research.

Prior to developing the term collective efficacy, Sampson (1988, 1991) focused on providing support to Kasarda and Janowitz’s (1974) systemic model of community attachment. Both of Sampson’s studies utilized data from the British Crime Survey although different years were used. Sampson (1988) believed prior research had failed to

look at both the macro and micro-level dimensions of social organization and community attachment. To test the validity of the systemic model, Sampson utilized a variety of community and individual level measures such as collective attachment, residential stability, family structure, socioeconomic status, length of residence, local friendships, and individual attachment to community. At the macro-level, Sampson (1988) concluded that local friendship ties varied across communities and that these ties are positively related to community stability. Residential stability also had a positive impact. At the micro-level, length of residence had an effect of local friendships, attachment to community, and participation in local social activities. Overall, Sampson (1988) found that the important social forces which undermine individual integration into a community are the systemic factors explored in the article rather than the traditional urbanization or demographic characteristics.

Sampson's (1991) follow-up research on the systemic model sought to replicate and improve his previous (1988) study. He saw three main limitations with the first study: the unit of analysis was too large, there was a limited measure of local friendship ties, and there was an absence of direct measures of social cohesion. The 1991 follow-up study attempted to improve on some of these issues. Similar to the 1988 results, Sampson (1991) found that "community residential stability has direct positive effects on macrosocial variations in the extent of community-based social ties, which in turn increases the level of community social cohesion" (pg. 59-60). Despite the improvement, Sampson (1991) still found limitations in the community-level measures and the linkage of micro- and macro- models.

Continuing the inquiry into the systemic model was Bursik and Grasmick (1993) who argued the traditional social disorganization theory was incomplete since it ignored the regulatory capacity of neighborhoods. They felt this could be fixed by using the systemic model “which emphasizes how neighborhood life is shaped by the structure of formal and informal networks of association” (Bursik and Grasmick, 1993, x). The focus on informal social networks often looked into the role of friends and family in controlling behaviors. Bursik and Grasmick (1993) believed this did not go far enough and looked to Hunter (1985) who provided three levels of local community social control: private, parochial and public. The parochial level involved broader interpersonal networks and included controls exerted by local institutions such as schools, churches and voluntary organizations (Hunter, 1985). The third level of social control, the public level “focuses on the ability of the community to secure public goods and services that are allocated by agencies located outside the neighborhood” (Bursik and Grasmick, 1993, pg. 17).

Taylor (1997) draws from Bursik and Grasmick’s (1993) research and argued the street block can be used as a key mediating construct. Up through this point, researchers generally utilized census tracts or block groups as their unit of analysis since the boundaries were clear and it was easy to pull demographic data. Unfortunately, census tracts and block groups do not accurately represent neighborhoods and it is difficult to exert informal social control on such large areas. Rather, Taylor’s (1997) argument for utilizing blocks as a unit of analysis is more manageable and better fits with the idea of informal social control. On street blocks, people get to know one another, individuals develop role obligations, there are shared acceptable norms, there are regularly recurring rhythms of activity, and clear boundaries that contain the behavior (Taylor, 1997).

Though researchers still use larger units of analysis to study community organization, there has been a large shift to use more meaningful units of analysis.

Sampson and his colleagues have, over the past three decades paid particular attention to the role of formal and informal social control in impacting and mediating crime levels in neighborhoods. As mentioned previously, one of his earliest pieces of research appeared in the 1986 “Communities and Crime” volume. Most of his research regarding social control occurs in Chicago and the data is drawn from the Project on Human Development in Chicago Neighborhoods (PHDCN); however, Sampson and Groves (1989) utilized data from the British Crime Survey. Using this data, they hypothesized that “local friendship networks will (a) increase the capacity of community residents to recognize strangers [...] (b) exert structural constraints on the deviant behavior of residents within the community” (Sampson and Groves, 1989, pg. 779). Their analysis found that communities with sparse friendship networks, unsupervised teenage peer groups, and low organizational participation had high rates of crime and delinquency. They found the effects of community structural characteristics could be mediated by variations in their community social disorganization variables (sparse local friendship networks, unsupervised teenage peer groups, and low organizational participation).

The study with perhaps the most impact on informal social control research is the Sampson et al. (1997) study that introduces the term “collective efficacy” which is once again defined as “social cohesion among neighbors combined with their willingness to intervene on behalf of the common good” (pg. 918). This was one of the earliest studies to use PHDCN data. They hypothesized that concentrated disadvantage decreased and

residential stability increased collective efficacy and that collective efficacy mediates the effects of neighborhood stratification. The PHDCN data created 343 neighborhood clusters from Chicago's 847 census tracts. Residents in each cluster were interviewed. The interview measured social control by asking about things such as the likelihood of residents intervening in certain situations. Social cohesion and trust were also measured. In addition to the survey data, census data was used for information on concentrated disadvantage, immigrant concentration and residential stability. Overall, they found the variables collected from the census data explained 70% of the neighborhood variation in collective efficacy (Sampson et al., 1997). Additionally, controlling for other factors, their combined measure of informal social control, and cohesion and trust remained a strong predictor of lower violence rates. Their findings supported their argument that collective efficacy or informal social control had an impact on mediating violent crime.

Another dimension of PHDCN involved videotaping and systematic social observations. Sampson and Raudenbush (1999) utilized this data to create variables on social and physical disorder in 196 neighborhood clusters. They additionally used the survey data discussed in Sampson et al., (1997) and U.S. Census data for demographic information. Their physical disorder measures included items such as the presence of garbage, graffiti, and abandoned cars. Measures of social disorder involved loitering, drinking alcohol in public, fighting, and drug activity. They found that structural characteristics were strongly associated with physical and social disorder and that collective efficacy predicted lower observed disorder after controlling for demographic, land use, and prior crime (Sampson and Raudenbush, 1999).

An article involving PHDCN data by Morenoff, Sampson and Raudenbush (2001) studied homicide variations from 1996-1998 across 343 neighborhoods. They found the most consistent predictors of homicide in communities were spatial proximity to violence, collective efficacy, and alternative measures of neighborhood inequality. Their findings not only demonstrated that neighborhood inequalities were important in explaining violence but also that spatial dynamics played a significant role.

Finally, published in 2012, Sampson's book *Great American City* sought to demonstrate the importance of place in our lives. While earlier articles used only one or a couple of dimensions of PHDCN data, Sampson's book utilized: a longitudinal cohort study of 6,200 children and families, community surveys, social observations through videotaping, panel studies with key community leaders, a study of collective action events in Chicago and a field experiment that measured the propensity of people in public settings to mail back lost letters. Once again, 343 neighborhood clusters were used as the unit of analysis. While the book focused on many dimensions of public life, only the findings that pertain to social control and collective efficacy are presented here. Most significantly, it was found that in communities that are otherwise similar, those with higher levels of collective efficacy experience lower crime rates. This is true not only for the current time period but also in the future as collective efficacy is found to be stable over time (Sampson, 2012). It was also found that organizational resources predict collective efficacy, nonprofits produce externalities that generate collective action, and that surprisingly, churches do not foster collective action (Sampson, 2012). While for years, researchers have focused on the role of the individual on delinquency and crime rates, research by Sampson and his colleagues clearly showed that neighborhood level

effects can and do have an impact on the individual as well as on delinquency and crime levels.

Importance of Informal Social Control

This chapter on the evolution of the neighborhoods and crime perspective has shown how the concept of social disorganization has played a substantial role in how we study communities. The Chicago School developed the concept and generally argued that rates of delinquency at the community level remained stable despite population changes. Criticisms of this resulted in diminished research in this area for decades. The resurgence of interest in neighborhoods and crime began in the 1970s and 1980s and resulted in a new group of sociologists and criminologists taking on the concept of social disorganization. A new systemic model of social organization resulted which looked at communities as dynamic entities with complex social relationships that have an impact on disorganization and crime. Finally, the PHDCN was one of the most complex and thorough research projects analyzing the salience of neighborhoods on a variety of social outcomes. Indeed, this research agenda led to the development and refinement of “collective efficacy” as an important theoretical construct in understanding how neighborhoods dynamics influenced crime levels. In addition to providing significant support for the role of informal social control in neighborhood dynamics, the PHDCN provided many opportunities for different facets of community level research. Studies of neighborhoods and crime have generally taken a macro-level approach; however, as the next chapter will show, some observers suggest that micro-level analyses may be more powerful in understanding the influence of place on crime patterns.

Additionally, one of the key themes that emerge throughout this chapter and the next chapter on micro-level opportunity theories are the concepts of formal and informal social control. This chapter began with research from the early 20th century that focused on neighborhood instability and the shifts in neighborhood dynamics that occur with city growth. For the Chicago School sociologists, it was the breakdown of close knit communities, usually through high rates of mobility that led to increased crime levels especially in the Zone in Transition. Though some communities, such as immigrant communities, were able to maintain their local ties for longer periods of time, crime eventually increased due to the isolation of some residents from the community.

Modern research on social control has spent more time developing the concept of informal social control. The concept of informal social control from the 1970s and 1980s distinguished between the three types of informal social control: private, parochial, and public and helped develop a key line of inquiry for Sampson and his colleagues. The application of collective efficacy by Sampson et al. (1997) was an important development in criminological research on the neighborhood dimensions of informal social control. Their concept focused not only on the ability of neighborhoods and communities to share common values and interests, but also the ability of residents to intervene for the benefit of the neighborhood.

The concepts of collective efficacy and informal social control are not only important in neighborhoods and crime research. Micro-level crime and place research employs similar concepts of guardianship, place managers, and intimate handlers. Informal social control provides a link between two often competing theories and helps to shape this dissertation's inquiry into violent crime places by taking a macro-level concept

such as collective efficacy and bringing it down to a place specific level. This research aims to show that it takes more than just opportunity for street violence to occur. It also requires the absence of strong social controls in any form (collective efficacy, guardians, or place managers).

Chapter 3 - A Review of the Literature: Crime and Place

This chapter provides an overview of the available theoretical research and empirical evidence demonstrating the importance of very small places in understanding criminal events and recurring crime problems. . While uneven spatial distributions of crime have been documented since the 1800s (see, e.g. Quetelet, 1831), the idea that crime is highly concentrated at a few very small locations within cities has only recently become a criminological axiom. In his recent Sutherland Award address to the American Society of Criminology, Professor David Weisburd (2015, pg. 133) demonstrated strong support for the “law of crime concentration at place” and argued that the “criminology of place” holds great promise for advancing criminology as a science. The study of crime places represents a distinct departure from traditional criminology which has tended to focus on why certain individuals become delinquent and criminal offenders or, as described in the previous chapter, why certain neighborhoods experience elevated levels of crime and disorder (Eck and Weisburd, 1995; Clarke, 1995; Braga and Clarke, 2014). As will be described further below, crime opportunity theories, which focus on explaining criminal events rather than criminal dispositions, are typically applied to understand street-to-street variation in the spatial distribution of crime.

This chapter proceeds as follows. The first section briefly presents the empirical evidence confirming the uneven distribution of crime across micro-geographic places within cities. The next section presents research on the characteristics of specific places that influences the occurrence of particular crime events. Research studies on criminogenic facilities and site features, as well as offender decisions to select particular targets and move towards specific criminal opportunities, are briefly summarized.

Subsequent sections present influential opportunity perspectives on crime beginning with seminal research on the role the built environment plays in facilitating and inhibiting crime, and continuing with rational choice, routine activities, crime pattern, and broken windows theories. Each section explains the development of the theory, its key concepts, and main criticisms.

The chapter concludes with a discussion of how other criminological theories influence criminal opportunity structures and further explores the role of informal social control in crime opportunity theories. Similar to its prominence in research on social disorganization theories and neighborhood effects on crime, informal social control represents a central concept in opportunity theories through guardianship, place management, and related concepts. The common application of informal social control in seemingly very disparate threads of criminological theories can be used to integrate neighborhood effects research with crime opportunity inquiries (see, e.g. Weisburd et al., 2012; Clarke, 1995). Indeed, such an exploration forms the intellectual basis for core research questions in this dissertation.

Crime Concentrations

Scholars have long observed that the spatial distribution of crime varied at specific places within neighborhoods (e.g., see Shaw and McKay, 1942; Hawley, 1950). However, until the mid-1980s, there were few quantitative studies that analyzed micro-level variations in crime (Braga and Weisburd, 2010). With the advent of powerful desktop computers and the development of mapping software (Weisburd and McEwen, 1997), there has been substantial growth over the last three decades in studies examining the concentration of crime at very small places. These studies have tended to use clusters

of addresses, buildings, intersection areas, and street block faces (commonly called “street segments”) as units of analyses to examine micro-level variations in the spatial distribution of crime (Weisburd, Bernasco, and Bruinsma 2009).

Two highly-influential early studies examined the concentration of citizen calls for service to the police at specific addresses within cities. In Minneapolis, Sherman et al. (1989) analyzed one year of police calls for service data and found that about 3% of addresses generated roughly half of all calls to the police. They also found, even in so-called high-crime neighborhoods, calls for service were further concentrated at specific address and the majority of addresses in the neighborhood were relatively crime free. Similar patterns were earlier identified in Boston (Pierce, Spaar, and Briggs, 1988). Other studies confirmed these seminal findings by revealing the uneven spatial distribution of burglaries (Forrester et al., 1988, 1990), gun crimes (Sherman and Rogan, 1995), and drug selling (Weisburd and Green, 1994) within neighborhoods.

More recently, scholars have begun to consider whether high-activity crime places, generally called “hot spots” of crime (Sherman et al., 1989), were stable over longer periods of time. Most of these early studies only considered relatively brief study time periods (for a discussion, see Weisburd et al. 2004). As such, it was unclear whether hot spots represented stable spatial concentrations of crime over extended periods of time. Establishing whether identified hot spots represented stable crime concentrations over longer time periods was essential in assessing the potential value of place-based crime prevention policy and practice (Braga and Weisburd, 2010). If crime hot spots were not stable, it made little sense to invest scarce crime prevention resources in specific locations rather than focusing on larger units of analysis such as neighborhoods.

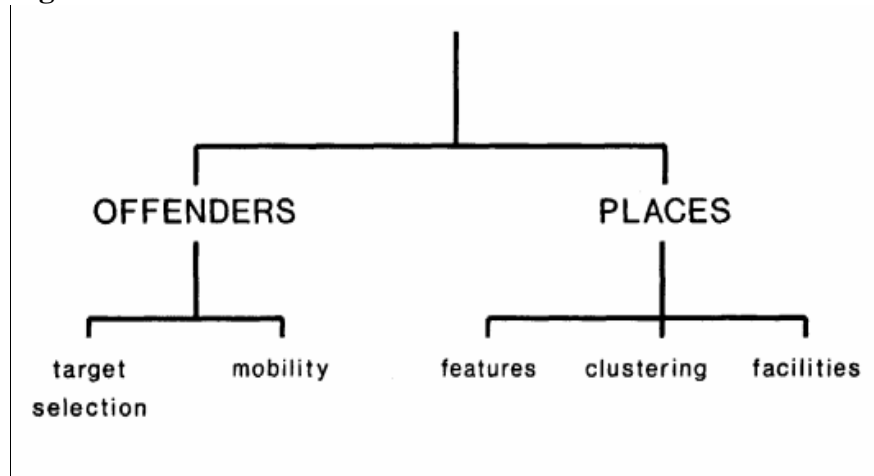
Two early studies in Boston (Spelman 1995) and Baltimore (Taylor, 1999) suggested that crime places were indeed stable over time. However, in 2004, Weisburd and his colleagues conducted a more definitive study by analyzing sixteen years of crime data in Seattle, Washington at the street segment level. Weisburd et al. (2004) used group-based trajectory analysis to identify developmental trends at specific places and found that the majority of crime in Seattle was concentrated at a small number of street segments and these concentrations were highly stable over time. In fact, citywide crime trends could be associated with increases and decreases in crime at a small number of highly-active street segments. These findings have been replicated in other cities and using different analytical approaches. In Boston, growth curve regression models were used to confirm the stability of gun violence and robberies at street segments and intersections over a twenty-nine year period (Braga et al. 2010; 2011). A study of crime calls for service in Vancouver, British Columbia also found stability at the street segment level over a sixteen year time period using group-based trajectory modeling (Curman et al., 2015).

The Characteristics of Places that Influence Crime Events

Beyond studies showing that crime concentrates at specific small places, research has also demonstrated that certain social and physical characteristics of places attract offenders and even potential victims. Eck and Weisburd (1995) identified five complementary bodies of research that support the study of crime at specific places (see Figure 3.1). These studies highlight the importance of place as observed through studies of offender behavior and decision-making processes as well as by studies that identify criminogenic characteristics of specific locations. Offender decision making will be

discussed more explicitly in subsequent sections on the rational choice perspective and routine activities theory. Here, offender mobility and offender target selection are briefly reviewed.

Figure 3.1: Studies of Crime and Place



Source: Eck and Weisburd, 1995

Generally, offenders need to be mobile to commit crimes. Brantingham and Brantingham (1981) suggest that offenders try to avoid targets near their residence to avoid being recognized. Research further suggests offenders do not travel very far to commit their crimes (Capone and Nichols, 1976; Phillips, 1980; Rhodes and Conley, 1981) as they do not want to commit their criminal acts in areas completely unfamiliar to them. Offenders also travel to areas that are target-rich such as downtown areas or shopping malls as opposed to quiet residential areas which may contain fewer targets (Boggs, 1965; Phillips, 1980; Costanzo, Halperin, and Gale, 1986). Offender mobility is often connected to how and which targets are selected.

Additionally, offenders tend not to choose their targets at random. Target selection can be based on a variety of factors such as desirability of the target, perceived risk of being caught, and accessibility of the target. Studies on the offender decision-making process, usually based on interviews with offenders, indicate that offenders are

rational, though they may not exhibit perfect rationality (Rengert and Wasilchick, 1990; Feeney, 1986; Kube, 1988). Offenders base their decisions to commit crime based on “cues at the sites; and their discovery of places is in a large part reliant on routine activities that are unrelated to crimes” (Eck and Weisburd, 1995, pg. 18).

As discussed earlier, research has revealed that crime concentrates at very specific small places within neighborhoods (e.g. Sherman et al., 1989; Weisburd et al., 2004). In addition to crime clustering, Eck and Weisburd (1995) identified research on facilities and site features as germane to understanding the importance of place in explaining crime events.

Facilities are identified as “special-purpose structures operated for specific functions” (Eck and Weisburd, 1995, pg. 8). Examples of facilities can be schools, bars, parking lots, apartment buildings, and stores. Though all of these facilities are places where people congregate, only certain facilities attract crimes. Additionally, crime type can vary based on facility type. While a bar might be prone to violent crimes, shopping malls may experience property crimes such as shoplifting and purse snatching. Parking lots with poor lighting and no parking lot attendant may experience break-ins, while an apartment building may experience robberies and domestic violence incidents. Research by Eck, Clarke, and Guerette (2007), identified the concept of risky facilities which are that small proportion of a certain facility type that account for the majority of crime experienced by the entire group. For example, Sherman et al., (1992)⁵ found that 15% of taverns in the city of Milwaukee, Wisconsin accounted for 50% of all tavern crime and a study by LaVigne (1994) found that 10% of the gas stations in Austin, Texas experienced over 50% of calls to police for drive offs and drug crimes.

Studies of site features focus the physical characteristics of a place that makes it attract criminal activity. A place could be attractive because it lacks effective guardians, or is easily accessible, or has a lot of potential targets. Architect Oscar Newman (1972) who focused on redesigning public housing buildings identified site features such as closed off stairwells, untrimmed bushes, and large undefined open spaces as site features that contribute to crime at place. In these instances, the aim is to make the target less desirable. This can also be accomplished by increasing surveillance through the use of guards (Hannan, 1982) or CCTV (Poyner, 1988) or by making certain targets more difficult to access by securing abandoned properties (Shane, 2012). These site features and the opportunities for crime created by them were influential in studies on the built environment discussed below.

Early Studies on the Built Environment and its Influence on the Spatial Distribution of Crime

In the 1960s and 1970s, a series of influential research studies focused on how the built environment influenced the spatial distribution of crime in cities and at specific places. Jane Jacob's (1961) *The Death and Life of Great American Cities* explored the relationship between crime and American cities. She criticized recent urban planning that separated land use because it created unsafe streets. For Jacobs, safe streets required three things: a clear demarcation between what is public space and what is private space, eyes on the street, and continuous sidewalk users to be eyes on the street and to encourage others to be eyes on the street. Sampson et al.'s (1997) "collective efficacy" is described by Jane Jacobs almost forty years prior. She believed that safe cities required trust among users of the sidewalk. Trust was formed by casual, public contacts at the

local level such as running errands, grabbing a drink at the bar, or walking the dog. The resulting trust enabled a person to intervene and take responsibility when issues arose. Though Jacobs' book was informed predominantly by her observations, her ideas were and continue to be very influential and popular among city planners, sociologists, and opportunity theorists.

Crime prevention through environmental design or CPTED was initially developed by C. Ray Jeffery (1971). The CPTED approach asserts that "the proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement in the quality of life" (Crowe, 2000, pg. 46). Though Jeffery (1971) promoted a particular set of ideas, a number of scholars have refined the CPTED concept resulting in a first and a second generation formulation of the approach (Cozens, Saville, and Hillier, 2005). The first generation, which Jeffery was part of, focused on six key characteristics of CPTED: territoriality, surveillance (informal and formal), access control, image/maintenance, activity program support, and target hardening (Moffat, 1983). For the purposes of this dissertation, the important concepts are territoriality, which provides residents with a sense of ownership of an area, informal surveillance, which relies on residents to increase the risks for potential offenders, and image/management, which suggests that maintaining a positive physical image of a place will encourage positive activities and increased levels of social cohesion and control. The broad concepts and ideas developed by Jeffery (1971) were integral to the development of situational crime prevention and other approaches focused on changing the physical environment to reduce crime and crime opportunities.

Finally, Oscar Newman's architectural approach to crime reduction led to the creation of the term "defensible space." Developed around the same time as CPTED, defensible space is "a model for residential environments which inhibits crime by creating the physical expression of a social fabric that defends itself" which creates an environment "in which latent territoriality and sense of community in the inhabitants can be translated into responsibility for ensuring a safe, productive, and well-maintained living space" (Newman, 1972, pg. 3). The key to defensible space was real and symbolic barriers, strongly defined areas of influence, and improved opportunities for surveillance (Newman, 1972). Most of Newman's work involved redesigning public housing developments in New York City. Similar to the work of Jane Jacobs (1961), Newman wanted to increase 'eyes on the street' by physically changing the environment to make it physically easier to observe others and to increase residents' sense of ownership where they live so they would be more likely to intervene when necessary. Critics of Newman felt that he neglected the role of social factors (Merry, 1981; Smith, 1987) and for making generalizations that were unjustified (Adams, 1973; Mawby, 1977; Mayhew, 1979). These criticisms caused defensible space to fall out of favor with researchers.

Rational Choice Perspective

The roots of contemporary conceptions of "rational choice" perspectives on criminal offending can be traced to classic legal and economic studies of criminal behavior. Cesare Beccaria ([1764] 1963) and Jeremy Bentham ([1879] 1982) were among the earliest scholars to identify the role of choice in criminal decision making. Bentham notes that "nature has placed mankind under the governance of two sovereign masters, pain and pleasure. It is for them alone to point out what we ought to do, as well

as to determine what we shall do” ([1879] 1982, pg. 1). When an activity causes an individual to experience more pain than pleasure, that person is less likely to participate in that activity.

Almost two centuries later, Gary Becker (1968) utilized an economic approach to offender perceptions of risk, effort, and reward. His economic analysis took into account public policies to combat illegal behavior, the probability of an offense being discovered and an offender apprehended, the type and size of punishment, and the cost apprehension and punishment. Optimally, ‘crime would not pay’ and “the real income received would be less than what could be received in less risky legal activities” (Becker, 1968, pg. 208). Though quite detailed, Becker’s conceptualization of rational choice had many shortcomings as described by Clarke and Felson (1993). First, it focused exclusively on the material rewards to crime and ignored other rewards such as pride or sexual gratification. Secondly, there was no differentiation between crime types. The thought process to participate in a burglary is very different than the thought process to murder someone and the risks and rewards vary greatly. Becker’s model also overestimated the chances of an offender being caught by law enforcement. Finally, the model considered the offender to be carefully calculating and self-maximizing rather than opportunistic. Clarke and Cornish’s (1983) rational choice perspective takes into account many of these criticisms and is described in detail below.

The rational choice perspective was developed in Britain by Ronald V. Clarke and Derek B. Cornish (1983), who felt the rehabilitative ideal had failed and other forms of crime control were necessary. Clarke’s earlier research on youth reoffending and absconding from training school led to the realization that opportunities could be

designed out of the institutional setting and reoffending and absconding could be reduced (Tizard, Sinclair, and Clarke, 1975). The result was the development of the rational choice perspective. Though many theoretical models attempt to explain all behaviors, the creators of the rational choice perspective are only concerned with their approach being “good enough.” The main concern is trying to prevent or disrupt crime and the perspective emphasizes policy and practice, clarity and parsimony (Clarke and Cornish, 1985; Cornish and Clarke, [1986], 2014).

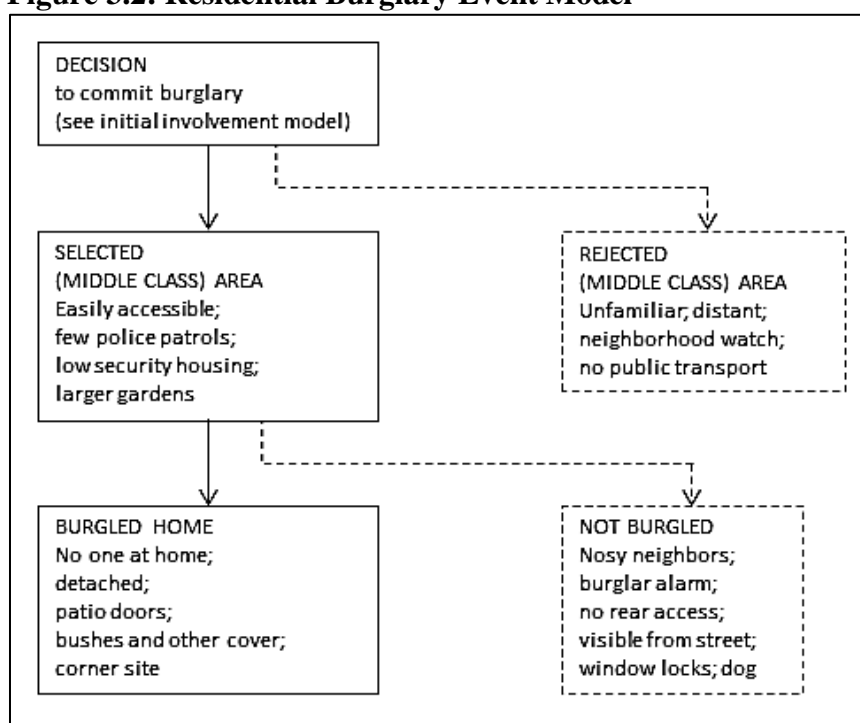
Though slight changes have been made to refine and improve the rational choice approach, it is based on the assumption that

“offenders seek to benefit themselves by their criminal behavior; that this involves the making of decisions and of choices, however rudimentary on occasion these processes might be; and that these processes exhibit a measure of rationality, albeit constrained by limits of time and ability and the availability of relevant information” (Cornish and Clarke, [1986], 2014, pg. 1).

Additionally, Cornish and Clarke (2008) identify six core concepts of the rational choice approach. First, criminal behavior is purposive. Crimes are deliberate acts and to understand them better, one needs to look for the motive behind the crime. The benefits of crime are not only monetary, they also be based on excitement, sexual gratification, revenge, and control. Secondly, criminal behavior is rational. An offender will choose the best possible means to achieve his goal. This does not necessarily imply the rationality is perfect or makes sense to everyone; however, at that time and place, it makes sense to the offender. Third, criminal behavior is crime specific. Motivations vary based on the crime. Even somewhat similar crimes such as residential burglary and commercial burglary can have different motivations. Fourth, there are two types of criminal choices, choices about criminal involvement and choices about the criminal

event. Involvement decisions revolve around choices made about initial involvement, continued involvement, and desistance. Event decisions are choices and decisions made prior to, during, and at the end of the actual criminal event. Fifth, there are separate stages of involvement: initiation, habituation, and desistance. Each stage has a different set of influential variables. Finally, criminal events unfold in a sequence of stages and decisions. These stages and decisions are dynamic and each event is different.

Clarke and Cornish (1985) developed a series of decision models to help explain initial involvement, the event, continuing involvement, and desistance. Decision models were developed to make “criminological theorizing of greater relevance to crime control policies” (Clarke and Cornish, 1985, pg. 166). Figure 3.2 depicts the event model for residential burglary. The residential burglary model begins with the decision to commit the burglary. It is followed by the choice of neighborhood and is concluded with the decision of which house to burgle. This event model is quite concise; however, the length and sequencing of an event model depends on the crime type. More general events require lengthier models due to the numerous choices with which the offender is presented.

Figure 3.2: Residential Burglary Event Model

Source: Clarke and Cornish, 1985

Situational crime prevention was developed as a practical extension of the rational choice perspective and comprises of “measures directed at highly specific forms of crime that involve the management, design, or manipulation of the immediate environment in as systematic and permanent a way as possible so as to reduce the opportunities for crime and increase its risks as perceived by a wide range of offenders (Clarke, 1983, pg. 225). Later formulations of the approach included reducing the rewards of crime (Clarke, 1995). Situational crime prevention directly links to the rational choice perspective in that the target hardening and crime reduction measures developed through situational crime prevention are intended to impact the decision process of the rational offender.

Some early examples of the success of situational crime prevention in changing the choices made by the rational offender include: suicide reduction by eliminating the poisonous content of gas supplied to households (Hassall and Trethowan, 1972), a

reduction in theft from telephone coin-boxes by replacing aluminum boxes with steel boxes (Mayhew et al., 1976) and the installation of steering column locks on all cars in West Germany which reduced car theft by 60% (Mayhew et al., 1976). Clarke (1995) described many opportunity reducing techniques, a partial list included: target hardening, access control, controlling facilitators, formal surveillance, natural surveillance, target removing.

While its policy driven focus has made the rational choice perspective highly influential, it is not without its critics. Leclerc and Wortley (2013) agreed and state “the rational choice perspective has in equal measure been one of the most influential and criticized criminological models to emerge in the latter quarter of the twentieth century” (pg. 3). Due to the broad appeal of the rational choice perspective across many disciplines, the perspective has faced a range of criticisms. A few of the most common criticisms are discussed below.

The first criticism is that offenders act rationally less often than is claimed. Because the decision to commit some crimes occurs rather quickly and offenders may be under the influence (alcohol, drugs) during the decision to commit crime, offenders may not be exhibiting perfect rationality. Cornish and Clarke (2008) agreed with this and argued that simply because an offender does not display perfect rationality does not mean he is not rational. Cornish and Clarke (2008) contended that situational measures intended to increase risks for the rational offender should be increasingly successful against the offender who may lack a high degree of rationality. Additionally, irrational actors are unlikely to be successful even without the increased risks.

Secondly, critics argue that some crimes are not rational. Critics find this to be true for violent crimes especially those with no financial motivations. Contrary to the economic rational choice model (Becker, 1968); the rational choice perspective developed by Clarke and Cornish has always included other motivations such as asserting dominance, revenge or to have fun (2001). Simply because some motivations do not appear rational to the general population, it does not mean that the motivation is not rational for the offender.

Finally, the rational choice perspective is criticized for being policy oriented rather than oriented towards figuring out why offenders commit crimes. Unfortunately, many criminological theories attempting to explain criminal behavior have no tangible results to support the theory (Wilson, 1975). For example, reducing poverty and decreasing the number of single headed households are often cited as measures to decrease criminal activity; however, it remains to be seen whether anyone can actually produce results despite decades of research. The rational choice perspective was developed to inform policy and though there are still many critics of the perspective, they are likely outnumbered by its supporters.

Though the rational choice perspective seems like a significant departure from traditional theories such as social disorganization, rational choice was not meant to compete with these theories. Rather, it was developed to provide a “framework within which to incorporate and locate existing theories” (Cornish and Clarke, [1986] 2014, pg. 11). Similar to Weisburd et al.’s (2012) argument about theoretical competition, Cornish and Clarke believed in the integration of theory. There is a direct link to informal social control or collective efficacy in that “increasing the chances of being caught usually

means attempting to raise the chances of an offender being seen by someone who is likely to take action” (Clarke, 1980, pg. 142).

Routine Activity Theory

While Clarke and Cornish were developing the rational choice perspective in the 1970s and 1980s in Britain, Lawrence Cohen and Marcus Felson (1979) were also developing a criminal event model in the United States. Over the past three decades, the routine activity approach has expanded to become more comprehensive and has evolved based on advances in technology. This section begins with a brief history of the approach with a focus on Amos Hawley’s (1950) *Human Ecology*. It is followed by the key ideas to the approach and reviews both the macro and micro approaches. A brief criticism of routine activities is presented followed by a concluding section that links the approach to informal social control and social disorganization. Similar the rational choice perspective, the routine activity approach did not initially receive a warm reception by traditional criminologists; however, over time, the approach has become widely accepted.

As suggested by Felson (2008), Amos Hawley’s (1950) book *Human Ecology* formed the theoretical underpinnings for the routine activities theory. The study of human ecology relating to the study of neighborhoods and communities gained popularity with the Chicago School in the 1920s. Hawley, mentored by Chicago School sociologist, Roderick McKenzie, expanded on early conceptualizations of human ecology arguing that humans will modify their behaviors based on changes in the physical environment (1950). In his view, the community was not only a unit of analysis but also “an organization of symbiotic and commensalistic relationships as human activities are performed over both space and time” (Cohen and Felson, 1979, pg. 589).

Hawley believed that there was both a temporal and spatial distribution of community units, and focused on three temporal patterns: rhythm, tempo, and timing. Rhythm refers to the reoccurrence of events. Tempo refers to the rate of reoccurrence of events. Finally, timing refers to the coordination among different activities which are interdependent (Hawley, 1950, pg. 289). Changes in community structure due to the accessibility of the motor vehicle, telephone, and radio led to the expansion of communities and shifts in the routine activities of its residents. Using Hawley's framework, Cohen and Felson (1979) developed a macro-level approach that sought to explain crime post World War II.

Following World War II, there was an economic boom in the United States that led to decreases in the unemployment and poverty rates. At the same time, however, there was an increase in violent and property crimes. The general consensus among traditional sociologists and criminologists is that an improved economy should result in crime reductions which led to the National Commission on the Causes and Prevention of Violence (1969) to wonder why "have urban violent crime rates increased substantially during the past decade when the conditions that are supposed to cause violent crime have not worsened-have, indeed, generally improved?" (xxxvii). In response to this question, Cohen and Felson (1979) presented their routine activity approach.

They argued that the shifts in the routine activities of everyday life led to the increases in crime despite the improved economy. They defined routine activities as "any recurrent and prevalent activities which provide for basic population and individual needs, whatever their biological or cultural origins" (Cohen and Felson, 1979, pg. 593). The biggest change that occurred was the movement of activities away from home due to

ease of transportation and women becoming more prevalent in the workplace. Cohen and Felson believed,

“structural changes in routine activity patterns can influence crime rates by affecting the convergence in space and time of the three minimal elements of direct-contact predatory violations: (1) motivated offenders, (2) suitable targets, and (3) the absence of capable guardians against a violation” (1979, pg. 589).

The absence of any one of these elements was enough to prevent a crime from occurring.

Predatory violations were defined as illegal acts where a person intentionally takes or damages another person or property (Glaser, 1971). A motivated offender is anyone who may commit a crime. The routine activity approach assumes a rational offender from the start. A suitable target was identified as a person or object likely to be taken or attacked by the offender. Determining a suitable target depended on its value, visibility, access, and inertia (Felson and Cohen, 1980). Finally, a capable guardian is “anyone whose presence or proximity discourages crime” (Felson, 2008, pg. 71). Capable guardians tend not to be police or security officers; rather, they are homeowners, neighbors, friends, bystanders, or anyone else who might prevent a criminal activity from occurring.

What began as a macro-level approach to crime soon moved towards a micro-level approach that helped to understand criminal events. Though the routine activity approach initially only claimed to explain predatory crimes, the authors soon realized that other crime types also fit within the approach. Felson (1987) soon included mutualistic offenses such as gambling or prostitution, competitive violations such as fights, and individualistic offenses such as suicide or solo drug use. Additionally, Felson developed the role of the capable guardian much more thoroughly and it through the capable

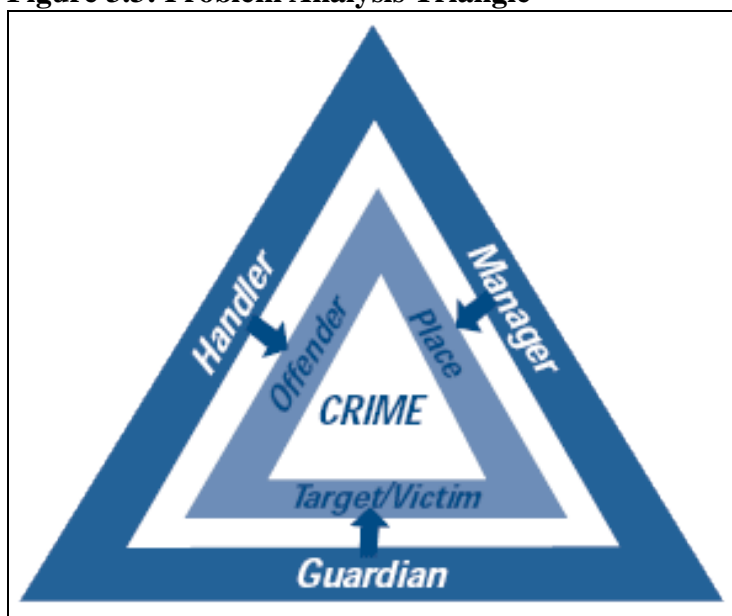
guardian that the routine activity approach links to the concepts of informal social control and collective efficacy.

Over the years, the role of the guardian was expanded in two ways. First, based on research by Clarke (1992), Felson expanded on the varying levels of crime discouragement. He identified four levels of responsibility. Personal responsibility for places involves an individual's responsibility for their own home or belongings. This also includes individuals who are directly connected to the owners. Assigned responsibility is for employees whose job it is to look after a place. These can be loss prevention workers or even store managers. Diffuse job responsibility for places involves other employees who are not directly responsible for security. Though these employees are not tasked with guarding or managing the place, they still may act as a guardian if the opportunity presents itself. Finally, there is general responsibility for places which involves any bystander or visitor who discourages crime with just their presence.

Secondly, guardianship was expanded with the creation of the problem analysis triangle (Figure 3.3). The original problem analysis triangle included only the inner triangle with the offender, the target, and the place. The expanded triangle provides controllers for each of the three elements (Clarke and Eck, 2007). Just as in the original crime triangle, the controller for the target/victim is the capable guardian. Capable guardians as mentioned previously include, people protecting themselves and their property, family, friends, and even the police or security. For the offender there is the handler, someone who can exert some control over the offender's actions. This is usually family and friends. The manager controls the place and assumes some responsibility for

the behavior of those within the place. These can be bar owners, landlords, or teachers. Effective controllers should be enough prevent a criminal act since they will greatly increase the chance of an offender being caught.

Figure 3.3: Problem Analysis Triangle



Source: Clarke and Eck, 2007, Step 8

Unlike the rational choice perspective or situational crime prevention, the routine activity approach has faced relatively few criticisms which were largely addressed through updates to the approach. Though initially the routine activity approach applied to only predatory offenses, it was soon expanded to consider additional crime types which were mentioned earlier (Felson, 1987). Updates to the approach also broadened the link to control theory which can be explicitly seen in the problem analysis triangle. Also, though Felson claims that the journey to victimization and crime are covered in the routine activity approach (2008), it only makes explicit references to macro and micro approaches. Additionally, it does not detail the decision making process of the offender, it implies a decisional offender. This is one reason why Felson (2008) believed it was

important to link the routine activity approach to other opportunity based approaches including the ones mentioned in this chapter.

The link between the routine activity approach and informal social control is much more explicit than the link between the rational choice perspective and informal social control. Additionally, many scholars support theoretically integrating routine activities with social disorganization (Kennedy and Forde, 1990; Miethe and McDowall, 1993; Sampson and Lauritsen, 1990). They argued that

“propositions about criminality (criminal motivation) can be linked to those of context (criminal opportunity), improving knowledge of how predisposition interacts with context such that decisions to commit crime are made” (Smith, Frazee, and Davison, 2000, pg. 490).

The link to informal social control was briefly mentioned above in the discussion of guardians and handlers. Felson (1995) directly touched on this by stating “informal social control requires both attaching handles to youths and organization community life so that such handles can be grasped” (pg. 54).

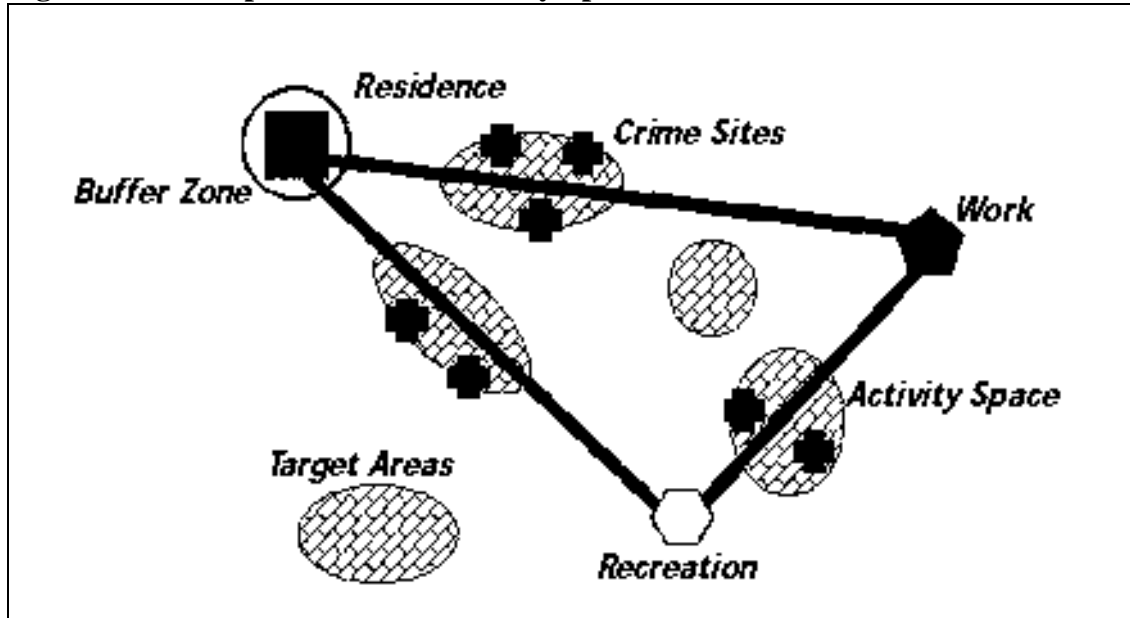
Crime Pattern Theory

Crime pattern theory developed soon after the rational choice perspective and the routine activity approach. This theory draws upon several other theoretical perspectives and analytical approaches to crime, such as rational choice, routine activities, strategic analysis, life-style theory, CPTED, and hot spot analysis, and uses this multidisciplinary approach to understand crime and criminality (Brantingham and Brantingham, 1993). Brantingham and Brantingham felt questions such as: why do some people commit crimes, why are some people frequently victimized, and why do some places experience a lot of crime, could be answered by “understanding the patterns formed by the rich

complexities of criminal events” (Brantingham and Brantingham, 1993, pg. 259). This section briefly reviews the key concepts of crime pattern theory and shows how it connects to the other key opportunity approaches.

Similar to the routine activity approach and the rational choice perspective, crime pattern theory focused on each criminal event and saw them as “an opportune cross-product of law, offender motivation, and target characteristic arrayed on an environmental backcloth at a particular point in space-time” (Brantingham and Brantingham, 1993, pg. 264). The aim was to understand patterns that developed throughout an individual’s routine activities. These patterned routine activities create opportunities for crime that a potential offender could take advantage of. While the routine activity approach uses a model which includes a target, an offender, and a guardian, crime pattern theory’s model states “crime is an event that occurs when an individual with some criminal readiness level encounters a suitable target in a situation sufficient to activate that readiness potential” (Brantingham and Brantingham, 1993, pg. 266). Conceptually, the model is simple; however, each element is a variable which complicates the model. One example of the relationship between the offender, target, and place can be seen in Figure 3.4 which depicts an offender’s activity space.

Figure 3.4: Example of a Crime Activity Space



Source: Rossmo (2000)

An offender's activity space consists of the areas he frequents (work, home, and recreational areas) and the routes he takes to move from one place to another. During an offender's routine activities, he comes into contact with potential victims and crime sites. Crime generators and crime attractors are two types of places that typically become crime hot spots. Crime generators are places where large numbers of people are attracted such as shopping malls, entertainment areas or business districts. Crime attractors are places that create criminal opportunities such as bars, parking lots, and shopping areas near public transportation. (Brantingham and Brantingham, 2008).

Decisions to commit crime are based on an offender's readiness/willingness and a trigger. Triggers are "shaped by the surrounding environment, past experience, and the crime template" (Brantingham and Brantingham, 1993, pg. 273). Past successes in a particular place or success in a particular crime type can trigger future events.

Additionally, the readiness to participate in a criminal event is dependent on the crime

type. A purse snatch does not require as much thought and preparation as a commercial robbery.

Just as in the routine activity approach which has a role for guardians or handlers, crime pattern theory understands that individuals do not function on their own, but are influenced by their networks of friends, family, and acquaintances. These networks also form the connection of crime pattern theory to informal social control and collective efficacy. While some networks can reinforce criminality in individuals, most will be composed of “law-abiding members forming strong links as guardians, minders and managers of common space-time” (Brantingham and Brantingham, 2008, pg. 81).

Similar to the other opportunity perspectives, crime pattern theory can be criticized for ignoring the social causes of crime. However, as with the rational choice perspective and the routine activity approach, crime pattern theory can work in conjunction with other theories seeking to explain the development of criminal offenders (Eck and Weisburd, 1995). Also, while crime pattern theory builds upon the routine activity approach, they can give differing explanations of crime at specific locations (Eck and Weisburd, 1995). Looking at a particular location, a crime pattern theorist would focus on an offender’s relationship with the place while a routine activity theorist would focus on the behaviors of the targets and guardians that may have prevented the crime. Braga and Weisburd (2010) explain “for the crime pattern theorist, particular places are problematic because of their location and relationship to the environment. For the routine activity theorist, certain places are problematic because of the types of people present and absent from the location” (pg. 76). While not a criticism of the theory, it is important to be able to distinguish between the two theories and their explanations.

Crime pattern theory was developed as a combination of different opportunity perspectives and theories. It seeks to study crime patterns over time in order to better understand crime and ways to inhibit it. Like the previously discussed opportunity theories, crime pattern theory was developed to aid in policy changes that may result in crime reductions. Once the crime patterns are understood, policies can be developed to modify patterns.

Broken Windows and Disorder

The “broken windows” perspective on the relationship between the spread of disorder and subsequent increases in crime was formally developed in a very well-known 1982 *Atlantic Monthly* article by James Q. Wilson and George L. Kelling.

This perspective developed from Wilson and Kelling’s experiences working with police departments in the 1960s and 1970s. Wilson’s earlier work focused on the complexities of policing and Kelling’s interest grew from working on a police foot patrol experiment in Newark, NJ. They also drew upon the highly influential work of Stanford psychologist Phillip Zimbardo (1973). His classic experiment found that a car abandoned in a stable neighborhood took only a few hours to be destroyed after its first window was broken, despite sitting untouched for a few weeks prior to the window being broken. Zimbardo suggested that individuals engaged in deviant behaviors when they believed there are no controls in an area, or when criminal behavior is acceptable (1973).

Based on Zimbardo’s argument, Wilson and Kelling believed that

“just as a broken window in a building left untended is a sign that nobody cares and invites more broken windows, disorder left untended is a sign that nobody cares and leads to fear of crime, withdrawal from public spaces, a breakdown of community controls, and more serious crime” (Wagers, Sousa, and Kelling, 2008, pg. 247-48).

Their focus was on disorderly behaviors such as loitering, public intoxication, and prostitution. They believed that if these behaviors were controlled, more serious activities would be inhibited. From a policing standpoint, it was argued that there should be assertive enforcement of misdemeanor offenses (Kelling and Coles, 1996). According to the original argument, this did not necessarily result in arresting individuals for misdemeanor offenses; it meant controlling those behaviors in a subjective manner. Allowing those behaviors to continue would lead to more serious street crime (Wilson and Kelling, 1982).

One of the earliest successes of order maintenance policing was found in the New York City subway system. Subway use was on the decline due to disrepair of the system, graffiti, vandalism, and petty theft. In order to combat this, transit police began to aggressively address panhandlers and turnstile jumpers while graffiti was aggressively removed from cars and from the stations (Civic Bulletin, 2004). The result was a decrease in crime and an increase in ridership (Kelling and Coles, 1996).

Other support for the link between disorder and perceived crime problems came from Skogan (1990) who analyzed robbery victimization data from forty neighborhoods and found that disorder mediated the indirect relationship between crime and economic and social factors (Welsh, Braga, and Bruinsma, 2015). Another study, by Taylor (2001), found support for the argument that disorder results in more serious forms of crime in Baltimore, Maryland. One of the largest arguments in support of broken windows policing came in the form of the 1990s crime drop in New York City. Though it is impossible to credit this type of policing for the violent crime drop, some studies have attempted, and found, a relationship between the two (Corman and Mocan, 2005; Kelling

and Sousa, 2001). Despite the success, the broken windows approach and the policing it entails have come under immense scrutiny in recent years.

One of the largest criticisms, especially recently, is that broken windows policing re-criminalizes quality of life offenses. Even Kelling (2015) acknowledges this type of policing is easy to abuse and there is a concern about bigotry among police. Relating to disorder, studies by Raudenbush and Sampson (2005, 1999) found that macro-level factors were more closely correlated with fear and crime than with disorder. The criticisms about certain types of broken windows policing are certainly well founded especially in light of New York City's Stop, Question and Frisk. However, this type of policing is not what was envisioned by Wilson and Kelling (1982). A recent meta-analysis by Braga, Welsh, and Schnell (2015) found statistically significant reductions in crime due to disorder policing strategies. More specifically, they found aggressive order maintenance strategies did not generate statistically significant reductions in crime while reductions were found with community problem-solving approaches aimed to change social and physical disorder (Braga et al., 2015). Though some may still question the relationship between disorder and crime, it is difficult to question the type of community policing that Wilson and Kelling (1982) imagined.

The link between broken windows policing and informal social control was made clear from its inception; "the essence of the police role in maintaining order is to reinforce the informal control mechanisms of the community itself" (Wilson and Kelling, 1982, pg. 33). Disorder results in increases in fear of crime which decreases informal social control and the chance that citizens will become involved when others engage in disagreeable behavior (Wagers, Sousa, and Kelling, 2008). The police are supposed to

work with residents to ensure that disorderly behavior does not inhibit the social control role of the community.

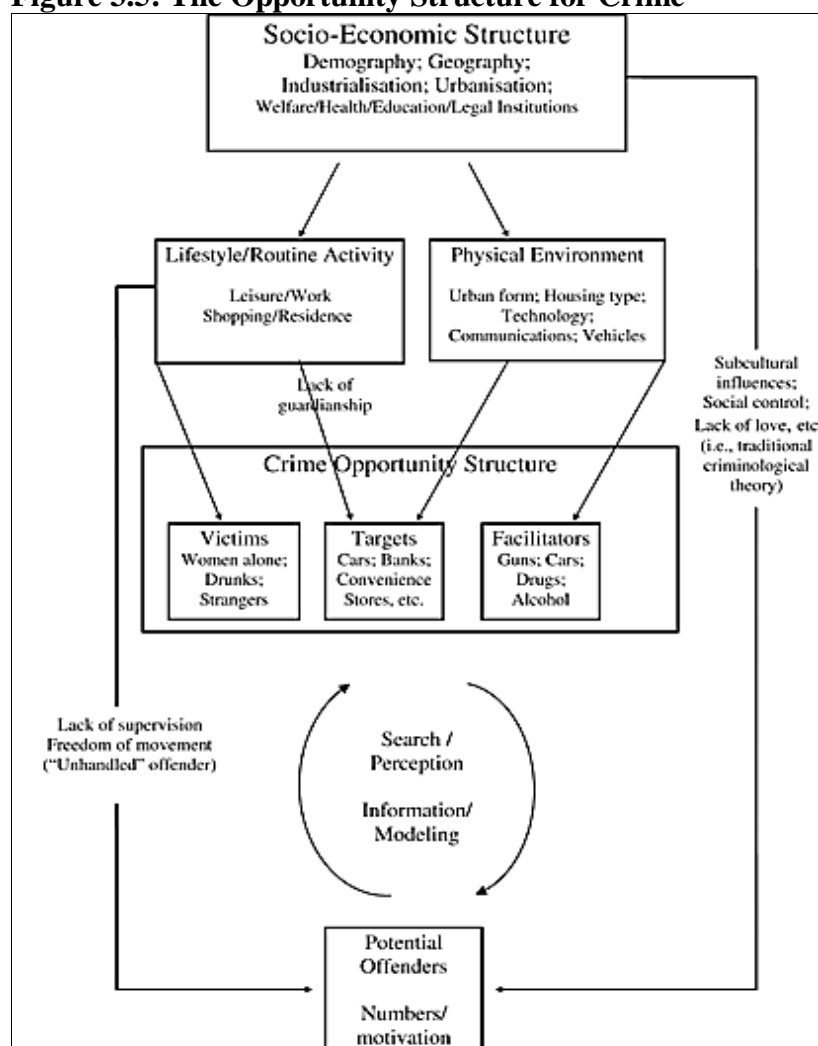
Broken windows policing is another example of a policy implication based on the opportunity perspective. The belief that “serious street crime flourishes in areas in which disorderly behavior goes unchecked” (Wilson and Kelling, 1982) is another idea focusing on the importance of place in the criminal event. Similar to the routine activity approach and crime pattern theory, broken windows demonstrates the importance of the guardian (or community) in inhibiting or preventing criminal events. The concluding section in this chapter reviews the overall links between opportunity theories and approaches and informal social control or collective efficacy.

Linking Opportunity Theories to Neighborhood and Crime Perspectives

The integration of opportunity theories with other traditional criminological approaches has been suggested by opportunity theorists (Clarke, 1995; Cusson, 1986). Clarke (1995) proposed a model of the opportunity structure for crime that integrated multiple theoretical approaches (Figure 3.5). The physical environment and lifestyle and routine activities are both impacted by the socio-economic structure of society which includes demographics, geography, education, and welfare. A direct link from socio-economic structure to the number of potential offenders is made through subcultural influences which include social control, lack of love, alienation and other factors often cited by traditional criminology (Clarke, 1995). Clarke’s (1995) linkage of multiple theories is simplified by the fact that all of the opportunity approaches make some reference to societal influences that can impact criminal opportunities or criminal decision making. Since this dissertation research seeks to link opportunity theories to

social disorganization to explain the differences in street violence at the street segment level, it is important to explain how a neighborhood level concept such as collective efficacy can link with place based approaches. The opportunity perspectives addressed in this chapter use informal social control in two main ways.

Figure 3.5: The Opportunity Structure for Crime



Source: Clarke, 1995

The ideas presented by Jane Jacobs, Oscar Newman, and James Wilson and George Kelling focused on increasing the sense of community in an area to impact crime. For Jacobs, this could be done by ensuring there were “eyes on the street” (1961). Newman sought to do this by increasing a sense of ownership in residents (1972).

Wilson and Kelling (1982) believed informal social control could be sustained if the police maintained order in the community. These different approaches more directly link to the concept of collective efficacy in their attempts to increase neighborhood cohesion.

The second way the opportunity perspectives address informal social control is through the use of guardians, handlers, or place managers. The rational choice perspective, routine activity approach, and crime pattern theory tend to focus on individual criminal events and on ways to increase the risks of criminal behavior. For the rational choice perspective (Clarke and Cornish 1983), the link is not as explicit; however, guardians, handlers, and place managers can be used to increase the chance of an offender being caught which impacts the decision making process. For the routine activity approach and crime pattern theory, the role of informal social control is quite clear. Guardians, handlers, and place managers are expected to act when there is a threat of crime. Guardians generally protect the target or victim, managers protect the place, and handlers control the potential offender. The presence of these controls should prevent a criminal event from taking place.

Conclusion

While it has been known for over a century that crime concentrates in certain areas (Balbi and Guerry, 1829; Burgess, 1925[1967]), research over the past few decades has been able to show that crime is concentrated at a small number of specific places within cities (Sherman et al., 1989). Research in Seattle and Boston has shown these crime concentrations are stable over time and even in neighborhoods that are regarded as high crime, there is street-to-street variation in crime (Braga et al., 2010; 2011; Weisburd et al., 2004; Weisburd et al., 2012). Studies of these high crime places indicate specific

characteristics and dynamics make these high crime locations attractive to criminals (Clarke, 1995; Newman, 1972). Understanding this, the theories discussed in this chapter suggest that the existence of crime places can largely be explained by the presence of criminal opportunities at the place level.

The influence of informal social control on criminal activity at crime places can be seen in opportunity theories through the use of concepts such as guardians, handlers, or eyes on the street while social disorganization theories used informal social control to explain neighborhood differences in crime levels. Weisburd et al. (2012) suggested that the existence of micro-level crime places can be explained through the use of both social disorganization and opportunity theories through the use of neighborhood level concepts such as collective efficacy. Braga and Clarke (2014) believed that micro-level variations in informal social control can be better explained through the use of opportunity theories and concepts such as guardianship and more effective place management. This study seeks to enhance our understanding of the salience of social disorganization and criminal opportunity theories in explaining the existence of high violent crime places in Newark, New Jersey.

Chapter 4 - Research Setting and Analytic Framework

This chapter details the research setting, data, and methodology used to investigate the issues raised in the three research questions presented in the introductory chapter. While a variety of methods were used to answer the research questions, this dissertation involves two main analyses: the identification of stable, high-violence street segments and a rigorous comparison of specific place characteristics associated with high and no/low violence street segments. Group based trajectory modeling (GBTM) was used to examine the stability of street violence at specific places in Newark over time and to identify persistently violent places for inclusion in the comparative analysis. A matched case-control design was then used to compare high street violence street segments to street segments with no or low violence levels controlling for tract/neighborhood. Controlling for neighborhood allowed for an increased focus on place-level opportunity and collective efficacy variables that may impact street violence levels at these specific locations. As will be described further below, a case-control study is the most appropriate research design to answer the third research question due to the scarcity of high violence street segments.

The first section of this chapter provides an overview of the research setting, Newark, New Jersey, and begins with a brief historical background of the city followed by a brief description of its demographics and violent crime problems. The second section provides a detailed description of the research data and identifies dependent variable and the unit of analysis. In the third section, empirical analyses focus on examining neighborhood violent crime concentrations and provide results to answer the first research question. Similarly, the fourth section explores street violence

concentration at the street segment level. The fifth section provides a detailed overview of trajectory analysis which will be used to answer the second research question. The case-control design represents the central analysis in this dissertation research and is explained in the sixth section. The case-control data will be analyzed using a logistic regression model. A brief description of the basic analytic model and how it will be used to provide results to answer the third research question is then presented.

Research Setting

The research study was conducted in Newark, New Jersey. Since this inquiry focuses on understanding persistently violent places, the research site needed to be a city that suffered from high levels of violent crimes each year. Moreover, given the extensive data collection needed to answer key research questions, the study required the strong support of the municipal police department. The Newark Police Department has been supportive of this research from the onset. Indeed, Newark's history of violence and the commitment from the police department were instrumental in its selection as the research setting.

The village of Newark was founded in 1666 by New England Puritans. While the city's location was fairly isolated initially, by the late 1700s, the city was transformed into a trade center due to its proximity to Manhattan and its location in between the Hudson and Delaware rivers. The completion of two bridges in 1795 established Newark as the manufacturing and industry hub of northern New Jersey. Newark officially became a city in 1836 and by 1860, its population was over 71,000 (Tuttle, 2009). The success of shoemaker Moses Combs and the inventions of Seth Boyden made Newark responsible for over 90 percent of all patent leather made in the United States. Ten years

later, Newark had added another 30,000 residents and continued to be known as a manufacturing city. A steady flow of immigrants from Europe in the early 1900s contributed to Newark's 1910 population of 350,000. Following WWII, Newark's population was at its peak with just under 450,000 residents.

African American migration to Newark from the South began following WWI. White flight soon followed and African Americans represented nine percent of the population by 1930. By the mid-1960s, African Americans made up the majority of the population in Newark. While life for African Americans was certainly better than the lives they would have faced in the South, racism and racist policies in Newark made life difficult. These issues came to a head on July 12, 1967 when residents saw police officers dragging an African American cab driver into the police precinct. Riots followed and lasted approximately five days and resulted in twenty-three deaths from gunfire. One police officer, one fireman and twenty-one African American civilians were killed. The aftermath of the riots left the city increasingly divided. One side felt "the black community was increasingly being taken over by ignorance and lawlessness and therefore needed to be controlled" and the other felt "that the authorities were corrupt racists who eagerly dealt out vigilante justice and suppressed people of color" (Tuttle, 2009, pg. 170).

Following the riots, Newark's population dropped considerably from about 400,000 residents at the time of the riots to about 259,000 in 1997. During this time period, Newark's housing conditions were some of the worst in the country. Newark's financial situation was bleak and the city relied on resources from the state and federal government. Some of this money was used to hire additional police officers which

resulted in an all-time high of 1,640 officers (3.4 cops per 1,000 inhabitants) (Tuttle, 2009). Despite this, there were only marginal decreases in the crime rate. Financial mismanagement by Newark's politicians was widely reported and continued through the turn of the century (Tuttle, 2009).

Beginning with the election of Mayor Cory Booker in 2006, and his subsequent appointment of Garry McCarthy as the Director of the Newark Police Department, the city began to experience noteworthy reductions in most violent crimes. McCarthy put more officers on the street at night, created new specialized units to focus on specific crime problems, and expanded the size of the gang unit. Despite the progress made in decreasing violence in Newark, the post-2008 recession and subsequent budgetary deficits caused the layoff of some 167 police in 2010 (Star-Ledger Staff, 2010). Unfortunately, many types of violent crimes, such as murders and shootings, have increased in recent years. In 2014, renewed violent crime reduction efforts were launched under newly elected Mayor Ras Baraka and his Police Director Eugene Venable. Although there have been some short-term fluctuations, violent crime has remained on the rise in recent years.

Newark is the largest city in New Jersey, with the 2010 US Census estimating a population of some 277,138 residents. Including the port and airport areas of the city, Newark's geographic expanse comprises roughly 26.0 square miles. Ample public transportation, consisting of bus, light rail, NJ Transit, Amtrak and PATH trains, makes commuting to and from Newark very convenient. Though Newark was fairly isolated when it was founded in 1666, the city now borders 12 other cities and a trip to Manhattan can take only 25 minutes on a PATH train. Newark is subdivided into five wards (North,

South, East, West and Central). The South, West and Central Wards are comprised of predominantly African Americans; the East Ward is a mix of Portuguese and Hispanic populations and the North Ward is a combination of Italians, African Americans and Puerto Ricans (City of Newark website¹). African Americans make up over half of the city's population (51.7%). The remainder of the population is comprised predominantly of black and white Hispanics followed by white (not of Hispanic descent) (ACS, 2009-2013²). The racial makeup of Newark is drastically different than the makeup in the rest of New Jersey which as a whole is comprised of only 13.6% African Americans (see Table 4.1).

The study time period for the proposed research is 2008-2013, which makes the American Community Survey, 5-Year Estimates (2009-2013) an appropriate data source to examine the demographic profile of Newark. Compared to the rest of New Jersey and the United States as a whole, Newark has substantially low percentages of owner occupied housing and college degrees. Additionally, the percentage of residents who are unemployed is approximately double the state and country levels. Even more troubling is the percent of individuals living below the Federal poverty line in Newark is almost three times greater than the percentage of New Jersey residents living in poverty (see Table 4.2).

¹ City of Newark Neighborhoods, accessed February 28, 2014, http://classic.ci.newark.nj.us/residents/neighborhood_services/

² American Community Survey, accessed February 28, 2014, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_13_5YR_C02003&prodType=table

Table 4.1: Racial Composition of Newark, New Jersey and the United States

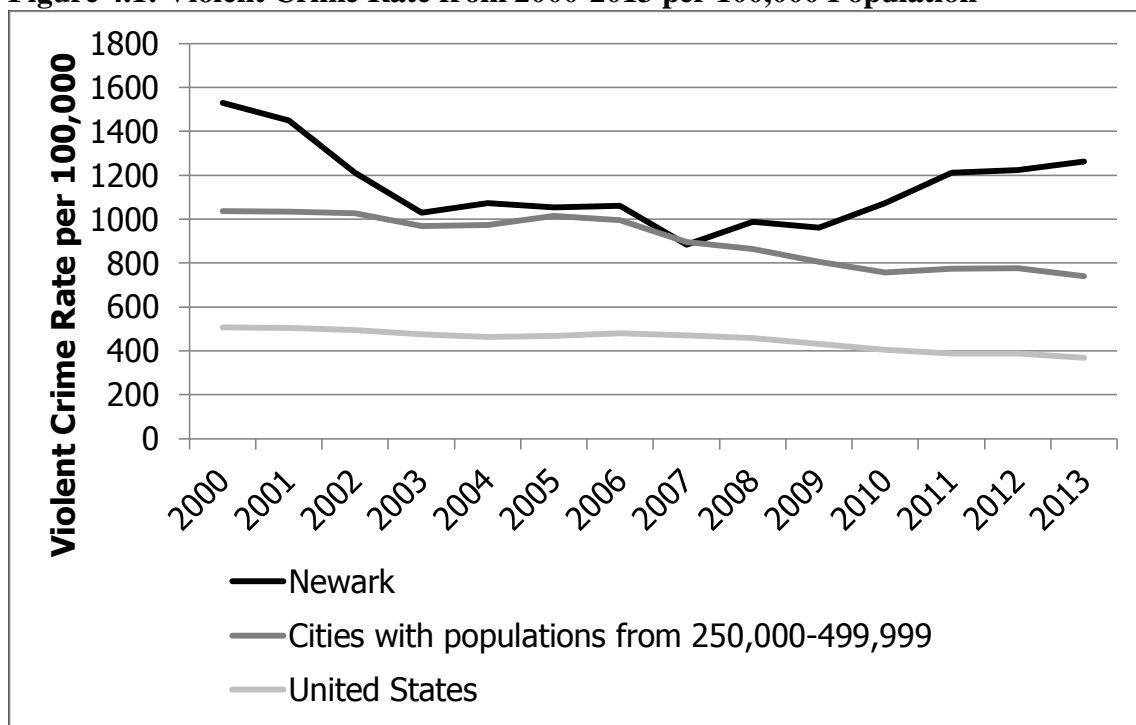
	Newark (ave. %)	New Jersey (ave. %)	United States (ave. %)
White	25.9	69.2	74
Black/Afr. American	51.7	13.6	12.6
American Indian	0.3	0.2	0.8
Asian/Pacific Islander	1.6	8.6	5.1
Other	14.4	6	4.7
Two or more races	6.1	2.5	2.8
Hispanic (any race)	34.1	18.2	16.6

Table 4.2: Selected Demographic Characteristics on Newark, New Jersey and the United States

	Newark (ave. %)	New Jersey (ave. %)	United States (ave. %)
Owner-occ. Housing	22.7	65.6	64.9
Renter-occ. Housing	77.3	34.4	35.1
Vacant housing	15.8	10.6	12.5
College degree*	12.7	35.8	28.8
Foreign born	27.2	21.2	12.9
Poverty	29.1	10.4	Not Available
Unemployment	12.2	6.7	6.2

* % of population 25 years or older with at least a bachelor's degree

Figure 4.1 compares the violent crime rate from 2000-2013 in Newark to cities similarly sized to Newark and the United States. The United States violent crime rate is less than half of the rate of Newark and similarly sized cities. Additionally, while the United States and other cities have generally experienced decreasing violence rates during the time period, Newark has seen steady increases in the violent crime rate over the past few years.

Figure 4.1: Violent Crime Rate from 2000-2013 per 100,000 Population

Source: Uniform Crime Reports³

As mentioned earlier, the research analyzed official data on street violence incidents in Newark from 2008-2013. Incident data were acquired from the Newark Police Department. Although incident report data suffer from some well-known limitations (such as police decision making bias; see Black and Reiss, 1970), violent crimes are much less likely to be underreported relative to property crimes (Fajnzylber, Lederman and Loayza, 2000). The violent crime incident types included in this study are murder, aggravated assault and robbery. Table 4.3 provides the yearly counts and percentages of the selected violent crime incident types during the time period studied. Rape was excluded from this study because these crimes are well known to be underreported relative to their true prevalence (Koss, 1992; Finkelhor, Wolak and

³ Uniform Crime Reports: Crime in the United States, accessed February 28, 2014, <http://www.fbi.gov/about-us/cjis/ucr/ucr-publications#Crime>

Berliner, 2001); indeed, the Newark Police recorded very few rape incidents during the study time period.

Finally, while the research briefly examined all violent incidents, the main focus was on violent incidents that were committed outdoors, also known as street violence. Limiting the work to street violence decreased the likelihood that the data would be confounded by domestic violence incidents which are less powerfully influenced by street dynamics. While some of the incident data included a field that indicated whether the incident was a domestic dispute, not all years included this field. Braga (1997) noted a similar issue when collecting aggravated assault data and needed to review each incident report to check for domestic incidents. Unfortunately, such an exercise would be too time consuming for this research given the number of incidents included in the study. The GIS incident files obtained from the Newark Police Department included a field that indicated whether the crime was committed indoors or outdoors.

Table 4.3: Number of Violent Crimes from 2008-2013 in Newark, NJ

	Murder	Aggravated Assault	Robbery	Total
2008	65 (2.5%)	1105 (41.9%)	1468 (55.6%)	2638
2009	73 (2.9%)	1017 (40.6%)	1414 (56.5%)	2504
2010	81 (2.8%)	1128 (39.0%)	1684 (58.2%)	2893
2011	91 (2.8%)	1133 (34.2%)	2085 (63.0%)	3309
2012	85 (2.7%)	1068 (33.7%)	2016 (63.6%)	3169
2013	99 (2.9%)	904 (26.2%)	2440 (70.9%)	3443

Source: Uniform Crime Reports⁴

⁴ Uniform Crime Reports: Crime in the United States, accessed February 28, 2014, <http://www.fbi.gov/about-us/cjis/ucr/ucr-publications#Crime>

Unit of Analysis

Street segments serve as the main units of analysis in the proposed study. Weisburd and his colleagues (2004) define street segments as “the two block faces on both sides of a street between two intersections” (290). Scholars suggest that street segments (or block faces) are appropriate units to capture the micro ecologies of neighborhood life (Appleyard, 1981; Jacobs, 1961; Taylor, 1999). Individuals who live on the same street segment get to know one another through direct contact or observing daily activities. Well-connected neighbors often share similar norms and develop roles to play in the life of the street segment. Weisburd et al. (2012) suggest that street segment attributes and dynamics can be described as “micro communities.” Moreover, street segments were selected as an appropriate unit of analysis for the proposed research because counting crime incidents at smaller units (such as street addresses) can be sensitive to coding errors (Klinger and Bridges, 1997; Weisburd and Green, 1994). Alternatively, selecting a larger unit of analysis (such as the block group) may have masked important micro level processes that impact violent crime. As such, it would have been very difficult to determine whether opportunity characteristics present on one street could impact violence on another street.

Intersections, and violent crime incidents occurring at intersections, were excluded from analysis for several reasons. Primarily, intersections can be considered to be parts of at least two street segments. Life that occurs at an intersection is connected to what occurs on the street segment. Therefore, it would be difficult to pinpoint precisely where life on the intersection ends and the street segment begins. Street segments always begin/end at the beginning/end of a block. Since intersections are part of multiple street

segments, it can be very difficult to determine whether an incident that occurs on an intersection is linked to a specific street segment that touches the intersection. It is for this reason that incidents occurring at intersections were excluded from analysis. On average, violent incidents occurring at intersections were 31% of the total violent incidents in the city from 2008-2013. Research by Braga and his colleagues (2010, 2011) utilized both street segments and intersections in their analysis of robberies and gun violence and did not find substantial differences in the developmental patterns between the unit types which suggested that exclusion of intersections did not limit the results of the analysis.

The street segment GIS shapefile was created by the City of Newark's Engineering Department and was periodically updated by the GIS Specialist at the Newark Police Department as well as by other researchers. In total, there are 6,166 street segments in the city. Since this study is focused on concentrations of street violence and the neighborhood and opportunity variables that influence the prevalence of violent crime incidents, specific types of street segments were excluded from the analysis. Highways, on ramps, and off ramps were excluded as well as the port and industrial area of Newark. These exclusions were made for the following reasons: 1) these isolated places experience almost no pedestrian traffic, 2) very small numbers of violent crimes occur in these areas, and 3) the Newark Police Department generally does not patrol these areas (rather the New Jersey State Police, Port Authority Police Department, and other law enforcement agencies have primary jurisdiction over these areas). Figure 4.2 provides a map of the included and excluded areas. After excluding these areas, 5,078 street segments were left for analysis. The mean length of these street segments is 379.06 feet.

Table 4.4 displays the violent crimes geocoded to a street segment by year. Additionally, it also displays the number of incidents that occurred outdoors. In total, 76.2% (13,689 of 17,956) of the violent crime incidents from 2008-2013 occurred on a street segment. Seventy-one percent (9,730 of 13,689) of these incidents occurred outdoors. Over 99% of these incidents were geocoded to a street segment which is well over the 85% match rate specified by Ratcliffe (2010) to retain accuracy.

Figure 4.2: Map of Newark, NJ

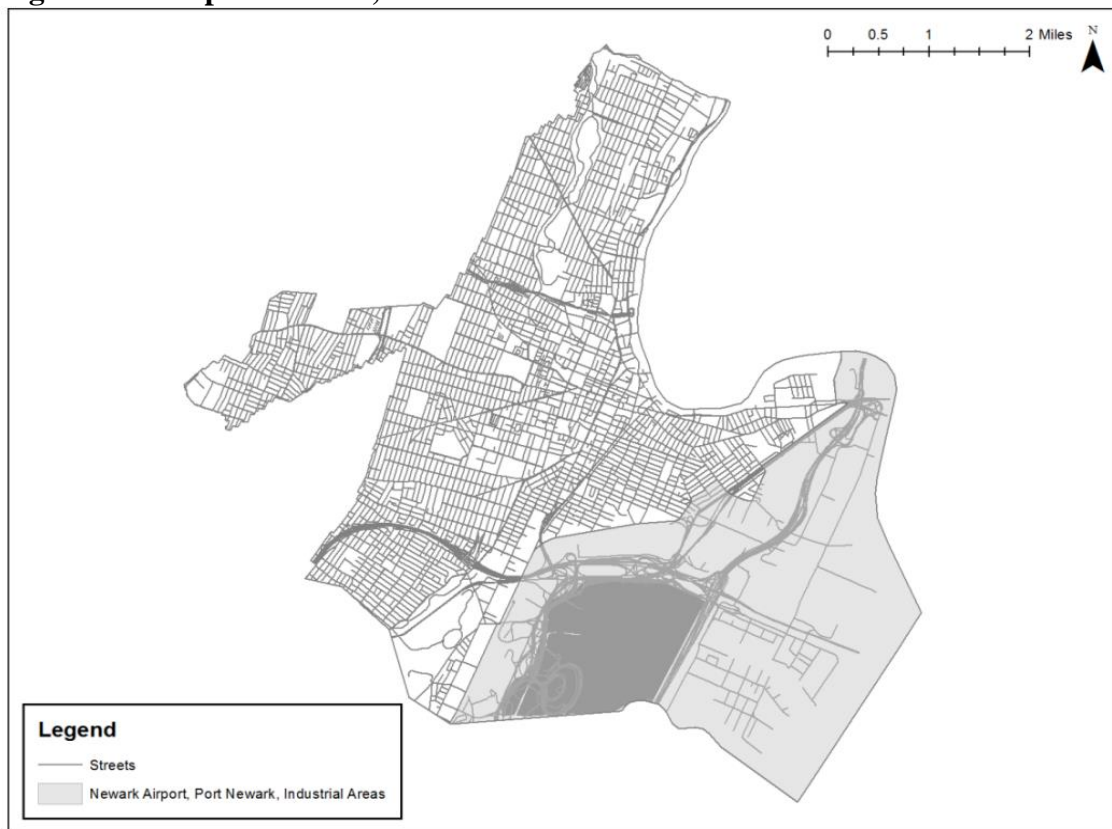


Table 4.4: Number of Violent Crimes from 2008-2013 on Street Segments and Outdoor Street Segments

	Murder	Aggravated Assault	Robbery	Total
2008				
Street Segments	60	1020	1299	2379
Outdoor Violence	47	614	987	1648
2009				

Street Segments	59	787	911	1757
Outdoor Violence	44	403	664	1111
2010				
Street Segments	76	884	1117	2077
Outdoor Violence	59	491	880	1430
2011				
Street Segments	80	879	1379	2338
Outdoor Violence	61	476	1056	1593
2012				
Street Segments	75	869	1471	2415
Outdoor Violence	56	541	1170	1767
2013				
Street Segments	88	795	1840	2723
Outdoor Violence	78	508	1595	2181

Neighborhood Concentrations

While the main analysis in this study is comprised of a matched case-control design, the initial analysis in this section answers research question 1:

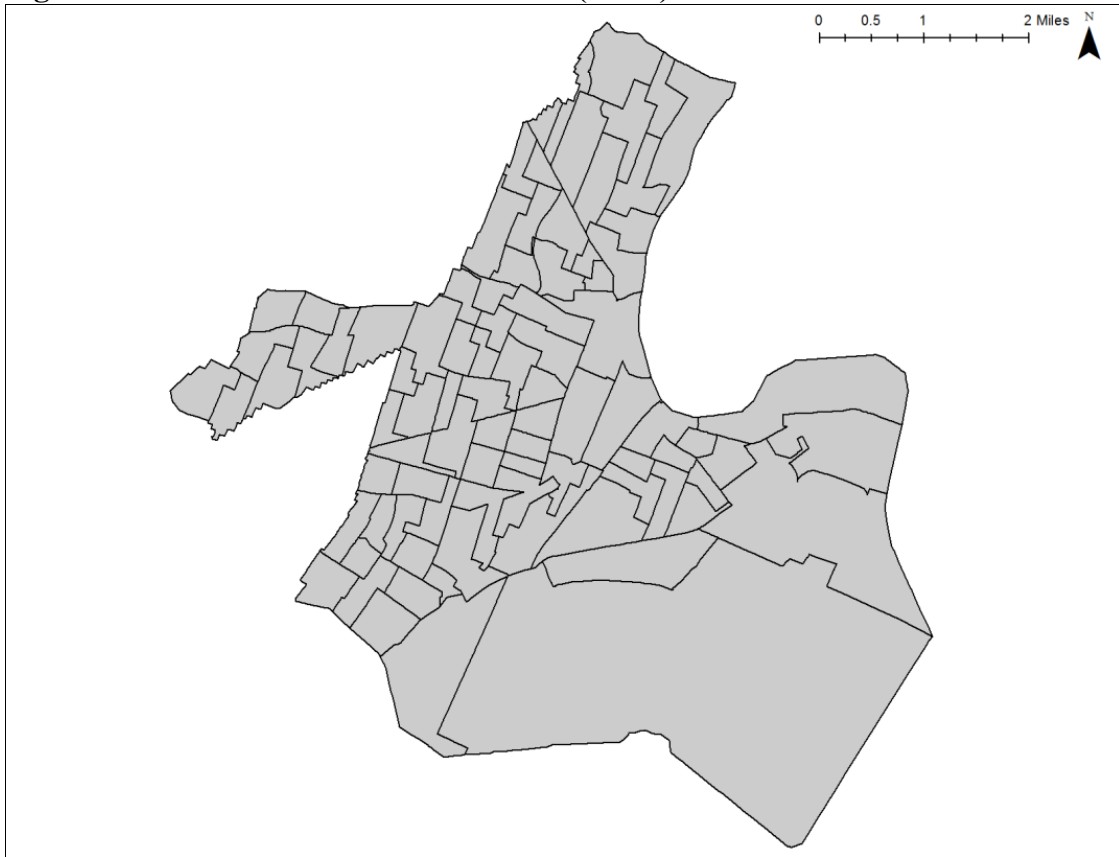
Are violent crime incidents in Newark concentrated in specific neighborhoods, at specific places within these neighborhoods, and at the street segment level?

Answering this question confirms whether street violence in Newark is concentrated in similar ways to concentrations found in other cities. Even within neighborhoods identified as high crime, prior research indicates that a large percentage of street segments will experience no or very little violence with a small percentage of segments comprising the majority of the violence (St. Jean, 2008). This initial analysis supports the rationale for conducting the analysis at street segments rather than at larger units. Although particular neighborhoods experience a majority of the violence in the city, conducting analyses at the larger neighborhood level would ignore salient street-to-street

variability in crime concentrations observed within neighborhoods (Sherman et al., 1989; Weisburd et al., 2012; Braga et al., 2010, 2011).

For this study, 2010 Census tracts were used as proxies for neighborhoods. While Census tracts were created for administrative purposes and are not perfect representations of true neighborhood boundaries (Hipp, 2007; Rengert and Lockwood, 2009), neighborhood boundaries created by the City of Newark were too large to adequately capture certain neighborhood level processes and do not capture the same socio-demographic information available via the Census. The case-control analysis matched street segments on a variety of characteristics; one important attribute was the neighborhood within which a particular segment resides. Newark contains eighty-eight Census tracts. Four of these tracts intersect with the excluded airport/port area and are not included in the main analysis. The eighty-four remaining tracts range from 0.53 square miles to 0.91 square miles. Figure 4.3 presents a map of Newark's Census tracts.

Figure 4.3: Newark's 2010 Census Tracts (N=88)



The substantive issues raised by the first research question were examined by analyzing street violence patterns across the tract-level neighborhoods. ArcMap 10.1 software was used to geocode and aggregate violent crime incidents during the study time period to census tracts and street segments. Crime maps were created to examine *prima facie* variability in the levels of violence across Newark neighborhoods. Although Newark is known as a violent city, it was expected that some neighborhoods/tracts would experience considerably more street violence incidents than others. Research suggests that important neighborhood level dynamics, such as social disorganization and the ability of residents to exert social control over public spaces, will influence the amount of violent crime experience in particular neighborhoods (Morenoff et al., 2001; Sampson et al., 1997)

Crime hot spots have been shown to exist in both low crime, middle class neighborhoods and high crime, lower class neighborhoods (Sherman et al., 1989; Weisburd and Green, 1994). To first investigate whether violent crime varies by neighborhood, street violence incidents from 2008-2013 were joined to Newark's 2010 census tracts. Figure 4.4 is map of the number of incidents per 1,000 residents by tract. Cut points for the five categories were determined in ArcMap using the Natural Breaks classification method which breaks the data into classes based on natural groupings. As the map shows, the majority of the tracts fall within the middle categories. Fourteen tracts fall in the lowest violence category and six tracts are in the highest violence category.

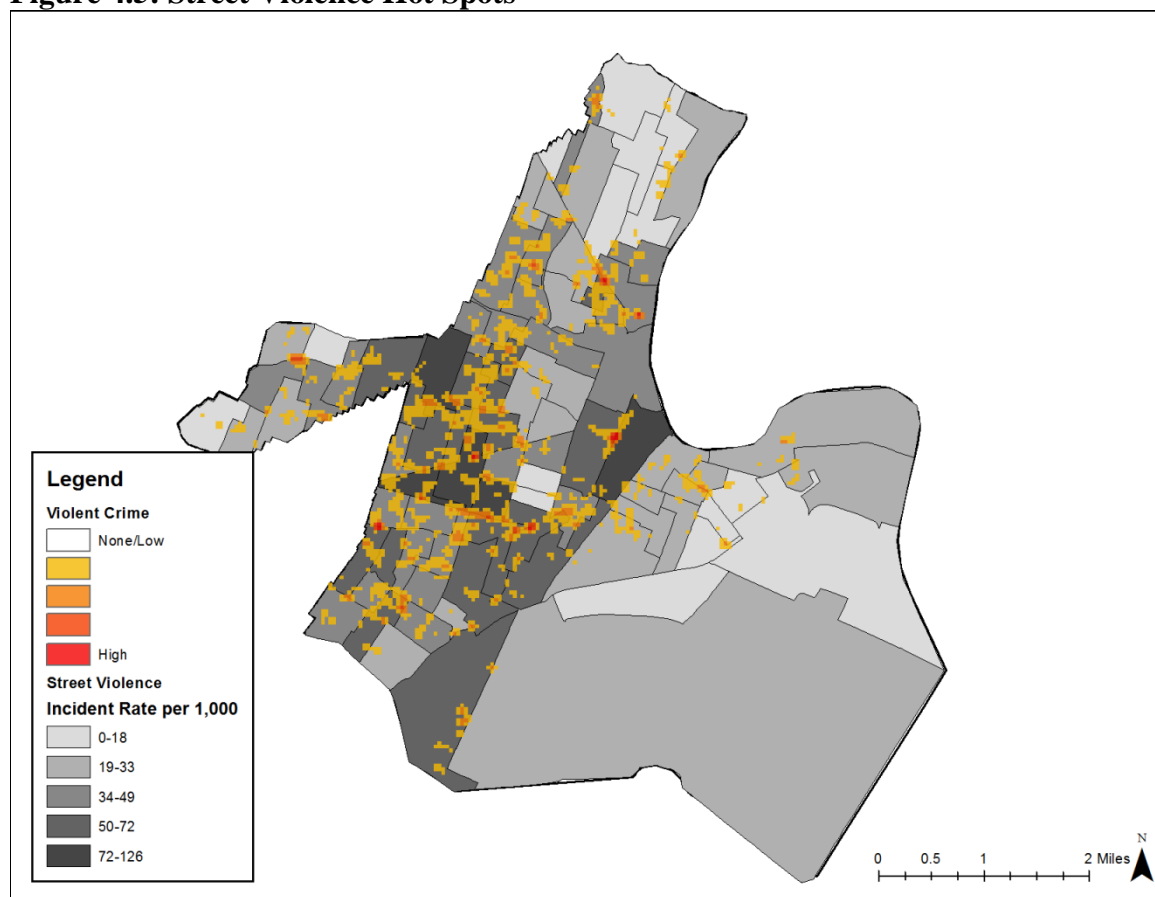
Figure 4.4: Street Violence Rate Per 1,000 Residents from 2008-2013 by Tract



Hot spot maps were created using the Spatial Analyst Tool in ArcMap 10.1.

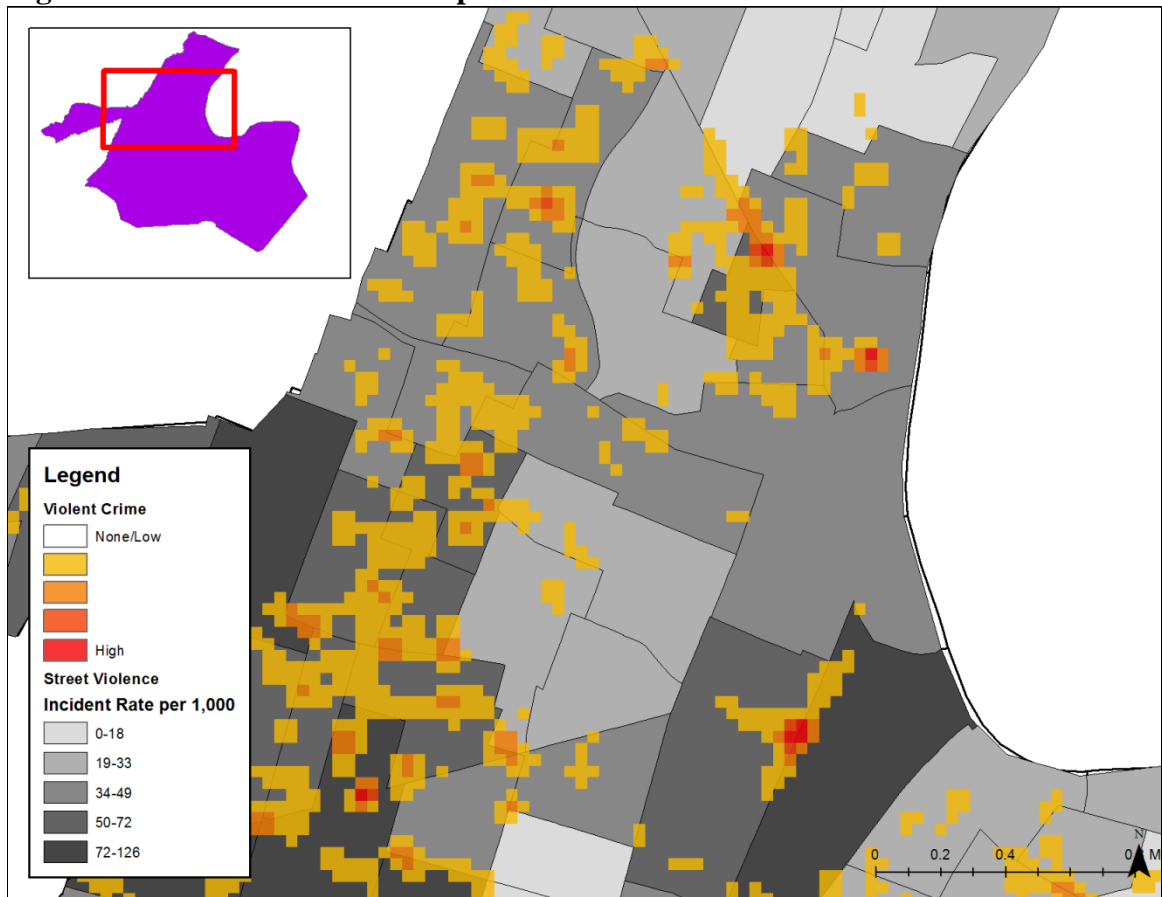
Figure 4.5⁵ is a citywide hot spot map and shows that the hot spots are generally located throughout the city. Figure 4.6 is the same map; however, it is zoomed in to show that the concentrations are not limited to high violence tracts and that even in the high violence tracts; hot spots do not cover the whole area. Many high violence tracts have areas clear of hot spots and some of the low violence tracts have areas of violence concentrations

Figure 4.5: Street Violence Hot Spots



⁵ On average, a street block in Newark is approximately 500 feet. Changing the cell size to 250 feet and the bandwidth to 500 feet restricts the search for incidents to a one block radius around each half-block unit of analysis.

Figure 4.6: Street Violence Hot Spots



The maps show that there is substantial variation in violence concentrations between and within tracts or neighborhoods. This finding is in line with what other researchers such as Sherman et al. (1989) and St. Jean (2008) have found - that even in so-called “crime ridden” neighborhoods, areas exist that are crime free.

An example of this can be demonstrated by comparing a relatively high street violence rate census tract to a relatively low street violence rate tract. Figures 4.7 (high violence) and 4.8 (low violence) display these tracts and identifies street violence levels by street segment. Violent incident categories were created by ArcMap using the Natural Breaks classification method. Both tracts experienced “hot spots” of violence; however, the high violence rate tract experienced violence on a higher percentage of street

segments than the low rate tract. Street violence concentrations from 2008-2013 for these two tracts can be found in Table 4.5. Both the map and the table show that in the low violence tract, violence is more concentrated and there are more areas that are relatively crime free compared to the high violence tract. Additionally, despite the fact that violence is more dispersed in the high violence tract, there are some street segments with zero or only one street violence incident during the time period. Research that utilizes neighborhoods as the unit of analysis misses this variation. The analyses conducted in this section answers the first portion of research question 1 affirmatively. Street violence does vary neighborhood to neighborhood. Furthermore, there is variation within these neighborhoods. This analysis shows that the study of violence concentrations at the street segment level is warranted. The next section details the methods used to show that these crime concentrations at the street segment level are stable over time.

Figure 4.7: High Violence Tract

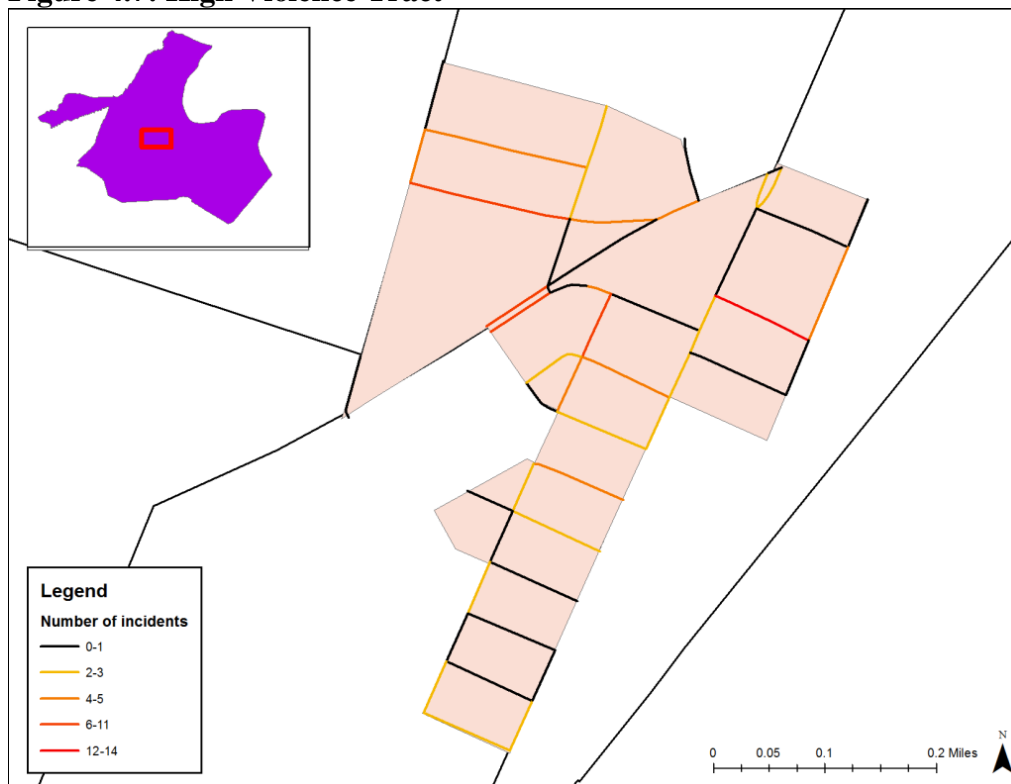
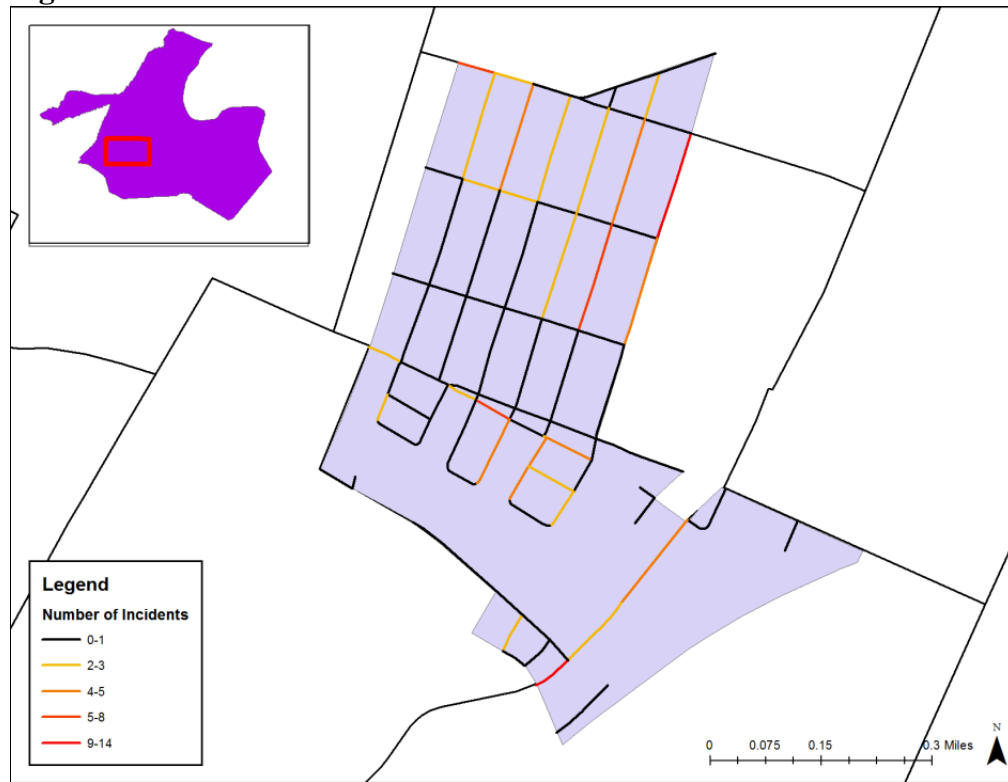


Figure 4.8: Low Violence Tract**Table 4.5: Crime Concentrations for a High and Low Violence Tract**

	Tract 67 High Violence Range	Tract 50 Low Violence Range
50% of crime	14.3% of segments	10.3% of segments
80% of crime	41.5% of segments	25.8% of segments
100% of crime	77.4% of segments	50.5% of segments

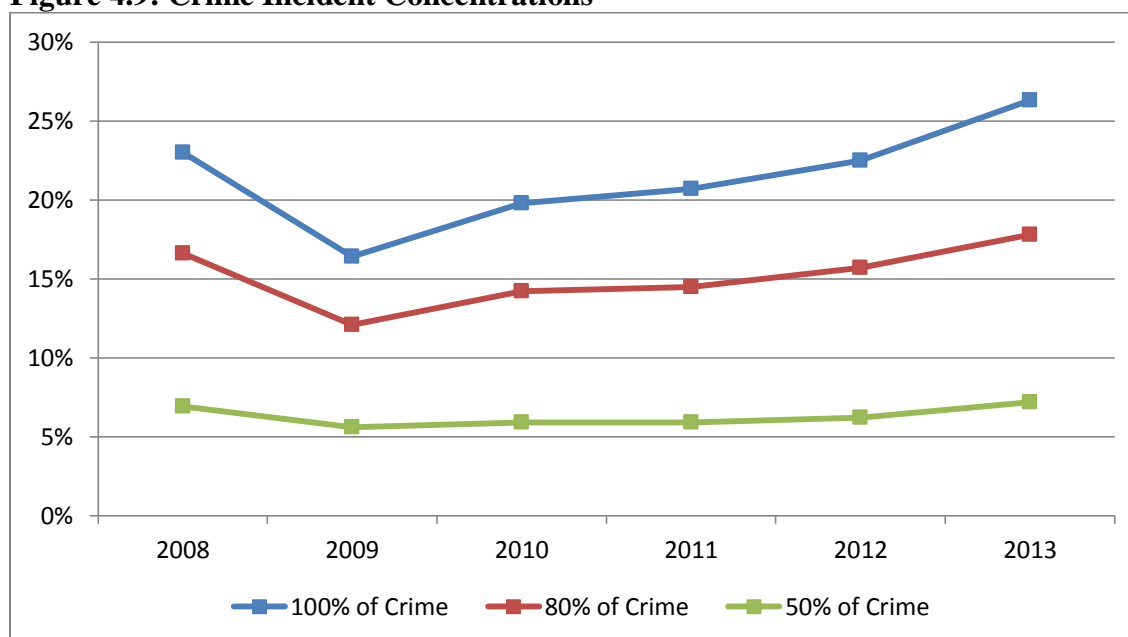
Crime Concentrations at Street Segments

As mentioned in the previous section, using neighborhoods as a unit of analysis would miss important within-neighborhood variation in the distribution of street violence. Street segments facilitate the analysis of within-neighborhood variation and also seem better suited to studying the impact of opportunity variables on violence. In other words, opportunity variables that occur on a particular street segment likely have little to no impact on a street segment within the same neighborhood but a few blocks away. The

neighborhood hot spot maps indicate that crime is concentrated at a level smaller than the neighborhood or tract. This section determines whether crime is concentrated at street segments.

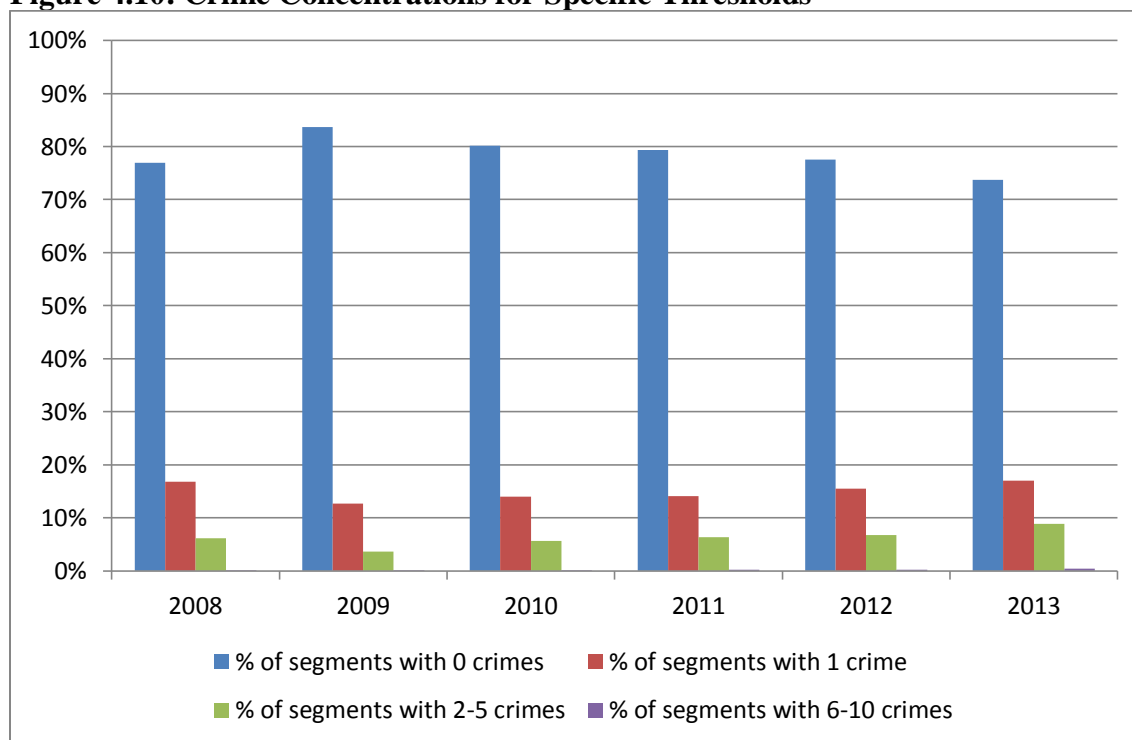
While Newark as a whole is generally thought of as a very violent city, this preliminary analysis revealed that 43% of the street segments did not experience a single violent street crime incident from 2008-2013. The mean number of incidents for street segments that experienced an incident from 2008-2013 was 3.3 (sd = 3.13). The most violent segment experienced 39 street violence incidents from 2008-2013. Examining the incident data year to year confirms persistent concentration at the street segment level (see Figure 4.9). Fifty percent of the street violence incidents fall on between 5.9 and 7.2 percent of the street segments. Eighty percent of the incidents are on between 12.1 and 17.8 percent of the segments. Finally, between 16.4 and 26.3 percent of the street segments each year account for all of the street violence incidents.

Figure 4.9: Crime Incident Concentrations



An alternative way to demonstrate the concentration of violent street crimes at street segments is to look at the distribution of street violence incidents year to year. This information is displayed in Figure 4.10. On a yearly basis, the number of street segments experiencing a specific number of incidents is relatively stable. The majority of street segments each year experienced no street violence incidents. The percentage of street segments that experienced one incident ranges from approximately 12.5% to 17%. The proportion of street segments with between 2 and 5 crimes is between 3.5 and 9 percent. The maximum number of street violence incidents experienced on a street segment during any given year is 10. Less than one half of a percent of street segments experienced between 6 and 10 incidents each year.

Figure 4.10: Crime Concentrations for Specific Thresholds



Trajectory Analysis

The spatial analyses described above confirm that street violence is concentrated at specific street segments throughout the city. However, more sophisticated statistical analyses need to be conducted to determine whether these concentrations of street violence are stable at street segments over time. This section reviews the methods and analysis used to answer the second research question:

Are there stable concentrations of street violence at street segments in Newark over time?

If crime hot spots are not stable over time, these high-activity crime locations would not be effective targets for interventions (Weisburd et al., 2004). The investment of scarce resources at specific locations makes little sense if crime naturally moves from place to place over time. In order to determine whether there are stable concentrations of violent crime at street segments in Newark over time, group-based trajectory modeling (GBTM) was used.

GBTM was initially developed and used by Nagin and Land in (1993) to study criminal careers. Since then, multiple studies have used this approach to study life course trajectories (Nagin and Tremblay, 1999; Blokland, Nagin, and Nieuwbeerta, 2005; Bushway, Sweeten, and Nieuwbeerta, 2009) and more recently, crime trajectories at place (Weisburd et al., 2004; Yang, 2009; Groff, Weisburd, and Morris, 2010; Weisburd et al., 2012; Curman, Andresen, and Brantingham, 2014). GBTM is an “easily applied approach for identifying distinctive clusters of individual trajectories within the population and for profiling the characteristics of individuals within the clusters” (Nagin, 1999, pg. 139). GBTM facilitates the groupings of street segments based on their violent

street crime trajectories and allows each group to follow its own developmental pattern or trajectory.

While GBTM was selected for the current analysis, other approaches, such as hierarchical modeling or latent curve analysis, could also be used to model the trajectories of violent street crime places over time. Each method has its strengths and weaknesses. GBTM differs from the two other main methods for analyzing individual level trajectories primarily in that it does not assume a continuous distribution. Recent studies on violence in Boston (Braga et al., 2010; 2011) utilized growth curve models to identify developmental trends on street segments and intersections. They were interested in calculating slopes for each individual unit rather than for each grouping which is a characteristic of GBTM. For the current study, GBTM used to determine whether violent crime is stable across places and whether the hottest/coldest street segments remain hot/cold over time. The identification of cohesive groupings of persistently violent places facilitated the selection of case street segments for the matched control case design.

The approach used for this analysis was taken from Nagin (2005). Analysis was conducted using the *traj* command in Stata 13.1 (Jones and Nagin, 2012). The first step was to determine the appropriate distribution for the dependent variable: the censored normal distribution, the zero-inflated Poisson distribution or the binary logistic distribution. Next, the number of groups and the shape of the trajectories needed to be determined. Each group can have either a linear, quadratic, or cubic shape. The Bayesian Information Criteria (BIC), the posterior probabilities of group membership, and the odds of correct classification were used to determine the appropriate number of

groups and shape. Generally, the model with the largest BIC is selected; however, it is only a guideline and it is important to consider practicality and parsimony when determining the number and type of groups (Nagin, 2005). The posterior probabilities of group membership measure the likelihood of belonging to a particular trajectory group. The post-estimation metrics also assess the quality of the model's fit to the data. Nagin (2005) suggests that probabilities higher than 0.7 represent a high level of accuracy.

Another diagnostic tool that can be used to measure the fit of the selected model is the odds of correct classification (OCC) which measures the percentage of individuals correctly classified into each group (Nagin, 2005). An OCC of 5.0 or higher for all groups is another indication that the model has a high level of accuracy. Once the correct number and type of groups has been identified, the groups will be labeled based on their developmental patterns. Weisburd et al.'s (2012) Seattle data utilized 22 groups and eight developmental patterns: crime-free, low-stable, moderate-stable, chronic-crime, low decreasing, low increasing, high decreasing and high increasing. Their analysis found enormous street-by-street variability in the developmental patterns at the street segment level. It was expected that the trajectory analysis on street violence in Newark, NJ would produce similar findings.

Matched Case-Control Design

This final section presents the main study design and data collection processes used to answer the third research question:

Controlling for neighborhood characteristics, do place-specific characteristics explain street-to-street variation in persistently violent crime places?

Determining the salience of place-specific characteristics in explaining persistently violent places requires a systematic comparison of violent street segments to nonviolent street segments. Case-control designs are ideal for this type of study due to the rareness of high violence street segments. Without it, a very large sample would need to be selected in order to ensure adequate statistical power to detect statistically significant differences between the groups if they, in fact, exist. In a case-control study, “the two groups are first defined on the basis of the presence (i.e., the case group) or the absence (i.e., the control group) of the outcome of interest” (Goodman et al., 1988, pg. 74).

Case-control studies are especially popular in medical research (Cole, 1979). These studies are more cost and time effective than their alternative, cohort studies which involve two groups of people, one which has been exposed to the risk factor and one which has not. The two groups are then studied over a period of time to see the incidence of the outcome of interest (Goodman et al., 1988). Matching is useful in case-control studies as it enhances “the precision with which the effect of a confounding variable can be controlled in situations in which the population of cases and controls differ substantially in their distributions on the confounder variable” (Lacy, 1997, pg. 143). Confounding variables make it difficult to determine what the causal factor in the outcome of interest is. In an effort to reduce bias, street segments with high levels of street violence were matched to no/low street violence street segments using theoretically informed matching in three ways: length of the street, type of street, and neighborhood.

Theoretically-informed matching was used to select the control segments. While using statistical techniques such as propensity scores is a popular approach to matching units, matching can also be “based on prior knowledge and theoretical understanding of

the social processes in question” (Rossi and Freeman, 1993, pg. 304). Street segments were matched based on several salient characteristics in order ensure cases and controls were as similar as possible. First, as described earlier, high violence segments were matched to no/low violence segments of similar length. Second, street segments were matched based on street type. The street types relevant for this study were: primary road without limited access, secondary and connecting road, and local, neighborhood, and rural road.

Finally, segments were matched based on neighborhood to control for broader socio-demographic characteristics that might be related to levels of violence on the street segment. As described above, 2010 US census tracts were used as proxies for neighborhoods. Ideally, segments would have been matched to like cases within the same tract. When this was not possible, segments were matched to other segments in similar tracts. Similar tracts were identified by looking at percent Black, percent below poverty level, percent female headed household, percent households on public assistance etc. Final matches were made based on similarities across the three dimensions. Using the guidelines set forth by Cohen (1988) and an online power calculator⁶, it was determined that in order to achieve a power of at least 80%, a minimum of 176 pairs were required in this matched case-control study. The findings from the trajectory analysis helped inform the final number of pairs selected for analysis.

Binary Regression Model

Probit or logit regression models would typically be used to estimate any observed differences between the cases and controls in a matched case-control design.

⁶ Power calculator accessed from: <http://sampsiz.sourceforge.net/iface/s3.html#cc> on 5/16/15

John Eck (1994), in his case-control study of drug markets in San Diego, used multiple logistic regression to examine the relationship of various independent variables to drug dealing. A matched case-control study of convenience store robberies by Hendricks et al. (1999) used conditional logistic regression.

Since the street segments used in this dissertation research are nested within census tracts, it is important to acknowledge that two segments within the same tract are more similar to one another than two segments in different tracts. To account for this, it was initially expected that hierarchical linear modeling (HLM) would be used. Hierarchical linear modeling (HLM) is a statistical approach appropriate for hierarchical data structures and has three general research purposes: improved estimation of effects within individual units, the formulation and testing of hypotheses about cross-level effects, and the partitioning of variance and covariance components among levels (Raudenbush and Bryk, 2002). Once the cases and controls were selected for analysis, it was determined that there was too much clustering among segments within certain tracts to create enough variation for the level 2 (census tract) analysis⁷.

Instead, a binary response model was utilized to analyze the case-control data. Binary response models utilize either a probit or logit model. Both models are extremely similar and there is often little difference between the predicted probabilities of the two (Cameron and Trivedi, 2005). Due to its relatively simple form and because odds ratios can be calculated which were used to interpret the results, a logit model was selected as the most appropriate for the data.

⁷ Sample size recommendations made by Hox (1998) recommended a minimum of 20 observations (level-1) for 50 groups (level-2). For the current analysis, 72 tracts were identified for level-2; however, given the small sample size, only one tract reached 19 observations. The mode for the number of observations per tract was 2. Only 9 of the tracts contained 10 or more observations.

Chapter 5 - Data Sources and Key Variables

This chapter provides a review of the data sources utilized to collect data for each variable. Additionally, an overview of the independent variables used in the main analysis is provided.

Data Sources

This research relied upon two key sources of data, official violent crime incident report data from the Newark Police Department for the dependent variable and data collected during systematic social observations of street segments. Data for additional independent variables were collected from: Newark Police Department, New Jersey Transit, Newark Housing Authority and the City of Newark. The systematic observation process is described below and is followed by a discussion of each independent variable included in the analyses.

Systematic Social Observations

Observational research has strong ties to the Chicago School of sociology (Park and Burgess, 1921) as these scholars sought to develop a deeper understanding of the relationships between physical structures and the broader social ecology of urban environments. Albert Reiss Jr. (1971) argued for “systematic social observation” where observational data were collected according to strict rules that could be readily replicated by others. More recently, systematic social observations have been used to describe neighborhood conditions in Chicago (Sampson et al., 1997) and at hot spots in Jersey City (Braga et al., 1999) and Lowell (Braga and Bond, 2008). These studies suggested

that following a precise methodology resulted in more reliable and valid observational data at specific places since the same process was used to collect data for each street segment. Furthermore, Green et al. (1998) argued that the reliability and validity of observational data increases as the unit of analysis decreases as street segments experience less and more simplistic patterns of activity than whole neighborhoods.

In this study, systematic social observations were conducted during the day to assess the physical characteristics of the segment and, consistent with temporal analyses of violent crime data, another visit was conducted to document the number of people in public places during peak violence. All site visits were conducted during warmer months when people spend more time outside and when snow does not limit visibility. Each site visit was video recorded with a GoPro camera allowing the information collected to be coded at a later point in time. Since filming was conducted at some of the most violent segments in the city, a detective from the Newark Police Department was present for each site visit.

Since daytime site visits were used to capture physical characteristics of the street, there were no temporal constraints on when the site visits could take place as long as the video camera could record clear images. Additionally, since the purpose of these visits was to capture many of the opportunity and disorder variables, an unmarked police car was not necessary. The police car slowly drove down the entire length of the street segment twice, so a recording could be made on each side of the street. During each recording, verbal notes were made to aid in the coding of the segments.

The objective of the evening site visit was to better understand public activity level on each street segment during peak violence hours. These site visits were

conducted Thursday through Sunday since there is more activity on the street on these days due to individuals having fewer obligations (work, school etc.) and after reviewing the data, increased levels of violence generally occurred on these days. A three hour window to visit each segment was selected based on the mean occurrence time for the violent incidents at each study street segment. For example, if Case 28 had a mean violent incident time of 9pm, then the site visit to that street segment occurred between 7:30pm and 10:30pm. Additionally, since the control segments had no street violence incidents or only one incident, the three hour window used at these locations was the same as their case match. In other words, Control 28 was visited during the same time frame as Case 28. Preferably, these site visits would have all been conducted in an unmarked police vehicle; however, this was not always possible. Although not ideal, it was not expected to impact the data collection since the police car was continuously driving down the street and the aim of the site visit was only to capture the number of people out in public. Since these visits predominantly occurred when it was dark outside, the verbal notes taken during the recordings were especially important.

The measures that were created by these systematic social observations and by other data collection processes can be found in Table 5.1 and explained in detail in the section below. Each independent variable represents count data or dichotomous dummy variables that were created based on categorical or binary (yes/no) variables.

Table 5.1: Independent Variables in the Matched Case-Control Study

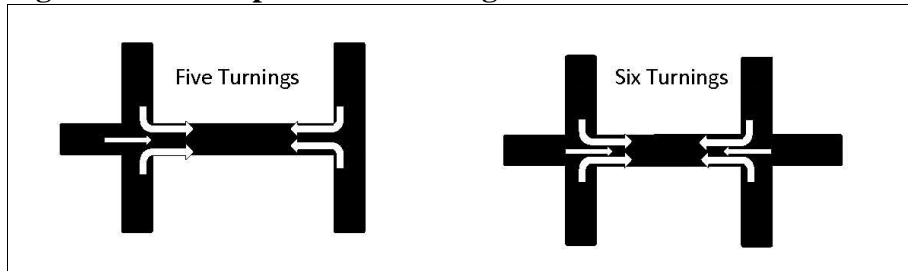
Routine Activities and Accessibility	Description
<i>Accessibility</i>	
Street entrances	# of entrances to the segment
Public transportation	# of bus/train stops with 1 block of the segment
<i>Motivated Offenders</i>	
Home address of arrestees	# of home addresses on each segment
Gang Territory	Presence of gang territory on segment (0=No, 1=Yes)
<i>Suitable Targets</i>	
Public facilities	# of public facilities within 2 blocks
At-risk businesses	# of banks, gas stations, check cashing stores, sit down restaurants, take out restaurant, bars, liquor stores and corner stores on the segment
Individuals on the street	# of individuals on the segment
<i>Guardianship</i>	
Physical disorder	# of abandoned residential and commercial buildings, vacant lots, and graffiti on the segment
Street lights	# of street lights on the segment
Formal surveillance	Presence of a NPD camera viewshed on the segment (0=No, 1=Yes)
Police and fire	Presence of police or fire station within 2 blocks (0=No, 1=Yes)
Collective Efficacy	
Block and tenant associations	Presence of a NPD identified association on the segment (0=No, 1=Yes)
Churches	# of churches present on the segment Presence of a freestanding church (0=No, 1=Yes)
Community and nonprofit orgs	Presence of a community or nonprofit org (0=No, 1=Yes)
Additional Variables	
Housing assistance	Presence of public housing (0=No, 1=Yes)
Land use	# of Section 8 addresses on the segment Type of land use on the segment
Large apartment building	Presence of a building with 4 or more stories (0=No, 1=Yes)

Routine Activities and Opportunity Variables

Accessibility

Accessibility to crime opportunities is a key but understudied component of crime and place research (Clarke, 2005). The ability to access or flee a location by car, public transportation or foot is part of the decision making process for a potential offender. Locations that are easily accessible are more likely to experience criminal activity compared to those that are difficult to access. Potential offenders, weighing the costs and benefits of a crime, are likely to assess the likelihood of them being able to flee the scene of a crime without being apprehended. It was believed that more accessible places would have higher levels of crime.

The first accessibility variable was measured as the number of entrances to the street segment. Research on traffic flow and crime have studied physical changes to the street such as street closures (Lasley, 1998; Zavoski et al, 1999) and changing street patterns (Bevis and Nutter, 1977; Zanin, Shane and Clarke, 2004). In a study on property crime, Beavon, Brantingham and Brantingham (1994), found that crime was higher on more accessible streets. They measured accessibility as “the number of ‘turnings’ into each street segment” (Beavon, Brantingham and Brantingham, 1994, pg. 126). The same operationalization was used for the current study; see Figure 5.1 for an example of street segments with five or six access points.

Figure 5.1: Example of a Street Segment with Five and Six Turnings

A public transportation variable was also used to measure the accessibility of the street segment. Accessibility is a key component to crime prevention techniques such as defensible space and crime prevention through environmental design (Newman, 1972; Jeffery, 1971). If potential offenders are able to easily access certain places, they are more likely to commit crime there. Weisburd et al. (2012) found that an increase in bus stops on a street segment was associated with an increase in the likelihood that a street segment was a chronic crime street versus a crime free street. Their data, however, considered all crime as opposed to just violent crime. Violent crime offenders may be less likely to use public transportation. Data on key public transportation features were obtained from New Jersey Transit. The GIS shapefiles contain bus stop, light rail and commuter train information. A 2013 bus stop file listed the total number of bus stops in the city as 2,073. The number of stops changes year to year due to usage, construction, budgetary issues; however, it is believed the stops are relatively stable over time. Newark also has fifteen light rail stops throughout the city and two locations in the city for commuter trains. The public transportation variable was operationalized as the number of public transportation stops within one block of the street segment.

Motivated Offenders

One of the key components of routine activities theory is the motivated offender. Under this theory, it is assumed a motivated offender will take advantage of the presence of a suitable target and the absence of a capable guardian (Cohen and Felson, 1979). While Weisburd et al. (2012) used “high-risk juveniles” (low academic achievers and truants), they did not include a measure of the adult population of potential offenders (which is much larger than the juvenile population).

This research developed a measure of “motivated offenders” by counting the home addresses of juveniles and adults who have been arrested by the Newark Police Department. Home addresses for each individual arrested were geocoded from computerized arrest reports. While home addresses are not perfect indicators of where individuals commit their crimes, in general, offenders are known commit crimes in areas familiar to them, including areas close to home (Brantingham and Brantingham, 1981; Block, Galary and Brice, 2007). What is more, arrest data do not capture all of the individuals who commit crime. Most criminal activity goes unnoticed by the police, police have discretion when it comes to making an arrest, and police patrol certain neighborhoods and areas more frequently than others (LaFave and Remington, 1965; Smith, 1986). This variable was measured as a count of the number of arrestee home addresses on each street segment.

In 2013, approximately 17,650 people were arrested by the Newark Police Department. Almost three-fourths of these people (12,928 out of 17,650) had home addresses in Newark. The Newark home addresses were geocoded with a 96.6% match rate (12,483 of 12,928).

Previous research on gangs has shown that gang-involved individuals engage in more violence than non-gang-involved individuals (Klein and Maxson, 1989). Gang territories are areas where gang members congregate for economic and social purposes (Brantingham, Tita, Short, and Reid, 2012). When another individual infringes on social and/or economic space controlled by particular gangs, violence can sometimes erupt. This dissertation research utilizes data on gang territories collected in 2011 as part of the Newark Violence Reduction Initiative. Similar to the process used by Kennedy, Braga, and Piehl (1997) in Boston, law enforcement officers from various agencies and units came together to map out gang territories and discuss gang dynamics in the city of Newark. The result was a citywide map that detailed gang territory boundaries as well as the gangs present in each area. Overall, 73 gang territories identified, comprising 2.33 square miles. Excluding the Port of Newark and Newark International Airport, the City of Newark comprises 15.8 square miles and gang territory covers 14.7% of the city's geographic expanse. In this dissertation, gang territory was measured as a binary variable (0= not located in gang territory, 1 = located in gang territory)

Suitable Targets

Similar to motivated offenders, it is conceptually difficult to identify which individuals are most likely to become suitable targets or victims. One approach is to identify places which are crime generators and attractors. Weisburd et al. (2012) identified certain types of public facilities that may attract suitable targets, such as community centers, hospitals, libraries, parks, and middle and high schools. Previous research has confirmed that these kinds of areas do indeed have increased victimization risks (Roman, 2002; Cromwell, Alexander and Dotson, 2008; Crewe, 2001; Perkins et al.,

1993). In 2014, ninety-seven of these public facilities were identified with six recreation centers, three large hospitals, eight public libraries, eighteen public schools that contained high school students, and sixty-two parks. Because of the low number of public facilities and the possibility that these site features could influence violent activity beyond immediate street boundaries, this variable was measured as the number of facilities within 758 feet of the street segment (the mean length of two street segments used in this study).

At-risk businesses served as the second measure of suitable targets in this study. At-risk businesses are places that may experience substantial foot traffic during operating hours thereby increasing the presence of suitable targets. Some examples of at-risk businesses are bars, clubs, fast food restaurants, convenience stores, gas stations, banks, motels, and the like. These places are similar to the risky facilities described by Clarke and Eck (2007); however, their focus was on the identification of the small proportion of these facilities that generated a majority of the crime occurring at all facilities of a specific kind. In contrast, this research simply counted the presence of at-risk businesses on case and control street segments rather than conducting supplemental analyses to identify whether such facilities experienced disproportionate shares of violence independent of the street segment. At-risk businesses were identified during site visits to each street segment. The variables were measured as the number of each at-risk business type on the segment.

The third measure of suitable targets, the presence of potential victims, was captured during night time site visits. The timing of these site visits corresponded to when these segments were the most violent. Since the majority of the site visits were

conducted at night, it was sometimes difficult to identify the exact number of people outside at the place. Therefore, this measure was expressed as a categorical variable based on the natural breaks in the data: 0 individuals on the street segment, 1-5 individuals on the street, 6-10 individuals on the street, and 10 or more individuals on the street.

Guardianship

“Guardianship” is a central concept in crime opportunity theories such as routine activities (Cohen and Felson, 1979). Likely offenders will be less likely to commit crime in particular places if capable guardians are present at the same time as suitable targets. Broken windows theory draws on the idea of guardianship in controlling crime when it suggests that “one unrepaired broken window is a signal that no one cares, and so breaking more windows costs nothing” (Wilson and Kelling, 1982, pg. 30). Disorder signals to potential offenders that no guardians are present to maintain an area and, therefore, it is permissible to commit crime in these areas. Skogan (1990) identifies physical disorder as abandoned buildings, trash-filled lots, graffiti and vandalism. Signs of physical disorder were used as an indicator of the level of guardianship on case and control street segments. Physical disorder variables were created by counting the number of abandoned buildings, vacant lots, and graffiti on study street segment during daytime systematic social observations.

The presence of street lights on study street segments was used as a second measure of guardianship. Effective street lighting should serve as a protective factor against violent crime as it increases visibility for both vehicles and pedestrians. Following rational choice theory, if likely offenders perceive that specific places are

being watched, they are less likely to commit crimes there due to perceived heightened apprehension risk. A number of studies have found an association between increased street lighting and subsequent declines in crime (Painter and Farrington, 2001; LaVigne, 1994; Welsh and Farrington, 2008). The number of street lights on a street segment was counted through site visits or through Google Street View which permits a computer user to view panoramic images of streets.

Formal surveillance, as measured by the presence of CCTV, was the final measure of guardianship included in this study. Similar to the impact of street lights, formal surveillance was expected to increase the risks associated with committing a crime. A meta-analysis of closed circuit television (CCTV) surveillance cameras found that CCTV has a modest but statistically significant preventive effect on crime (Welsh and Farrington, 2008). The presence of formal surveillance was determined by examining whether some portion of the street segment was within a NPD surveillance camera viewshed (the geography visible to the camera when it is in panning mode). The camera viewshed data was based on previous research conducted by Piza, Caplan, and Kennedy (2014). The presence of a CCTV camera viewshed on the street segment was measured as a binary variable (0 = not present on the segment, 1 = present on the segment).

Measures of Collective Efficacy

As discussed in Chapter 2, social disorganization theories have played a central role in explaining the variation in crime across neighborhoods in cities. In recent years, researchers became increasingly interested in understanding the influence of mediating variables – most importantly, collective efficacy – that may reduce violence levels in an area, even when high levels of disorganization and opportunities for crime are present

(Sampson, 2012; Sampson et al., 1997; Taylor, Gottfredson, and Brower, 1984). As conceptualized by Sampson et al. (1997), ideal measures of collective efficacy are drawn from interviews and surveys of community residents; however, these research activities are costly and time intensive, especially in regards to citywide studies. Moreover, measures of collective efficacy have historically been observed at larger units of analysis such as neighborhood clusters, community areas, or census tracts (Sampson, 2012).

This research, however, and the Weisburd et al. (2012) study are based on the argument that life on the street segment can be viewed as stable social interactions resembling a “micro community.” As such, measures of collective efficacy can appropriately be collected at the street segment level. Weisburd et al. (2012) used the percentage of active voters out of all registered voters on a street segment as their key indicator of collective efficacy. This measure was criticized by Braga and Clarke (2014) as not measuring social cohesion and a willingness to intervene. They argued that, while voting is clearly civic, it doesn’t represent individual involvement or investment in neighborhood life. Drawing on previous research by Sampson (2012) and the recommendations of Braga and Clarke (2014), collective efficacy in this study was measured by the presence of three different kinds of community groups: block/tenant associations, churches, and nonprofits/community organizations.

Block Groups and Tenant Associations

One of the measures of collective efficacy suggested by Braga and Clarke (2014) was the presence of a block group or tenant association on a street. These tend to be locally organized groups focused on the needs and concerns of a small group of people, usually the tenants of a building or residents of a block. One study by Chavis and his

colleagues (1987) found that block association members were significantly more likely to have expectations of collective efficacy than non-members. As such, the presence of block groups and tenant organizations should reduce crime since members may be more likely to intervene should a problem arise. Unfortunately, the existing research on the effectiveness of block and tenant associations reducing crime is quite limited. As their popularity grew over the course of the 1980s and continuing today, the potential crime prevention benefits of neighborhood watch programs have received more attention. A recent meta-analysis by Bennett, Holloway, and Farrington (2006) found that 15 of 18 studies provided evidence that neighborhood watch reduced crime. Neighborhood watch programs, however, are more focused on safety while block and tenant associations can also focus on other community issues such as disorder. Nevertheless, the presence of block and tenant associations was expected to be more strongly associated with no/low violence street segments.

A list of block and tenant associations was provided by the Newark Police Department. The list contained the names of groups that received crime prevention training from NPD community service officers. Thirty-eight such block and tenant associations were identified. The area serviced by each group was identified through conversations with community service officers. A GIS shapefile was created to map the associations and easily identify which street segments were connected to an association.

The use of police department records to determine the number and geography of these associations was not ideal. Communities like the ones studied in the current research often have an antagonistic relationship with the police and have even been known to organize to protect themselves from the police (Marx and Archer, 1971). For

this and other reasons, many associations do not want to have an official relationship with the police. Unfortunately, the City of Newark does not maintain records of block and tenant associations and it would not be possible to accurately identify the presence of an association through site visits. Google searches and conversations with community activists revealed additional associations; however, identifying whether these associations were still active and the boundaries of these associations were often times not possible. Since these represented the most consistent measure available, this study only considered tenant and block associations that received NPD crime prevention training. The presence of block and tenant associations was measured as a binary variable (0 = not present on the segment, 1 = present on the segment).

Churches

The presence of a church on a street segment was considered a measure of local collective efficacy as church members seemed likely to intervene locally in ways similar to other local community organizations. Research, however, has not documented consistent association between church membership and collective action. In Chicago, Sampson (2012) found that the density of churches in a neighborhood was negatively related to collective efficacy. In one Boston neighborhood in Boston, McRoberts (2005) found that many churches did little to improve the surrounding area as members were often drawn from outside neighborhoods. However, Brunson, Braga, Hureau, and Pegram (2013) found that certain churches were more active in the community than others and suggested that particular kinds of churches might be more likely to engage in collective actions to control violence. Given the possibility of some crime control actions being pursued by particular churches, this collective efficacy variable was measured by

counting the number of churches on a street segment. The data for this variable was collected during site visits and by using Google Street View. Since it was possible that not all churches have the same activity level or prominence in the community, an additional measure was created to identify whether a church was freestanding as opposed to a storefront. Freestanding churches were speculated to provide more a more stable presence in the community as opposed to storefront churches which suggest mobility over time. The presence of a freestanding church on the segment was measured as a binary variable (0 = not present on the segment, 1 = present on the segment).

Community and Nonprofit Organizations

The presence of community and nonprofit organizations on a street segment was the final collective efficacy measure considered in this study. Local organizations that are active in the community should encourage neighborhood cohesion and, in turn, increase collective efficacy. There has been little research on the impact of these particular kinds of organizations on neighborhood levels of crime. Instead, much of the research focuses on more generally defined community and neighborhood organizations. Ohmer and Beck (2006) found that while participation in a neighborhood organization increased the collective efficacy of the organization itself, it did not increase collective efficacy of residents in the neighborhood. Alternatively, Sampson (2012) found neighborhoods with a high density of nonprofit organizations also had a high rate of collective action events, one of their key measures of community involvement. In this study, the data for this variable was collected during daytime site visits. Organizations were measured by the presence of an organization on a street segment (0 = not present on the segment, 1 = present on the segment).

Additional Variables

Housing Assistance

While neighborhood level variables were controlled by design, it is possible for micro-level variations in disadvantage to be associated with violence at street segments in Newark. As such, the presence of public housing and Section 8 vouchers on a street segment was considered as a proxy for micro-level pockets of disadvantage in specific places. The presence of public assistance in neighborhoods has been linked to social disorganization and can magnify neighborhood disadvantage (Bursik, 1989; Kubrin and Weitzer, 2003; Wilson, 1987).

Data for this variable was obtained from the Newark Housing Authority. Information on the public housing developments, including site maps, is available online.⁸ The Newark Police Department also has GIS shapefiles for the housing developments. There are currently forty-five public housing developments in the city. The family developments consist of townhouses and apartment buildings with a maximum of three stories. The senior developments are high rise buildings and though the demographics of those officially living in the apartments are very different than the demographics in the family developments, oftentimes, individuals illegally live with family members in these apartments. For this reason, the senior developments are included with the family developments for the public housing measure. Data on the Section 8 vouchers were obtained for the first quarter of 2014. Addresses were geocoded and matched to the appropriate street segment. Of the 4,662 addresses provided by the Newark Housing Authority, 4,592 were geocoded for a match rate of 98.5%. The

⁸ Newark Housing Authority Family Residences. Accessed 2/28/15.
http://www.newarkha.org/Portfolio_Family.php

housing assistance variable was measured in two ways: the presence of public housing on a segment (0 = not present on the segment, 1 = present on the segment), and the number of Section 8 voucher addresses on the street segment

Land Use

Distinguishing between different land use types is important when identifying the potential differences between violent and nonviolent street segments. Residential areas are traditionally believed to experience lower crime rates due to fewer opportunities for crime and increased social control; areas with other types of land use, such as commercial use or mixed use are expected to have higher crime rates because of increased anonymity (Jacobs, 1961; Taylor 1997). Weisburd et al.'s (2012) study identified a segment as mixed use if it contained between 25 and 75 percent residential or commercial properties.

Data on land use was collected during the daytime site visits and/or through Google Street View. The presences of several types of land use on the street segment were identified: mixed use, residential, commercial, green space, schools and vacant land/no land use. The variable was measured as the predominant land use on the segment utilizing a multicategory dummy variable for each land use type (0 = not present on the segment, 1 = present on the segment).

Chapter 6 - Analytical Models and Results

Trajectory Analysis

The previous statistical analyses confirmed that street violence in Newark is concentrated at particular street segments spread throughout the city. However, additional analyses were needed to determine whether these street violence concentrations were indeed stable at specific street segments over time. If the location of violent crime incidents naturally moved from place to place, then the investment of scarce crime prevention resources to address problems at specific locations would make little sense. In this section, the second research question is considered:

Are there stable concentrations of street violence at street segments in Newark over time?

Group-based trajectory modeling (GBTM) was used to determine whether there were stable concentrations of violent street crime incidents at specific street segments in Newark over time.

The GBTM approach used to identify developmental patterns of crime at specific places in Newark was developed by Nagin (1999, 2005) and Nagin and Land (1993). This analytical approach differs from other group-based methodologies, such as hierarchical modeling (Bryk and Raudenbush, 1987, 1992; Goldstein, 1995), and latent curve analysis (McArdle and Epstein, 1987; Meredith and Tisak, 1990; Muthén, 1989; Willett and Sayer, 1994), in that GBTM does not assume a continuous distribution throughout the population (Nagin, 2005). Rather, these models assume “there may be clusters or groupings of distinctive developmental trajectories that themselves may reflect distinctive etiologies” (Nagin, 2005, pg. 5). As will be described further below,

Weisburd and his colleagues (2004) used GBTM in their seminal analysis of longitudinal crime trends at street segments in Seattle.

There are, of course, other ways to model the concentration of crime at small places over time. For instance, Braga et al. (2010, 2011) used latent curve analysis to analyze developmental trends in serious violence crime on street segments and intersections in Boston. In contrast to Weisburd et al. (2004), the focus of their research involved estimating the slopes for each individual “street unit” rather than determining distinct groupings of street units (which is a characteristic of GBTM). One key criticism of GBTM is whether the trajectory groupings identified represent real and precise groups with distinctive etiologies rather than groupings that reflect arbitrary cutoffs (Eggleston, Laub, and Sampson, 2004; Skardhamar, 2010). While this criticism is certainly a valid concern, the likelihood that the groupings in this analysis represent misclassifications is minimized as the GBTMs applied in this dissertation explicitly compares a small number of groups that differ greatly rather than comparing larger numbers of groups that differ modestly.

Prior Research

Over the past decade, a series of studies have been published that used GBTM to identify the developmental patterns of crime at street segments. Most of the studies that are germane to this inquiry were conducted by Professor David Weisburd and his colleagues. The first study by Weisburd, Bushway, Lum, and Yang (2004) analyzed official data on crime incidents at street segments in Seattle over a 14-year period. Their analysis suggest that an 18 group trajectory model best fit their data and, while they additionally grouped the trajectories into increasing, decreasing, and stable, some 84% of

the segments were grouped into the stable trajectories. Reflecting on the general crime drop that Seattle experienced during the study time period, Weisburd et al. (2004) suggested that a minority of the street segments were driving the decrease.

Extending this micro place work in Seattle, Yang (2009) explored the spatial and temporal relationships between violence and disorder. Yang (2009) utilized census block groups rather than using street segments as the unit of analysis. The GBTM analysis identified a four-group model as the best fit for the violent crime data. The high violence group, while containing less than 4% of the block groups, accounted for 22.7% of the total violent crime incidents. The social disorder trajectory analysis identified a three-group model with the high disorder group (12% of block groups) accounting for almost half of the social disorder incidents. Lastly, the physical disorder analysis identified a four-group model with the high group containing 5% of the block groups and 22.8% of the physical disorder. A comparative analysis revealed that high levels of disorder predicted high levels of violence about 30% of the time.

A third Seattle study by Weisburd, Morris, and Groff (2009) identified juvenile arrests over a 14-year period. Using trajectory analysis, they identified 86 street segments that contained one-third of the juvenile arrests. Their analysis also provided support for routine activity theory and Brantingham and Brantingham's (1993) argument about activity space.

A final Seattle study by Groff, Weisburd, and Yang (2010), analyzed 16 years of crime data at the street segment level; in this analysis, the GBTM grouped the segments into 22 distinct groups with 8 levels of crime patterns. Further spatial analysis of these groupings found that some street segments had trajectories that were unrelated to their

immediately adjacent streets, suggesting street-to-street variation in the distribution of crime events.

Building on their earlier trajectory analysis studies in Seattle, Weisburd et al. (2012, 2014) conducted extended analyses of the 22 groups and 8 crime patterns identified in Groff, Weisburd, and Yang (2010). Their new analyses mapped the street segments based on their crime trajectory patterns to highlight the street-to-street variation in crime within and across Seattle neighborhoods. As described in the literature review of this dissertation, their main analysis compared high-crime activity street segments and low/no crime street segments identified by the trajectory analysis to analyze the importance of crime opportunity and social disorganization covariates on crime at the street segment level.

While the majority of relevant studies using trajectory analysis were conducted by Weisburd and colleagues, Curman et al. (2014) used GBTM to analyze 16 years of calls for service data in Vancouver, British Columbia. Their trajectory analysis found that a majority of street blocks had stable crime trends while none of the trajectories experienced an increasing pattern. Additionally, a spatial analysis of the distribution of different groupings of street block trajectories found that crime levels and their stability changed substantially from one block to the next.

Analysis

The group-based approach to model developmental trajectories utilizes a multinomial modeling strategy. The distribution of outcome trajectories, conditional on year is denoted by $P(Y_i | Year_i)$, where the random vector Y_i represents street segment i 's longitudinal sequence of street violence and the vector $Year_i$ represents the year when the

street violence on street segment i is recorded. The group-based trajectory model assumes that the population distribution of trajectories arises from a finite mixture of unknown order J . The likelihood for each street segment i , conditional on the number of groups J , may be written as

$$P(Y_i | Year_i) = \sum_{j=1}^J \pi^j \cdot P(Y_i | Year_i, j, \beta^j)$$

Where π^j is the probability of membership in group j , and the conditional distribution of, and the conditional distribution of Y_i given membership in j is indexed by the unknown parameter β^j which among other things determines the shape of the group-specific trajectory (Jones and Nagin, 2012).

The approach used for this trajectory analysis follows the methods used by Weisburd et al. (2012) which were based on work by Nagin (1999, 2005) and Nagin and Land (1993). The current analyses used Stata 13.1 and a GBTM estimation plug-in program developed by Jones and Nagin (2012). To prepare the data for analysis, the street violence incidents were joined to the street segments for each year to produce yearly counts for each segment⁹. On average, 78.6% of the street segments had zero street violent incidents each year and the remainder was distributed as rare event counts. Determining the type of model is the first decision that needed to be made about the form of the trajectory analysis: Zero Inflated Poisson (ZIP), Censored Normal (CNORM), or binary logit. The censored normal model is appropriate when the data is censored by a scale minimum, maximum or both. Since count data was being utilized and a large share

⁹ Since non-neighborhood street segments were removed, any incident occurring on those street segments were not utilized in this analysis. Despite this, on average, 98.7% of the outdoor violence incidents were joined to the neighborhood street segments.

of street segments had zero year-to-year street violence incidents, a ZIP model was chosen to take into account intermittency (Weisburd et al., 2012).

The next two steps in the analysis involved determining the order of the model and the number of groups. Each grouping can take one of three shapes: linear, quadratic, and cubic. The approach detailed by Nagin (2005) was used to select the appropriate number of groups. This entails increasing the number of groups in the model and giving each grouping a different shape until the Bayesian Information Criterion (BIC) no longer increases. For the current analysis, the BIC continued to increase until five groups with a quadratic shape ($\text{BIC} = -20090.74$)¹⁰. Though the number of groups with the highest BIC is generally selected, it is not the only criteria used to select the appropriate number of groupings.

The posterior probabilities of group membership measure the likelihood of belonging to a particular trajectory group. The post-estimation metric also assess the quality of the model's fit to the data. Nagin (2005) suggests that probabilities higher than 0.7 represent a high level of accuracy. Another diagnostic tool that can be used to measure the fit of the selected model is the odds of correct classification (OCC) which measures the percentage of individuals correctly classified into each group (Nagin, 2005). An OCC of 5.0 or higher for all groups is another indication that the model has a high level of accuracy. For the five group quadratic model, the posterior probability and OCC did not meet the threshold for the groupings. For this reason, the posterior probability and OCC was calculated for a four group model with the same results.¹¹ Finally a three group model with a linear shape was selected and no warning message appeared ($\text{BIC} = -$

¹⁰ The four group model had a BIC of -20089.68

¹¹ Additionally, during the Stata analysis, a warning message appeared for both the five and four group models which stated that the variance matrix was nonsymmetrical or highly singular.

20128.27). Both the posterior probability and OCC were above the thresholds for all groupings and no warning message appeared. Table 6.1 displays the results of a three group model¹².

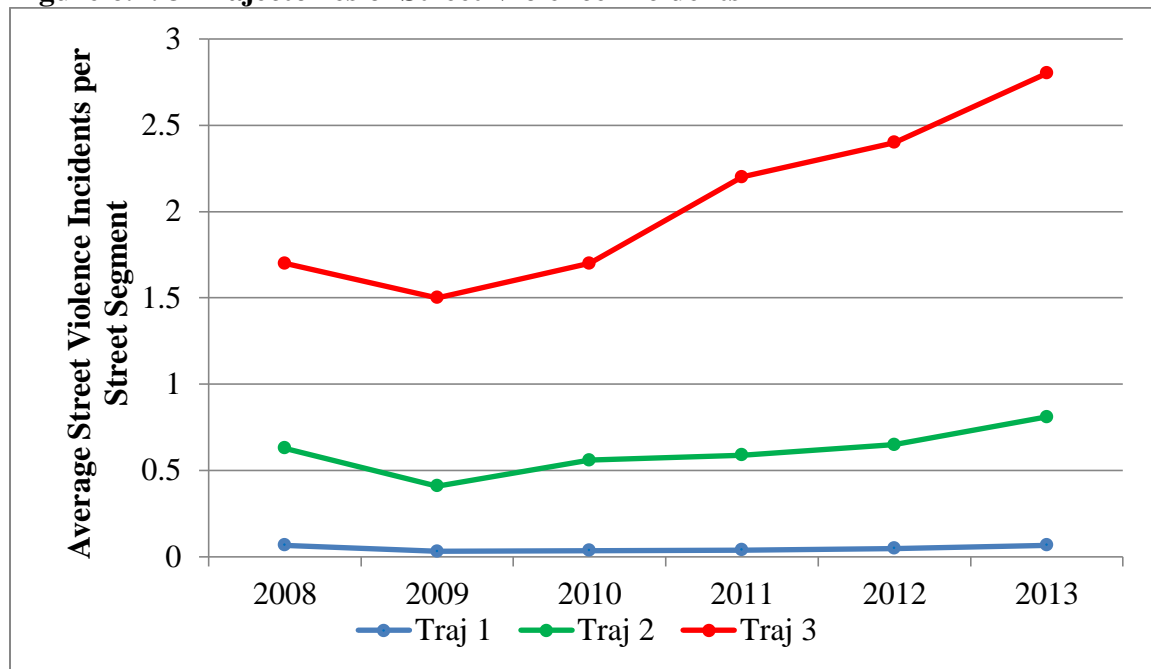
Table 6.1: Trajectory Groupings of Street Violence

Trajectory Group	# of Streets	% of Total Streets	Average Posterior Probability	Odds of Correct Classification
1	3122	59.6	0.91	6.85
2	1775	35.8	0.86	11.0
3	181	4.7	0.92	233.2

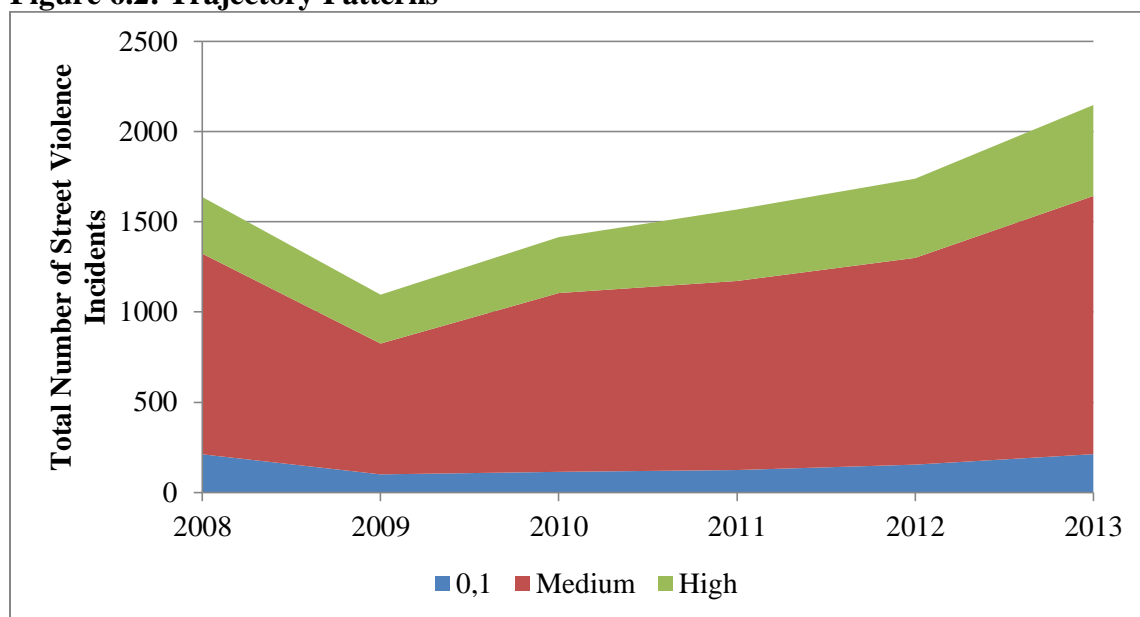
Results

Figure 6.1 illustrates the three group model that was obtained using the GBTM as specified above. It displays the mean number of street violence incidents per street segment found in each trajectory group each year. It is interesting to note that the mean number of incidents in first two trajectory groupings appear relatively stable over time while the third group goes from approximately 1.5 incidents in 2009 up to about 2.8 incidents per segment per year in 2013 which represents an 87% increase.

¹² A trajectory analysis was also conducted using all violence rather than just street violence. A six group model had the lowest BIC (-23541.38) with posterior probabilities and OCCs above the minimum thresholds. The 4th, 5th, and 6th groupings were combined into a “high violence” group containing 3.96% of the street segments. 73.9% of the all violence “high violence” street segments were contained in the street violence “high violence” group indicating that the majority of “high violence” segments are the same regardless of how violence is measured.

Figure 6.1: 3 Trajectories of Street Violence Incidents

In Figure 6.2, the total number of crime incidents per year per trajectory grouping is displayed. The first trajectory group, which contains street segments with zero or only one street violence incident per year, contains 60.2% of the street segments and comprises between 8% and 13% of the street violence each year. The second trajectory grouping contains 35.3% of the street segments and comprises between 65% and 70% of the violence each year. Finally, the third or “high street violence” trajectory group contains 4.5% of the street segments and between 19% and 25% of the street violence each year. Visualizing the data in this way reveals that, though the third grouping contains a disproportionate amount of violence, all three groupings followed a similar pattern and experienced a general increase in the number of street violence incidents per year.

Figure 6.2: Trajectory Patterns

This analysis confirms prior research conducted in other cities showing that crime or specifically street violence is concentrated in specific places and that the majority of places experience little or no street violence each year. It also suggests that resources should be directed at these “hot” places since they are continuously violent. In response to the second research question, this analysis confirms that there are stable concentrations of street violence at street segments within Newark. Since the concentration of street violence at specific micro places was indeed stable over time, it was appropriate to move forward to the main analysis which compared selected street segments from the first trajectory group to street segments in the third trajectory group.

Case-Control Analysis

The trajectory analysis confirmed that the concentration of street violence is stable over time at the street segment level. As such, the main analysis that forms that basis for the third research question can be pursued:

Controlling for neighborhood characteristics, do place-specific characteristics explain street-to-street variation in persistently violent crime places?

The trajectory analysis identified 181 high violence street segments. Three segments were removed from the case-control analysis; these segments no longer existed as they were removed as part of a housing development closure and the construction of a school.¹³ Therefore, 178 segments were identified for the main analysis. With a sample size of 178 segments per group, the statistical power of the case control design to detect a medium effect (0.3) at the $p < .05$ level is 80.5%. Each high violence segment was matched to one of 3,122 segments identified in the trajectory analysis as having no street violence incidents or only one street violence incident. As described in the previous chapter, theoretically informed matching was utilized to match the segments based on street length, street type, and neighborhood. Census tracts were used as proxies for neighborhoods. Attempts were made to select controls from the same census tract; however, when this was not possible, the control was selected from a tract with similar demographics.

Although there were 3,122 segments identified as potential matches for the high violence group, it was difficult to find matches with the appropriate street length. Therefore, multiple consecutive street segments from the low/no crime group were joined to create a longer street segment which provided a better match to the high violence segments. Forty-six of the control street segments were selected in this way.

¹³ Other high violence street segments included closed public housing developments; however, these streets were still accessible to the public and to vehicle traffic. Additionally, these closed developments were not as secure showed signs of vandalism.

Table 6.2 displays the matching variables and compares the cases and controls. Difference of proportion tests were used to investigate whether there were statistically significant differences in the percentages of key matching variables in the two groups. These tests revealed no statistically significant differences in the neighborhood or street type variables. Since it was an interval measure, a difference of means test was used to evaluate differences in the segment length variable for the two groups. Longer street segments generally present more crime opportunities and, as such, were more likely to be in the case group. While the matching process attempted to identify case and control segments of similar length, the test revealed cases were significantly longer than control ($p < .001$).

Table 6.2: Case and Control Match Criteria

	Case (N=178)	Control (N=178)	Difference	Difference of Proportions/Means
Neighborhood				
% Black	64.9%	64.3%	0.4%	0.12
% Below Poverty	33.6%	32.5%	1.1%	0.22
% Female Headed	62.5%	62.1%	0.4%	0.08
% Unemployed	13.2%	12.8%	0.4%	0.11
% Under 18	28.9%	27.6%	1.3%	0.27
% Households on Public Assistance	30.6%	29.2%	1.4%	0.29
Street Type				
Principal	14.6%	14.6%	0%	0.00
Minor Arterial	17.4%	16.2%	1.2%	0.30
Collector	14.6%	13.4%	1.2%	0.33
Local Road	51.1%	53.4%	-2.3%	-0.43
State Highway	2.2%	2.2%	0%	0.00
Segment Length	755.4ft	517.1ft	238.3ft	7.84***

*** $p < 0.001$

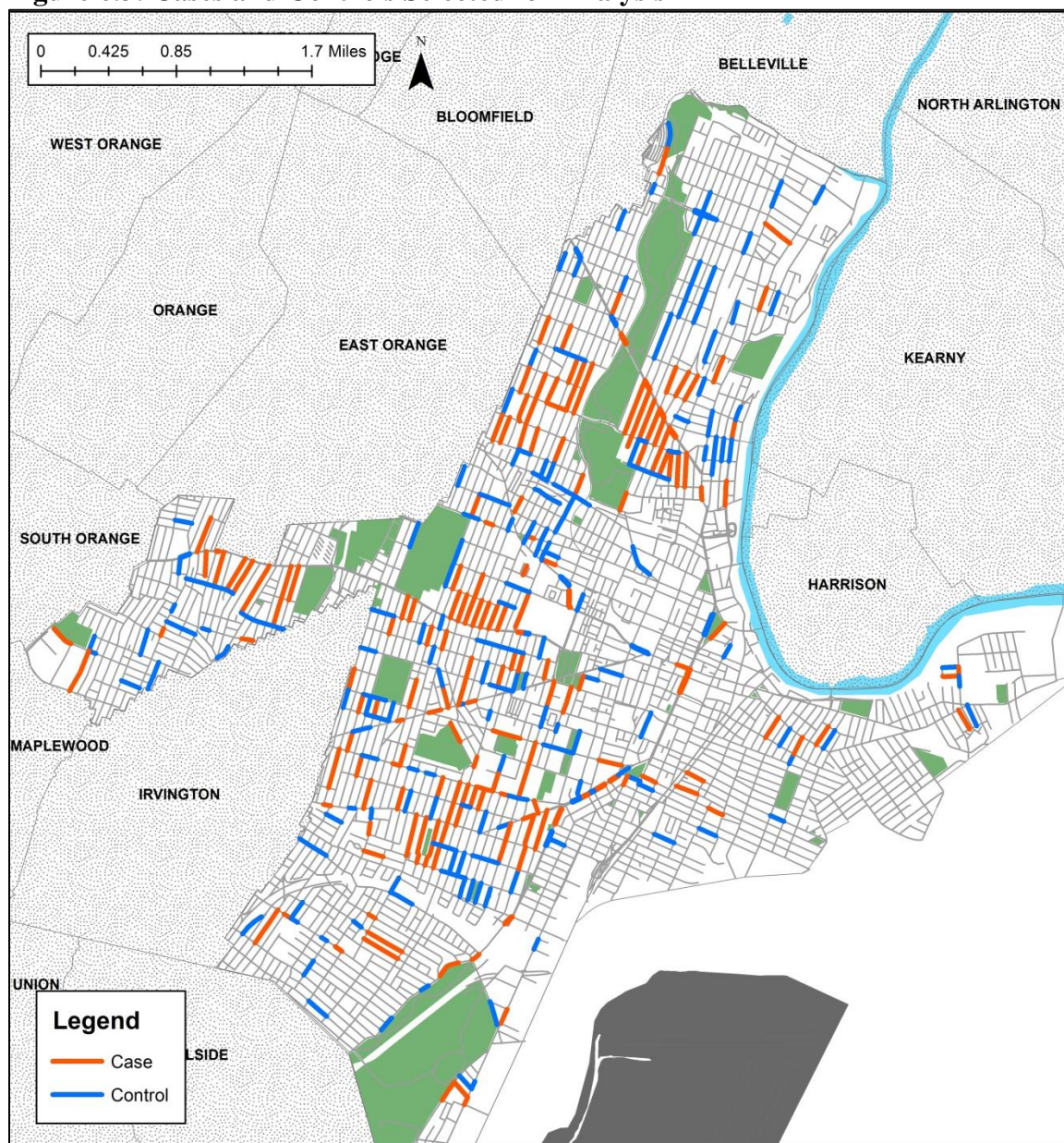
Since there were no statistically significant differences between the cases and controls in any of the neighborhood variables, these measures were used to create a concentrated disadvantage index (see, e.g. Sampson, Raudenbush, and Earls, 1997). A

principal components factor analysis, a data reduction technique used to identify underlying latent variables that summarize a series of highly- correlated observed variables was conducted (Jolliffe, 2002). Essentially, the principal components analysis was applied here to combine highly-correlated neighborhood variables into underlying factors characterizing concentrated disadvantage at the neighborhood level. After rotating the variables, the disadvantage variables were placed into two groupings (see Appendix 1A). The first contained percent black and percent unemployed. The second contained percent in poverty, percent female headed household, percent under 18, and percent of households on receiving public assistance.

Figure 4.3 displays the spatial distribution of case and control segments included in the main analysis. In general, the selected street segments were geographically concentrated towards the center of the city. The majority of the segments, 59.0% (209 of 354) were contained in the North and South Wards respectively while the Central Ward contained 19.2% (68 of 354), the West Ward 13.8% (49 of 354), and the East Ward 8.5% (30 of 354). The concentration of violent street segments in particular neighborhoods made it more complicated to select control street segments from the same neighborhood.

Once the case and control street segments were selected, the data collection process outlined in Chapter 4 commenced. Specific information on each variable will be discussed in the next section.

Figure 6.3: Cases and Controls Selected for Analysis



Simple Comparison of Key Variables Between Case and Control Groups

As described in the methods chapter, a variety of methods were used to collect the data used in the case-control analysis. While general information was provided earlier, this section will delineate specific variable information germane to the selection of cases and controls. Table 6.3 summarizes descriptive statistics for each variable by group and

provides the results of difference of means and difference of proportions tests as appropriate to the data.

Table 6.3: Descriptive Statistics of Variables in the Analysis

	Case (N=186)	Control (N=186)		
Count Variables	Mean	Mean	Difference	Difference of Means
# of Access Points on the Segment	5.24	5.88	-0.64	-4.10***
# of Section 8 Addresses on the Segment	4.73	0.98	3.75	4.02***
# of Public Transportation Stops on the Segment	6.75	5.3	1.45	1.96*
# of Home Addresses of Arrestees on the Segment	14.43	2.7	11.73	4.02***
# of Public Facilities Within 2 Blocks of the Segment	1.13	0.96	0.17	0.68
Signs of Physical Disorder on the Segment				
# of Structures with Graffiti	1.02	0.91	0.11	0.67
# of Vacant Lots	0.91	0.50	0.41	3.34***
# of Abandoned Houses	1.26	0.38	0.88	5.47***
# of Closed Commercial Businesses	0.75	0.48	0.27	2.23*
# of Street Lights on the Segment	6.54	5.37	1.17	3.64***
# of Churches on the Segment	0.42	0.35	0.07	0.99
At Risk Businesses on the Segment				
# of Banks	0.04	0.02	0.02	1.10
# of Gas Stations	0.08	0.02	0.06	2.21*
# of Check Cashing Stores	0.03	0.01	0.02	1.32
# of Sit Down Restaurants	0.10	0.09	0.01	0.21
# of Takeout Restaurants	0.21	0.07	0.14	3.05**
# of Bars	0.06	0.04	0.02	0.82
# of Liquor Stores	0.07	0.03	0.04	1.72 ⁺
# of Corner Stores	0.36	0.08	0.28	5.42***
Categorical Variables	Percent	Percent	Difference	Difference of Proportions
# of People on the Segment at Night				
0 People	9.0%	34.8%	-25.8%	-5.89***
1-5 People	32.0%	52.2%	-20.2%	-3.86***
6-10 People	26.4%	8.4%	18.0%	4.48***
10+ People	32.6%	4.5%	28.1%	6.82***

Predominant Land Use of the Segment				
Residential	57.3%	39.9%	17.4%	3.28***
Commercial	8.4%	8.4%	0%	0.00
School	0.56%	0.56%	0%	0.00
Park/Cemetery	0.00%	0.56%	-0.56%	-1.00
Large Empty Space	0.00%	0.56%	-0.56	-1.00
Mixed	33.7%	50.0%	-16.3%	-3.12**
Binary Variables	Percent	Percent	Difference	Difference of Proportions
Proportion of segments Within Gang Territory	47.8%	23.6%	24.2%	4.77***
Proportion of Segments With Public Housing	16.9%	11.8%	5.1%	1.37
Proportion of Segments Within CCTV Viewshed	42.7%	25.3%	17.4%	3.47***
Proportion of Segments with Police or Fire Station Within 2 Blocks	20.8%	14.6%	6.2%	1.53
Proportion of Segments with a Freestanding Church	22.5%	24.7%	-2.2%	-0.49
Proportion of Segments with a Community Org or Nonprofit	5.1%	3.4%	1.7%	0.80
Proportion of Segments with an Apt Building with 4 or More Stories	31.5%	11.2%	20.3%	4.67***
Proportion of Segments with a Block or Tenant Association	17.4%	19.1%	-1.7%	-0.42

[†] $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Accessibility

Two accessibility variables were created for this analysis. The first was the number of access points to a segment. Some 75.8% of the cases and 80.9% of the controls contained five or more access points to the segment. The difference of means test indicated the difference of -0.64 between the cases and controls was statistically significant ($p < .001$).

The second accessibility measure was the number of bus and train stops within one block of the street segment. Just as a high number of access points to a segment may reduce detection and apprehension risk for potential offenders, a high number of public transportation stops on a street segment may facilitate offender access and escape. As Table 6.3 reveals, 20.2% (36 of 178) of the cases had no public transportation stop within one block while 21.9% (39 of 178) of the controls had no stops. Additionally, 23.6% (42 of 178) of the cases and 17.4% (31 of 178) of the controls had ten or more bus/train stops within one block of the segment. This suggests that a majority of the street segments selected for analysis were accessible by walking only a short distance. The difference of means test indicated the difference between the case and control means (1.45) was statistically significant at the 0.05 level.

Motivated Offenders

The presence of motivated offenders on case and control street segments was first, measured as the number of home addresses on the street segment of individuals arrested by the Newark Police Department in 2013. Of the approximately 13,000 arrestees with home addresses in Newark, 2,569 were located on the case segments while 481 were located on the control segments. Of the 178 cases and 178 controls, 80.4% (15 of 178) of the cases and 37.6% (67 of 178) of the controls had no home addresses of arrestees on the segment. The difference of means test indicated statistically significant differences between the mean number of addresses on the cases and controls (11.73) at the 0.001 level.

The second measure of motivated offenders was the presence of gang territory on the street segment. In 47.8% (85 of 178) of the cases and 23.6% (42 of 178) of the

controls were contained within a gang territory. The difference of means test indicated that there was a statistically significant difference (24.2%) between the two groups at the 0.001 level.

Suitable Targets

The first measure of suitable targets in this dissertation was operationalized as the number of public facilities within 2 blocks of the segment. In 61.8% of the cases (110 of 178) and controls (110 of 178) contained at least one public facility within 2 blocks. The maximum number of facilities within two blocks of the cases was seven for the case street segments and five for the control street segments. The difference of means test indicated there was no statistically significant difference between the mean number of public facilities on the cases or controls.

The second suitable target variable was measured as the number of people on the street segment during peak violence times. Since the majority of the data was collected at night, when there were a large number of individuals on the street, it was difficult to count the exact number of individuals on the street. For this reason, the variable was simplified into a categorical measure. For the cases, 32.6% (58 of 178) of the segments contained ten or more individuals out during peak violence hours. Alternatively, 52.2% (93 of 178) of the controls contained between one and five individuals present on the segment. For the 0 people on the street at night, the difference in proportions was -25.8%. The 1-5 people group experienced a difference of -20.2% while the 6-10 group had a difference of 18%. Finally, the 10+ people group had a difference of 28.1%. For each of the categories, the difference of proportions test indicated statistically significant differences between the cases and controls at the 0.001 level.

The final measure of suitable targets was at-risk businesses. Corner stores and take-out restaurants were the most popular at-risk business on the case segments with 64 and 38 places respectively. For the control segments, the most popular at-risk business were sit down restaurants with 16 restaurants with corner stores coming in second with 15 stores. For the difference of means test, there were statistically significant differences between the cases and controls for takeout restaurants (0.14) and corner stores (0.28) at the 0.001 level. Gas stations (0.06) contained statistically significant differences at the 0.05 level and liquor stores (0.04) were significantly different at the less restrictive 0.1 level.

Guardianship

Four guardianship measures were created for the case-control analysis. The first, physical disorder, was created during site visits. On the high violence segments, 225 abandoned residential structures were identified. Additionally, 181 structures with graffiti were found along with 162 vacant lots, and 134 closed commercial buildings. For the low/no violence segments, 162 structures with graffiti were identified, 89 vacant lots, 85 closed commercial buildings and 67 abandoned residential buildings. There were statistically significant differences between the cases and controls at the 0.001 level for vacant lots (0.41) and abandoned houses (0.88) and at the 0.05 level for closed commercial businesses (0.27). Statistically significant differences were not found between the cases and controls for the number of structures with graffiti.

The data for the second guardianship measure, the number of street lights on the segment, was obtained using Google Street View. Six street lights was the most common number of lights on the case segments and five street lights was the most common

number for the controls. The maximum number of street lights (25) was found on a case segment that contained a hospital, commercial stores, and restaurants. The difference of means for the cases and controls (1.17) was statistically significant at the 0.001 level.

The formal surveillance variable, whether the street segment fell into a NPD CCTV camera viewshed was measured as binary variable. Given that the city only has 149 cameras citywide, it is somewhat surprising that 42.7% (76 of 178) of the cases and 25.3% (45/178) of the controls have some portion of the segment within a NPD camera viewshed. The difference of proportions test indicated statistically significant differences between the cases and controls (17.4%) at the 0.001 level.

The final guardianship variable was the presence of a police or fire station within two blocks of the street segment. Seventeen fire stations were identified and five police stations. In 20.8% (37 of 178) of the cases and 14.6% (26 of 178) of the controls were within two blocks of a police or fire station. The difference of proportions test did not find statistically significant differences between the cases and controls.

Collective Efficacy

Three variables were created to measure collective efficacy at the street segment level. Thirty-eight block or tenant associations were identified in the city. Only 17.4% (31 of 178) of the cases and 19.1% (34 of 178) of the controls had an active block or tenant association on the segment. The difference of proportions test indicated no statistically significant difference between the cases and controls.

A second measure of collective efficacy, churches was measured in two ways. The first was a count of the number of churches. In 33.1% (59 of 178) of the cases and 28.7% (51 of 178) of the controls, there was at least one church present on the segment.

The difference of means test indicated no statistically significant differences in the mean number of churches on the cases or controls. The second measure looked at the presence of a freestanding church on the segment. In 22.5% (40 of 178) of the cases and 24.7% (44 of 178) of the controls contained a freestanding church. Similar to the number of churches, the difference of proportions test indicated no statistically significant differences between the cases and controls on the presence of a freestanding church.

The final collective efficacy measure, the presence of a nonprofit or community organization was measured as a binary variable. Only 5.1% (9 of 178) of the cases and 3.4% (6 of 178) of the controls contained a nonprofit or community organization. The difference of proportions test did not indicate a statistically significant difference between the cases and controls.

Additional Measures

Three additional measures were identified that could be salient factors that influence whether a street segment experiences high levels of violence or not. These variables were housing assistance, apartment buildings with four or more stories, and land use. Two variables were created to measure housing assistance. The first was a count variable and counts the number of addresses that receive Section 8 assistance vouchers on the street segment. The mean number of Section 8 addresses was 4.73 for the cases and 0.96 for the controls with a difference of 3.75. One outlier was discovered on a case segment contained 153 Section 8 addresses all located in one large apartment building. The difference in means test indicated a statistically significant difference between the cases and controls at the 0.001 level. The second public assistance variable was the presence of public housing on the street segment. Only 16.9% (30 of 178) of the

cases and 11.8% (21 of 178) of the controls contained public housing on the segment. The difference of proportions test did not find a statistically significant difference between the cases and controls

The second measure, apartment buildings with four or more stories provides a measure of density on the street segment. All of the public housing developments in the city, with the exception of senior developments contain three or fewer stories. In 31.5% (56 of 178) of the cases and 11.2% (20 of 178) of the controls contained at least one apartment building with four or more stories with a difference of 20.5%. The difference of proportions test found a statistically significant difference between the cases and controls at the 0.001 level

The final measure, land use, identified the main land use type on the segment. The majority of segments were residential with 57.3% (102 of 178) of the cases and 39.9% (71 of 178) of the controls. Three segments were identified as being predominantly schools, parks/cemeteries, or empty land use. When the regression analysis (see below) was conducted, since there was only one of each type, the variable was perfectly predicted and that case/control was dropped from the analysis. To remedy this, these three land use types were collapsed into the mixed use category since the land types could be used for multiple purposes. In 33.7% (61 of 178) of the cases and 50% (89 of 178) of the control segments were considered mixed use. Both the cases and controls contained 8.4% (15 of 178) commercial land use. Statistically significant differences were found for residential land use (17.4%) at the 0.001 level and for mixed land use (-16.3%) at the 0.01 level.

Correlations

Prior to executing linear regressions, analysts need to ensure that multicollinearity is not a problem for the models. Multicollinearity issues arise when multiple variables are correlated with one another. This presents a problem since the variables “effects on the response can be due to either true synergistic relationships among the variables or spurious correlations” (Graham, 2003, pg. 2809). In order to ensure that multicollinearity was not an issue for the model, the bivariate relationships among the control and independent variables was examined. The *correlate* function in Stata was used to test observed correlations between the variables. Since some of the variables measured similar concepts, it was expected that medium (0.3-0.5) and high (0.6-1.0) correlations might exist. Fortunately, the resulting correlation matrix suggested that none of the independent variables were highly correlated with the exception of street segment length and number of streetlights on a segment (0.56). This correlation was expected, and was not a cause for concern; streetlights were generally evenly-distributed along a street and longer streets tended to contain more street lights. The correlation coefficients summarizing the bi-variate relationships among the variables can be found in Appendix 1.

After the correlations were reviewed, the variables were then explicitly tested for collinearity problems. The *collin* command was used to identify the variance inflation factor (VIF) and tolerance levels for each variable. According to Allison (2012), VIFs over 2.5 and tolerances under 0.40 are cause for concern. For all tested variables, segment length was once again the only potentially problematic measure with a VIF of 2.59 and a tolerance of 0.39. However, cutoff points for VIF and tolerance metrics are

subjective; the values observed for segment length are barely beyond the acceptable levels suggested by Allison (2012). Collinearity tables can also be found in Appendix 1B.

Multivariate Analysis of Case and Control Segments

Multivariate binary regression models were used to analyze the independent impacts of key covariates on whether a street segment was persistently violent or not. Like other linear regression analyses, these binary models estimate the dependence of a dichotomous response variable on a set of regressor variables (Wermuth and Marchetti, 2012). Since the dependent variable was dichotomous (case=1, control=0) a binomial logit model was appropriate to estimate the probability that a particular event will occur given a unit change in a particular regressor while holding the other regressors constant (Long, 1997). Due to the clustering of cases and controls within certain tracts or neighborhoods, the *cluster* option was used to account for correlated standard errors within the tracts.

Similar to Weisburd et al. (2012), the parameter estimates (b), odds ratios, and the standardized measure of variable effect (Beta) were calculated for each model using the *logistic* and *listcoef, help* commands in Stata. The formula for the logistic response model is as follows:

$$Prob(y = 1 | x) = \Lambda(x\beta) = \frac{\exp(x\beta)}{1 + \exp(x\beta)}$$

The probability that the dependent variable equals 1 given the independent variables x equals the cumulative distribution function (exponential of a vector of values times a

vector of parameters divided by 1 plus the exponential of vector of values times a vector of parameters).

Results

Table 6.4 displays the results from the logit model.¹⁴ The R^2 of a model examines the “fit” of the model to the patterns in the dependent variable. A high R^2 means that the model does a good job explaining or predicting the dependent variable. The Pseudo R^2 in the model is 0.57.¹⁵ The current research’s R^2 is very similar to the R^2 in Weisburd et al. (2012), 0.60, although their multinomial logit model included categories representing all of their street segment trajectory groupings.

Three of the control variables in the model were found to be statistically significant. Local roads were statistically significant at the 0.01 level. Controlling for the other variables, the odds of a local road being a high street violence segment was 70% less likely when compared to an arterial road (reference category). The odds of a state highway ($p < 0.01$) being a high violence segment was 790% more likely when compared to an arterial road. For the street length variable, each additional foot in length of the street segment increased the odds of falling into the high violence group by 0.3% ($p < 0.001$), holding the other variables constant.

¹⁴ A second model was run with the number of churches replaced by freestanding churches but a statistically-significant result was not produced.

¹⁵ While what determines a good fitting model is subjective, a study by Weisburd and Piquero (2008) found that tests of criminological theories in the journal *Criminology* had a median R^2 of 0.36.

Table 6.4: Logistic Regression Results of Case-Control Analysis of High Violence and No/Low Violence Street Segments

Variables	b	Odds Ratio	Beta	Sig
Principal	0.311	0.733	0.110	0.501
Local Road	1.180	0.307	0.590	0.010**
Collector	0.339	0.713	0.118	0.607
State Highway	2.186	8.902	0.324	0.005**
Concentrated Disadvantage 1	0.102	0.903	0.102	0.657
Concentrated Disadvantage 2	0.096	0.908	0.096	0.612
Segment Length	0.003	1.003	0.001	0.000***
<i>Accessibility</i>				
Access Points	0.541	0.582	0.814	0.006**
Public Transportation	0.006	0.994	0.039	0.827
<i>Motivated Offenders</i>				
Arrestee Home Address	0.200	1.222	0.496	0.000***
Gang Territory	0.062	1.064	0.030	0.876
<i>Suitable Targets</i>				
Public Facilities	0.005	1.005	0.006	0.979
Bank	1.230	3.422	0.213	0.180
Gas Station	0.883	2.418	0.225	0.251
Check Cashing	0.553	0.575	0.077	0.575
Sit Down Restaurant	0.130	0.878	0.060	0.627
Takeout Restaurant	1.693	5.438	0.746	0.003**
Bar	1.416	4.121	0.328	0.028*
Liquor Store	1.361	3.901	0.299	0.087+
Corner Store	1.892	6.633	0.960	0.003**
Individuals Out at Night	1.004	2.730	1.020	0.000***
<i>Guardianship</i>				
CCTV Camera	0.729	2.072	0.346	0.041
Police and Fire	0.883	2.417	0.337	0.098+
Graffiti	0.338	0.714	0.522	0.062+
Vacant Lot	0.108	1.114	0.127	0.693
Abandoned House	0.322	1.380	0.508	0.143
Closed Commercial Building	0.340	1.405	0.391	0.029*
Street Light	0.034	0.967	0.104	0.563
<i>Collective Efficacy</i>				
Churches	0.259	1.296	0.174	0.354
Community Org and Nonprofit	0.757	0.469	0.152	0.536
Block Association	0.292	1.339	0.113	0.628
<i>Other Variables</i>				
Residential Use	0.103	0.902	0.051	0.838
Commercial Use	0.037	1.038	0.010	0.953
Tall Apt Building	0.834	2.303	0.342	0.154
Section 8 Addresses	0.149	1.160	1.337	0.170
Public Housing	0.261	1.298	0.092	0.595
_cons		0.097		0.034
Wald chi ²	195.66			
Prob > chi ²	0.000			
Log likelihood	-105.7148			
Pseudo R ²	0.5716			

* p<.1, * p<.05, ** p<.01, *** p<.001

Accessibility

For the accessibility variables, only the number of access points to a segment was statistically significant. Controlling for other variables, for every additional access point on a segment, the odds of being a high violence segment decreases by 42% ($p < 0.01$). While Weisburd et al. (2012) found a very strong relationship between bus stops and their chronic-crime pattern segments, this study did not find a statistically significant relationship which may be because street violence is more reliant on private vehicles than on buses or trains for transportation.

Motivated Offenders

Motivated offenders were measured in this research in two ways, as the number of arrestee home addresses on the segment and the presence of a gang territory on the segment. Gang territory was not found to be statistically significant; however, the home address variable was found to be statistically significant at the 0.001 level. Each additional arrestee home address on the segment increases the odds of the segment being high violence by 22%, holding the other variables constant.

Suitable Targets

The presence of suitable targets on the street segment was operationalized in three ways: public facilities, risky businesses, and individuals on the street at night. Public facilities were not found to be statistically significant. The risky businesses variable was disaggregated by type of business. Holding the other variables constant, takeout restaurants and corner stores were found to be statistically significant at the 0.01 level, bars at the 0.05 level, and liquor stores at the 0.1 level. These risky businesses are some

the strongest predictors of all the statistically significant variables. The lowest odds ratio in the group is for bars. Each additional bar on the segment increases the odds of the segment being high violence by more than 300%. The ratios are even higher for corner stores, takeout restaurants, and bars. Finally, controlling for the other variables, the number of individuals on the street during peak violence times was statistically significant at the 0.001 level. Since this was a categorical variable, a one unit increase in the grouping category increased the odds of it being a high violence segment by 173%.

Guardianship

For the guardianship variables, holding the other variables constant, CCTV cameras, the presence of a police or fire station within two blocks of the segment, graffiti, and closed commercial buildings were statistically significant. When a segment fell into a CCTV camera viewshed, the odds of being a high violence segment increased by 107% ($p < 0.05$). For police and fire stations, the presence of a station within two blocks of a segment increased the odds that the segment fell into the high violence group 140% ($p < 0.1$). While police or fire stations were supposed to represent protection and safety, in this case, they are associated with high violence segments. Each additional closed commercial building on a segment increased the odds of that segment being high violence by 41% ($p < 0.05$). The odds ratio regarding the number of structures with graffiti was surprising. Each additional structure with graffiti is associated with a 29% reduction in the odds of being a high violence segment ($p < 0.1$).

Additional Measures

None of the additional measures were found to be statistically significant.

Collective Efficacy

None of the collective efficacy variables were found to be statistically significant or even approach statistical significance at the $p < 0.1$ level which was similar to what was found in the difference of proportions and difference of means tests. This differs from what Weisburd et al. (2012) found through their use of active voters. A discussion of why this may be will be reviewed in the final chapter.

Count Regression Model

It is important to recognize here that the key dependent variable could also be expressed as count data: the total number of incidents on each segment across all years. As such, a negative binomial regression with standard errors clustered by tract was used to analyze the case-control research design. The results from the negative binomial model can be found in Appendix 2. In general, the two models presented congruent findings. However, there were a few variables that were statistically significant in the binary regression analysis that were not statistically significant in the count model. These were: local roads, highways, liquor stores, CCTV, and police and fire stations. Variables that were statically significant in the count model and not the binary model were as follows: public transportation and apartments with four or more stories ($p < 0.1$), and gas stations ($p < 0.05$). For the other statistically significant variables in the negative binomial model, the direction and size of the relationship between the variable and the number of violence incidents remained the generally same. What is more, the R^2 for the count model was 0.079 while the R^2 for the binary model was 0.57, indicating that the logit model better fit the data analyzed.

In the preliminary difference of means and proportions tests, all three of the newly statistically significant variables were found to have significant differences between the cases and controls. However, in the logistic regression analysis, when controlling for other variables, there were no statistically significant differences. While the presence of an apartment building four or more stories tall approached significance at the less restrictive $p < 0.1$ level, the number of public transportation stops on the segment and the number of gas stations did not. The incidence rate ratio was used to interpret the findings in the count regression model. For public transportation, holding the other variables constant, each additional bus stop increased the number of violent incidents on street segments by 1.8 percent (IRR= 1.018). Controlling for the other variables, each additional gas station increased the number of violent incidents on street segments by 75 percent (IRR= 1.749)¹⁶. Finally, comparing street segments with an apartment building four or more stories to a segment without a building with four or more stories, holding the other variables constant, segments with tall apartment buildings had almost 36 percent more violent incidents (IRR=1.355) .

¹⁶ Sixteen of the street segments contained a gas station, with one segment containing three gas stations. Four of the segments had 0 or 1 street violence incident during the time period with the remaining 12 segments containing between 9 and 29 incidents. These extremes are due to the street segments used in the negative binomial regression being the same as the segments used in the case-control analysis. Half the segments have 0 or 1 incident while the other half is the most violent segments in the city. The large impact of gas stations on street violence incidents is likely due to this reason. The same can be said for the large impact of apartments with four or more stories

Chapter 7 - Discussion and Implications

This dissertation research used a matched case control study design in a modest attempt to better understand the salient opportunity and social disorganization variables that influence the existence of chronically violent street segments in Newark, New Jersey. This final chapter will discuss the findings from the logistic regression used to analyze the data in the case-control research design, provide an overview of the limitations from this study, review the theoretical and policy implications based on these findings, and finally discuss how future research can be improved based upon the findings and insights gained from this dissertation.

Summary of Research Findings

Research questions 1 and 2 were necessary to frame the main analysis. Research question 1 was intended to determine whether street violence incidents in Newark were concentrated in specific neighborhoods and at specific street segments. Drawing on previous research on crime concentrations, it was hypothesized that there would be high levels of street violence concentrated at both the neighborhood and street segment level. The associated hypothesis was confirmed through basic descriptive analyses that revealed particular neighborhoods in Newark experienced high-levels of street violence. Further, all street violent crime incidents occurring between 2008 and 2013 occurred at a small portion of Newark's street segments, varying between 16.4% and 26.3% of all street segments each year.

The second research question aimed to confirm that these high violence street segments were stable over time. Prior research suggested that high violence street

segments would be stable year to year (see, e.g. Weisburd et al., 2012; Braga et al., 2010, 2011). Using GBTM analytical models, street segments were placed into three groups based on similar violent crime trajectories over time. The “high” violence group contained 4.5% of the street segments and between 19% and 25% of the street violence each year. This group also experienced the sharpest increase in the mean number of incidents during that time period. The findings from the trajectory analysis indicated that these “high violence” street segments identified as high violence were indeed chronically violent over the study time period. As such, the second hypothesis was affirmed by these findings.

Confirmation of the first two hypotheses allowed the main analysis to proceed. Research question 3 used a matched case-control design to explore the role of opportunity and collective efficacy measures to better understand why certain street segments were chronically violent when compared to demographically similar street segments with little to no violence. Nineteen variables were developed and used as measures of various opportunity and collective efficacy concepts. As will be discussed in detail below, many of the crime opportunity measures were found to be statistically significant predictors of whether a particular street segment was persistently violent, confirming the third hypothesis. However, the fourth hypothesis was rejected as none of the collective efficacy measures were found to be statistically significant predictors of chronic violence at street segments included in this study.

Control Variables

Though the analysis attempted to control for road type and segment length, the case-control analysis revealed statistically significant differences between the cases and

controls on these two variables. For road type, there were no statistically significant differences between the cases and controls in the difference of proportions test.

However, when controlling for other variables, a local road was associated with a 70% decrease in the odds of being high violence when compared to minor arterial roads (reference category) at the 0.01 level. According to the Federal Highway Administration (2013), minor arterial roads, in an urban context, “interconnect and augment the higher Arterial system, provide intra-community continuity and may carry local bus routes” (pg. 15). Local roads provide direct access to adjacent land, carry no through traffic, and generally are the remaining roads after all arterial and collector roadways have been identified. As such, local roads in Newark would contain residential streets which experience less through and pedestrian traffic than minor arterial roads. Additionally, since this study excludes incidents that occur indoors, violence on residential streets may be minimized. Arterial roads present more opportunities for violence through the increased presence of suitable targets such as at-risk businesses and individuals on the street. Similarly, state highways had statistically significant higher odds of being high violence than minor arterial roads when controlling for all other variables. The state highways in this study contained many commercial businesses and gas stations which present increased opportunities for violence.

As the trajectory analysis did not permit the use of segment length as an exposure variable, the matching process attempted to control for segment length by design. It was, however, difficult to find appropriate matches for the high violence segments since the highest violence segments also tended to be the longest. The difference of means test indicated a statistically significant difference in the mean segment length of the cases and

controls. This was confirmed during the regression analysis which found segment length to be statistically significant at the 0.001 level, holding all other variables constant. Each additional foot of segment length increased the odds of that segment being high violence by 3%. This finding was not surprising as longer street segments present more opportunities for violence. It is interesting to note that Weisburd et al. (2012) did not find segment length to be statistically significant in their analysis of chronic street segments compared to crime-free segments. Segment length was found to be statistically significant when the crime-free pattern was compared to the low-stable, low-decreasing, and high-decreasing patterns.

Accessibility

The two accessibility measures in this dissertation were the number of access points to a segment and the number of public transportation stops within one block of the segment. Controlling for the other variables, the number of access points was found statistically significant at the 0.01 level and each additional access point was associated with a 42% decrease in the odds of a street segment experiencing chronically high levels of violence. While this finding is contrary to most accessibility research, there is a reasonable explanation rooted in methodological decisions. During the case and control selection process, numerous consecutive zero and one incident street segments were joined to create longer matches for the cases. As such, street segments originally containing six access points now contained upwards of nine access points and this led to the finding that more access points result in less street violence. In this case, the number of access points is not a reliable measure of accessibility and this statistically significant finding should be taken with caution.

Secondly, Weisburd et al. (2012) found that each additional bus stop on a street segment almost doubled the odds of that street being in the chronic crime pattern contrasted to the crime-free pattern. In this study, the difference of means test indicated statistically significant differences between the cases and controls; however, when controlling for other variables, the number of public transportation stops was not found to be statistically significant. One reason for this could be that violent offenders are less likely to use public transportation as a mode of escape. Private vehicles are more reliable and allow for an easier getaway. Additionally, bus and train stops are ideal places to find suitable targets for property crimes such as purse snatches and other thefts due to the high concentration of individuals and frequent population turnover. An analysis of all crime or only property crime in Newark might have revealed a statistically significant public transportation finding.

Motivated Offenders

Motivated offenders were measured in two ways, the number of arrestee home addresses on a street segment and the presence of gang territory on the segment. Weisburd et al.'s (2012) measure of motivated offenders was high risk juveniles on the street segment which was found to be statistically significant at the 0.001 level; holding other variables constant, an additional truant juvenile on the street segment more than doubled the odds of that street segment being in the chronic pattern. In this dissertation research, each additional arrestee home address on the segment increased the odds that segment experienced persistently high levels of street violence by 22.2% ($p < 0.001$). While this study used a different measure than Weisburd et al. (2012), the increased

presence of likely offenders on street segments resulted in an elevated risk that the location would experience high levels of street violence over time.

Second, the presence of gang territory on the street segment was not found to be a statistically significant predictor of elevated violence in the multi-variate case-control analysis but was found to be statistically significant in the initial difference of proportions test. After reviewing the correlations and rerunning the multivariate analysis by adding one variable at a time, the variable measuring the number of arrestee home addresses appears to have the largest impact on the significance of the gang territory variable. This suggests that the impact of gang territory on persistent violence is mediated through the increased presence of arrested offenders at the place. These arrested individuals seem likely to be the gang members themselves. Papachristos et al. (2015) suggest most violent conflicts involving gang members are not rooted in turf issues; rather, gang-member-involved violence tends to involve personal and drug disputes. As such, gang territory above and beyond the number of criminally-active gang members at the place might not be highly influential in predicting violence at Newark street segments.

Suitable Targets

Suitable targets were measured in three ways: public facilities, at-risk or risky businesses, and individuals outside at night on the street segment. The public facilities variable was measured similar to Weisburd et al. (2012), and included the same type of public facilities; however, the distance buffer was changed from a quarter mile to two blocks since it was unlikely that the presence of a park within one quarter mile had an impact on a street segment. While public facilities are places where people congregate, parks, hospitals, community centers, and schools appeared not to be obvious facilitators

of violence. Other studies on residential crime found that the presence of stores, parks, schools, and other public facilities had no effect on crime levels (Waller and Ohikiro, 1978; Reppetto, 1974).

Eight measures of risky businesses were used in this dissertation. Statistically significant risky businesses such as take-out restaurants, bars, liquor, and corner stores were found to increase the odds a street segment was identified as high violence. Compared to the other businesses such as sit-down restaurants and banks, the statistically significant risky businesses stay open late and individuals often congregate outside of these locations which present many opportunities for violence. Additionally, three out of the four business types can sell alcohol which may further incite violence (Gruenwald, 2006; Roncek and Bell, 1981).

Finally, the number of individuals on the street segment during peak violence was found statistically significant at the 0.001 level when other variables were held constant. This was a continuous variable that was measured categorically since it was sometimes difficult to determine exactly how many individuals were on a segment once the number surpassed 10. For every one unit increase in the categories (0, 1-5, 6-10, 10+), there was a 170% increase in the odds a street segment was high violence. More individuals on the street represented increased opportunities for violence. When people congregate, especially young people, and they are not participating in any specific activity, research has shown that levels of deviance can increase (Hirschi, 1969).

Guardianship

Four guardianship measures were created for the case-control analysis: the number of street lights, presence of a CCTV camera viewshed, police and/or fire station

within two blocks, and four disorder variables. The number of streetlights present on the segment was statistically significant in the difference of means test but not during the case-control analysis. On average, there was about a one streetlight difference between the cases and controls. Streetlights are generally equally spaced along a street segment and vary according to street type so it is not surprising that there are not statistically significant differences when controlling for other variables. However, Weisburd et al. (2012) found a statistically significant relationship between the presence of streetlights and the likelihood that a street segment would be in a chronic crime trajectory. As such, an argument could be made that street lighting was increased in areas with existing crime problems in an attempt to increase guardianship. The same argument could be made for the presence of a CCTV camera viewshed which was statistically significant at the 0.05 level. A segment that fell within a camera viewshed had an increased odds of being high violence by 107%. Despite this finding, cameras were strategically placed in problematic areas therefore it would be difficult to argue that the cameras contributed to the violence.

Police and fire stations within a distance of the segment was another measure that was utilized by Weisburd et al. (2012). Their research used a quarter mile inclusion area while this research used a two block inclusion area. The measure was found to be statistically significant in both studies. In the current research, the presence of a police or fire station was associated with a 142% increase in the odds that the street segment was high violence. This, however, is somewhat misleading since police and especially fire stations are strategically placed throughout the city. The police stations, most of which are over half a century old, likely predate some of the violent crime concentrations found in the city. Due to these issues, this finding should be taken with caution.

Finally, disorder was measured as the number of vacant lots, abandoned homes, closed commercial buildings, and structures with graffiti. Closed commercial buildings were associated with a 41% increase in the odds of a street segment being high violence. Abandoned properties decrease the number of individuals present to act as guardians or place managers and additionally these empty spaces can be used to facilitate crime (Spelman, 1993). Alternatively, each additional structure with graffiti was found to be associated with a 29% reduction in the odds a segment was high violence. This finding is contrary to what was expected. One possible explanation was that graffiti was found on some street segments with very little land use. These could be closed housing developments or areas next to freeways. These street segments were not necessarily ideal for the case-control study but as mentioned previously, it was very challenge to find street segments of an adequate length for inclusion in the study.

Other Variables

Three other measures were created that did not easily fit into one of the opportunity or collective efficacy categories. As identified earlier in this dissertation, these measures were land use, apartment buildings with four or more stories, and public assistance. Land use, the presence of public housing, the number of Section 8 addresses on the segment, and the presence of an apartment building with four or more stories were not found to be statistically significant. Controlling for concentrated disadvantage and clustering by tract likely removed any effect public or Section 8 housing had on the level of violence. Weisburd et al. (2012) also did not find land use to be statistically significant.

Collective Efficacy

None of the collective efficacy measures were found to be statistically significant or even approach statistical significance at less restrictive levels. In contrast to Weisburd et al.'s (2012) use of active voters on the street segment, this research considered suggestions made by Braga and Clarke (2014) and used block and tenant associations as a key measure of collective efficacy on the street segment. Further, collective efficacy measures based on the presence of churches, nonprofit, and community-based organization were also investigated in this analysis.

Sampson (2012) found that the density of churches was negatively related to collective efficacy. In this research, the analysis revealed the number of churches or the presence of a freestanding church has no discernible impact on street violence could be due to a variety of factors. Newark is home to hundreds of churches and, as such, it would be very difficult to determine the number of socially active churches and the number of parishioners belonging to a church. As suggested by Sampson (2012), one reason why churches may not have been statistically significant possible could be that many parishioners may not live near the church and therefore may not be active in the community immediately surrounding the church.

Community and nonprofit organizations were also not found to exert a statistically significant influence on street violence. It is possible that these kinds of organizations do not exert much control over local dynamics at street segments by virtue of the specific activities they engage or their orientation towards community change. For instance, a local nonprofit focused on improving schools could work to enhance

educational opportunities in the larger neighborhood and invest little effort in controlling groups of young people loitering on adjacent street corners during evening hours.

The presence of block and tenant associations were identified as the third measure of collective efficacy on case and control street segments. This variable was collected during meetings with Community Service Officers from the Newark Police Department as well as Precinct Captains. One limitation of collecting the data in this way was that associations not active with the police could be missing from the analysis. Given very limited resources, it was beyond the scope of this research, however, to create an accurate list of active block associations with mapped street boundaries since no one in the city documents that information. Moreover, collecting data on associations with an active relationship with the police department was considered an appropriate measure of these community groups directly focused on crime prevention issues. It is important to note here that one reason why these associations did not impact violence levels in this study could be driven by inconsistent commitments to crime prevention work by the included associations. These associations might start with high levels of commitment from residents that subsequently fade over time. Additionally, it was mentioned during conversations with Community Service Officers that these block associations are generally only concerned with quality of life issues such as parking and trash and that the meetings are only used to vent frustrations rather than foster strong community relationships. One final issue relating to the associations was that there were a few neighborhood associations identified during the research process that were not used because they did not operate within a small enough geographical area. This would be one

example of how collective efficacy might be better operationalized at the neighborhood level rather than the street segment level.

While attempts were made to create measures that were as accurate as possible and approximate the ideas of collective efficacy, the study measures were not perfect. There are certainly other ways to measure collective efficacy, with the most popular (and perhaps most accurate) being through surveys or interviews with residents. Furthermore, as argued by Braga and Clarke (2014), collective efficacy might be better measured at the neighborhood level while at the street segment level, guardianship is a better measure of informal social control. This will be discussed in additional detail in the theoretical implications section.

Limitations

Like any social science inquiry, this study has some clear limitations. Although the matched case-control design with 178 matches provided sufficient statistical power, a larger study would have been ideal. As described earlier, limited resources circumscribed the number of site visits at street segments. Nevertheless, a larger N may have better positioned the current study to detect more subtle differences between case and control street segments. Moreover, while the analysis attempted to adjust for segment length and to select all control matches from within the same census tract as the case segments, it proved to be more difficult than anticipated. The concentrations of lengthy, high violence segments in certain areas made such adjustments difficult. Combining no/low violence segments into longer segments and selecting from other similar tracts helped to mitigate the issue.

Since this study only included violent incidents that occurred outdoors, this research does not sharpen our understanding of how crime opportunity structures might impact indoor violence. While it is unclear whether opportunity structures impact domestic violence incidents that take place indoors, place characteristics and dynamics seem likely to influence indoor, non-domestic violence such as commercial robberies. Unfortunately, it was difficult to distinguish between indoor non-domestic violent crimes. The domestic violence indicator that was present in some years of data was not available in all years and even then its reliability and validity was questionable.

While the variables used in this analysis attempted to address limitations in measures used by Weisburd et al. (2012), additional variables could have been created to operationalize collective efficacy, if more resources were available. Surveys or interviews would have been an important addition to the quantitative data that were used in the analysis. These more traditional data could more accurately represent key collective efficacy concepts as measured at the neighborhood level.

Despite these limitations, his study makes some important contributions to crime and place research. The use of a matched case-control study based on the findings from a trajectory analysis is a novel way to better understand the differences between high violence segments compared to no/low violence segments. This dissertation also advanced the use of trajectory analysis to identify groupings of street segments with like trajectories over time for further data collection and analysis. As such, this research went further than many descriptive studies by identifying potential causes for observed differences between two of distinct kinds of street segment groupings.

Theoretical Implications

Collective efficacy, as described earlier in this dissertation, can be thought of as an informal social control mechanism that relies on social cohesion among neighbors to mediate crime and disorder in a neighborhood (Sampson et al., 1997). A neighbor's willingness to intervene when necessary is strongest when neighbors know one another and when residents feel a sense of ownership in an area. It is unrealistic to expect the police to prevent every crime and, given budgetary constraints on departments, it is increasingly important for residents to be active in their community as way to foster safe public spaces. Activities such as approaching strangers in the neighborhood or monitoring children playing outside can modify behaviors that lead to criminal activity.

The current dissertation research investigated whether existing sources of official data could be used to measure collective efficacy at the street segment level. Unfortunately, the analysis did not find any statistically-significant associations between the presence of block/tenant associations, churches, and community/nonprofit organizations on the persistence of street violence at street segments over time. This finding differed from Weisburd et al. (2012) who found that their measure of collective efficacy at the street segment level (active voters) was a statistically significant predictor of crime. The current research attempted to more accurately approximate the neighborhood collective efficacy measure by identifying ways in which the street segment could operate as a micro-community. Despite this attempt to use alternative measures that might be better positioned to capture local dynamics, the lack of statistically-significant findings raises questions about the viability of collective efficacy as a relevant place-level crime prevention mechanism.

The findings from this study indicate that the proper domain for collective efficacy might be at the larger neighborhood or community level. Collective efficacy is consistently articulated as an ability to mobilize social networks in a neighborhood to exert control over a variety of social outcomes in these larger areas (Sampson, 2012). Therefore, it is questionable whether actions linked to the existent of social connections than span neighborhoods can accurately be measured at the street segment level. Nevertheless, neighborhood concepts of collective efficacy still have implications for crime prevention policy and practice in small places such as street segments. Sampson states that:

“Razing a drug house or closing a rowdy bar is a complex act, for example, that is about much more than the place itself. It matters what neighborhood the house or bar is in – what “kinds of people” reside there, what zoning laws are, how vocal the residents are, and how the decision makers view the area” (2013, pg. 7)

In essence, effective change at place requires support from the local community, local nonprofits and the local government and this level of support cannot easily be measured at the street segment level.

Based on the findings from the current research, it appears that measuring informal social control in very small places such as street segments may be best measured through opportunity theory and different conceptions of guardianship. Guardians have been identified as those whose presence discourages crime (Felson, 2008). Drawing on routine activity theory (Cohen and Felson, 1979) and the popular problem analysis triangle (Clarke and Eck, 2007), targets or victims have guardians, offenders have handlers and places have managers to enact informal social control in an effort to prevent crime.

For the guardianship role, authority figures invested in highly-localized social contexts are more likely to intervene and exert social control in response to deviance than peers or passersby (Osgood, Wilson, O'Malley, Bachman, and Johnston, 1996). In fact, Felson (1995) explained that the capable guardian may be the most important actor for explaining variations in crime since their presence or absence influences criminal acts in specific places. Examples of guardians are: homeowners, family, teachers, and store employees. Guardianship at the place level can be measured in a number of ways. In this dissertation, guardianship was measured through physical disorder, street lights, formal surveillance, and police/fire stations. Additional guardianship measures could be the presence of Business Improvement Districts and the presence of residential or business security cameras. A research design similar to PHDCN at the street segment level could also provide an abundance of guardianship measures through systematic social observations and interviews with residents.

Policy Implications

The findings of this dissertation make several important contributions to crime prevention policy. The use of trajectory analysis to identify persistently violent street segments is an innovative approach to identify “hot spots” of violence. Traditionally, hot spot analysis conducted by police departments and cities are focused on shorter periods of time such as the specific Comstat period, year to date, and the past year. Police departments should partner with researchers to use more sophisticated statistical models and methods to identify areas with persistent crime problems. As suggested by this research study and other scholars (e.g. Braga et al. 2010; Weisburd et al. 2012; Sherman et al., 1989), limited crime prevention resources should be directed towards the

smaller number of specific hot spot locations that persistently generate a disproportionate amount of crime in cities. The remainder of this section makes policy recommendations that can be implemented at the street segment level to modify crime opportunity structures.

By identifying specific opportunities for crime such as abandoned buildings, corner stores, and people on the street at night, the findings from this research indicate that place-specific crime prevention programs designed to change criminal opportunity structures at places could be used to reduce violence levels. The crime control efforts of local police departments can be guided by engaging the problem-oriented policing (POP) approach. POP challenges the “police to be proactive in identifying underlying problems that could be targeted to alleviate crime and disorder at their roots” (Weisburd, Telep, Hinkle, and Eck, 2010, pg. 140). POP involves scanning to identify problems, analysis to analyze the problem which aids in the development of appropriate interventions, response which involves the implementation of the intervention, and assessment which is evaluating the impact of the response.

A second approach that can be used not only by police departments but also by local government or community groups is situational crime prevention. As discussed in the literature review on crime and place, situational crime prevention involves opportunity-reducing measures focused on specific crime types, and involves changing the environment to make crime more risky or less rewarding (Clarke, 1997). Situational crime prevention complements POP by encouraging deeper analysis of specific crime problems and, through its twenty-five techniques, providing guidance on specific interventions that could be used to prevent various crime problems. Previous studies of

micro places utilizing situational crime prevention and POP strategies have found reductions in the targeted crime and disorder events (Eck, 2002; Poyner, 1981; Weisburd, 1997). As such, POP and situational crime prevention approaches, if implemented properly, would be effective at reducing violence by developing specific responses to various crime opportunities.

The use of POP and situational crime prevention in police departments and cities across the world is very evident on the Center for Problem-Oriented Policing website. Seventy-two guides have been developed using the POP approach for various problems. Guides relevant for the findings from the current research analyze issues such as assaults in and around bars, disorderly youth in public places, and abandoned buildings and lots. Many of the interventions utilizing situational crime prevention techniques focus on street lighting (Painter, 1994, 1996; Pease, 1999) or CCTV (Farrington, Gill, Waples, and Argomaniz, 2007; Phillips, 1999). A few examples of interventions relevant to the current findings are mentioned below.

One randomized controlled study in Jersey City, NJ found reductions in crime and disorder at violent places as a result of a POP program that was implemented by the police department (Braga, Weisburd, Waring, Mazerolle, Spelman, and Gajewski, 1999). More generally, a systematic review of the effectiveness of POP in reducing crime and disorder found that POP had a statistically significant impact on crime and disorder (Weisburd, Telep, Hinkle, and Eck, 2010). Though the use of POP techniques on the specific opportunity measures in the current research is limited, previous research utilizing POP shows much promise for the application of POP to specific crime places.

Given the finding that bars, take-out restaurants, and liquor and corner stores on a street segment increase the likelihood that a street segment is chronically violent; interventions at risky facilities can have a positive impact on the level of violence on the immediately surrounding area. A recent POP guide aimed at better understanding and analyzing problems at risky facilities provides some commonsense advice (Clarke and Eck 2007). Some of the recommendations from this guide involve local sanctions, certification programs for security, voluntary codes of practice, and performance standards. The results from various interventions aimed at alcohol consumption at bars or other establishments with liquor licenses have been mixed (Graham, 2000). However, multifaceted interventions that involve the facility itself, local government, and community mobilization have experienced positive results on violence stemming from bars (Homel et al., 1994; Wallin, Norström, and Andréasson, 2003). A proposed local ordinance in Newark, NJ that required security guards at certain take-out and sit-down restaurants after a certain time aimed to increase place managers in an effort to reduce crime (Giambusso, 2012).

Evaluations of interventions focused on reducing crime in and around abandoned buildings are limited. Existing research on abandoned buildings does little more than confirm that abandoned buildings facilitate criminal activity (Accordino and Johnson, 2000; Spelman, 1993). A POP guide on abandoned buildings and vacant lots (Shane, 2012) suggested 30 responses such as: physically securing the properties, enforcing building codes, acquiring properties by the government, razing buildings, and holding property owners criminally liable for conduct on their property. Cities with serious

abandoned property problems should take these recommendations into account and should measure the effectiveness of the responses they implement.

The findings from this research also indicate that concentrations of people, either through concentrations of individuals on the street at night or concentrations of arrestee home addresses impact levels of street violence. In these cases, more effective guardianship is necessary to disrupt the interaction between a suitable target and a motivated offender. Empirical tests of how to increase human guardianship are extremely limited (Hollis-Peel, Reynald, Bavel, Elffers, and Welsh, 2012). Increases in human guardianship in these cases could involve supervision of peer groups by adults and increased police patrols in areas with a high number of arrestee addresses or in areas where people are known to congregate. Since effective increases in human guardianship are difficult to produce, proxies are necessary. Some general policy recommendations could involve enforcing juvenile curfews, and ticketing and/or towing vehicles parked illegally in problematic places to discourage loitering. Other general recommendations (see Scott, 2011) include creating alternative legitimate places and activities for youth, modifying public places to discourage disorderly behavior, and establishing and enforcing rules of conduct.

Building upon the theoretical implications from this research, the current findings do provide direct guidance on broader community-based crime prevention efforts. However, these findings suggest that collective efficacy as a crime control mechanism might be most appropriately considered at the neighborhood level. It is important to recognize, however, neighborhoods with strong collective efficacy can better position the crime control activities of place managers and others dealing with crime opportunities on

street segments. Crime policy interventions at the neighborhood level should figure out how to mobilize social networks and social organizations to address the specific crime hot spots within their communities. Based on the community-level perspective, policymakers should pay increased attention to:

“integrating crime-targeted interventions (e.g., early-warning systems, ‘hot spot’ identification; reduction of social disorder; community prisoner re-entry) with more general ‘non-crime’ policies that address mediating processes of social organization (e.g., intergenerational closure, control-of-street-corner peer groups, organizational participation and mobilization, collective efficacy)” (Sampson, 2011, pg. 232).

Most micro-level policy recommendations are centered on what police and others at very small places can do to change the situational structure of places; however, it is also important to acknowledge that these efforts can be strengthened when these places are located in neighborhoods with high levels of collective efficacy.

Future Research

The current research has shown that opportunity factors play a large role in the levels of violence over time at street segments in Newark, NJ. The policy implications reveal that there may be relatively straightforward ways to reduce violence levels. Future research in this area should aim to expand on the current research in several ways.

First, though the findings from this research seem transferable to other cities, the results seem to have higher external validity for cities with higher levels of disadvantage such as Baltimore, Maryland, and Oakland, California. It may not be appropriate to generalize these findings to cities such as Seattle, Washington. Seattle is demographically and economically different than Newark. Similar studies should be

conducted in other cities to see if the findings are indeed transferable to other urban contexts.

Future research could also expand upon the current research by increasing the number of street segments and variables studied. The current research was limited due to financial constraints which impacted the number of site visits that could reasonably be conducted. If future studies were funded (this study was done without any external support), site visits could be conducted on many more street segments and provide more refined insight on the role a broader range of opportunity structures play in recurring violence. Studying more street segments might also allow for the use of hierarchical linear modeling which would allow for a better understanding of how neighborhood dynamics impact the specific places that comprise larger communities. Also, in a funded study, the ability to purchase additional information on businesses would aid in the creation of new measures such as the number of employees and total retail sales on a segment.

Additional research could build on the current study by conducting a qualitative study of the neighborhoods, street segments, and of specific locations on street segments. Local ethnographies or interviews similar to what was conducted by St. Jean (2008) in Chicago can supplement the quantitative data. The information collected would provide additional insight into the lifestyles of residents and/or potential offenders. These interviews could also aid in the development of other collective efficacy measures.

Finally, future research could expand on the dependent variable. New studies could make use of longer time series of data. Since this research commenced, two more years of crime data has become available which would allow for eight years of data.

New studies could also examine specific kinds of street violence or analyze indoor violence. As mentioned in the limitations section, including indoor violence may allow for a better understanding of crimes such as commercial robbery. Lastly, though Weisburd et al. (2012) analyzed all crime in their analysis, a separate study on property crime and opportunity may be warranted.

Conclusions

Over the past century, criminological research has placed an increased emphasis on the role of place and its relationship to crime. Crime and place research initially studied whole cities and gradually moved down to a smaller unit of analysis such as neighborhoods, census tracts, street segments, and addresses. Two criminological theories have dominated the study of crime and place: social disorganization and criminal opportunity. The current research has shown that studying street violence at micro places is warranted and has applied both theories in an attempt to understand why certain segments are more violent than others. Drawing on earlier research by Weisburd and colleagues and an article by Braga and Clarke (2014), this research utilized a variety of opportunity and collective efficacy measures in a matched case-control study aimed at better understanding their role in street violence.

The findings indicated that certain opportunity measures such as individuals on the street at night, arrestee home addresses, risky businesses, and disorder explained a large proportion of the differences between the cases and controls. While the collective efficacy measures were not found to impact the violence levels, it was likely due to collective efficacy not being measured in the proper domain. This dissertation has shown that violence prevention efforts do not need a citywide neighborhood oriented approach

to be successful. Making changes at the street segment level to reduce opportunities for violence should produce real reductions in the level of violence a city experiences.

Appendix 1: Correlations and Multicollinearity Diagnostics

1A: Principal-component factor analysis

Principal-component factor analysis of % black, % below poverty, % female headed household, % unemployed, % under 18, and % receiving public assistance

Principal-Component Factor Analysis Unrotated

Factor analysis/correlation		Number of obs	=	356
Method: principal-component factors		Retained factors	=	2
Rotation: (unrotated)		Number of params	=	11
Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	2.95809	1.83553	0.4930	0.4930
Factor2	1.12256	0.26063	0.1871	0.6801
Factor3	0.86192	0.34589	0.1437	0.8238
Factor4	0.51603	0.18862	0.0860	0.9098
Factor5	0.32741	0.11343	0.0546	0.9643
Factor6	0.21399	.	0.0357	1.0000
LR test: independent vs. saturated: $\chi^2(15) = 801.12$ Prob> $\chi^2 = 0.0000$				

Factor Loadings (Pattern Matrix) and Unique Variances

Variable	Factor1	Factor2	Uniqueness
Black	0.5365	0.6549	0.2832
Below Poverty	0.7157	-0.5474	0.1881
Female Headed	0.7821	0.0278	0.3876
Unemployed	0.5871	0.508	0.3973
Under 18	0.7196	0.0324	0.4812
Public Assistance	0.8270	-0.3663	0.1819

Principal-Component Factor Analysis Rotated

Factor analysis/correlation		Number of obs	=	356
Method: principal-component factors		Retained factors	=	2
Rotation: orthogonal varimax (Kaiser off)		Number of params	=	11
Factor	Variance	Difference	Proportion	Cumulative
Factor1	2.32169	0.56273	0.3869	0.3869
Factor2	1.75896	.	0.2932	0.6801
LR test: independent vs. saturated: $\chi^2(15) = 801.12$ Prob> $\chi^2 = 0.0000$				

Rotated Factor Loadings (Pattern Matrix) and Unique Variances

Variable	Factor1	Factor2	Uniqueness
Black	0.048	0.8452	0.2832
Below Poverty	0.9008	-0.021	0.1881
Female Headed	0.6157	0.483	0.3876
Unemployed	0.1754	0.7563	0.3973
Under 18	0.5625	0.4499	0.4812
Public Assistance	0.8841	0.1909	0.1819

Factor Rotation Matrix

	Factor1	Factor2
Factor1	0.8083	0.5888
Factor2	-0.5888	0.8083

1B: Correlations and Collinearity Diagnostics

Correlations for groupings of similar variables and for variables with medium and high correlation levels

Road Type:

	principal	collector	state hwy	Local
principal	1			
collector	-0.1672	1		
state hwy	-0.0627	-0.0613	1	
local	-0.4326	-0.4228	-0.1586	1

(arterial road is the reference category)

Disorder:

	graffiti	vacant lot	abandoned house	closed commercial
graffiti	1			
vacant lot	0.1881	1		
abandoned house	0.1693	0.3598	1	
closed commercial	0.3811	0.0492	-0.0367	1

Variables correlated with segment length:

	segment length	individuals on the street	arrestee addresses	abandoned houses	street lights
segment length	1				
individuals on the street	0.3327	1			
arrestee addresses	0.3587	0.3408	1		
abandoned houses	0.4075	0.2953	0.2545	1	
street lights	0.5613	0.2428	0.1945	0.239	1

Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R- Squared
ConcentratedDisadv1	1.27	1.13	0.7863	0.2137
ConcentratedDisadv2	1.35	1.16	0.7417	0.2583
Principal	2.02	1.42	0.494	0.506
Collector	1.79	1.34	0.5594	0.4406
statehighway	1.47	1.21	0.6811	0.3189
Localroad	2.49	1.58	0.4009	0.5991
Seglength	2.59	1.61	0.3865	0.6135
accesspoints	1.56	1.25	0.6396	0.3604
section8	1.23	1.11	0.8141	0.1859
Publichous	1.39	1.18	0.721	0.279
publictransportation	1.56	1.25	0.6411	0.3589
gangbinary	1.41	1.19	0.7112	0.2888
nightpplcode	1.61	1.27	0.6219	0.3781
cctvcamera	1.39	1.18	0.7211	0.2789
arresthomeaddall	1.79	1.34	0.5581	0.4419
Policefire	1.14	1.07	0.8753	0.1247
Numpubfac	1.3	1.14	0.7718	0.2282
Graffiti	1.53	1.24	0.6547	0.3453
Vacantlot	1.43	1.2	0.6982	0.3018
abandonedhouse	1.68	1.3	0.5936	0.4064
closedcommercial	1.41	1.19	0.7109	0.2891
Streetlight	2.05	1.43	0.4875	0.5125
Numchurch	2.41	1.55	0.4157	0.5843
freestandingchurch	2.36	1.54	0.4234	0.5766
residentialuse	1.86	1.37	0.5363	0.4637
commercialuse	1.52	1.23	0.6569	0.3431
communitynonprofit	1.13	1.06	0.8817	0.1183
Bank	1.18	1.08	0.8501	0.1499
Gasstation	1.34	1.16	0.7459	0.2541
checkcashing	1.14	1.07	0.876	0.124
sitdownrest	1.21	1.1	0.8292	0.1708
Takeoutrest	1.49	1.22	0.6732	0.3268
Bar	1.09	1.05	0.9138	0.0862
Liquorstore	1.19	1.09	0.8369	0.1631
cornerstore	1.41	1.19	0.7103	0.2897
aptw4stories	1.28	1.13	0.779	0.221
blockassociation	1.27	1.13	0.7874	0.2126
Mean	VIF		1.55	

	Eigenval	Index
1	11.2517	1
2	2.621	2.0719
3	1.5884	2.6615
4	1.4802	2.7571
5	1.4206	2.8143
6	1.3751	2.8605
7	1.2615	2.9865
8	1.1587	3.1162
9	1.1399	3.1418
10	1.0805	3.227
11	0.9938	3.3648
12	0.97	3.4058
13	0.9281	3.4818
14	0.8621	3.6126
15	0.8148	3.716
16	0.7562	3.8574
17	0.738	3.9046
18	0.6944	4.0254
19	0.6463	4.1724
20	0.6062	4.3084
21	0.57	4.4428
22	0.5235	4.6363
23	0.5197	4.653
24	0.4965	4.7607
25	0.4654	4.9169
26	0.4238	5.1524
27	0.3709	5.5081
28	0.3611	5.5821
29	0.3332	5.8109
30	0.3173	5.9552
31	0.2787	6.3537
32	0.2272	7.0378
33	0.1875	7.7467
34	0.1767	7.9797
35	0.1747	8.0248
36	0.1134	9.9607
37	0.0561	14.1607
38	0.0169	25.8313
Condition Number		25.8313

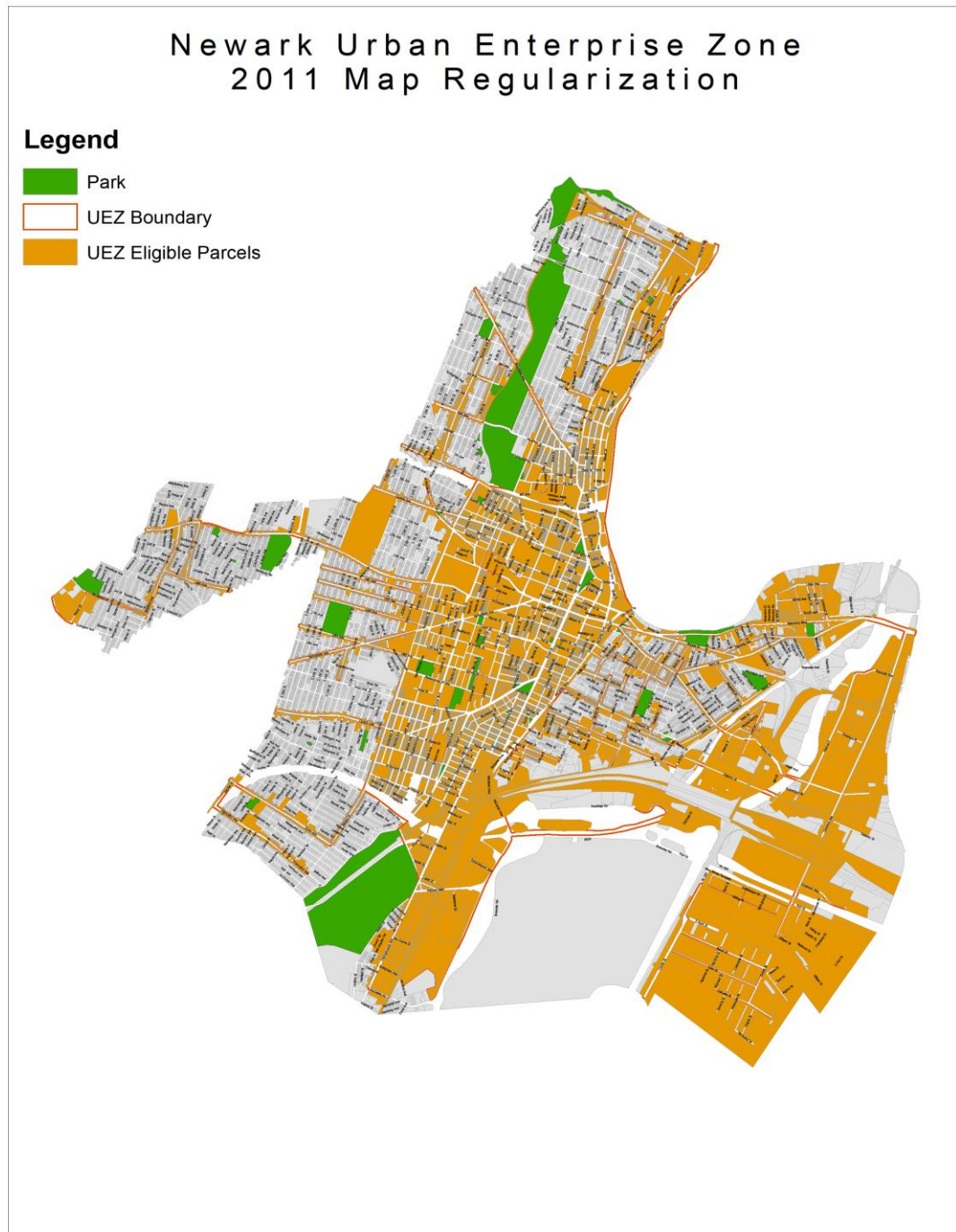
**Eigenvalues & Cond Index computed from scaled raw
sscp (w/ intercept) Det(correlation matrix) 0.0003**

Appendix 2: Count Model Using Negative Binomial Regression

Wald chi2(36)	=	703.84			
Dispersion	=	mean	Prob > chi2	=	0.0000
Log likelihood	=	-946.90117	Pseudo R2	=	0.0790
	IRR	Std. Err.	z	P> z	
Principal	.7747726	.2141274	-0.92	0.356	
Local Road	.8563246	.1530018	-0.87	0.385	
Collector	1.067146	.2422693	0.29	0.775	
Highway	1.776748	.8543987	1.20	0.232	
Concentrated Disadvantage 1	1.033259	.0818351	0.41	0.680	
Concentrated Disadvantage 2	1.104029	.0891361	1.23	0.220	
Segment Length	1.001026	.0003457	2.97	0.003**	
<i>Accessibility</i>					
Access Points	.8160794	.0446862	-3.71	0.000***	
Public Transportation	1.017647	.0092625	1.92	0.055+	
<i>Motivated Offenders</i>					
Arrestee Home Addresses	1.02878	.0055522	5.26	0.000***	
Gang Territory	1.021068	.1198935	0.18	0.859	
<i>Suitable Targets</i>					
Public Facilities	.9396027	.0445532	-1.31	0.189	
Bank	1.694201	.5587528	1.60	0.110	
Gas Station	1.749398	.4761287	2.05	0.040*	
Check Cashing	1.719327	.6805936	1.37	0.171	
Sit Down Restaurant	1.051134	.1143426	0.46	0.647	
Takeout Restaurant	1.461594	.1853023	2.99	0.003**	
Bar	1.775953	.4007653	2.55	0.011*	
Liquor Store	.9654715	.2615265	-0.13	0.897	
Corner Store	1.517769	.1479247	4.28	0.000***	
Individuals Out at Night	1.245293	.0778658	3.51	0.000***	
<i>Guardianship</i>					
CCTV Camera	1.037523	.1492755	0.26	0.798	
Police and Fire	1.209285	.1927307	1.19	0.233	
Graffiti	.8524652	.0317831	-4.28	0.000***	
Vacant Lot	1.04547	.0602905	0.77	0.441	
Abandoned House	1.046939	.0405598	1.18	0.236	
Closed Commercial	1.147793	.0577154	2.74	0.006**	
Street Light	.9732984	.0284033	-0.93	0.354	
<i>Collective Efficacy</i>					
Churches	1.077499	.0990706	0.81	0.417	
Community Org and Nonprofit	1.374442	.3696188	1.18	0.237	
Block Association	.8707191	.1790400	-0.67	0.501	
<i>Other Variables</i>					
Residential Use	1.000093	.1470248	0.00	0.999	
Commercial Use	1.102674	.2948646	0.37	0.715	
Tall Apt Building	1.354819	.2121870	1.94	0.053+	
Section 8	.9986901	.0029410	-0.45	0.656	
Public Housing	1.182336	.2059732	0.96	0.336	
_cons	3.65699	1.708120	2.78	0.006	
/lnalpha	-0.08678	.1022168			
alpha	0.916876	.0937201			

* p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendix 3: Map of Newark Urban Enterprise Zone



Source: www.newarkuez.org

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