

ABSTRACT

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LONGITUDINAL STUDY OF VIOLENCE
AND DISORDER AT PLACES

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This research examines the relationship between disorder and violence across geography, specifically whether disorder and violence are causally related. This issue has generated much debate in the field of criminology. The broken windows thesis argues that untended disorder will lead to crime while social disorganization theory suggests that these two phenomena are merely spuriously related. To examine the longitudinal relationship between disorder and violence, this dissertation used data from the city of Seattle, Washington and analyzed them with dynamic statistical tools. Group-based trajectory analysis was used to identify different patterns of disorder and violence. The findings reveal a moderate level of spatial association between disorder and violence. Moreover, the results show that lack of disorder may be a protective factor for places in preventing future crime. This particular finding provides a new insight for crime prevention strategy.

I further use Granger causality tests to examine the causal association between disorder and violence within selected violence and disorder hotspots. Findings from the Granger causality tests indicate that disorder does not lead to violence. As such the results suggest that public policy targeting disorder may not lead to crime reduction benefits. This particular finding challenges the notion of broken windows policing. Although broken windows policing might increase the chance to apprehend criminals due to the spatial clustering of social disorder and violence, the findings suggest that reducing levels of disorder will be unlikely to have strong impacts on crime rates. Additionally, potential collateral effects of police crackdowns on disorder need to be considered. Lastly, social disorder and physical disorder seem to relate to violence differently. Specifically, social disorder corresponds with violence more strongly than physical disorder. This issue has theoretical implications and should be explored further in future research.

CAUSAL OR MERELY CO-EXISTING: A LONGITUDINAL STUDY OF
VIOLENCE AND DISORDER AT PLACES

By

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Dedication

This dissertation is dedicated to Taiwan---- a beautiful country where I grew up and love deeply.

Acknowledgements

I have been very lucky and fortunate during my time in Maryland. I have made many good friends, have learned from great scholars, and have worked with wonderful people. I am also very lucky that whenever there is an obstacle, there is always someone giving me his/her hand to assist me to overcome the difficulty. I have had so much fun in Maryland...and that was why it took me almost seven years to get my degree!

There are many people who have provided me with their unfailing support during this long journey including my mentors, professors that I took classes from, colleagues, friends, and last but not the least, my family. Among all of these people, there are two individuals that I am deeply grateful---Professor David Weisburd and Professor Cynthia Lum.

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Table of Contents

DEDICATION	II
ACKNOWLEDGEMENTS	III
TABLE OF CONTENTS	V
LIST OF TABLES	VII
LIST OF FIGURES	VIII
CHAPTER 1: INTRODUCTION	1
CHAPTER 2: DISORDER AND CRIME	14
SOCIAL DISORGANIZATION THEORY	16
<i>Disorder and Crime Association</i>	21
ROUTINE ACTIVITIES THEORY	22
<i>Disorder and Crime Association</i>	23
THE INCIVILITY THESIS	24
<i>Social Disorder vs. Physical Disorder</i>	27
<i>Disorder and Crime Association</i>	30
POLICING DISORDER? WHAT DOES IT REALLY MEAN?	31
<i>Historical Development of Order Maintenance Policing</i>	31
CONCLUSIONS	36
CHAPTER 3: RESEARCH QUESTIONS	39
Problems of Past Literature in the Study of Crime and Disorder	39
The Current Study	42
Validate Theories with Empirical Data	45
CHAPTER 4: SITE SELECTION AND DATA COLLECTION	48
DATA SOURCE	48
UNIT OF ANALYSIS	52
IDENTIFYING VARIABLES	55
Violence	56
Disorder	56
CHAPTER 5: METHODOLOGY	59
DISORDER-VIOLENCE: HOW ARE THEY POSSIBLY RELATED?	60
STATIONARITY AND UNIT ROOTS	61
TWO-STAGE PROCEDURE	63
STAGE 1--EXAMINATION FOR ASSOCIATION	64
STAGE 2---EXAMINATION OF CAUSALITY	68
CHAPTER 6: DATA ANALYSES AND RESULTS I (TRAJECTORY ANALYSES)	73
DESCRIPTIVE STATISTICS	74
TRAJECTORY ANALYSES RESULTS	78
COMORBIDITY ANALYSES (JOINT TRAJECTORY ANALYSES)	88
GEOGRAPHIC DISTRIBUTIONS OF DIFFERENT TYPES OF TRAJECTORIES	94
SUMMING UP	99
CHAPTER 7: DATA ANALYSES AND RESULTS II (TIME SERIES ANALYSES)	101
TIME INTERVAL SELECTION	101

UNIT ROOT TESTS AND STATIONARITY	108
UNIT ROOT TESTS AND STATIONARITY	108
EXPLORING THE RELATIONSHIPS BETWEEN TIME SERIES	119
<i>The Causal Impacts between Disorder and Violence (in Levels)</i>	120
<i>The Causal Impacts between Disorder and Violence (in Differences)</i>	127
CHAPTER 8: DISCUSSIONS AND CONCLUSIONS	132
IMPLICATIONS FOR DISORDER-VIOLENCE RESEARCH	133
DISORDER AND VIOLENCE: CAUSAL OR CO-EXISTING	139
LIMITATIONS	150
FIXING BROKEN WINDOWS: THE SOCIAL MEANINGS OF BROKEN WINDOWS POLICING	153
CONCLUSIONS	155
APPENDIX A. LISTS OF DISORDER DESCRIPTIONS	157
APPENDIX B. OVERALL PROBABILITIES BETWEEN DISORDER AND VIOLENCE TRAJECTORY ASSIGNMENT	160
REFERENCE	161

List of Tables

	Page
Table 3-1	Summary of Disorder's Role and the Expected Relation to Crime in Each Theory 47
Table 4-1	Descriptive Statistics of Demographic Variables of Block Groups 49
Table 6-1	(a) Descriptive Statistics of Violence and Social Disorder Data from 1989-2004 77
	(b) Descriptive Statistics of Physical Disorder (Complaints and Illegal Dumping & Litter) from 1989-2004 77
Table 6-2	Violent Trajectory Summary Data and Trajectory Model Diagnostics 79
Table 6-3	Social Disorder Trajectory Summary Data and Trajectory Model Diagnostics 81
Table 6-4	Complaint Trajectory Summary Data and Trajectory Model Diagnostics 84
Table 6-5	Illegal Dumping & Litter Trajectory Summary Data and Trajectory Model Diagnostics 86
Table 6-6	Conditional Probabilities of the Violent Trajectory Assignment Given the Social Disorder Trajectory Assignment 90
Table 6-7	Conditional Probabilities of the Violent Trajectory Assignment Given the Illegal Dumping Trajectory Assignment 91
Table 6-8	Conditional Probabilities of the Violent Trajectory Assignment Given Complaint Trajectory Assignment 93
Table 7-1	<i>t</i> -tests for Selected Sample Bias Using 1990 and 2000 Census Information 107
Table 7-2	Summary of Test for Stationary 118
Table 7-3	Granger Causality Tests for Levels 124
Table 7-4	Granger Causality Tests for Differences 129

List of Figures

	Page
Figure 2-1 The Basic Systemic Model of Crime	19
Figure 3-1 All Possible Disorder-Violence Associations	42
Figure 4-1 Seattle Crime Trend (Including All Crimes)	51
Figure 4-2 Seattle Census Block Groups Boundaries	55
Figure 6-1 Longitudinal Trends of Violence and Disorder in Seattle 1989-2004	75
Figure 6-2 Violence Trajectory of Census Block Groups in Seattle	80
Figure 6-3 Trajectory of Social Disorder	82
Figure 6-4 Trajectory of Complaints	85
Figure 6-5 Trajectory of Illegal Dumping & Litter	87
Figure 6-6 Geographic Distributions of Different Trajectory Classifications	95
Figure 6-7 Geographic Correspondences between the Distributions of Violence and Disorders	98
Figure 7-1 Geographic Locations of the 15 Selected Block Groups	105
Figure 7-2 Violent and Disorders Time Series Plots	109

CHAPTER 1: INTRODUCTION

"A city isn't just a place to live, to shop, to go out and have kids play. It's a place that implicates how one derives one's ethics, how one develops a sense of justice, how one learns to talk with and learn from people who are unlike oneself, which is how a human being becomes human."

----*"The Civitas of Seeing" Richard Sennett (1989)*

Like what is described in Sennett's paragraph, a modern city is a setting that serves various functions for people, not just a place to live. Modern urban areas are usually characterized with differences, a "mosaic of segregated people" referred to by Robert Park (1928). In cities, different people possess different characteristics, follow different lifestyles yet live in the same areas. Each group is seeking to preserve their peculiar cultural forms and to sustain their unique conception of life (Park, 1928). In cities, different cultures naturally come into contact and the unfamiliarity of other value systems often creates uneasy feelings among people with different cultural backgrounds. Due to the unfamiliarity of other cultures, an increased level of diversity might be seen as a sign of disorder by mainstream society (Sennett, 1989). In cities, people interact with each other constantly and start to feel the need to draw boundaries between conventional and unconventional behaviors. The separation between civility and incivility is one example of this. These boundaries are important guides to people as they set the social norms for the approval/disapproval of various behaviors (see Durkheim's Moral Education, 1961). Consequently, it is fair to say that the specific concept of disorder is also a byproduct of the urbanization process.

Urbanization produced the concept of disorder, but the social meaning of disorder comes from wrestling between different social groups. Disorder is sometimes viewed as

a manifestation of a diverse society (see Sennett, 1989 and Skogan, 1990). Often times, disorder is considered a criminogenic phenomenon, which brings collateral effects to the society (specifically see Wilson and Kelling, 1982 for the classic work representing this perspective). These contrasting views demonstrate the fact that there is no single definition of disorder that everyone agrees with; disorder in one person's view might represent the norm of another person. In other words, there is no objective way to define disorder.

Additionally, the meaning of disorder, just like all other social norms, changes over time, along with the development of a city. In the view of the Chicago School researchers, a city is not merely an environmental setting but is rather an organism that grows, changes, and evolves over time (Wirth, 1962). The addition of different cultures and values in a city contributes to the evolution and redefinition of social norms, with disorder being one example. The new definitions of social norms are the result of competition and the transaction of different cultures and values. This process is critical as the social meaning of a behavior often determines how people react to the behavior. In other words, when a society defines certain behaviors as unwanted or deviant, people will start to view them as a menace or danger to society. But this process is not equally influenced by all groups in the society---the powerful groups often enjoy the privilege of determining the “*norms*” (Durkheim, 1961, 1951; Sennett, 1970). This ambiguity of the social norm is even more obvious when dealing with less severe social phenomena such as disorder.

Unlike crime, there is often no agreeable legal definition to classify disorder. Various occurrences and behaviors have been identified as disorder in past literature,

ranging from deteriorated buildings to teenagers hanging out on the street corner. Even the term “disorder” is not always used to describe these minor violations. Past research has referred to this phenomenon as “signs of crime” (Skogan and Maxfield, 1981), “early signs of danger” (Stinchcombe et al., 1980), “urban unease” (Wilson, 1968), “broken windows” (Wilson and Kelling, 1982), “soft crime” (Reiss, 1985; Weisburd et al., 1992), “public moral offenses” (Weisburd and Mazerolle, 2000), “cues to danger” (Warr, 1984), “incivilities” (Hunter, 1978; Taylor, 1995, 1999, 2001), and “disorder” (Skogan, 1990). Most scholars now settle on the term of either *disorder* or *incivility* (LaGrange et al., 1992; Taylor, 1999).

Under the big umbrella of disorder, there are two commonly used subcategories: physical disorder and social disorder¹ (Skogan, 1990; Hancock, 2001; Sampson and Raudenbush, 1999; Weisburd et al., 2006). Hancock (2001) suggested another, less general way, to label different kinds of disorder. Based on temporal features, Hancock (2001) classified disorder into two groups: the episodic type which occurs at no fixed time, such as public drinking, and the on-going conditions like abandoned buildings which are always there.

While disorder has been discussed and theorized prior to 1990 (see Wilson and Kelling, 1982), Skogan was the first to clearly articulate disorder and its impacts on neighborhoods (Skogan, 1990). In his book *Disorder and Decline*, Skogan points out that the concept of disorder is ambiguous and can represent a variety of meanings. Thus, he notes that it is important to differentiate between the friendly “active uses of the environment” (not disorder) and disorderly behavior which bothers the residents in a

¹ Social disorders are referred to behaviors involving strangers and considered threatening. Physical disorders are referred to as deterioration of urban landscape (see Sampson and Raudenbush, 1999, p. 604).

neighborhood, as the former may suggest a very well connected neighborhood while the latter may represent a disoriented neighborhood. Taylor (1999) proposed very specific operational definitions of social and physical disorder (incivilities). Social incivilities include behaviors such as public drinking, drunkenness, rowdy and unsupervised teens, sexual harassment, arguing and fighting, open prostitution, and public drug sales. Physical incivilities include things like abandoned buildings, graffiti, litter, vacant and trash-filled lots, unkempt yards and housing exteriors, abandoned cars and the conversion of houses and apartments to drug-selling locations.

In this dissertation, I use social disorder and physical disorder to characterize various behaviors that have been studied in the past disorder-relevant literature. In terms of defining social and physical disorder, I follow the operational definitions of Taylor (1999) and also refer to Skogan's (1990) and Sampson and Raudenbush's (1999) studies. I consider social disorder to represent a process that involves human behaviors while physical disorder mainly represents a state of the physical environment of a place.

Regardless of the origin and meaning of disorder, it is now viewed negatively by society. For example, a popular police strategy, broken windows policing, concentrates its attention at eliminating disorder to achieve crime reduction effects. This seemingly odd strategy suggests that the police focus their efforts on reducing disorder because it imposes greater danger to society by setting the stage for more severe crimes to occur.

Here I list three possible rationales that explain the use of this strategy.

Reason 1: Disorder is truly harmful to the society as it causes some unwanted consequences (usually crimes). Thus, society feels the need to restrict this kind of behavior.

Reason 2: Disorder is considered harmful as it tends to co-occur with other unpleasant outcomes. Thus, without knowing the real impact of disorder, society believes by controlling disorders/incivilities the unpleasant outcomes will also be reduced.

Reason 3: Disorder violates the moral standards of certain groups of the society. Thus, by setting social norms against certain behaviors, the society expresses its value system via the separation of the “conventional” groups from the “deviant” groups.

The aforementioned reasons are not completely exclusive to each other.

Nevertheless, it is clear that each rationale represents a different perspective and will lead to different social reactions to disorder.

In addition to the overwhelming interest of public policies targeting disorder, disorder has also been studied in various fields. For example, researchers from various fields such as criminology, economics, urban planning and political science focus on the role that disorder plays in society (e.g., Corman and Mocan, 2000, 2005; Giacomassi and Forde, 2000; Taylor, 1999; Wilson and Kelling, 1982; Brower, Unpublished Manuscript). This interest in disorder, however, is nothing new. For more than two decades, researchers have debated whether disorder represents social negativities or merely a manifestation of alternate culture (see Sennett, 1989; Sampson, 2004; Kelling and Coles, 1996; Wilson and Kelling, 1982). Some explored the concept of disorder by focusing on the topic of fear of crime. For example, James Q. Wilson (1975) pointed out that daily hassles (i.e., street people, panhandlers, rowdy youths, or ‘hey honey’ hassles, see Taylor, 1999 for more detailed descriptions) trouble urban residents as much as crime does, if not more. Garafalo and Laub (1978) also argued that the urban conditions and the characteristics of the modern society (disorder is one of them) are the main sources of the “fear” of residents, rather than the true fear of “crime.”

The most influential work studying disorder and its implications for public policy was the article entitled “*Broken Windows*” published by Wilson and Kelling in 1982. In this article, Wilson and Kelling claim that disorder has a causal impact on crime. Specifically, they imply that there is an objective reality of disorder across society that can lead to an increase of serious crimes. Because disorder is an underlying cause of crime, police should focus on disorder intervention/prevention to achieve greater crime reduction benefits as opposed to a focus on crime. Bratton and Kelling (2006) state that “[f]ixing broken windows...reduces fear; and it has an impact on serious crime” (p.2).

The apparent policy relevance of the broken windows thesis is appealing to practitioners and the general public. Police have embraced this idea seriously, with the quality-of-life policing (also known as broken windows policing) effort in New York City as the best-known example (see Kelling and Sousa, 2001 and Bratton and Kelling, 2006).

Despite the popularity of the broken windows thesis in the policy arena, variations in the research on the relationship between crime and disorder may not necessarily support such a blanket statement from a theoretical standpoint (Sampson and Raudenbush, 1999, 2001; Harcourt, 2006; for opposing view see Xu et al., 2005; Kelling and Sousa, 2001). In addition, police acceptance of this causal link between disorder and crime without consulting empirical evidence risks an inefficient allocation of scarce police resources. Compared to other types of crime (e.g., violent crime or property crime), disorder is generally considered minor on the continuum of crime seriousness (see Wolfgang et al., 1985). Thus, it is not intuitive for police to concentrate their limited

resources on disorder given the immediate gravity of more serious crimes unless the evidence points out that the disorder-oriented treatment pays off.

Before answering questions about the effectiveness of broken windows policing, we first need to know whether there is any relationship, as well as the specific type of relationship, between crime and disorder in the first place. Just like the debate on the effectiveness of the broken windows (BW) policing, there are conflicting perspectives regarding this question. Sampson and Raudenbush (1999) argue that the connection between disorder and crime is spurious and mediated by other factors (also see Harcourt, 2001 and Harcourt and Ludwig, 2006). They argue that the unconfirmed, yet widespread, acceptance of the broken windows idea may lead to other unintended consequences such as human rights violations or disproportionate punishments (see Sampson and Raudenbush, 1999; 2001; Sampson, 2004; Harcourt, 1998). On the other side, practitioners are more concerned about practical implications. They endorse the validity of the broken windows thesis with their experiences obtained from working on the streets. The strongest advocates of the BW thesis, Bratton and Kelling, argue that the negative view of it is merely a critique from ivory-tower academics that have no idea about street life (see Bratton and Kelling, 2006).

The debate over whether the broken windows thesis represents the reality or simply a myth is still ongoing. With the intensive policy interest but weak empirical support, the relationship between disorder and crime has become one of the “hottest” yet unsolved issues in the field of criminology. The issue is unsolved due to three reasons. First, there are no quality longitudinal data available to examine the underlying mechanism between crime and disorder. Past studies mainly assess the relationship in a

short period of time or use cross-sectional data collected many years apart (see Sampson and Raudenbush, 1999 and Taylor, 1999; 2001). Thus, it is hard to examine whether the association between crime and disorder is causal without knowing their temporal relationship.

Second, the unit of analysis in past research has largely been at the macro level, such as cities (Skogan, 1990), neighborhood clusters (Sampson and Raudenbush, 1999, 2001), residential-units (Reisig and Cancino, 2004), or census tracts (Lum, 2003). The only exception is Taylor's (2001) study, which focused on block faces of streets in Baltimore.² The problem of using macro-level geographic units is that the findings might not be generalizable to smaller geographic units. Additionally, Groff et al. (2007) have found that there is a significant amount of variability in crime at the micro level that is often not observed at the macro geographic level. Thus, macro-level analysis may mask the dynamic relationships between disorder and crime (Weisburd et al., 1992; Groff et al., 2007).

Third, the use of inappropriate methodology hinders the field from making any firm conclusions on the relationship between crime and disorder. Past research studying this topic mainly relied on static analytical tools. The main drawback of using static methods is the inability in distinguishing a causal relationship from a spurious relationship. For example, regression models were often used on cross-sectional data without first examining the causal assumptions. This common practice led to a situation where, when studying phenomena like disorder and crime, the causal order has always been assumed rather than based on empirical results (see Kelling and Sousa, 2001 for an

² However, with only two data points measured 13-years apart, it is a relatively weak test of the causal link between disorder and crime.

example). In order to shed light on the current debate between disorder and crime, it is important to utilize a method that can capture dynamic patterns.

The goal of this study is to reveal the dynamic relationship between disorder and crime, particularly violent crime, in a longitudinal fashion.³ Past research on disorder and crime tends to find a very trivial and non-significant relationship between disorder and general crime, except for robbery.⁴ Specifically, violent crime seems to have a stronger association with disorder compared to general crime. In one of the key studies that found supportive evidence for the BW thesis, Kelling (one of the original authors of the BW thesis) and Sousa argued that violent crime would be the most anticipated outcome of an unattended disorder problem. Therefore, it is reasonable to conclude that using violent crime as opposed to general crime can enhance the power to detect the effects between disorder and crime. Another advantage of using violent crime as opposed to crime in general for the current study is because violent crime has less of a dark figure problem than property crime when official data is used as the source of information. Therefore, I will examine the long-term relationship between disorder and violent crime, instead of crime in general, in this dissertation.

In addition to the well documented association between disorder and violence, another reason of selecting violence rather than using general crime stems from the distinct nature between disorder and violence. Certain types of disorder (like graffiti and vandalism) are qualitatively similar to property crime in that both involve actions that

³ This research was supported by two grants from the National Institute of Justice. “The Criminal Careers of Places: A Longitudinal Study” (PI: David Weisburd. No. 2001-IJ-CX-0022) and “Explaining Developmental Crime Trajectories at Places: A Study of ‘Crime Waves’ and ‘Crime Drops’ at Micro Units of Geography” (PI: David Weisburd. No.2005-IJ-CX-0006).

⁴ In the past studies, robbery has always been found to correlate with disorder positively, regardless of how disorder was measured (Weisburd et al., 1992; Sampson and Raudenbush, 1999, 2001; Kelling and Sousa, 2001).

damage physical objects or the environment. Therefore, with property crime and disorder, it is hard to argue that one causes the other. Disorder and violence, however, occupy the two ends of the crime severity spectrum with disorder on the least severe end and violence on the most severe end. Thus, there is less overlap in terms of severity and nature of these two types of behaviors, which can avoid the tautological problem of using one behavior to predict itself.

One issue with researching this topic comes from the subjective nature of disorder. As mentioned earlier, disorder carries different social meanings to different groups of people. Some behaviors may be considered disorderly by one group, but are deemed appropriate/conventional to another group. Taking into account the subjective nature of disorder is even more crucial in place-based studies. Places, such as neighborhoods or street blocks, not only possess physical characteristics such as buildings and construction, but also foster different cultures (Wirth, 1962). When a place has a high level of heterogeneity, it is hard to identify a definition of disorder on which everyone agrees.⁵

This somewhat arbitrary nature of disorder makes the understanding of its role difficult. Criminologists in general believe that disorder represents social negativities such as the breakdown of social control or disorganization of the neighborhood. Past studies have explored the common covariates of disorder, such as fear (Garafalo and Laub, 1978; Taylor, 1995), neighborhood decline (Skogan, 1990), crime (Wilson and Kelling, 1982; Sampson and Raudenbush, 1999) and more disorder (Wilson and Kelling, 1982; Skogan, 1990). Nonetheless, there is also a positive view about disorder. Urbanist

⁵ There are still some behaviors that are considered disorder universally such as illegal dumping. However, it is important to note the arbitrary nature of the perception of disorder in the urban environments.

Richard Sennett (1970, 1989) argued that disorder actually represents diversities commonly found in urban life. An extensive exposure to disorder in urban life can help people from different groups familiarize with each other and further promote racial integration. With these different perspectives in mind, it is premature to conclude that disorder is purely harmful. Whether disorder brings both positive and negative impacts to the society or only leads to negative outcomes is an empirical question that requires extensive research efforts. The current study specifically focuses on disentangling the intertwined relationship between disorder and violence. Hopefully, the findings will enhance our understanding of how disorder is related to crime in urban life.

This research will provide a number of valuable contributions. First, the current study uses data collected by three different agencies in the city of Seattle, Washington from 1989-2004. The sixteen-year length of data will provide the best place-based data available. The multiple data sources further provide an advantage of being able to cross-validate information from different databases. Also, the longitudinal nature of the data makes it possible to study the temporal relationship between violent offending and disorderly behaviors. As such, this data will add to our understanding of the long-term relationship between disorder and violence at places.

Second, I use the census block group as my unit of analysis. The census block group is an appropriate geographic unit of analysis for this study as it is large enough to allow the formation of social control yet small enough to reveal the variations of crime across places. Furthermore, when defining census block group boundaries, population size is taken into account (see footnote 19 for more details). Therefore, variability of population density should not bias the outcomes. Third, I use dynamic research methods

such as Joint-Trajectory Analysis and Granger Causality tests to examine the co-morbidity of violence and disorder. Joint-Trajectory Analysis will help to illustrate the long-term development of these two phenomena simultaneously while Granger causality tests will explore the causal direction between violence and disorder.

This dissertation is divided into eight chapters. In Chapter two, I review the past literature that is relevant to a study of crime and disorder. This review covers the roles of disorder within the frameworks of traditional criminological theories as well as the expected relationship between disorder and violence from different theoretical standpoints. Chapter three outlines the research questions central to this study. This chapter reviews the important questions about the relationship between violence and disorder and discusses the reasons why these questions are still unsolved. Chapter four provides detailed descriptions of the site selection and data collection process. Summary statistics and detailed descriptions of the data are provided. Chapter five is the methodology section, which includes descriptions of methods used for the analyses. This chapter presents the justifications for using the selected methods to study the relationship between disorder and violence. Chapter six presents both descriptive statistics as well as results from trajectory analysis. Results from single trajectory analyses and joint trajectory analyses are both reported and the comorbidity between disorder and violence trends is discussed. The results of trajectory analyses are then used to map the spatial distributions of violence and disorder. Chapter seven covers the results of time series analyses. Fifteen census block groups were selected for time series analyses. After determining the stationarity of time series, Granger causality tests were used to examine the directions of causality between the violence series and disorder series. Chapter eight

discusses the implications of the findings for disorder-violence research, place-based theoretical approaches, and police practices.

CHAPTER 2: DISORDER AND CRIME

As discussed earlier, disorder represents social negativity to the general public. Concern about the relationship between disorder and crime is further deepened by the fact that disorder and crime often co-exist at places. In a study of drug hot spots in Jersey City, Weisburd and Mazerolle (2000) found that serious crime and disorder tend to cluster together in drug hot spots. With data collected at only one time point, however, they were unable to draw conclusions about the causal link between disorder and crime. This association has also been confirmed with crime data collected and used in Seattle, Washington in this dissertation. In 2004, for instance, the average number of violent crimes per high disorder block group (20 or more disorder incidents per year) was 42 while the same number for low disorder block groups was only 6.18. Computing the ratio between the two figures, I found that the number of violent crimes in the high disorder block groups was 6.85 times higher than that of the low disorder block groups. Though these findings do not inform us of any specific causal direction between disorder and violence, they do provide us with a clear reason why disorder has been viewed as a precursor to crime.

To better understand the temporal association between disorder and crime, we need to first review what criminological theories state about these phenomena. Though both individuals and places have long been the foci of criminological research, the majority of criminological research focuses on individual criminal involvement (Kempf, 1993; Sampson, 1986a; Reiss, 1986; Weisburd et al., 1992). As a result, criminologists often assume that places play a relatively minor role in explaining crime compared to an

individual's criminal propensity (Clarke and Felson, 1993; Trasler, 1993; Weisburd et al., 2006). This orientation can also be observed in the recent development of criminological theories. For instance, two recently emerged theories that have stirred a lot of debate in criminology, Gottfredson and Hirschi's (1990) self-control theory and Sampson and Laub's age-graded theory of informal social control (1993; see also Laub and Sampson, 2003), both focus solely on individual differences (either propensity or life circumstances) which contribute to criminal offending. To address this over-reliance on individual-oriented research in criminology, Sherman (1995) argues that crimes are far more predictable by places than by individuals; thus, he suggests that studying places is a more fruitful approach than studying individuals from a crime prevention standpoint. Fortunately, despite this overwhelming interest in person-centered criminology, there has always been some work that examined the differences in crime patterns across geographic areas (see Guerry, 1833; Quetelet, 1833 for the earliest examples). Social disorganization theory (SD), originally proposed by the Chicago School, is one of the long-standing traditions in criminology that focuses on the impact of the social environment on individual criminal behavior. Routine activities theory (RA) is another example showing how the temporal-geographic convergence of offenders, targets and lack of capable guardians predicts the occurrence of crime (see Cohen and Felson, 1979). The broken windows thesis, though it does not mention space explicitly, has a strong place-based element within its conceptualization.

Person-centered theories, the dominant sector of the field of criminology, remain silent in the domain of the study of disorder. One of the few exceptions is self-control theory. Gottfredson and Hirschi (1990) argue that people with low self-control are more

likely to commit both crime and analogous behaviors such as drinking, speeding, and other disorderly acts. As such, disorderly behaviors are considered crime-analogous behaviors that are said to be caused by the same underlying trait, low self-control, which leads to criminal offending. In contrast to its paucity in person-centered theories, the disorder and crime connection has garnered a good deal of attention in place-based criminology (or theory of crime-and-place as suggested by Eck and Weisburd, 1995). The focus of this line of research covers a wide range of topics: some examine the association between disorder and crime while others try to understand the impacts of disorder on communities.

In the following sections, I will review several theoretical perspectives of criminology of place and their development. Within each theory, the role of disorder and the mechanism by which it is related to crime will be discussed. At the end of this chapter, I will briefly review the historical importance of disorder for police enforcement. I will then discuss the potential consequences of aggressive policing targeting disorder.

SOCIAL DISORGANIZATION THEORY

Social disorganization theory is a classic example of a place-based criminological theory. Park and Burgess (1921), influenced by urban ecology, discovered that the distribution of crime in the urban area follows a zoning pattern that is similar to the way a natural ecosystem operates. Following the zoning framework proposed by Park and Burgess (1921), Shaw and McKay (1942) empirically tested social disorganization theory by studying patterns of delinquency in Chicago. After reviewing plots of the geographic distributions of delinquency, they concluded that the patterns of delinquency in the city

coincided with the distribution of economic development. Specifically, they found delinquency clustered within the “transition zone”—the area between the industrial center and the residential area. The transition zone also exhibited high levels of building deterioration, infant mortality, hygienic problems, an abundance of illegitimate opportunities and population heterogeneity (Shaw and McKay, 1942). Bursik (1988) described that the continuing process of population invasion and succession of the inner city resulted in disorganization; as a result, local communities failed to realize the shared values of the residents or to solve commonly experienced problems (pp.521). As such, these areas remained disorganized and crime-ridden and the area-specific value system (or subculture) was passed down from generation to generation, regardless of who lived there.

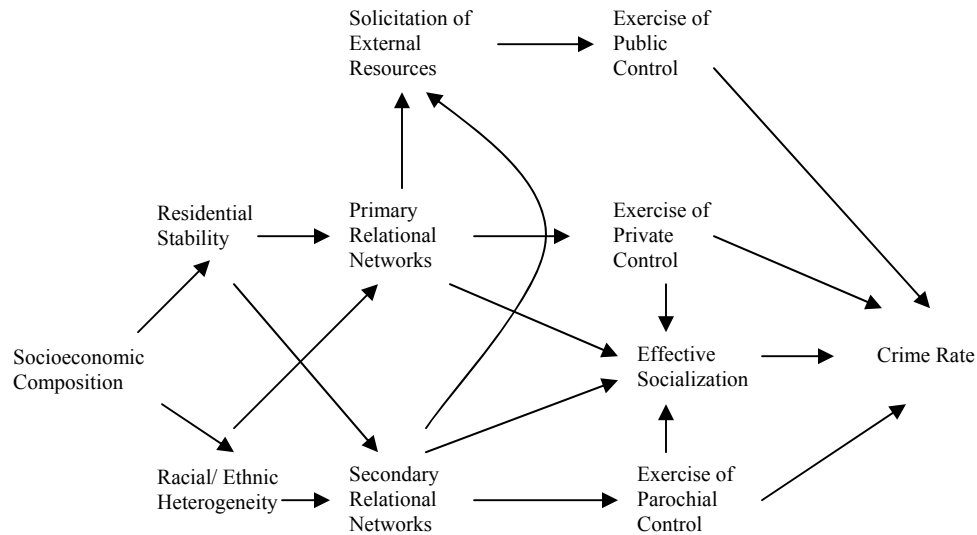
Social disorganization theory, with Shaw and McKay’s conceptualization, enjoyed great popularity for many decades. After the 1970s, however, it was seriously challenged and criticized in several ways. First of all, the ambiguity of the concepts and the underlying mechanism makes testing social disorganization theory extremely difficult. Delinquency and social disorganization were almost indistinguishable based on Shaw and McKay’s theorization; thus it is hard to say whether delinquency should be a result, or the source, of social disorganization (Bursik, 1988). Kornhauser (1978) recognized this problem and pointed out that Shaw and McKay failed to adequately separate the cultural and structural elements in their original theory. Among these two elements, Kornhauser argued that the control aspect of social disorganization theory should be the main emphasis of the theory’s effort to explain crime and other problems. According to Kornhauser, social bonds (or the interdependency among residents) are the

foundation of social control; it works as a “web” system with intertwined relationships that go throughout the community (Kornhauser, 1978, p. 45).

Second of all, Bursik and Webb questioned the notion that crime stays relatively stable. With an additional 20 years of crime data collected in Chicago, Bursik and Webb (1982) found that the stability of crime was just a historical artifact that happened to be observed by Shaw and McKay. After WWII, changes in community characteristics began to affect changes in crime rates. Bursik and Webb (1982) further argue that the changes or instability of neighborhood characteristics, rather than the traits themselves, predict increases in the crime rate. In other words, a poor but stable neighborhood might have a lower crime rate compared to a richer but unstable neighborhood. Heitgerd and Bursik (1987) further noted that rapid changes in the income level, population heterogeneity and residential mobility in neighboring communities were related to changes in crime in a given community. Bursik (1988) later integrated his idea into the systemic model proposed by Hunter (1978). The systemic model includes different levels of social control, and in turn forms a complicated network in communities. The sources of control can come from family, school, and other public institutions (Bursik and Webb, 1982; Bursik and Grasmick, 1993). Together, the effects of the different levels of social control maintain order in communities. This particular concept regarding the importance of social networks inspired Bursik. He concludes that the effects of traditional social disorganization variables are mediated by the multiple levels of the social control system, which in turn affects crime (see Figure 1). Similar to the individual-based social control theory (Hirschi, 1969), Bursik and colleagues suggest that crime occurs because of weak control in communities. The inability of places to control

things that occur within their boundaries further affects the strength and quality of social control, and in turn, leads to an increase in crime and other problems-- just like the lack of social bonding for individuals.

Figure 2-1. The Basic Systemic Model of Crime



Source: Bursik and Grasmick (1993). Neighborhoods and Crime.

While Bursik emphasizes the importance of stability of neighborhoods, Sampson and his colleagues began to recognize the importance of a “good” community in relation to the crime problem (Sampson, 2002; 2004; Sampson and Groves, 1989; Sampson et al., 1997; Sampson and Raudenbush, 1999; 2001 to name a few). A community is not just a physically bounded area. Residents need to have a sense of belonging and connection, shared interests, shared memories and goals, and close inter-personal relationships for a place to be a community (Fowler, 1991; McMillan and Chavis, 1986; Baum, 1997; Yang, unpublished manuscript). Those features together form a trait that Sampson refers to as

“collective efficacy” which is analogous to the concept of self-efficacy to individuals. Having a high level of collective efficacy makes a neighborhood less prone to problems. Sampson argues that in a neighborhood with high collective efficacy (i.e., cohesive relationships and shared expectations) residents work together to solve problems and make the neighborhood a desirable place to live based on their expectations. Similar to Bursik and Grasmick (1993), Sampson and Groves (1989) also proposed an indirect effect between structural factors and neighborhood crime rates. Sampson and colleagues (1997) further define the mediator as residents’ mutual trust and willingness to intervene in neighborhood business, which is called collective efficacy. Sampson’s version of SD is different from Bursik’s idea in that the collective efficacy requires community residents to reach a consensus of norms and work together to realize common goals, which extends beyond the ideal of social control put forth by Bursik and Grasmick (1993).

Throughout the history of the development of social disorganization theory, disorder has usually been mentioned as a side point. In traditional SD, disorder was often considered a manifestation of social disorganization (Shaw and McKay, 1942; Shaw et al., 1929) Bursik, however, recognized the potential effect of disorder and used it as a proxy of the level of social control in his crime equation (Bursik and Grasmick, 1993). Others have followed this line of thinking and treated disorder as a proxy of low social-control (see Lum, Yang, and Weisburd, 2005 for an example). Sampson, among all the SD theorists, has paid the closest attention to testing the role of disorder. Using systematic social observations (SSO)⁶ and residential surveys, Sampson and colleagues

⁶ Sampson et al. (1997) first utilized the results from video taping in SD theory testing. SSO, however, had been used in studying other topics like the drug market environment (see Green, 1995).

found a moderate association between disorder and predatory crime (Sampson and Raudenbush, 1999). However, after controlling for neighborhood characteristics, the correlation between predatory crime and disorder vanished for all offenses except robbery. Thus, they concluded that “*public disorder and most predatory crimes share similar theoretical features and are consequently explained by the same constructs...the concentration of disadvantage and lowered collective efficacy*” (Sampson and Raudenbush, 1999, p. 637).

This particular study has advanced SD in many ways. For example, data were collected from multiple independent sources (SSO, resident interviews, census information and official crime data) and thus, were considered more reliable than other studies which relied on a single database. Sampson and colleagues also use a hierarchical modeling technique that allows researchers to test the elements of SD more thoroughly across different social segments. The biggest limitation of this study, as was acknowledged by Sampson and Raudenbush, is the use of cross-sectional data. Without long-term observations characterizing neighborhood changes, any conclusions drawn about the causal direction of the relationship between disorder and crime will be limited (Sampson and Raudenbush, 1999, p. 638).

Disorder and Crime Association

As mentioned earlier, disorder has not enjoyed a stand-alone status in traditional social disorganization theory. In contemporary social disorganization theory, both Bursik and Sampson treat disorder as a consequence of the lack of social control or as a product of structural variables. Thus, disorder is only related to crime through its associations with structural variables. That is, crime and disorder should be positively correlated but

the relationship is not *causal*. As such, we should expect that disorder and violence move in a similar rhythm for social disorganization theory to be correct.

ROUTINE ACTIVITIES THEORY

Routine activities theory (RA), originally proposed by Cohen and Felson (1979) shares some similarities with social disorganization theory. Both social disorganization theory and routine activities theory focus on crime patterns over geographic places. However, the latter often places greater emphasis on individual households, which is a smaller unit of analysis, in contrast to communities, which is a common unit of analysis for social disorganization research (though sometimes in routine activities theory the unit can be at a higher level of aggregation, see Cohen and Felson, 1979).

Similar to SD, RA clearly has a control element in its crime equation. RA suggests that with the temporal and spatial convergence of three elements--a motivated offender, a suitable target and the lack of a capable guardian-- a crime will naturally occur. The incorporation of guardianship in the theory clearly points out the importance of external control in the determination of whether a crime will occur. Cohen and Felson note that the concentration of this spatial-temporal convergence determines the patterns of crime at places. Places with an abundant influx of these three elements should have more crime occurrences than in places where those elements rarely come into contact.

This extremely parsimonious theory describes a phenomenon that occurs at the micro level (see Weisburd, et al., 1992; Weisburd and Braga, 2006), yet Cohen and Felson (1979) made no attempt to include individual differences in the theorization. The differences in offender's motivation levels and guardian's capability are not addressed in

the theory, or often treated as universal (Lum, 2003). As such, though many prior studies tested RA by surveying residents' lifestyles (Kennedy and Forde, 1990; Meithe et al., 1987), it is still a theory with a primary focus on crime places, rather than on individuals.

In terms of the implications of RA, Bursik and Grasmick (1993) believe that it is specifically formulated to explain property crime as one of the key elements concerning valuable targets. Others have argued that violent crime may also be adequately explained by the convergence of the three elements of RA (Groff, 2006).

Under the framework of RA, disorder can also be viewed as an outcome of the spatial-temporal convergence of actors, actions and the environment. For example, social disorder requires actors (motivated offenders) who behave in socially undesirable ways (actions), other people in the area who may be bothered by these actions (targets), and a lack of external control (guardianship) that is capable of stopping those behaviors. Thus, social disorder represents how different people's routine activities intersect. On the other hand, the existence of physical disorder can reinforce the routine activity patterns of an area. For instance, the presence of abandoned buildings may attract motivated offenders to an area.

Disorder and Crime Association

Under the framework of RA, it is possible that a place with a persistent occurrence of social disorder will create an easy convergence between offenders and victims and thus increase the crime rate. Or, it is also possible that a place with more physical disorder (like dilapidated buildings or abandoned lots) provides a shelter for drug use, prostitution, and other similar behaviors. In these cases, physical disorder indirectly increases the occurrence of crimes by providing a specific opportunity

structure, but physical disorder itself is not criminogenic. Based on the RA perspective, social disorder should be related to violence at a higher level than physical disorder.

The unique focus of RA can enrich disorder-related research as RA puts human activities back into the environmental context. Unfortunately, RA is currently underused to understand the disorder-crime association. There has been no formal attempt to incorporate disorder into RA's theoretical framework, regardless of the promise it can bring to the field (see Weisburd et al., 1992).

THE INCIVILITY THESIS

Another perspective that specifically focuses on disorder and its collateral consequences comes from studies of incivilities. This line of studies often focus on actions which involve minor violations of social norms or other behaviors that are not severe in nature (e.g., Skogan, 1990; Skogan and Maxfield, 1981; Taylor, 2001). Though there is a shared interest across these studies, the topics covered vary widely. The diversity among the studies is largely due to the ambiguous definition of disorder, which was discussed in the first chapter.

Skogan believes that incivilities will eventually result in neighborhood decline because they cause a range of psychological, social-psychological and behavioral outcomes in neighborhoods. Beginning with the appearance of incivilities, the decline of a neighborhood is a gradual process (Skogan, 1990: 65). First, signs of incivilities cause social withdrawal of residents from participating community activities. It also discourages people from cooperating with their neighbors. Second, the existence of incivilities weakens neighborhood morale. Residents become concerned about their

personal safety after a number of incidents happen in their neighborhood. As a result, residents lose trust in each other. Third, from a practical standpoint, incivilities undermine the housing market. It directly affects the willingness of people to invest in the area. Due to a lack of investment, the housing market is suppressed and neighborhood decline becomes an unavoidable outcome (Skogan, 1990: 65). To test his hypothesis, Skogan (1990) collected information from 40 neighborhoods in six different cities during 1977-1983.⁷ The simple association between disorder and robbery victimization in those neighborhoods was +.80. However, when other neighborhood factors were taken into account, the association dropped to +.54, though still fairly substantial. Based on these findings, Skogan concluded that with the small number of cases at hand, it is hard to tell “*whether they have either separate ‘causes’ or separate ‘effects’ at the area level*” (1990, 73).

The problem of Skogan’s study extends beyond the inability of making causal inferences. Among all six cities, Chicago was sampled in three different years and accounted for 18 out of total 40 neighborhoods. Thus, the trend Skogan observed was probably biased and largely driven by the Chicago observations. Additionally, Skogan combined the observations across three years into one database. This final database was then analyzed in a cross-sectional fashion despite the potential autocorrelation problem. The lack of quality data and use of a static method together undermines the plausibility of Skogan’s conclusions about the effects disorder has on crime and neighborhood decline, which by default is a dynamic process (also see Taylor, 1995; Harcourt, 2001 for more comprehensive critiques).

⁷ Skogan’s data come from originally five separate studies. To compose the final data, he aggregated and merged those five datasets into a master data to produce the neighborhood level data of disorder, crime rates and neighborhood characteristics (Skogan, 1990).

Among all the studies of disorder, Ralph Taylor was the first to use micro-places as the unit of analysis (Taylor, 1999). Taylor sampled 562 street block faces from 66 randomly selected neighborhoods in Baltimore, Maryland. The data were collected at two separate time points. The first wave was collected in 1982 when the research team conducted surveys to study citizens' perception of neighborhood disorder; in 1994, Taylor and colleagues followed up 30 of the originally sampled neighborhoods to see whether disorder observed in 1982 was related to the current crime rate. Without controlling for any covariates, crime was found to be correlated with incivilities significantly. However, after controlling for the neighborhood structures, disorder and crime were no longer significantly correlated, which is opposite of what the broken window thesis expects. Taylor also further explored the effects of different type of incivilities. Nonetheless, Taylor's study (1999) had a similar problem as Skogan's study. With data collected 13 years apart, it is extremely difficult to make any plausible causal arguments about the long-term disorder-crime association.

Another important advance in disorder related studies came from other theoretical perspectives concerning the origin of disorder. As mentioned earlier, traditional social disorganization theory sees disorder as a by-product of social disorganization. For example, Sampson and colleagues explicitly argue that disorder and crime share the same origin---social structural factors----and these effects are mediated by collective efficacy (Sampson and Raudenbush, 1999). Thus, disorder can be seen as an analogous behavior of crime (see Lum et al., 2005). In this case, the relationship between crime and disorder is spurious, rather than causal.

Conversely, Wilson and Kelling (1982) asserted that incivilities are the root cause of crime. They suggest that incivilities (or signs of disorder) lead to a sense of low social control perceived by those in the community, which triggers residents' fear. Fearful residents may further withdrawal from the community, and subsequently more serious types of crimes will occur. Therefore, targeting crime would not solve the fundamental problem, but focusing on disorder intervention will result in a greater crime prevention benefit (also see Kelling and Coles, 1996).

Like Bursik and Webb (1982), Skogan (1990) also points out that the instability of neighborhood traits would lead to problems. The disagreement between Skogan and Bursik is the extent of the impact that disorder has on the community. Bursik believes that instability of the neighborhood reduces the level of social control with an increase in crime rate as the final outcome. Similar to Bursik, Skogan also argues that disorder leads to crime, but also has a broader impact on other aspects of neighborhoods; the ultimate consequence of disorder is the decline of neighborhoods.

Social Disorder vs. Physical Disorder

In the study of disorder, it is important to differentiate two different kinds of phenomena---social disorder and physical disorder. From a research standpoint, social disorder and physical disorder are qualitatively different. Sampson and Raudenbush (1999) clearly pointed this out in the beginning of their article: “[s]ocial disorder, we refer to behaviors involving strangers and considered threatening... [p]hysical disorder, we refer to the deterioration of urban landscapes (p. 603-604).” From this statement, it is obvious that social disorder requires the involvement of human behaviors, which impose threats to others in the neighborhood. Thus, the key element defining social

disorder depends on the presence of actors who perform the offensive actions. In addition, social disorder is usually an episodic behavior, which only lasts for a short duration. Conversely, physical disorder represents an objective condition that might last for a long period of time unless some actions are taken to change it. The focus of the latter is on the physical conditions rather than on individual acting within the conditions. Many of the past studies proposed clear definitions of social and physical disorder along with characteristics included within each category (Sampson and Raudenbush, 1999; Skogan and Maxfield, 1981; Skogan, 1990; Taylor, 2001; LaGrange et al., 1992). However, when doing analysis, people often combined these two categories together into one total disorder measure---- assuming that they represent the same underlying construct. For instance, Skogan and Maxfield (1981) used a general term of “sign of disorder” to represent the violations of “people’s expectations about fit and proper conditions and conducts.” Within this “sign of disorder” they included a wide range of circumstances like unsupervised teens hanging out on the streets, abandoned buildings, illegal drug use, and vandalism.

Overall, the qualitative differences between social and physical disorder are rarely addressed.⁸ I believe that mixing the concepts of social and physical disorder hinder us from disentangling the intertwined relationship between disorder and violence. Social disorder and physical disorder are different in many ways. Social disorder involves actors and current actions; thus, the presence of social disorder perhaps provides a pool of potential targets, motivated offenders or both for violent offenses to occur. Physical disorder, however, does not necessarily involve actors. Most of the time, we do not

⁸ For example, Sampson and Raudenbush (1999) argued that “*the results are so similar for physical and social disorder, and because the two scales are highly correlated ($r=.71$), we combine them into a summary index of disorder...*” (p. 626).

see/know the actors who dump trash or break glass in the next block. We recognize physical disorder when we see it, even without seeing the creator(s) of it. As such, physical disorder provides unmistakable visual cues to the users of the space. Therefore, residents' perception of physical disorder should be more consistent than their perceptions of social disorder as the latter involves an individual's value judgment.

Compared to social disorder, I believe that physical disorder is less criminogenic of violent crime. An abandoned place could attract would-be offenders to engage in criminal activities (see Weisburd et al., 2006). However, physical disorder itself, without the presence of potential offender/victims, should be related to crime to a lesser extent than social disorder. It is possible that there exists a sequential relationship between social disorder and physical disorder. This possibility will be examined later using the Granger causality test to see if there is a directional relationship between the two types of disorder. The distinction between social and physical disorder also carries importance on another equally important subject---fear of crime. In addition to crime, fear is another phenomenon that has long been connected to disorder (see Garofalo and Laub, 1978; Kelling and Coles, 1996; Taylor, 1999, 2001). Kelling and Coles (1996) argued that fear mediates the effects of disorder on crime in a community. However, the differential effects of social and physical disorder were not discussed by Kelling and Coles. Based on Sampson and Raudenbush's phrases cited earlier, it is expected that social disorder and physical disorder should have different impacts on fear. Social disorder invokes a feeling of fear to residents, while physical disorder provides a more neutral image that might still be bothersome to some residents. As such, the emotional reactions related to social and physical disorder are not necessarily the same. The empirical evidence from

Taylor's (1999) observations in Baltimore provides a good example of how different those two types of incivilities can be. In the study, physical disorder is found to be correlated with changes in rates of aggravated assault, burglary, and motor vehicle theft while social disorder is correlated only with changes in the rate of rape (all of the correlations are significant at .10 level, Taylor, 1999, p.5).⁹ Overall, the empirical findings and theoretical arguments point to the need of studying these two disorders separately. Therefore, in the currently study, I will disaggregate disorder into social and physical disorder to examine the effects that different types of disorder have on crime.

Disorder and Crime Association

Despite the empirical disagreement (see Taylor, 1999 and Sampson and Raudenbush, 2001), within all the theoretical arguments about disorder/incivilities, most of them assume an association between disorder and crime. Skogan's *Disorder And Decline* suggests that incivilities will lead to more criminal victimization, neighborhood dissatisfaction and changes in neighborhood structure

The broken windows thesis proposes an indirect effect of disorder on crime. Untended disorder in a community is argued to lead to increased fear of crime among residents who feel that informal social controls have broken down. In turn, fearful residents withdraw from the community, which further lowers levels of informal social control and ultimately sets the stage for increased disorder and crime problems in the neighborhood.

⁹ The examples of the type of incivilities that Taylor used can be classified into two categories: social incivilities, such as public drinking, drunkenness, rowdy and unsupervised teens, sexual harassment, arguing and fighting, open prostitution, and public drug sale; and physical incivilities including things like abandoned buildings, graffiti, litter, vacant and trash-filled lots, unkempt yards, and housing exteriors, abandoned cars and the conversion of houses and apartments to drug-selling locations (Taylor, 1999).

POLICING DISORDER? WHAT DOES IT REALLY MEAN?

In addition to the theoretical interest in the relationship between disorder and violence, the issue also carries strong policy relevance. The direct policy implication of the theory concerning disorder results in its popularity among practitioners. The broken windows thesis, for example, claims that targeting disorder will achieve crime reduction effects (e.g., Kelling and Sousa claim that the quality-of-life policing in the NYPD reduced crime). Clearly, the intended consequences of policing disorder are crime reduction and decreasing residents' fear. Based on the available evidence, it is hard to tell whether those intended goals have been met. However, many people argue that there are unintended consequences of the broken windows initiative that result in huge impacts on individuals' daily lives, including human rights violations, restriction of freedom and unfair treatment targeted at minorities to name just a few (see Erzen, 2001, Harcourt, 2001, and Herbert, 2001; McArdle and Erzen, 2001; Sampson, 2004 for elaborated arguments). In this section, I will review the historical development of how police deal with disorder problems and compare and contrast the current situation and past history. Some potential but unintended consequences of overly relying on disorder policing will be discussed.

Historical Development of Order Maintenance Policing

The emphasis on order maintenance in policing has existed for hundreds of years. During the Plague in 1348, police regulated working class people who were believed to be responsible for things like poverty, vagrancy, drinking, the spread of the plague, immorality and crime (Rawlings, 2002). Through the 1400-1600's in England, legal acts explicitly defined behaviors which poor people were more likely to engage in as immoral.

For instance, in 1494 one statute explicitly prohibited behaviors including vagrancy, begging, unlawful games and the violation of alehouse regulations (i.e., 11Hen. VII, c.2). The rationale behind the policy was that by imposing severe responses to regulate the working/poor population, society could restore and maintain a desirable social order (Rawlings, 2002).

Until the late 18th century, dealing with drunkenness, soliciting and arresting the disorderly and homeless were still the responsibilities of the watchmen (i.e., police officers in earlier times) in London.¹⁰ In the early nineteenth century, the watchmen were transformed into a more organized institute (see 1829 London Metropolitan Police Act) by which attention was switched from disorder to more serious crime. Further, the police began to place greater emphasis on crime reduction with the rise of the professional era (in the mid-twentieth century). August Vollmer (1971), Chief of Police of Berkeley, California, asserted that “the main task of police should be fighting crime.”

The belief that disorder arose from lower class people was still found in 20th century America. Edward C. Banfield, James Q. Wilson’s mentor, claimed that “[t]he lower-class individual lives in the slum...which, is an expression of his tastes and style of life” and “[T]he slum is specialized as [a site] for vice and for illicit commodities generally” (1974, 71-72; as quoted in Harcourt, 2001). Following the same line of thinking, it is not surprisingly that Wilson later (Wilson and Boland, 1978; 1981; Wilson and Kelling, 1982) became one of the strongest advocates for using aggressive policing targeting certain “tastes and lifestyles” (i.e., disorder) which are clearly related to particular groups.

¹⁰ For an example, see Westminster Night Watch Act 1774: 14 Geo. III, c. 90.

The concept first appeared in Wilson's works in the 1970s. Wilson and Boland (1978, 1981) suggested that aggressive policing has a deterrent effect on potential offenders either through the direct influence on the perceived threat of sanctions or through the indirect influence on the increasing certainty of arrest. Wilson and his colleagues argued that order enforcement by the police provides a visual deterrent for the would-be offenders (Wilson and Boland, 1978, 1981). Thus, when aggressive policing approaches become more visible on the street, it will deter potential offenders (regardless of whether or not the actual arrest certainty increases). Wilson and Boland (1978) further pointed out that this deterrent effect does not depend on how many sworn officers a police department has; rather, it depends on *what* those police officers do on the street. To test this statement, Wilson and Boland used the number of moving traffic violation citations issued per sworn officer as a proxy of police aggressiveness in their 1978 article. Sampson further tested the idea to see whether aggressive policing deters future crime. Using data collected from all major cities, Sampson concluded that aggressiveness of police activity had a deterrent effect for robbery, but the same effect was not found for homicide (Sampson, 1986b).

These earlier works set forth a distinct point of view on crime and disorder that made possible the later broken windows thesis.¹¹ The belief that police aggressiveness can reduce crime is also the underlying assumption of broken windows policing (see Wilson and Boland, 1978, 1981 and Sampson and Cohen, 1988 for details).

¹¹ Harcourt (2001) further argues that the works of Edward Banfield's had tremendous influences on Wilson's early works, especially the broken windows essay. Harcourt believes that Banfield basically proposed a study about class-specific behavioral patterns and the natural devolution of a disorderly neighborhood.

As for American policing, the developmental pathway was slightly different. The crime fighting paradigm was challenged at the end of the twentieth century. The failure of the crime reduction goal revealed by empirical evidence brought severe crises to the credibility of the professional model of policing (Kelling et al., 1974; Spelman and Brown, 1984; Levine, 1975; Weisburd, 1996). Research had shown that police alone were not capable of reducing crime (Weisburd and Eck, 2004; Committee to Review Research on Practice and Policy, 2004). Thus, several innovations were proposed as salvages to modern policing (see Weisburd and Braga, 2006 for a detailed review of the innovations). Among those innovations, COMPSTAT is the strongest proponent of order-maintenance policing. Under the framework of COMPSTAT, order maintenance once again replaced the crime fighting goal.

Interestingly, COMPSTAT still claims crime fighting as its main goal; it just proposes an alternative route--the broken windows approach. Broken windows policing argues that if police want to achieve the crime reduction goal, disorder problems need to be reconsidered and addressed seriously (Wilson and Kelling, 1982; Kelling and Sousa, 2001). The empirical support for the broken windows approach is mixed. Interestingly, most of the supportive evidence comes from Kelling's work (see Kelling and Sousa, 2001 for an example).¹² In order to study whether the crime drop in New York can be attributed to the success of broken windows policing or to the changes of economic, political, demographic factors, Kelling and Sousa (2001) compared violent crime rates and misdemeanor arrests¹³ between 76 precincts from 1989 to 1998. They concluded

¹² Harcourt and Ludwig (2006) have reconstructed the NYC data to replicate Kelling and Sousa's findings. The results from Harcourt and Ludwig did not confirm the original statements from the Kelling and Sousa study.

¹³ Misdemeanor arrest represents police efforts in disorder intervention in this case.

that “over 60,000 violent crimes were prevented from 1989 to 1998 because of ‘broken windows’ policing (p.3).”

At a first glance of the article, the patterns of violent crime and misdemeanor arrest seem to support the broken windows thesis in which violent crime trends are expected to decrease when misdemeanor arrests are increased (see Kelling and Sousa, 2001 figure 1A and 1B on page 7). The nature of this static descriptive analysis fails to reveal the co-existing nature of the patterns in a dynamic fashion. Thus, it is hard to make any causal claims between violent crimes and misdemeanor arrests (Greene, 1995; Eck and Maguire, 2000; Harcourt, 2001). The alternate explanation for these patterns can also be a consequence of allocating more police resources to reduce disorder and less to reduce violence by the NYPD. Thus, the lack of a sophisticated methodology to account for the co-existing patterns damaged the credibility of the conclusions.

From the previous discussions, it is easy to see the connection between Wilson’s early works and broken windows policing (for similar ideas, see Harcourt and Ludwig, 2006). The importance of aggressiveness of policing has become the central element of both the broken windows thesis and broken windows policing. The difference of this later BW argument compared to Wilson’s early works is that the strict deterrence perspective of police aggressiveness has now evolved into another concept illustrated through the use of the phrase, “*fixing broken windows*”.

The deterrent aspect of aggressive policing has gained some empirical support, however, the strategy of targeting disorder in reducing crime results in some controversies (Wilson and Boland, 1978; Sampson and Cohen, 1988; Sampson, 1986b). Tracing the history of policing, we can see that the order maintenance strategy had been

used as a tactic mainly to suppress certain groups (usually the poor, working, and lower classes, etc.) in the early years (Rawlings, 2002). In New York City, McArdle and Erzen (2001) also pointed out that broken windows policing affects the lives of minorities and the homeless much more significantly than it affects middle class residents (McArdle and Erzen, 2001). Whether the new fad of “quality of life policing” is really a neutral policy targeting crime reduction through the improvement of life quality for everyone or is a policy that has a hidden agenda at the expense of certain populations remains to be seen.

CONCLUSIONS

As we can see, interest in the study of disorder has gone through several shifts over the past couple of decades. As discussed earlier, the original focus of the disorder related research was on its association with fear of crime (for example, see Wilson, 1975; Garofalo and Laub, 1978). The focus on disorder has now shifted toward its influence on crime, neighborhood contexts, and social control (Wilson and Kelling, 1982; Skogan, 1990; Taylor, 1999; Bratton, 1998; Hunter, 1978; Bursik and Grasmick, 1993). However, to fully test the long-term impacts of disorder and its association with crime, quality longitudinal data is needed.

Fortunately, there have been some efforts to collect quality ecological data in order to improve the understanding of disorder and its consequences at places. For example Robert Sampson and his colleagues began the extensive data collection for the Project of Human Development at Chicago Neighborhood (see Sampson et al., 1997). Also, David Weisburd and his research team continue to collect wide-ranging data that are important to the understanding of the development of crime and disorder at places in the Seattle Project (see Weisburd, Lum and Yang, 2004). The availability of the new

data provides an excellent opportunity to carefully examine the association between crime and disorder, and perhaps to also see how police efforts affect both. In addition to the exciting progress on data collection, advances in methodology also allow researchers to test more sophisticated models.

Another new development in disorder related research concerns a change in the subject of interest. Earlier studies often examined disorder's impact on individual behavior and response (i.e., fear of crime, emotional reaction and etc.); while later studies also expanded their focus to phenomena at a higher aggregate level. This is an important step forward as any comprehensive theory of crime requires an understanding of individual factors and environmental influences as well as the interactions between the two domains (see Agnew, 1999; 2006). Specifically, Agnew (2006) argued that a complete "storyline" of crime consists of both individual factors and situational factors. A neighborhood is more than merely an aggregation of individuals and the interactive effects of neighborhoods and individuals on crime are far more extensive than the impacts of individual's criminality (Bursik, 1986; Bursik and Grasmick, 1993; Taylor and Gottfredson, 1986). However, in the field of criminology, our knowledge of individual factors is way ahead of our knowledge of environmental factors. The shift from individuals to a moderately sized geographic area as a unit of analysis also implies the recognition of the equal importance of places in the study of crime. A well known example is Skogan's "Disorder and Decline," in which he describes the impacts of disorder on neighborhoods as an entity, rather than on individuals residing in these neighborhoods.

This study will add to our place-based knowledge of the storyline of crime by exploring how disorder and violence associate at places (census block groups). By tracing both phenomena over a long period of time, I hope this study can shed light on this long-standing “chicken-egg” debate and contribute to knowledge that will be of use in evaluating policing strategies.

CHAPTER 3: RESEARCH QUESTIONS

Prior research focusing on the relationship between disorder and crime has often assumed a causal relationship over time without a close examination. In this chapter I will begin with a review outlining the problems of past studies. I will then list the main questions that are central to the current study. A summary table with violence-disorder associations from each theory's perspective will also be presented.

Problems of Past Literature in the Study of Crime and Disorder

Studies have often treated the relationship between disorder and crime as causal, as long as a positive correlation between the two variables was observed (Taylor, 1999; Skogan, 1990; Kelling and Sousa, 2001). Few studies actually went an extra step to confirm the causal relationship between disorder and crime.¹⁴ When an attempt is made to investigate the relationship, Structural Equation Modeling (SEM) is one of the most popular methods used to disentangle the complicated causal relationship among variables. SEM is a tool developed to explore or confirm relationships among latent and observed variables (Loehlin, 1998). It is a very powerful tool, but only useful when researchers include all of the relevant parameters (or most of the critical ones) and specify the relationships correctly. However, the use of SEM in past literature has posted some problems.

The first limitation of past disorder related studies using SEM is the use of cross-sectional data. Using SEM to analyze cross-sectional data imposes some critical

¹⁴ In order to estimate the simultaneous causal relationships between proposed endogenous variables and exogenous variables, Structural Equation Modeling (SEM) is often used in the criminology field, especially when only cross-sectional data is available (see Sampson and Raudenbush, 1999; Xu et al., 2005 for some examples relating to the crime-disorder relationship).

problems because the results cannot tell us whether the “selected optimal” model is the *true* model. The validity of the results highly depends on the quality of data. Thus, reliance on cross-sectional data rather than longitudinal data leads to a problem of having insufficient information indicating the temporal order among factors. The knowledge of proper temporal order is required for SEM to verify whether the selected “optimal” model correctly resembles the data. In other words, observations measured at the same point of time might inflate the association between variables due to the shared time effects. Additionally, using observations from cross-sectional data also imposes a theoretical challenge. A correlation does not help differentiate the causal order between two variables. Disorder can lead to crime but an increase of crime may also cause more disorder (see Skogan, 1990). To differentiate these two conditions, the use of longitudinal data with correct time lag specification is important (see Skogan, 1990; Markowitz et al., 2001 for examples). Statistical conclusions based on cross-sectional observations risk the chance of inaccurately estimating the long-term relationship between disorder and violence.

Second, another common problem of past studies is the failure to make a distinction between social disorder and physical disorder. As discussed in the previous chapter, social disorder always involves current human behavior while physical disorder is mainly the product of past human behavior. Social disorder requires not only actors to produce the actions, but also an audience to perceive the actions and atmosphere to be threatening. Therefore, one key element of social disorder is the gathering of people. When a group of people converge together, which is fairly common in urban areas, it creates high levels of anonymity. Urban anonymity is a hotbed for crime because

anonymity not only provides motivated robbery offenders with a large pool of potential victims but also makes it easier for them to escape after committing crime. Specifically, people who gather together might not be wrong-doers or motivated to commit crime, but there exists an uncertainty of what this group would do next. This group might just hang around and have fun themselves, or they might attract the would-be offenders' attention, or they might pick a fight with other groups. The unknown nature of group dynamics or the presence of unpredictable people (like a drunken man on the street) is what makes other people uncomfortable when they see signs of social disorder.

In addition to the nature of behavior, characteristics of actors also play important roles in the determination of social disorder. This intensive human element is one of the main factors distinguishing social disorder from physical disorder. There are other features that distinguish the two types of disorder. For instance, physical disorder tends to be more objective while social disorder is more subjective. Physical disorder depends on the features of places while social disorder requires actors within certain contexts. Physical disorder represents a sense of lack of control/maintenance of a place while social disorder invokes uneasy and threatening feelings to audiences.

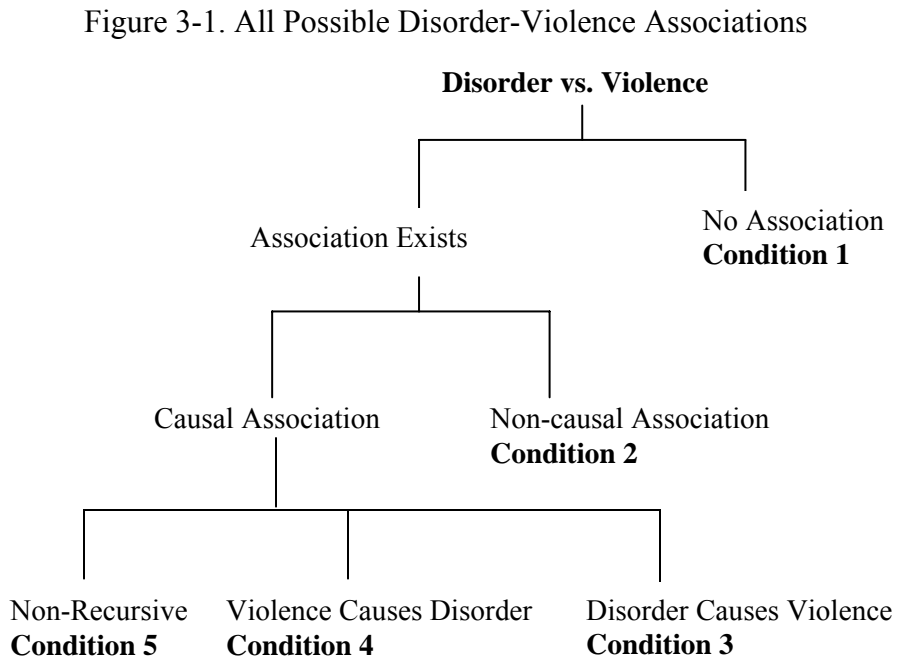
Based on the findings from previous studies, it is almost common knowledge that there is an association between disorder and violence (robbery specifically). This type of association has not yet been explored under a true longitudinal study (except for Kelling and Sousa, 2001). Additionally, whether different types of disorder have similar effects on crime is not yet clear. The current study will provide a more precise perspective in understanding the association between disorder and violence, specifically, the different effects that social disorder and physical disorder have on violent crime (or vice versa).

The Current Study

Before I lay out the research questions for the current study, it is important to review the logic behind this study. How do disorder and violence associate? Logically speaking, there are only five possible ways that disorder and violence can be related.

- 1) Disorder and violence are NOT related (no relationship).
- 2) Disorder and violence are correlated, but not causally (driven by a third factor, spuriously related).
- 3) Disorder causes violence (a direct relationship with temporal order assumed).
- 4) Violence causes disorder (a direct relationship with temporal order assumed).
- 5) Disorder and violence have a non-recursive relationship (both 3 and 4 hold simultaneously).

The five possibilities are illustrated in a tree plot below (Figure 3-1):



The tree plot covers all the possible relationships between disorder and violence, which are more than what were suggested by the prior research. Sampson and Raudenbush suggest the disorder-violence to be related in a non-causal way (condition 2); while Wilson and Kelling (1982) along with Bratton (1998) believe condition 3 is the correct specification. Skogan, on the other hand, believes possibility 5 represents the real dynamic of the neighborhood decline process. And almost no one supports possibility 1 which assumes a null association between the two factors.

My goals in this research are: 1) to first understand whether disorder and violence are related; 2) then, assuming that they are related, to test what kind of relationship they possess. As such, the first step will be to test condition 1, the null association. If I can prove option 1 is not realistic, then the next step would be to uncover the actual nature of the association between disorder and violence (options 2 through 5).

To examine these research questions, I use time-series methods. First I will examine how these two trends move over time. If there turns out to be a strong association between the disorder and violence trends, a further test will be done to determine the direction of causation. Essentially, I would examine whether increases in the level of disorder lead to a higher number of violent crimes (or vice versa). I will describe the process behind this analysis in detail in Chapter 5. I believe that resolution of these issues carries significant theoretical and public policy implications. If, for instance, I confirm that disorder does lead to crime, then the finding is supportive of public policies which attempt to reduce the violent crime rate via prevention strategies targeting disorder (e.g., the quality-of-life policing in New York City). On the other

hand, if changes in violent offending are independent of the changes in disorder at places, then the prevention strategies based on targeting disorder should be reconsidered.

In sum, this dissertation attempts to answer two main research concerns in light of these gaps in our understanding of the relationship between violent crime and disorder. The first and most important question to consider is “what is the longitudinal relationship between disorder and violent crime?” Theories and research studying individual behavior point out that risk-taking or disorderly behavior might be analogous to other types of criminal behavior (Gottfredson and Hirschi, 1990). Is this also the case for places? Do places with high violent crime rates also tend to have high disorder rates? Does one have a causal impact on the other? Answers to these questions can provide empirical evidence, which will inform the heated debate between the supporters and critics of the broken windows approach.

Next, if any association is found in the previous step and the type of association is determined, I will then examine the effects of different types of disorder on violent crime. This will allow for a test of whether the association between disorder and violent crime depends upon the type of disorder that we use (i.e., social disorder or physical disorder). As discussed earlier, routine activities theory might predict a relationship between social disorder and violent crime but not physical disorder as social disorder reinforces the convergence of the routine activities of both victims (targets) and offenders while discouraging the participation of guardians. This information should shed some light on the underlying mechanism of the interrelationship between disorder and violent crime.

Validate Theories with Empirical Data

Another goal of this study is to verify the validity of theories that are related to the study of disorder. I cannot “test” or attempt to test a theory when I do not have all the required information that is crucial to the corresponding theories. A randomized experiment is obviously impossible to be used for this type of research. Though a comprehensive test of theories is not possible with the current data, I can, however, test whether the results are consistent with the underlying logic of each theoretical perspective. For example, the broken windows thesis predicts disorder to have a causal impact on violence. If my findings show that the two trends are independent of each other, or moving in the same direction without time lags, or related in the opposite direction, then it is reasonable to conclude that the broken window thesis does not hold based on the empirical results.

The comparison between different theories and the role of disorder in each theory is summarized in Table 3-1. From the table, I can conclude that almost all theories expect a positive association between crime and disorder. The main difference between theories is two-fold: the type of association between disorder and violence and whether there is a time lag between the two.

For example, SD theorists believe that the association is spurious. After controlling for the structural variables, the association should vanish. In other words, both disorder and violence reflect the level of structural factors (or collective efficacy to be precise), and there should be no time lag between the changing patterns of those two trends. From the standpoint of RA, one might expect a positive association, but the association should be stronger for social disorder than physical disorder. Wilson and

Boland's deterrence perspective (Wilson and Boland, 1978) and broken window thesis are the only two that expect a causal relation between disorder and violence. This is not surprising as in the previous discussion we know that they came from the same paradigm. Accordingly, we should expect to see that the disorder trend precedes the violence trend from this perspective.

In sum, I will explore the disorder –violence nexus with longitudinal data. The different effects of various types of disorder will also be examined. Moreover, I will make an attempt to confirm the validity of theories based on their expectations of the relation between disorder and violence as well as the time difference between the two trends. In Chapter 5, I will further discuss the statistical methods to be used to test the long-term association between disorder and violence.

Table 3-1. Summary of Disorder's Role and the Expected Relation to Crime in Each Theory.

Theory	Disorder discussed?	In what context is it discussed?	Social or Physical Disorder	The relationship between crime and disorder from the theoretical standpoint	Time Lag Between Trends
SD: Traditional (Shaw and McKay)	Yes	As an indicator of SD	Physical Disorder	Spurious. The relationship between crime and disorder is ecological. Both crime and disorder are just products of the ecological distribution of the urban economics.	No
SD: Systemic Model (Bursik)	Yes	As a sign of the failure of social control	Did not mention	Spurious. Disorder represents the level of social control. So if disorder (the actual level of disorder) goes up, then social control goes down and crime will soon follow.	No
SD: Collective Efficacy (Sampson)	Not explicitly	Analogous Behavior	Both	Spurious. The relationship between crime and disorder represent the level of concentrated disadvantage and collective efficacy. After controlling for level of collective efficacy, the relationship between crime and disorder vanishes.	No
RA (Cohen and Felson)	Did not discuss	N/A	Did not discuss	More social disorder will lead to more robbery as higher levels of anonymity will lower the guardianship and thus reinforce motivated offenders.	Yes Social Disorder → Violence
Deterrence Theory (Wilson and Boland)	Not explicitly	As a proxy of deterrent effect	Social Disorder (traffic violation)	Police enforcement on disorder can serve as a deterrent to potential offenders. The level of police response to disorder should have impacts on crime reduction.	Yes Disorder Arrests reduce Violence
Broken Windows (Wilson and Kelling)	Yes	It is the key element of the theory	Both	Causal. Wilson and Kelling assume that the level of disorder will have direct impact on the increase of crime.	Yes Disorder → Violence

CHAPTER 4: SITE SELECTION AND DATA COLLECTION

Michael Maltz (1995) argued that most of the past research that studied crime at places relied on two different strategies: using quantitative methods with cross-sectional data (see Sampson, 1986b) or using qualitative approaches with ethnographic data (Anderson, 1999). A lot of times researchers choose to use the first method simply because it is time and money consuming to collect new data over a long period of time. Maltz, understanding the practicality of this problem, suggests an alternative of using archival data collected by public agencies to tell a story about the phenomenon of interest. The study uses crime data collected by three public agencies across 16 years, which makes it an excellent example of the strategy suggested by Maltz. The richness of the data will help us to understand the intertwined association between violence and disorder at places.

DATA SOURCE

To understand the longitudinal patterns between disorder and violent crime, I use information collected from the city of Seattle, Washington (see Weisburd, Lum and Yang, 2004 for more details about data collection process). Compared to most American cities with populations of over 200,000, Seattle represents a fairly heterogeneous city in terms of racial composition. According to the 2000 U.S. Census, Seattle has a population of 563,374 and is ranked as the 22nd most populous city in the country. Among Seattle's population, 70.1% is Caucasian, 8.4% is African American, 5.3% is Hispanic and 13.1% is Asian. Asians are overrepresented in Seattle compared to other cities (the average

percentage of Asian population in the US is 3.64% in 2000, Census Bureau, 2002). The demographic features of Seattle were drawn from the 1990 and 2000 Census information and presented in Table 4-1. Ten variables were constructed to reflect the demographic features at the block-group level.

Table 4-1. Descriptive Statistics of Demographic Variables of Block Groups

	1990 Census Information				2000 Census Information			
	Min	Max	Mean	Std. Deviation	Min	Max	Mean	Std. Deviation
POPDEN	333.62	50269	9168.74	6746.220	208.48	97445	10091.04	8485.55
HETERO	2.31	21.17	3.3973	1.57892	2.31	17.23	3.9271	2.15228
YOUTHMALE	.00	.38	.0416	.03440	.00	.34	.0434	.03646
FHH	.00	.49	.0496	.06046	.00	.42	.0471	.05325
LINGISO	.00	.37	.0410	.06325	.00	.61	.0518	.07788
COLLEGE	.01	.89	.3787	.18283	.02	1.00	.4811	.19178
UNEMPLOY	.00	.54	.0517	.04654	.00	1.00	.0519	.06485
MEDINC¹⁵	.00	181804	43900.78	18770.04	.00	200001	52698.83	22191.43
RENTER	.00	1.00	.4344	.25394	.00	1.00	.4319	.25256
MOBILITY	.12	1.00	.5476	.16427	.00	1.00	.5389	.16780

Note: These ten variables are described below:

POPDEN: total number of residents divided by the number of square miles in the area.

HETERO: this variable represents the level of racial heterogeneity¹⁶.

YOUTHMALE: This study uses the percentage of males who are between ages of 12-20 to represent population at risk¹⁷.

FHH: percentage of female-headed households

LINGISO: percentage of residents who do not speak English.

¹⁵ The median income of 1990 has converted to the currency value of year of 2000 for comparison's sake. CPI conversion rate is .743.

¹⁶ The variable is calculated as the following way:
$$\text{Hetero} = \frac{1}{\sqrt{\frac{(\%white-.25)^2 * (\%black-.25)^2 * (\%asian-.25)^2 * (\%other-.25)^2}{4}}}$$

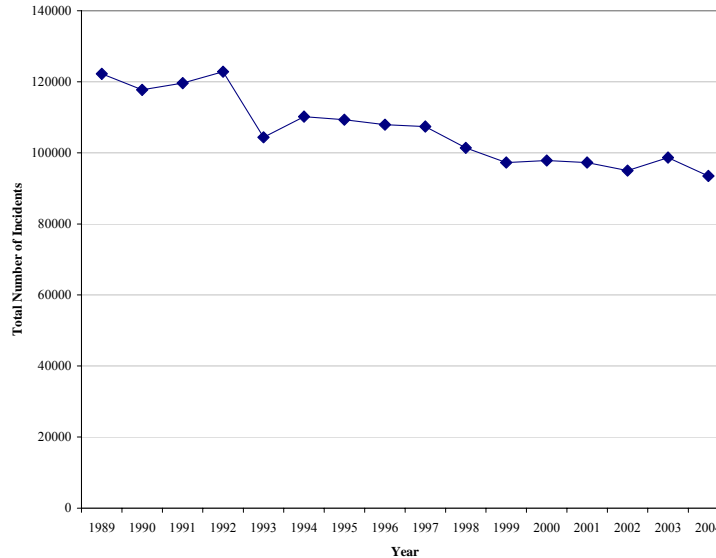
¹⁷ It is commonly argued in the past literature that young males are considered a high risk population.

COLLEGE: percentage of residents with at least four years of college education.
UNEMPLOY: percentage of population who are unemployed.
MEDINC: residents' median income.
RENTER: percentage of renter occupied houses.
MOBILITY: percentage of the occupied housing units in which resident lived there for five years or less

From the side-by-side comparison, one can see the changes in Seattle over a 10-year period of time. Like many other large cities in the United States, Seattle has wealthy and poor neighborhoods. Seattle has a yearly median income that ranges from \$7,382 to \$200,001 per block group based on the 2000 U.S. Census. Seattle is getting more populous, more racially heterogeneous, with more foreign born people who do not speak English. Additionally, residents are more educated and wealthier than in earlier time periods. In general, the unemployment rate and the stability of resident stayed about the same from 1990 to 2000.

Seattle also has a level of crime occurrences substantial enough for this study to be meaningful (see Figure 4-1). Across 84 square miles, Seattle has 8,091 crimes per 100,000 people, higher than the average crime rate of other cities with similar populations in 2004 (Federal Bureau of Investigation, 2006). Seattle also has crime problems as well as disorder issues. The average crime rate ranges from 2,132 to 5 per block group in 2000; in 2004, the ranges spread from 1,829 to 10 per block group.

Figure 4-1. Seattle Crime Trend (Including All Crimes)



Another unique benefit that Seattle provides is the availability of longitudinal crime data. Seattle has kept detailed crime data since the 1980s. Due to data format issues, only data after 1989 are available in computerized format (see Weisburd, Lum and Yang, 2004 for a detailed discussion of this issue). There are three different types of official data available in Seattle: 911 calls for service data, incident reports and arrest reports. In terms of the inclusiveness, calls for service data cover the widest span while the arrest data have screened out a substantial amount of crime and thus, contain the least amount of information. Calls for service data are mainly generated from citizen's reports without the verification of police investigation and thus can also contain information which is not crime related. Incident reports are generated by police officers after an initial investigation of a request for police service. Crime incident report data provide a middle ground as a balance between inclusiveness (i.e., calls for service data) and

accuracy (represented by arrest data) of data.¹⁸ Thus, incident data are used in this analysis as the primary measure of crime and disorder.

In addition to the unfiltered nature, another important reason not to use calls for service data is due to the length of available data. Incident and arrest data are both available for the whole 16-year period, from 1989 to 2004. To date, Seattle has collected only six years of calls for service data. The current study aims to understand the longitudinal trends of disorder and violent crime, thus more observations can lend stronger power for the current study. Arrest data, though also available for the whole 16 years, possibly reflect police practice more than actual crime trends as the data can only represent those cases which have led to a suspect arrest, but not those that have not been cleared by the police. Additionally, minor offenses like disorder are usually dismissed and thus did not result in arrests. Thus, arrest data would appear to be a poor indicator to represent the actual occurrence of violent crime and disorder, which are the focal concerns of the current study.¹⁹ I decided to adopt incident reports as my main crime measurement to take advantage of the length of the data as well as its inclusiveness.

UNIT OF ANALYSIS

As stated by Moorman (1980), the results from statistical analysis are partly dependent on the size of the unit of analysis. Bailey (1985) also demonstrated empirically that different levels of data aggregation will yield different crime patterns. In fact, the use of different units of analysis even altered the direction of a relationship in some cases (Bailey, 1985). Thus, it is important to pick a reasonably sized area as the

¹⁸ See Lum (2003) for an in-depth discussion of data sources available from Seattle.

¹⁹ For more detailed information about the comparison of the three databases, please see Lum (2003) and Miggans (in progress) for cross comparisons.

study unit. To avoid the misuse of unit of analysis, Bailey (1985) advised that researchers need to determine the “most appropriate” unit of analysis based on theoretical guidance.

Most prior studies use larger geographic units to study crime such as states, cities, neighborhoods, or census tracts (except for Taylor, 1999). For the current research, I will use census block groups²⁰ as the unit of analysis (see Figure 4-2 for visual presentation of the Census block group boundaries). Using a block group as the unit of analysis provides several advantages. First, it allows for an examination of the phenomenon in a relatively small geographic unit. This is beneficial because the aggregation present in a larger geographic unit of analysis might mask changes that would have been observed in a micro unit (see Weisburd et al., 2004 and Weisburd, Lum and Yang, 2004). Meanwhile, a block group is also big enough for systemic social control to exercise within the unit. Studying crime and social problems, Aronson et al. (2007) found great diversity in physical and social conditions at the census block group level. Walsh and Taylor (2007) further argue that the boundaries of census block groups align with many interpersonal and control-related dynamics. Tita et al. (2005) also found clear distinctions between gangs’ set locations in Pittsburgh, PA at the census block group level. Thus, using a block group as the unit of analysis should be reasonable to examine different criminology frameworks concerning the effects of places.

In addition to its desirable size for testing place-based theories, the census block group is also adjusted for the number of households in an area. According to the U.S. Census’ guidelines, an ideal size for a block group is 400 housing units, with a minimum

²⁰ The size of block group is in between census tracks and census blocks. Generally, a census track can be divided into about 4 block groups, at most 9 block groups, depending on the size of population within each block group (Census Bureau, 1994).

of 250 and a maximum of 550 housing units (Census Bureau, 1994). Furthermore, the guidelines also require that block group boundaries follow clearly visible features, such as roads, rivers and railroad (Census Bureau, 1994, p11-9). Therefore, the analysis of crime patterns based on the aggregation at block-group level should take into account the effects of different population density while also considering the effects of natural boundaries.

Furthermore, the block group is also the smallest geographic unit for which U.S. Census data is available. With the census information, I can verify the similarity between areas that demonstrate different crime patterns. In Seattle, the size of a census block group ranges from .02 miles to 2.48 miles with the average size as .147 miles (standard deviation .172). In 1990 Seattle included 127 census tracts and 579 census block groups. Due to the unusual characteristics of certain block groups, the analysis excluded 9 block groups that are dominated as abandoned industrial sites, parks, or military sites. This left me with a total sample size of 570 for the full analysis.

Figure 4-2 Seattle Census Block Groups Boundaries



The Seattle data allows for the aggregation of 2.4 million incidents at the address level to 570 block groups for each of the 16 years. Notably, block group boundaries changed from 1990 to 2000, thus, I normalized data to 2000 boundaries for purposes of analysis.²¹

IDENTIFYING VARIABLES

As mentioned earlier, this study will draw violence and social disorder information from police incident reports. Physical disorder information, however, mainly comes from two other data sources: “Illegal Dumping and Litter Data” provided by

²¹ The census boundary for block group changed from 1990 to 2000. The 1990 census data is normalized according to 2000’s block group boundary by using information from GeoLytics[®].

Seattle Public Utility Service and “Complaints Data” provided by Seattle Planning and Development Department. The Illegal Dumping and Litter database includes dumping but also other types of littering items that occurred on the streets. This database covers the time period from 1992-2006. The incidents in this database were generated from problems noticed by both inspectors (self-initiated), reports from other agencies, and from citizens calling the hot line or emailing the agency to report illegal dumping problems. The complaints database includes information collected from 1984-2004. The main source of information was from citizen’s filing complaints. As such, the complaint data should reflect more about citizen’s perceptions and dissatisfaction rather than the real conditions of the areas.

Before getting into the analysis stage, I will review more detailed information about the content under each variable of interest to the current study.

Violence

With respect to the classification of violence, it is quite straightforward. I follow the official definition of violent crime and include the following types of offenses in my violence measure: aggravated assault, non-aggravated assault, homicide, kidnapping, drive-by shooting, rape, robbery, and sexual offenses.

Disorder

With regard to disorder, the definition is not as clear as with violence. Weisburd and Mazerolle (2000) suggested that disorder reflects both the physical look of a neighborhood and the social fabric that binds residents to one another (pp. 344). From summarizing the prior literature, I defined disorder as things that: 1) are deviant from the

desired social norms, 2) are not so serious to be considered as crime, and 3) have the effects of endangering the social control networks suggested by Bursik's systemic model. In this study, I will be testing disorder under the frameworks of different theories. Thus, I follow the common practice of classifying disorder incidents into either social disorder or physical disorder categories. Social disorder incidents were drawn from police incident reports while physical disorder incidents were compiled by the illegal dumping and complaint databases.²² As mentioned earlier in Chapter 2, it is important to explore the nuances between these two types of disorder. Below I lay out the definitions of disorder adopted in this study.

Social Disorder

Social disorder generally refers to behaviors that are considered threatening by other people (Sampson and Raudenbush, 1999). Social disorders are also defined as public moral offenses which tend to result in police reactions such as prostitution, gambling, indecency, public drunkenness, narcotics arrest and disturbing the peace (Weisburd and Mazerolle, 2000). Summarizing from past research, my social disorder measure includes the following items: disorderly conduct, noise, alcohol and public drinking, gambling, drug-related offenses (not including large scale drug trafficking), and prostitution. A detailed list of offenses included in the category can be found in Appendix A.

²² It is worth noting that the use of official police records to represent social disorder itself can be problematic. Police practice can represent the social values of the majority. Thus, it invokes a question of by whose standard and perspectives these rules were enforced? This research does not have enough information to answer this question. But it is important to recognize this issue.

Physical Disorder

Physical disorder usually refers to the deterioration of urban landscapes (Sampson and Raudenbush, 1999). Specifically, physical disorder includes things like abandoned buildings, graffiti, litter, vacant and trash-filled lots, unkempt yards and housing exteriors, abandoned cars and the conversion of houses and apartments to drug-selling locations (Taylor, 1999). Based on past literature, my physical disorder measure includes: illegal dumping, litter, graffiti, weeds, vacant lots and buildings, inoperable cars on the street, junk storage, exterior abatement, substandard housing and minor property damage. Again, a list of descriptions included in the physical disorder measure is listed in Appendix A.

CHAPTER 5: METHODOLOGY

To study the longitudinal patterns between disorder and violence, it is necessary to use an appropriate methodology that can effectively examine time-series data.²³ Before getting into the technical details, I first provide a quick overview describing different time series phenomena that are relevant to the current study. Essentially, my research questions involve two time series—one for disorder and another for violence. There are only limited combinations that these two series can demonstrate together.²⁴ Below I list three simplified descriptions which represent the ways in which the disorder and violence series may associate. **Independence:** the two trends are moving independently. In this case, the disorder trend should not be informative for the prediction of the violence trend. **Co-integration**²⁵: the two trends are moving in the same direction and there is no obvious time lag in between trends. In this case, the pattern of one trend should not precede the other. Co-integration can be manifestations of two types of conditions: either the disorder and violence trends are driven by the same third factor or they instantaneously cause each other. **Causal connection:** one trend causes and precedes the other trend. Thus, knowing the disorder series would help us to predict a latter level of the violence series (or vice versa). In this chapter, I will review the meaning of each possibility under the context of the disorder-violence association. Then, I will detail each of the methods that are used to examine the research questions of

²³ Regarding the importance of using time series methods, please refer to O'Brien's 1999 article.

²⁴ To make the point clearer, the following cases are illustrated in the extreme/perfect scenarios. For example, when two things are independent, the correlation should be exact zero. I understand the extreme scenario almost never happens in real life. But I use these cases for illustration purpose.

²⁵ Detailed review about those concepts will be discussed in the later sections.

this dissertation. Finally, at the end of this chapter, I will summarize the relevant tasks that each of the methods is set to achieve.

DISORDER-VIOLENCE: HOW ARE THEY POSSIBLY RELATED?

In Chapter 3, I illustrated all the possible ways in which disorder and violence can be related in a probability tree plot (see figure 3-1). If I link the tree plot to the time series expressions, the conditions can be divided in the following ways. When the two trends are totally independent, we know that condition 1, null association, is the reality. Co-integration will be observed under condition 2 and condition 5. Condition 2 represents the situation where a common third factor influences both disorder and violence, as suggested by Sampson and his colleagues (see Sampson and Raudenbush, 1999; Sampson, 2004), while condition 5 shows an instantaneous causality or a non-recursive relationship as proposed by Skogan (1990). An instantaneous causality represents a situation where the disorder and violence trends are closely related to each other; the direction of causality, however, is hard to determine as the influence occurs within an extremely short period of time. It may also represent a non-recursive relationship in which levels of disorder and violence cause each other. Conditions 3 and 4 both indicate a causal relationship between the two trends. However, the directions of causation specified in these conditions have different theoretical implications. In condition 3, the causal direction runs from disorder to violence, which is consistent with the broken windows thesis (Wilson and Kelling, 1982), while in condition 4 the causal direction is opposite to what the broken windows thesis suggests.

Before analyzing time-series data, there are some caveats that need to be acknowledged. First, it is hard to establish causality in observational longitudinal data.

Holland (1986) believes that causality can never be established except through the examination of controlled experiments. Unlike in randomized experiments, when we analyze longitudinal data, we usually do not know what exactly would have happened if event A did not occur before event B.²⁶ While this might be the case, I believe that we can still get a clear picture of the association between time series variables if we use appropriate statistical approaches along with adequate theoretical guidance (see Granger, 1988). Below I review some crucial concepts to time-series data to aid the understanding of the issues before delving into the analyses.

STATIONARITY AND UNIT ROOTS

A test of time-series data usually starts with tests of the stationarity assumption. Thus, the first step of analysis will be to determine whether the disorder and violence time series are stationary. A time series can follow different patterns: stationary, trend-stationary or with unit-root property (Moody and Marvell, 1996; LaFree and Drass, 2002; LaFree, 2005; Hamilton, 1994). A **stationary** time series has a constant mean, variance and autocorrelation over time (LaFree and Drass, 2002; Nelson and Plosser, 1982). Conventional statistical tests mainly rely on the condition that the trends of interest are stationary. Therefore, if violence and disorder trends are stationary we then can apply most of the conventional statistical tools to evaluate the association without worrying about the autocorrelation problem. A **trend-stationary** time series is expressed as a deterministic function of time (t) plus a stationary stochastic process with a mean of zero (Nelson and Plosser, 1982, 141). For instance, if disorder and violence do not have constant means and the levels of both trends are in increments of a function of time, then

²⁶ Although there exist other possible methods like the counterfactual method (see Sweeten, 2006), the data were not appropriate for these techniques.

they are considered trend-stationary. As for the unit-root feature, a time series with a **unit-root** property refers to a non-stationary process. Instead of fluctuating around a constant mean (stationary) or a constant trend (trend stationary), a unit root series is the “random walk with drift” from a mean level with no tendency to return to the original mean level (Nelson and Plosser, 1982; LaFree and Drass, 2002; Moody and Marvell, 1996; O’Brien, 1999). These three concepts regarding stationarity are illustrated with the following equation.

$$x_t = a + x_{t-1} + w_t \quad \text{----- (1)}$$

The equation represents a time series concerning variable x . The current value x_t will be determined by the previous value x_{t-1} plus a random component w_t and a systematic drift a . The trend is drifting upward or downward depending on the sign of a .²⁷ A time series is said to have a unit root when the coefficient for x_{t-1} is 1. When a trend has a unit root, it “remembers” its previous value perfectly and it cannot be stationary (O’Brien, 1999).

To test whether a series has one or more roots, the following equation will be examined using the Dickey-Fuller test (see O’Brien, 1999 for more technical details).

$$x_t = a + \rho x_{t-1} + w_t \quad \text{----- (2)}$$

If ρ , coefficient of x_{t-1} , is significantly different from 1, then the time series does not have a unit root and thus should be stationary. On the other hand, when we fail to

²⁷ See O’Brien (1999) and Hamilton (1994) for more detailed explanations about the unit-root features of time series.

reject the null hypothesis that $\rho=1$, then we treat the time series as having a unit root. We then repeat this process by taking the first difference (i.e., $x_t - x_{t-1}$, the difference between two consecutive time points) to determine the order of the trend. If the first difference does not have a unit root, then the time series is integrated of order of one. The same process will be repeated until the new series with differenced values reaches stationarity.

TWO-STAGE PROCEDURE

In this dissertation, I will use a two-stage procedure to conduct my research. Common knowledge suggests that disorder and violence are related to each other. Therefore, in prior literature, it is very rare that disorder and violence are hypothesized to be independent from each other. However, if disorder is indeed independent from violence, then both Sampson & Raudenbush and Wilson & Kelling's perspectives are wrong. Aside from the independence hypothesis, there are two other more common options: disorder and violence are either co-integrated or causally related. In earlier sections, I concluded that a co-integrated relationship between disorder and violence can be viewed as supportive to theories that suggest a spurious association (e.g., Sampson and Raudenbush's social disorganization). A finding of causal association, however, provides support to theories like the broken windows thesis.

In order to disentangle the potential association between disorder and violence, a two-stage approach was chosen. I will first examine whether there is an association between the two variables at places. If disorder and violence are found to have an association, then a causality test will be pursued to examine the direction of causality.

These analyses will be conducted using both social disorder and physical disorder measures to examine their potentially differential effects on violence.

STAGE 1--EXAMINATION FOR ASSOCIATION

In order to explore whether there is a meaningful association between disorder and violence, I will use Group-Based Trajectory Analysis (GBTA), introduced by Nagin and Land (1993), as the analytical strategy. Specifically, the results from trajectory analysis will demonstrate the disaggregated patterns of the general trends and reveal population heterogeneity within violence and disorder trends. In addition, Joint Trajectory Analysis (JTA), an extension of GBTA, will also be used to demonstrate the comorbidity between the phenomena. Consequently, the results from both GBTA and JTA should inform us of whether there is an association between the two trends and the concordance rate.

Group-based Trajectory Analysis and Joint Trajectory Analysis

GBTA was originally designed to illustrate the developmental patterns of individual criminal offending (Nagin, 2005, 1999; Nagin and Land, 1993). The primary assumption of GBTA is that patterns of observations of interest over time can be approximated with a set number of groups characterized by polynomial growth curves (Nagin et al., 2003; Nagin and Tremblay, 1999). Specifically, it is designed to identify latent groups of individuals with similar developmental pathways (Bushway et al., 2001; Weisburd et al., 2004; Nagin, 2005). Thus, the results from GBTA illustrate the latent

growth curves of a set number of groups.²⁸ While modeling the developmental pathways, GBTA allows individuals to follow different trajectories based on the values of observation (Bushway et al., 2001). The fact that it can capture the developmental process in a dynamic way rather than the traditional static way makes GBTA quite attractive for researchers who are interested in understanding long-term trends.²⁹ GBTA also reports the estimated proportion within the population that follows each pathway (Sweeten, 2006). The posterior probabilities reported by GBTA also provide an assessment of the odds of correct classification of individuals' group assignment.

The following equation represents a basic version of GBTA that is a polynomial function which models dependent measures over time (Nagin et al., 2003).

$$y_{it}^j = \beta_0^j + \beta_1^j time_{it} + \beta_2^j time_{it}^2 + \varepsilon \quad \text{-----}(3)$$

Where y_{it}^j is the level of the dependent variable for individual i at time t given the membership in group j . The shape of each group is determined by the parameters β_0^j , β_1^j , and β_2^j . It is also possible to set up a higher order function. The total number of j , however, is partially determined by the researcher. In order to determine the optimal number of groups, a comparison of the Bayesian information criterion (BIC) is necessary.

$$BIC = \log(L) - 0.5 * \log(n) * (k)$$

Where “L” is the value of the model's maximized likelihood estimates, “n” is the sample size, and “k” is the number of parameters estimated in the given model.

²⁸ The number of groups is determined by the prior theories, empirical criteria (Bayesian Information Criteria--BIC) and posterior probability (for more detailed information, please see Nagin, 2004, 2005).

²⁹ Some researchers argue the quality of data and the availability of time-span of data will seriously impact the conclusion (see Eggleston et al., 2003). Nagin (2004) believes that all statistical tools will experience the same problems if sufficient information is not provided.

Generally speaking, when a model gets more complicated, the model fit will almost always get better. To balance between model fit and parsimony, the second part of the equation takes into account the potential loss of parsimony and penalizes the increase in the number of groups. Except for when the benefits gained from adding an additional group outweighs the loss of parsimony, there is no reason to go with a more complicated model over a simpler one (Nagin, 2005). The actual decision-making process regarding the final number of groups is much more complicated. Other than using BIC as a criterion, the researcher also needs to take into consideration the relevant theories, posterior probabilities of group assignment, the odds of correct classification (OCC), estimated group probabilities and whether meaningful groups are revealed.

The equation of the computation of OCC is shown below. The numerator represents the odds of correct classification into group j based on the maximum probability classification rule while the denominator is the odds of correct classification into group j based on group proportion (for detailed explanations of the process, see Sweeten, 2006). The OCC represents the accuracy of trajectory group assignment above and beyond assignment based on chance.

$$OCC_j = \frac{\frac{AvePP_j}{1 - AvePP_j}}{\frac{\pi_j}{1 - \pi_j}}$$

Overall, GBTA has been applied widely on different subjects related to individual behaviors. However, Weisburd et al. (2004) have provided an example showing that GBTA can be used in the study of places. One advantage of GBTA is its usefulness in

handling and summarizing studies with a large number of cases into several meaningful categories. This feature makes it appropriate for the longitudinal study of crime and place as they often involve a large number of cases.

Additionally, the new extension of GBTA---Joint Trajectory Analysis (JTA)---further advances GBTA by adding the ability to incorporate two phenomena simultaneously. It is purposely designed to account for the co-morbidity or heterotypic continuity of two distinct but theoretically connected developmental courses.³⁰ Conventional statistical methods linking two groups of measures (for example, simple correlation or regression analysis) are usually static and inefficient in using the information contained within longitudinal data (for a detailed discussion, see Nagin and Tremblay, 2001). Nagin and Tremblay (2001) first used JTA to explore the comorbidity between physical aggression and hyperactivity. The advantage of JTA is that it can demonstrate simultaneous patterns between two time series and provide conditional probabilities for the occurrence of one variable given the existence of the other. Thus, JTA enables researchers to capture the simultaneous relationship between violence and disorder while also showing the magnitude of association between the two variables.

The results from trajectory analysis in general will provide evidence of whether different places exhibit different patterns of crime and disorder. The findings of Weisburd et al. (2004) remind us that a general trend of macro places does not necessarily represent a universal phenomenon experienced at all places. This is one of the unique contributions that trajectory analysis offers to the current study.

³⁰ Nagin and Tremblay define co-morbidity as “the contemporaneous occurrence of two or more undesirable conditions, such as conduct disorder and hyperactivity during childhood”; and heterotypic continuity “is the manifestation over time of a latent individual trait in different but analogous behaviors.” (Nagin and Tremblay, 2001:18).

Although JTA can provide an estimate of the co-occurrence of disorder and violence, along with other findings, it does not give us a definitive answer about the direction of influence. In other words, if the results from JTA show that disorder and violence tend to cluster spatially, we are still unable to determine whether disorder causes violence or vice versa. From both theoretical and policy relevance standpoints, it is important to know whether disorder has a causal impact on crime or the relationship is merely spurious. Therefore, in stage 2 I test for the existence of causality, as well as the direction of association between the two variables.

STAGE 2---EXAMINATION OF CAUSALITY

If an association is found between disorder and violence in the previous stage, then the next step will be to explore whether the association between them is causal. The Granger-causality test is a method commonly used in economics to test causal relationships in time-series data (Sims, 1972; Rogers et al., 1996; Granger et al., 2000). In the past decade, it has begun to be acknowledged as a useful tool in studying time series data in the field of criminology (for example, see Marvell and Moody, 1997, 1999; Moody and Marvell, 1996).

Granger-Causality Test

This method was first introduced by Granger (1969) to explore whether changes in one variable are the cause of changes in another. Basically, the Granger-causality test makes use of available time series information between a set of variables to conclude which of the variables induce subsequent changes in the others (Rogers et al., 1996; Granger et al., 2000). The operational definition of Granger causality is two-fold. First,

the cause occurs before the effect; second, the cause contains information about the effect that is unique and is contained in no other variable (Granger, 2003).

Sims later elaborated on the Granger causality method (1972). In a classic article written by Sims (1972), he applied the Granger causality test to determine the causal relationship between income (measured by GNP) and money (measured by national currency and reserves). After his successful application of the Granger test, many scholars started to use it to study two or more sets of time-series data³¹ rather than relying on conventional correlational analyses or pure regressions.

The basic idea of Granger-causality is quite simple: If variable X causes Y, then changes in X should precede changes in Y (Sims, 1999). In order to say that X Granger causes Y, there are two conditions to be met.³² First, X should help predict Y; the past observation of X (lagged values of X) should also help predict Y in a regression sense (Sims, 1972, p.541). Second, Y should not help predict X. These two assumptions can be expressed in the following equations (y_{1t} represents the violence rate and y_{2t} represents the disorder rates).

$$\Delta_{y1t} = \alpha_0 + \sum_{i=1}^k \alpha_{1i} \Delta_{y1t-i} + \sum_{i=1}^k \alpha_{2i} \Delta_{y2t-i} + \varepsilon_{1t}$$

$$\Delta_{y2t} = \beta_0 + \sum_{i=1}^k \beta_{1i} \Delta_{y1t-i} + \sum_{i=1}^k \beta_{2i} \Delta_{y2t-i} + \varepsilon_{2t}$$

In order to test whether disorder causes violence, we need to construct two sets of hypotheses which are outlined below.

³¹ According to Granger (1969), it is also feasible to test the causality between three sets of time-series data simultaneously.

³² In the economic literature, when using the Granger causality test, people tend to use the term “Granger causes” when describing causal associations. However, this is not the norm in criminology. Thus I use “cause” instead of using “Granger cause” in the following manuscript to avoid awkward language.

Hypothesis 1: Disorder does NOT cause the violence.

$$H_{0A}: \alpha_{21} = \alpha_{22} = \alpha_{23} = \dots = \alpha_{2k} = 0$$

$$H_{1A}: \text{Not } H_{0A}.$$

Hypothesis 2: Violence does NOT cause disorder.

$$H_{0B}: \beta_{11} = \beta_{12} = \beta_{13} = \dots = \beta_{1k} = 0$$

$$H_{1B}: \text{Not } H_{0B}.$$

From the equations and hypotheses, we can conclude that failing to reject H_{0A} implies that disorder does not cause violence. Likewise, failing to reject H_{0B} suggests that violence does not cause disorder. If neither can be rejected, then disorder and violence are independent series. If both are rejected, then there is a “feedback” loop between disorder and violence and an instantaneous causality exists between the variables.

There is one important point that needs clarification regarding the Granger causality test. Enders (2004) points out that Granger causality is somewhat different from a test of exogeneity (Enders, 2004). An exogeneity between two variables requires a temporal order and causal connections between the occurrences of the two. Granger causality examines whether the use of current and past values (or changes) of one variable help predict future values (or changes) of another variable. Therefore, the Granger causality test satisfies the temporal order requirement of an exogeneity test. Without the inclusion of all possible independent variables in the model, however, the Granger causality test cannot be used to identify the true causes of a variable. In addition, a contemporaneous effect between two variables would also be considered as causal under the Granger causality framework. This type of relationship is usually

referred to as “Granger Causation” to be distinguished from “true causation.”³³

Nonetheless, I believe that Granger causality is an adequate test for the BW thesis as the causes of disorder (or crime) were never a concern in Wilson and Kelling’s original conceptualization.

In this study, I use Granger causality to examine causal associations in the sense of explanatory power. If the past values of social or physical disorder (or changes) help predict the future values (or changes) of violence more so than the other way around, then I can conclude that disorder *Granger causes* violence.³⁴

CAVEATS OF METHOD SELECTION

Before examining the results, it is crucial to review some methodological issues to justify the selection of the analytical strategies outlined above.³⁵ The co-integration test, formulated by Engle and Granger (1987), also seems to be another reasonable way to examine the long-term relationship between these variables. In statistical terms, two (or more) series are co-integrated when a linear combination exists between the series that makes the combined series stationary. This test will assess whether all of the time series, including violence, social disorder, complaint and illegal dumping, will together form an equilibrium that remains at the same level regardless of the regular ups and downs of the

³³ In his Nobel Prize winning lecture, Granger (2003) responded to the general skepticism against Granger causality “...they did agree that my definition was not ‘true causation’ in their eyes, it was only ‘Granger causation.’ I would ask for a definition of true causation, but no one would reply.” The much-debated question of whether such a test constitutes a valid test of causality is beyond the purpose of this dissertation.

³⁴ As noted in footnote 32, from here on I will use “causes” rather than “Granger causes” to avoid awkwardness

³⁵ There are also some potential alternatives to GBTA such as latent growth curve analysis and hierarchical linear modeling. Each method has its strengths and weakness that distinguish one from the other and the targeted users. In this study, I did not include any covariates in the model as the effects of other covariates are beyond the concerns of the study. Under this condition, there is really not much of a difference between the varying methods. Therefore, I decided to use GBTA as it is appropriate to answer the questions proposed in the study.

individual series. The answer to this question bears both theoretical and policy importance. If the combination of violence and disorder remains stable at a certain level, then changing either one of the variables will inevitably affect the rest of the elements in the equilibrium. For example, if we try to tackle violent crime, the system would then try to increase the level of disorder in order to regain equilibrium. A similar situation applies to attempts to target disorder. When disorder is reduced the violence level might be increase, or the disorder level at the next time point might go up, in order to maintain equilibrium if the trends are co-integrated.

However, in this study, all of the time series are stationary (see Chapter 7 for detailed test results). This makes a co-integration test meaningless. A co-integration test examines whether two (or multiple) non-stationary series move together with similar rhythms in the same direction. If a time series does not seem to be “moving” with a trend, then by definition it cannot be tested to see if it moves with another series. This is exactly the case for the current study. All of the time series have no specific pattern or trend. Therefore, there is no point in conducting co-integration tests. Thus, to answer the question of whether violence trends depend on disorder trends, I chose Granger causality tests to examine the causation between disorder and violence.

CHAPTER 6: DATA ANALYSES AND RESULTS I (TRAJECTORY ANALYSES)

This study explores the relationship between violence and disorder. The empirical results will be used to verify different theoretical perspectives concerning the disorder-violence link, namely the broken windows thesis and social disorganization theory (the collective efficacy version). The broken windows thesis predicts that changes in the disorder level precede changes in violence; while Robert Sampson's social disorganization theory suggests that they are both manifestations of the level of collective efficacy---therefore, the linkage between the two should be co-existent rather than causal. To test the key difference between these perspectives, I use several different databases that were collected independently by different agencies in Seattle. Sixteen years of violent crime incidents recorded by the Seattle Police Department were used to represent the level of violent crime; social disorder measures were also drawn from this incident database; physical disorder measures were derived from two separate data sources—the illegal dumping and litter database collected by Department of Public Utility, and the Ordinance Complaints database (abbreviated as complaints database in the following text) collected by the Seattle Planning and Development Department (for more details, see Chapter 4 and Appendix A).

The following two chapters present the results from different analyses of the relationship between disorder and violence, including univariate analyses, trajectory analyses and Granger causality tests of the longitudinal patterns of violence and disorder (both social disorder and physical disorder). Findings from these various analyses should provide insights into understanding the question of interest.

DESCRIPTIVE STATISTICS

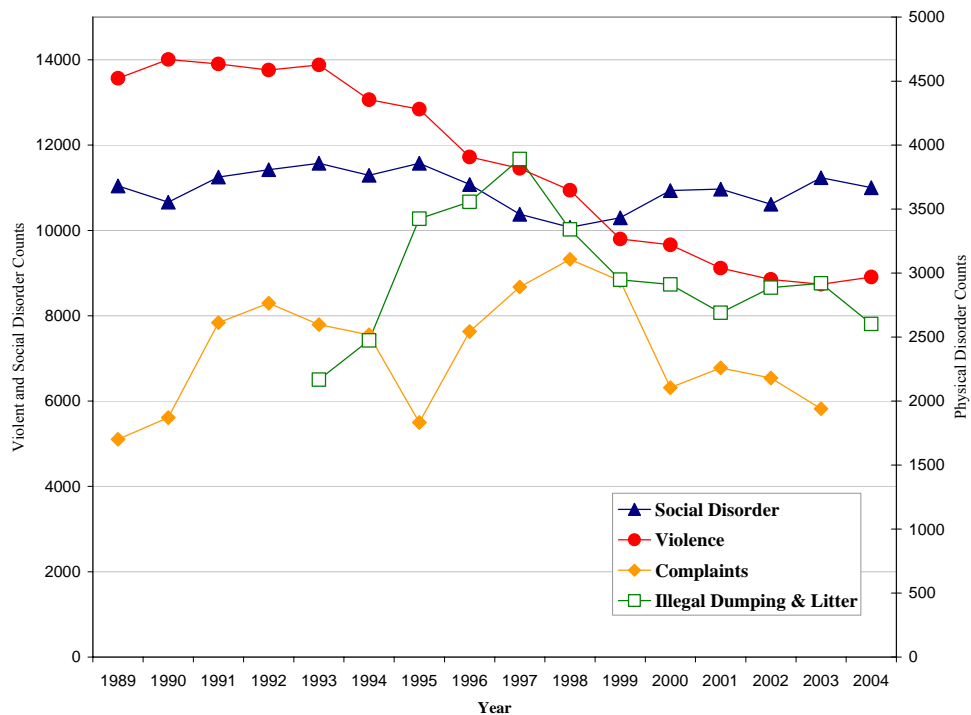
Before discussing the findings, it is important to know the general picture of the violence and disorder trends over time in the city of Seattle. Although the city trends do not provide us with an understanding of the relative relationship between the trends at micro places, they do give us an overall glimpse of the magnitude of each type of incident over time. Figure 6-1 shows the longitudinal trends of violence and disorder (both social disorder and physical disorder) in Seattle over 16 years.³⁶ The violence trend was stable from 1989-1993 and then began to decline thereafter. Between 1989 and 2004, the number of violent incidents decreased by about 20%. Meanwhile, the social disorder trend stayed relatively stable. The commonly seen crime drop did not seem to impact the social disorder trend, regardless of the fact that they share the same information sources. As for physical disorder, two data sets were used to represent the concepts: the complaint database and the illegal dumping and litter database. The complaint data trend showed a bi-modal pattern with a dip in 1995³⁷. The Illegal Dumping data, however, demonstrated more of a bell shape pattern. The trend increased through the early years (from 1993-1996) and reached its peak in 1997-98. From then, the trend gradually declined and eventually returned to its initial level. At the city level, there is no apparent relationship between the violence, social disorder and physical disorder trends. From this graph, one thing is certain: if broken windows are said to have

³⁶ The Illegal Dumping database only covered the time period between 1993- 2006 while the complaint dataset ranges from 1993-2003; therefore, these two physical disorder trends (combining both complaints and illegal dumping) only appear in a shorter period of time. In a later section, these two measures will be analyzed both jointly and separately to see if the inclusion of either database alters the results.

³⁷ Based on exchanges with people who work at the Department of Planning and Development (mainly Karen White, 2007), there was a large scale lay-off and termination of the inspection program around 1994 and 1995. These events could be the reason for the big dip in 1995.

a collective impact on human behavior in the city level, it does not appear to lead to violent behaviors in Seattle.

Figure 6-1. Longitudinal Trends of Violence and Disorder in Seattle 1989-2004



Note: For ease of comparison, physical disorder trends are plotted against the secondary axis.

Next, I present some descriptive statistics to explore how violence and disorder were distributed across census block groups. This is important because the aggregated trends shown above do not tell us whether there exists variability in each trend across different places within Seattle. Additionally, there needs to be enough variation present for the proposed study to be meaningful. If there appears to be no variability and all places demonstrate similar trends, then the following analyses focusing on revealing population heterogeneity are meaningless. Also, it is needless to say that analyses using smaller units (i.e., Census Block Group) would not be required either.

Table 6-1 shows the means, standard deviations, minimum values and maximum values of violence and disorders of block groups by year. Again, violence and social disorder are comparable in terms of their means, which are both much higher than the mean level of physical disorder measures (including illegal dumping and complaints). The range of standard deviations of social disorder (32.6-41.9) is narrower than the range for violence (25.4-44.9; see Table 6-1 (a)). During the last several years of observation, the level of violent incidents decreased dramatically and the disparity of violence counts between places also got smaller. Social disorder, however, has shown a consistent level of both mean values and dispersions over time.

The average levels of illegal dumping & litter and complaints are pretty similar to one another (see Table 6-1 (b)). Each census block group on average has about 3-6 complaints and illegal dumping & litter problems per year. The distributions of both datasets have standard deviations that are very close to their mean values---which might suggest a Poisson distribution for both datasets. Overall, census block groups in Seattle experience more violence and social disorder problems than physical problems based on current measurements. The extent of physical disorder problems, however, spreads throughout the city more evenly than the violence and social disorder problems. In other words, there is more uniformity in physical disorder problems across the census block group in Seattle while there appears to be more variability in violence and social disorder suggesting a higher level of concentration of these problems in certain areas.

Table 6-1. (a) Descriptive Statistics of Violence and Social Disorder Data from 1989-2004

	Violence				Social Disorder			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
1989	23.84	40.275	0	476	19.41	34.128	0	471
1990	24.62	44.926	0	606	18.74	32.595	0	483
1991	24.43	42.217	0	609	19.77	35.475	0	602
1992	24.18	42.682	0	619	20.08	37.781	0	613
1993	24.39	44.157	0	623	20.34	41.979	0	729
1994	22.96	38.393	0	534	19.85	38.153	0	688
1995	22.57	40.937	0	559	20.34	39.483	0	606
1996	20.60	37.478	0	582	19.47	41.047	0	704
1997	20.13	37.049	0	583	18.24	39.344	0	672
1998	19.23	34.073	0	525	17.71	36.168	0	621
1999	17.22	31.062	0	451	18.09	33.936	0	516
2000	16.98	29.264	0	397	19.22	35.930	0	514
2001	16.02	27.845	0	355	19.28	33.202	0	434
2002	15.56	25.935	0	326	18.65	36.103	0	471
2003	15.36	25.383	0	334	19.74	35.277	0	499
2004	15.66	28.275	0	387	19.34	34.083	0	447

(b) Descriptive Statistics of Physical Disorder (Complaints and Illegal Dumping & Litter) from 1989-2004

	Physical Disorder (Complaints)				Physical Disorder (Illegal Dumping and Litter)			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
1989	2.99	3.497	0	28	N/A	N/A	N/A	N/A
1990	3.29	3.635	0	46	N/A	N/A	N/A	N/A
1991	4.59	4.342	0	40	N/A	N/A	N/A	N/A
1992	4.86	4.682	0	39	N/A	N/A	N/A	N/A
1993	4.56	4.551	0	47	3.81	5.742	0	43
1994	4.43	4.577	0	45	4.34	5.872	0	41
1995	3.22	3.180	0	23	6.00	7.976	0	62
1996	4.47	4.525	0	31	6.24	7.666	0	51
1997	5.08	5.402	0	50	6.82	7.902	0	47
1998	5.46	5.020	0	35	5.86	6.707	0	46
1999	5.17	6.124	0	70	5.17	6.983	0	61
2000	3.70	3.642	0	26	5.09	6.814	0	65
2001	3.97	4.226	0	35	4.71	5.859	0	53
2002	3.83	3.794	0	33	5.05	6.703	0	75
2003	3.41	3.763	0	40	5.11	6.588	0	75
2004	N/A	N/A	N/A	N/A	4.56	6.288	0	85

The findings from the previous analyses naturally led to the next question—do the relationships between these trends observed at the city level also manifest themselves at micro-geographic levels? In other words, do all the micro places in the city follow the general trends that were observed at the city level? In the following sections, I will conduct different time-series analyses at the census block group level to examine the existence of population heterogeneity across census block groups.

TRAJECTORY ANALYSES RESULTS

The previous trends from city wide analysis, nevertheless, do not tell us the type of association between violence and disorders at micro places. We cannot draw conclusions about violence and disorder trends at micro places from the reading of citywide patterns. It is possible that disorder-violence link is indeed a micro-place phenomenon where, for example, the impacts of disorders can only affect violence within nearby areas. Thus, a high level of aggregation might mask the dynamics at micro places. I use group-based trajectory analysis (see Nagin, 1999; 2005; Nagin and Land, 1993; Nagin and Tremblay, 2001) to answer these questions. In the following section, I will show findings from trajectory analyses to reveal population heterogeneity within the domains of violence, social disorder and physical disorder (i.e., complaints and illegal dumping & litter separately).

Violence

Drawing from violence-related police incident reports in Seattle, the violence variable includes the following offenses: robbery, homicide, rape, aggravated assault,

non-aggravated assault, kidnapping, drive-by shooting, and sexual offenses. This variable reflects the frequency of violent incidents that occurred within each census block group per year. Group-based semi-parametric trajectories were estimated on 569 census block groups containing a total of 184,217 violent incidents over 16 years. Through consideration of BIC statistics, stability of group assignment, and size of groups, a four-group model was chosen for violent incidents. The summary of model goodness of fit criteria is shown in Table 6-2 to aid the determination of number of trajectory groups and the examination of model performance.

Table 6-2 Violent Trajectory Summary Data and Trajectory Model Diagnostics

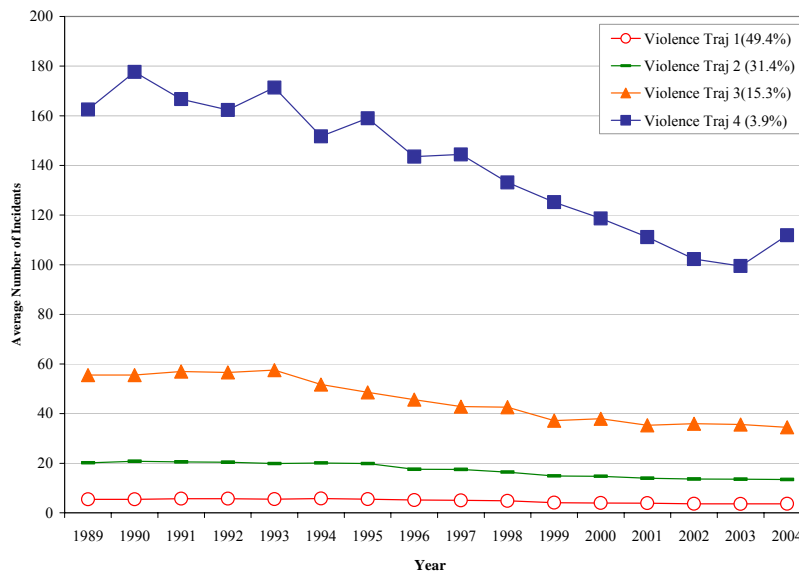
Traj. Group	# of Block Groups (% of Total Blkgrp)	# Incidents (% of Total Incidents)	Avg. # of Violence	Avg. PP	Odds Correct Classification
1	281 (49.4%)	21,759 (11.8%)	77.43	.999	1023.267
2	179 (31.4%)	49,662 (27.0%)	277.44	.996	543.9936
3	87 (15.3%)	63,494 (34.5%)	729.82	.999	5530.412
4	22 (3.9%)	49,302 (26.8%)	2,241	1.000	$+\infty$

The minimum average within-group posterior probability in the model is .996, and the lowest value of the odds of correction classification (OCC) is 543.9. Nagin (2005) suggests that when average posterior probability is higher than .7 and OCC values are higher than 5, the group assignment represents a high level of accuracy. Judging by these standards, the four-group model performs satisfactorily in classifying the 569 block groups into separate violent trajectories.

A graphic representation of the four-group model is shown in the following figure (See Figure 6-2). It is obvious that all violent crime trajectories follow a downward

trend. Regardless of trajectory group assignment, each trajectory shows crime reduction of around 32-37% over 16 years.

Figure 6-2 Violence Trajectory of Census Block Groups in Seattle (N=569)



From Table 6-2 and Figure 6-2, it is clear that violent incidents are highly concentrated at certain areas. In trajectory group 4, twenty-two census block groups (less than 4% of total block groups) accounted for about 27 % of the total incidents. In these violent crime “hot” block groups, 2,241 violent crimes occurred on each of the block group during 16 years. For trajectory group 1, there were only about 77 violent crimes per census block group over 16 years, 30 times less than the intensity of the “hot spots.”

Social Disorder

Social disorder, also drawn from the police incident database, includes problems such as public drinking, noise complaints, harassment, drug use, stalking—so basically

the measure includes vice offenses and other behaviors that are generally considered a disruption to conventional society (for a full list, please see Appendix A). The main difference between social disorder and physical disorder is that social disorder always involves person(s) while physical disorder might just be a physical condition that indicates the lack of maintenance of the areas. Most previous studies tend to mix the effects of social disorder with physical disorder when studying their impacts on crime. In the current study, I construct social disorder and physical disorder variables separately from three independent data sources. This allows me to examine the effects of different types of disorder on violence.

During 16 years of observation, there were 175,405 social disorder incidents reported in Seattle. Using similar criteria, a three-model solution was chosen for social disorder. The minimum average within-group posterior probability in the model is .997, and the lowest value of the odds of correction classification (OCC) is 648 (see Table 6-3). Compared to the criteria recommended by Nagin, the three-group model on social disorder performs very well.

Table 6-3 Social Disorder Trajectory Summary Data and Trajectory Model Diagnostics

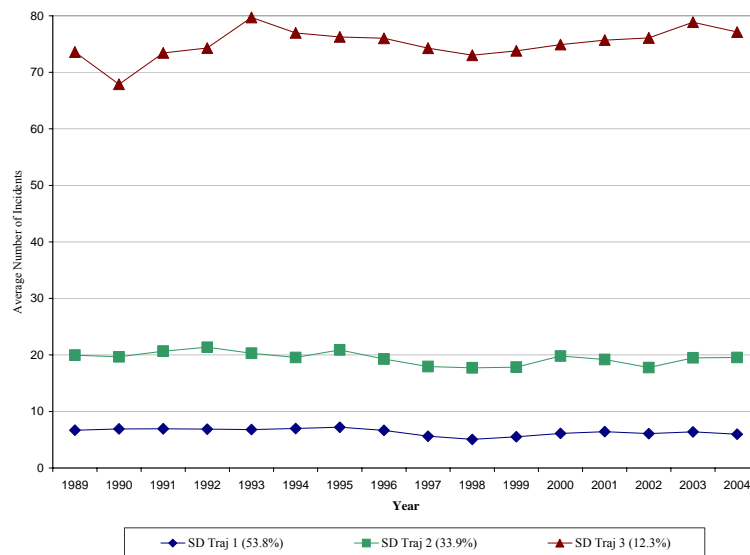
Traj. Group	# of Block Groups (% of Total Blkgrp)	# Incidents (% of Total Incidents)	Avg. # of Social Disorder	Avg. PP	Odds Correct Classification
1	306 (53.8%)	31,273 (17.8%)	102.20	.998	428.5093
2	193 (33.9%)	59,997 (34.2%)	310.87	.997	648.001
3	70 (12.3%)	84,134 (48.0%)	1,201.91	.999	7122.951

Figure 6-3 shows trajectories of social disorder. Unlike violent trajectories, all three social disorder trajectories are highly stable over time. Trajectory 1, the low rate

social disorder trajectory, remains at a steady level of 7-8 social disorder incidents per block group per year. Trajectory 2, the moderate trajectory group, also keeps a steady level of around 20 social disorder incidents over time. Trajectory 3 shows the highest social disorder rate---on average 70-80 social disorder incidents occurred in the block groups assigned to this trajectory group. The trend of trajectory 3 shows a little fluctuation in the first five years (from 1989-1993) but has been quite stable since then.

Social disorder incidents also show a concentration pattern. About 12 % of the block groups were responsible for almost half of the social disorder events. Within those hot spots, 1,202 social disorder incidents were filed over 16 years.

Figure 6-3 Trajectory of Social Disorder



Given the fact that the general crime drop has been observed in the 90's in many places in the United States, this particular finding is particularly interesting (Bratton, 1998; Eck and Maguire, 2000; Blumstein, 2002; Kelling and Sousa, 2001). In a previous study examining the longitudinal crime trend in Seattle, Weisburd et al. (2004) also found

a declining pattern at the city level, while the street-segment level analysis showed crime trajectories belonging to three different categories (increasing, decreasing and stable). Essentially, regardless of the unit of analyses used, the previous studies generally indicate that there have been some changes in crime rates over the past two decades. The findings from social disorder tell us quite a different story. It almost seems that social disorder may be a constant phenomenon that is irrelevant to crime problems.

Physical Disorder—Complaints

The first set of analyses on physical disorder is based on data collected by the Seattle Planning and Development Department. Due to restrictions regarding data accessibility, only information up to 2003 is available. The complaint data mainly came from one source—citizens call in to complain when they perceive problems. The data contain information such as “inoperable vehicles”, “vacant buildings and lots”, “substandard housing”, and “junk storage” that fits the descriptions of disorder described by the broken windows thesis. Over 15 years, there are 35,864 unique complaint cases recorded in the city of Seattle.

Overall, the model performs very well based on the diagnostic statistics (see Table 6-4). A three-group solution was chosen based on the goodness of fit statistics and diagnostic criteria. The summary of the model performance is shown in Table 6-4. Complaints seem to spread out more across block groups compared to either violence or social disorder incidents. Although there are some areas with higher levels of concentration of physical disorder, the disparity between high rate areas and low rate areas is not as salient as what was found in the analysis of violence above.

Table 6-4 Complaint Trajectory Summary Data and Trajectory Model Diagnostics

Traj. Group	# of Block Groups (% of Total Blkgrp)	# Incidents (% of Total Incidents)	Avg. # of Complaints	Avg. PP	Odds Correct Classification
1	299 (52.7%)	9,495 (26.5%)	31.76	.984	167.978
2	227 (39.7%)	18,307 (51.0%)	80.65	.971	32.170
3	43 (7.6%)	8,062 (22.5%)	187.49	.994	570.630

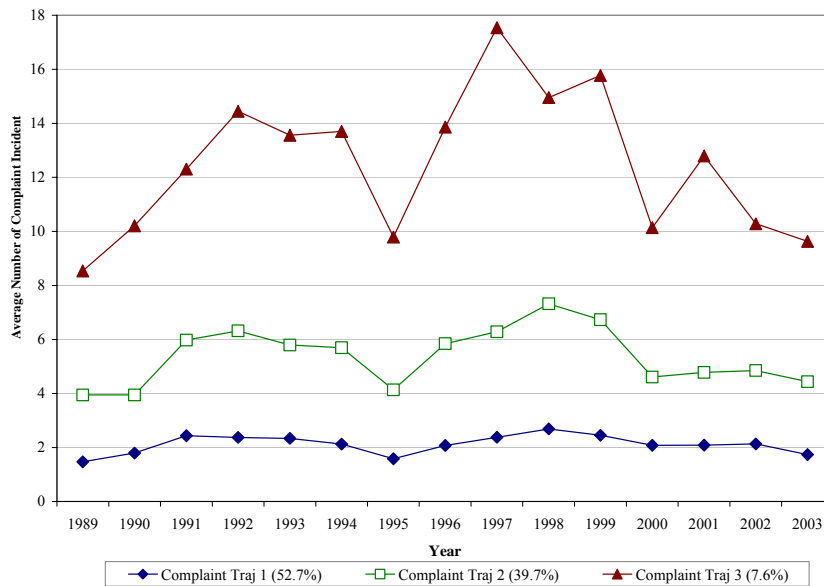
The graphic illustration of complaint trajectories is shown in Figure 6-4.

Compared to violence and social disorder, the volume of complaints is only about 1/5 of the first two databases. Thus, the average number of complaints that occurred in each block group is also lower than the average number of violence incidents or social disorder. This difference is shown in Figure 6-1 and can also be noted by comparing the scales used by different trajectory graphs.

The patterns of the three complaint trajectory groups resemble the city-wide complaint trend and only differ in their level of intensity; all of them follow a bi-modal distribution (see footnote 33 for an explanation of the bi-modal distribution). However, the trajectories differ in the heights of the two bi-modal peaks. With higher frequencies of disorder, the trajectories illustrate higher and more sharply rising peaks, while at lower levels of physical disorder the trajectory is more stable, remaining fairly flat over the 15-year period.

If the trajectory groups accurately reflect the actual occurrence of physical disorder (or the broken window phenomenon), then it is reasonable to conclude that all places have experienced similar trends of physical disorder over time. Again, the only difference separates the groups is the magnitude of incidents. If the trends are governed by some external factors, these forces do not seem to vary across census block groups.

Figure 6-4 Trajectory of Complaints



Physical Disorder—Illegal Dumping & Litter

The second set of physical disorder data came from a database that recorded the locations and frequency of illegal dumping and litter incidents. This data were collected by Seattle’s Public Utility Department. The systematic data collection efforts did not start until 1992 and information was not consistently gathered for that year. Therefore, this study only uses information from 1993 to 2004 when analyzing the illegal dumping dataset.

The type of dumping and litter items recorded in the database consists of things like tires, appliances, yard waste, mattresses, and freezers to list just a few. This particular database includes incidents that came from various sources such as citizen’s calling, inspector’s initiative, and other agencies’ reports. Therefore, the level of incidents should accurately reflect the extent of the actual physical condition of the areas.

Totally, 35,708 incidents involving illegal dumping and litter were analyzed in the current study. The optimal number of trajectory groups for illegal dumping & litter data is four. The model diagnostic indices and other summary information are shown in table 6-5. Once again, the model performs well in terms of separating out trajectories with different pathways. The concentration of dumping/litter “hot spots” is greater than what I found in the analyses of social disorder and complaint but still not as salient as in the analysis of violence.

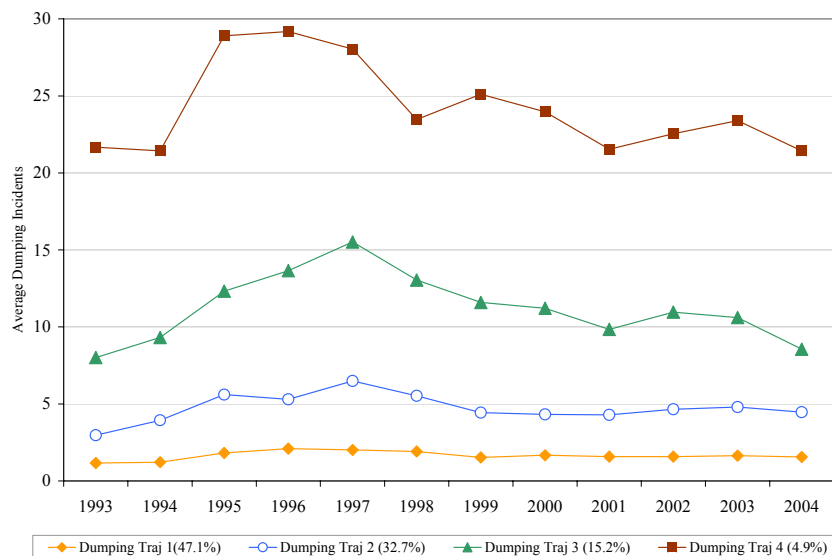
Table 6-5 Illegal Dumping & Litter Trajectory Summary Data and Trajectory Model Diagnostics

Traj. Group	# of Block Groups (% of Total Blkgrp)	# Incidents (% of Total Incidents)	Avg. # of Dumping	Avg. PP	Odds Correct Classification
1	266 (47.1%)	5,257 (14.7%)	19.76	.986	79.1013
2	189 (32.7%)	10,734 (30.1%)	56.79	.963	53.56633
3	86 (15.2%)	11,579 (32.4%)	134.64	.994	924.2456
4	28 (4.9%)	8,138 (22.8%)	290.64	.999	19388.76

The four-group solution is shown in the following graph (see Figure 6-5). Census block groups that were classified in trajectory group 1 (about 47% of the city) showed almost no dumping and litter events over the 12 years. Trajectory group 2 includes 189 census block groups (32.7%) and within those places, a low but stable level of dumping and litter problems existed. Trajectory 3, which accounts for 15.2% of the areas in Seattle, experienced an increasing level of dumping/litter problems in the 1990s. The level peaked in 1997 and then gradually declined. Trajectory 4, the highest level trajectory, represents less than five percent of the city and these areas always had a substantial amount of dumping/litter problems over the study period. On average, there

are about 2-3 dumping incidents per month within these block groups. Trajectory 4 began with about 22 dumping events per year, and then the number increased sharply in 1995 (by about 40%). These 28 census block groups remained at the peak level for three years and then began to decline gradually. Eventually, the level of illegal dumping and litter problems went back to its initial point in the end of the observation period.

Figure 6-5 Trajectory of Illegal Dumping & Litter



Up to this point, there is no apparent association between the results from all four different types of trajectories. The violent crime trajectories have been going down; the social disorder trajectories remained fairly stable over time; the complaint trajectories were regularly moving up and down; and the illegal dumping trajectories followed a uni-modal distribution over time. In the following section, I will conduct joint trajectory analyses to examine pairs of trajectories simultaneously to understand the co-occurrence of the variables of interest.

COMORBIDITY ANALYSES (JOINT TRAJECTORY ANALYSES)

In the previous section, a single trajectory for each of the variables was shown separately. However, when studying the relationship between disorder and violence, there is an important question to be answered---What is the relationship between different trajectories within each block group? Are census block groups classified into the high disorder trajectory also characterized as having higher levels of violence---as predicted by the broken windows thesis? Do social disorder and physical disorder tend to coexist? In a nutshell, I will examine the co-morbidity among these central phenomena. Co-morbidity issues are best answered using joint trajectory analysis, as proposed by Dan Nagin (2001). Recall that joint trajectory analysis can examine the longitudinal patterns of multiple phenomena in a simultaneous fashion. Thus we can closely assess the likelihood of a place having one characteristic (e.g. violence) given the presence of another attribute (e.g. disorder). In the following section, conditional probability tables will be shown to demonstrate the likelihood that we observe violence in an area given the probability of the area's disorder trajectory group assignment. Additionally, maps will be used to show the geographic distributions of trajectories of different variables. The visual illustrations can provide us an easy understanding of locations of each trajectory group and of the relative geographic relationship within and between variables of interest.

Co-Occurrence of Violence and Disorders

I. Social Disorder vs. Violence

Joint trajectory analysis takes into account the longitudinal patterns between violence and social disorder. It produces conditional probabilities which indicate the co-occurrence between the two trajectory group assignments. Once again, all the joint

trajectory results showed satisfactory goodness of fit³⁸. The results were also very similar to the results reported in the previous section. To avoid redundancy, I will not list them again in the current section.

The results from analyzing both violence and social disorder are shown in Table 6-6. The table shows the probability of violence trajectory assignments given the corresponding social disorder trajectory classification.³⁹ The concordance rate between social disorder and violence is very high for the low rate group. We call two ordinal variables concordant if one observation is ranked high on both variables or ranked low on both variables (Weisburd and Britt, 2007). In this case, if a block group is assigned to the low rate social disorder trajectory, then there is an 88.1% of chance that this group will also be found in the no (or negligible) violent trajectory and 11.9% of chance of being classified in the mid-rate violent trajectory group. There is almost no chance that a low disorder block group will be found in a moderate or high violent trajectory group. As such, the results suggest that having few social disorder problems can be a protective factor for places in regards to violent crime problems. Nevertheless, those low rate groups are not so much of the concern due to their theoretical and policy implications. As per the broken windows thesis, we want to know whether having a high level of social disorder will inevitably lead to future violent crime problem. The concordance rate for the high end is not so consistent. For block groups within the high social disorder

³⁸ Similar to results from single trajectory analyses, all the posterior probabilities of the joint trajectory analyses are higher than .90. The value of model OCCs are also far better than the suggestive cut off point (i.e., 5).

³⁹ In the text, I only show the conditional probabilities tables which representing the probability of one phenomenon given the occurrence of another. I also computed the overall probability tables indicating the size of each cells in the cross-tabs. The information conveyed in those tables is very similar to the conditional probabilities tables. The only difference is that the conditional probability tables make it easier for readers to understand the relative conditions within each disorder classification. Thus, I attach the overall probability tables in Appendix B and will not review them in the text.

trajectory, there is only about a 30.6 % of chance of also being classified into the high rate violent trajectory group. In other words, among 70 block groups that continued to demonstrate a high level of social disorder over 16 years, only about 1/3 of them also illustrated a high violence rate, while the other 2/3 showed moderate levels of violent crime. To put those probabilities in perspective, it is important to note that the low rate disorder group accounts for 53% of the total population, the moderate disorder group represents 34.1% of the cases, and the high disorder group contains 12.7% of the block groups. It is also important to note that all violent trajectories illustrated a downward trend in spite of maintaining stable disorder rates.

Table 6-6 Conditional Probabilities of the Violent Trajectory Assignment Given the Social Disorder Trajectory Assignment

Violence Disorder		Violence Trajectory			
		Negligible	Low-Rate Decline	Moderate Decline	High Rate Decline
Social Disorder Trajectory	Low Rate Stable	0.881	0.119	0.00	0.00
	Moderate Stable	0.074	0.721	0.204	0.00
	High Rate Stable	0.0	0.014	0.680	0.306

II. Illegal Dumping & Litter vs. Violence

Analyzing the longitudinal patterns between violence and illegal dumping, the joint trajectory analysis estimated the probabilities of violent trajectory group assignment conditioning on the areas' illegal dumping trajectory group classification. The detailed results from joint trajectory analysis are listed in Table 6-7. As with social disorder and

violence described above, the concordance rates are again highest among the lowest rate trajectory groups. Eighty-two percent of block groups with negligible dumping problems are also relatively free of violence. Also as above, this is not necessarily true at the other end of the continuum. Having been assigned to the highest illegal dumping trajectory group only corresponds to a 30 % of chance of having a high level of violence. Additionally, 18 % of block groups having high levels of illegal dumping were assigned to the low level of violence trajectory group. The probabilities of the off diagonal elements (discordant pairs) are higher for the illegal-dumping and violence cross tabulation than for the social disorder and violence comparison above. The proportions of negligible, low rate, moderate, high rate dumping trajectory groups are 47.8%, 32.5%, 14.8% and 5.0%, respectively. Similar to many studies, the hot spots of many crime related phenomena only account for a small portion of the population. Having said that, the results indicate that having more broken windows does not necessarily predict what the level of violence will be at a given place.

Table 6-7 Conditional Probabilities of the Violent Trajectory Assignment Given the Illegal Dumping Trajectory Assignment

Violence Dumping		Violence Trajectory			
		Negligible	Low-rate Decline	Moderate Decline	High Rate Decline
Illegal Dumping Trajectory	Negligible	0.824	0.159	0.018	0.000
	Low Rate	0.285	0.527	0.171	0.016
	Moderate	0.012	0.326	0.424	0.238
	High Rate	0.00	0.179	0.501	0.321

III. Complaint vs. Violence

The concordance rates between the complaint and violence trajectory group assignments are the lowest among all three sets of comparisons (see Table 6-8). In the low rate complaint trajectory, 66 % of the block groups also have negligible levels of violence. However, there is a 34 % chance that a low complaint block group can have non-negligible amounts of violence. For moderate and high rate complaint trajectories, the patterns of the violence trajectory group assignment are not consistent either. The concordance rates between the violence and disorder (measured by complaint data) trajectories do not pattern as consistently as in previous analyses, although the proportions of each complaint trajectory group are similar to what was found in the previous analyses. The proportions of low rate, moderate, and high rate complaint trajectory groups are 52.9%, 39.1%, and 7.9%, respectively.

Let's imagine a real life example to illustrate the inconsistent probabilities that I observed. If we have a total of 100 block groups that show high levels of physical disorder judged by the complaint trajectory grouping, 4 of them are free of violence problems, 28 of them have a low level of violence occurrence, 47 of them have a moderate level of violence, and 21 of them have a high level of violence problems. The lack of a clear pattern between complaints and violence trajectory assignment can be a result of many possible causes. These possible causes will be discussed in a later section. Though there is no definite answer at this moment, the complaint data clearly demonstrate a different dynamic from the rest of the variables.

Table 6-8 Conditional Probabilities of the Violent Trajectory Assignment Given Complaint Trajectory Assignment

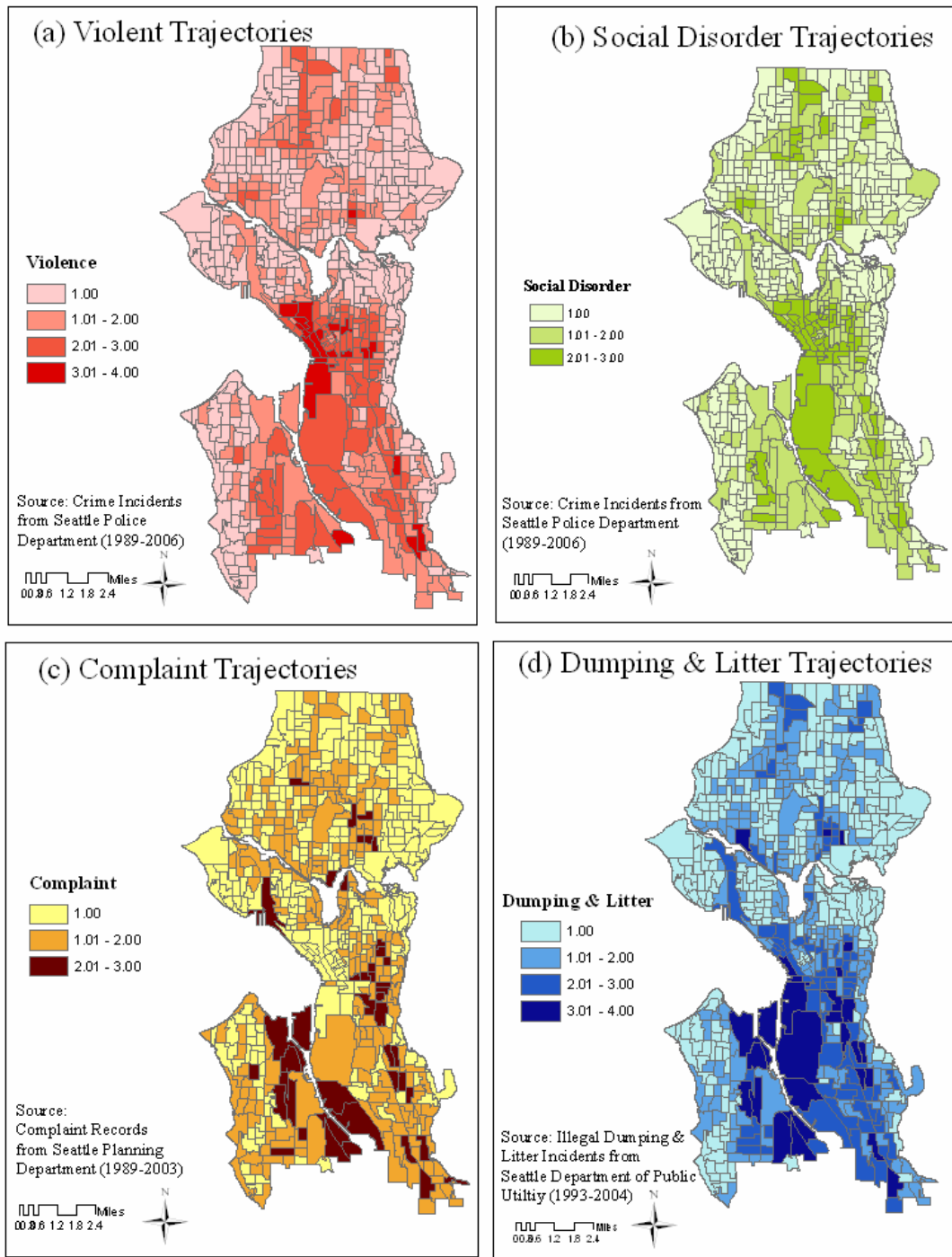
		Violence Trajectory			
Violence Complaint		Negligible	Low-rate Decline	Moderate Decline	High Rate Decline
Complaint Trajectory	Low Rate	0.659	0.217	0.083	0.040
	Moderate	0.354	0.442	0.170	0.034
	High Rate	0.044	0.280	0.469	0.206

GEOGRAPHIC DISTRIBUTIONS OF DIFFERENT TYPES OF TRAJECTORIES

In the following page I start by plotting the geographic locations of trajectory group assignments for each variable (Figure 6-6). The number of trajectory groups corresponds to their level of observations, as such group 4 has the highest number of violent incidents and group 1 the fewest. Similarly, when reading the maps the darker the color, the higher the rate of the particular type of incident.

From reading the maps, it is quite obvious that the “hot spot” of violence concentrates in the center, downtown area of Seattle (Figure 6-6 (a)). There are also a few areas in the south and one area in the north that are marked as having high levels of violence. But there is no doubt that violent crimes cluster in the center area, which is the narrowest area from east to west in Seattle. Social disorder and illegal dumping also show a similar pattern, with a lesser level of concentration. The hot spots of illegal dumping are located more to the south than violence and social disorder hot spots (Figure 6-6 (d)). The map of the complaint-based trajectory distribution (Figure 6-6 (c)) shows quite a different story. The central area of the city contains the highest concentration of violence, social disorder and illegal dumping & litter problems; however, this area seems to be free from those physical disorder problems such as abandoned cars, substandard housing, etc. that were measured by the complaint dataset. Interestingly, in the few hot spots in the north and south noted above, the concentration patterns are consistent across all four databases. Once more, comparing results from analyzing all four databases, the findings from complaint data stand out. The results from complaint data do not entirely coincide with patterns observed from the rest of the databases.

Figure 6-6. Geographic Distributions of Different Trajectory Classifications



Below, I further examine the geographic correspondence between different types of disorder and violence. For illustrative purposes, I dichotomize disorder into high or low categories based on the original trajectory assignments. Block groups that are classified as having a high rate trajectory in the previous analysis are labeled as “high”, whereas block groups belonging to other trajectory groups are labeled as “low.” I therefore create four possible combinations according to the area’s classifications of social disorder and physical disorder⁴⁰: (1) low social disorder-high physical disorder; (2) low social disorder-high physical disorder; (3) high level social disorder-low level physical disorder; and (4) high level social disorder-high level physical disorder.

Figure 6-7 displays the distribution of the four social-physical disorder combinations as well as the intensity of violence based on these trajectory groupings.⁴¹ To better exemplify the differential distribution of violence with respect to different disorder combinations, I only select block groups that were classified in either the highest violence trajectory or the negligible violence trajectory to allow the difference to be shown easily. The map shown in figure 6-7 conveys two pieces of information for each block group. First, I denote each block group based on the social disorder--physical disorder classification: a blank polygon with light orange frame is for low social disorder-low physical disorder; a dotted pattern is for low social disorder-high physical disorder; a diagonal striped pattern is for high social disorder-low physical disorder; and a dark orange filled area represents high social disorder-high physical disorder. In addition to the fill patterns, the level of violence is denoted by two symbols: diamond denotes that

⁴⁰ For the sake of simplicity, here I only use illegal dumping to construct the physical disorder category.

⁴¹ The layout of the map was inspired by Morenoff et al., 2001.

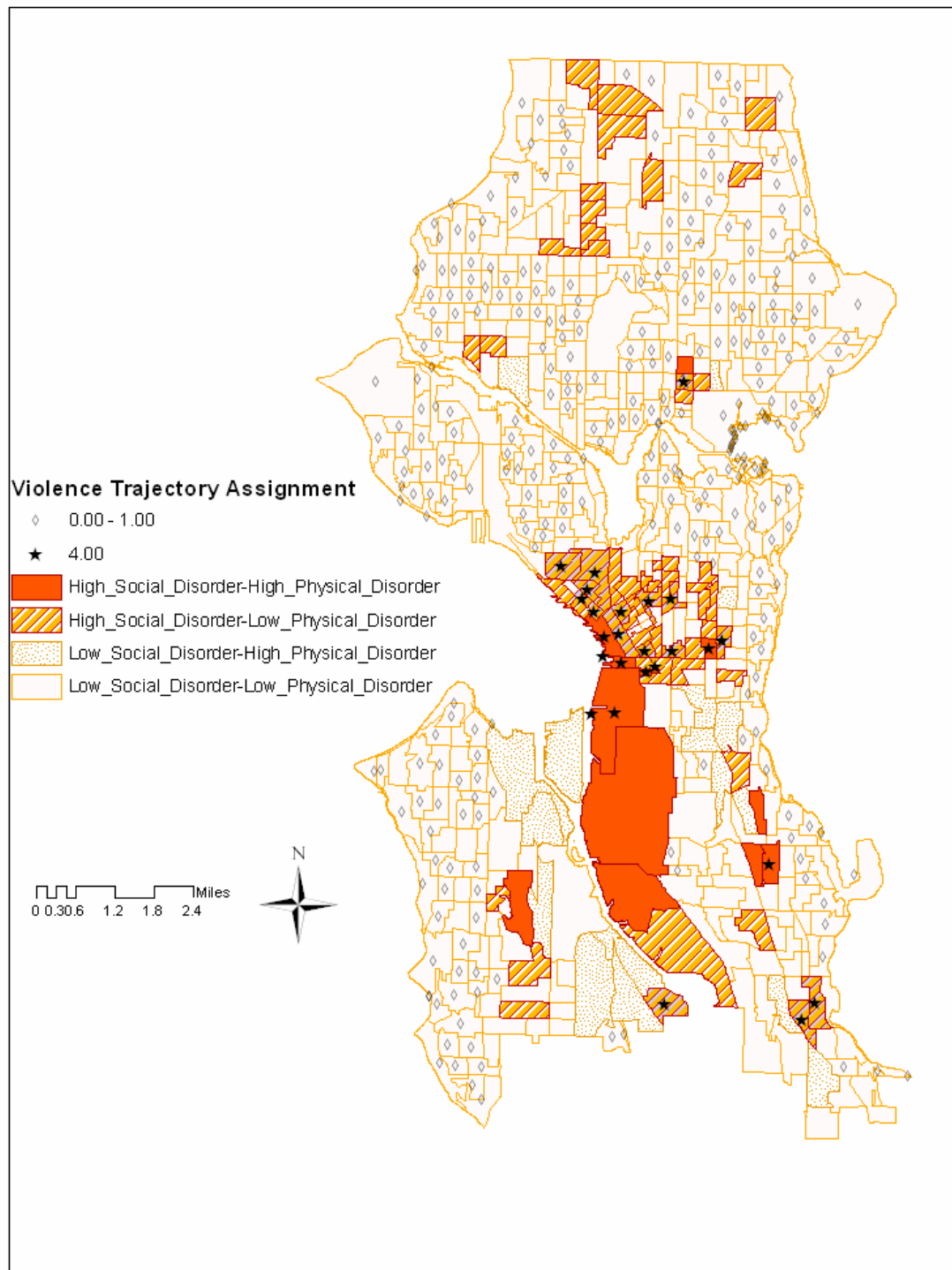
the corresponding block group has been assigned to the negligible violence trajectory and the star symbolizes a high violence rate for the given block group.

Some interesting observations emerge from examining the map. First, stars, indicating high levels of violence, only show up at block groups with high levels of social disorder (dark orange and diagonal striped areas). High levels of physical disorder alone do not seem to attract violence problems. Additionally, diamonds only occur at places with low levels of both social and physical disorder. Even though the existence of physical disorder does not seem to associate with high violence rates, it does correspond to non-trivial violence problems. While high violence areas always coincide with high social disorder, having high social disorder does not predict the occurrence of a high violence trajectory; areas with both high levels of social disorder and high physical disorder are not necessarily predisposed with high levels of violence problems. Perhaps there is something above and beyond the level of disorder that helps explain the violence rate at places.

This map once again confirms findings from the previous section that a place with low disorder will be free of violence but this logic does not work the other way around. That is, having high levels of disorder does not appear to be necessary or sufficient in explaining violence. From the correspondence rates on the map, it might be more convincing to argue that the characteristics of the central area predict the level of violence more so than linking disorders to violence.⁴²

⁴² As mentioned in an earlier chapter, the determination of census block groups also depends on the size of households. Thus, the size of the population within each block group should not bias the results of the analyses. In other words, the concentration of violence in the central area should not be due to the difference of population density. Further analysis about this issue will be presented in Chapter 8.

Figure 6-7. Geographic Correspondences between the Distributions of Violence and Disorders



SUMMING UP

The findings outlined above suggest there is no sign that the disorder trends precede the violence trend as claimed by the BW thesis. The four datasets analyzed above yield four distinct types of trajectory patterns. More specifically, the violence trend seems to be independent from the disorder trends' movements when we study all 570 block groups. Nonetheless, there is a spatial co-morbidity found from the joint trajectory analyses. We also learned some consistent patterns from the joint trajectory analyses. That is, if a census block group does not have a disorder problem, then it is very unlikely it will have violence problem. This consistency, however, is not always true for the high disorder areas. Block groups that have high levels of disorder---the main focus of the BW thesis--do not always have high levels of violence. Moreover, social disorder predicts violence better than physical disorder, but not by much. Specifically, a place with a high level of any kind of disorder problem has only less than one third of a chance of also having high a violent crime rate. What do these findings tell us about the validity of the BW thesis? Wilson and Kelling were right on one point: if a place has no disorder, then it is unlikely to have a crime (violence) problem. Their generalization of the previous logic to further argue that if a place has disorder then it must have crime does not seem to be so true based on the empirical results.

Is it possible that broken windows mechanism is only valid for places that have sufficient amounts of disorder or violence? Perhaps the inconclusive results were due to attenuation caused by analyzing the whole city rather than just hot spots? We know that certain places (i.e., the "hot spots" or "the powerful few") are responsible for the majority of both disorder and violence problems (see Gladwell, 2002; Sherman, 2007; Sherman et

al, 1989; Weisburd et al., 2004). In other words, most places are symptom free while a few places exhibit a high intensity of disorder, violence and other problems. As such, disorder and violence may not cause concern at most of the places as a low intensity of one problem might not necessarily exceed the threshold to invoke reactions or reinforce the generation of another type of problem. Thus, analyzing the total population (in this case, 570 block groups of the whole city) rather than focusing on the powerful few may be misleading. The inconclusive results above also suggest that more thorough analyses are needed to further explore this issue. In the following section, I select block groups that are either classified highest in all three disorder trajectories or highest in the violence trajectory group for further analyses. An additional criterion was applied to avoid the contamination of spatial autocorrelation: any selected block group cannot be adjacent to another selected block group so no two selected block groups can share boundaries.

CHAPTER 7: DATA ANALYSES AND RESULTS II (TIME SERIES ANALYSES)

The findings from trajectory analyses so far do not provide conclusive empirical support for the BW thesis. The majority of places with low or negligible disorder problems do not experience violence problems. However, for block groups that experience high levels of disorder only about 30% of them are also troubled by a high level of violence. Even though there is a pattern between violence and disorder, it is not clear from the trajectory analysis results what kind of relationship exists between the two. Additionally, spatial clustering of social or physical disorder does not necessarily inform us of the location where violence concentrates.

Recall that the BW thesis argues that the level of disorder should causally influence the level of crime (violence in this case); while the Sampson and Raudenbush (SR) perspective suggests that the levels of disorder and violence are just spuriously related. In this chapter, I use time series methods to examine whether these two trends are causally related at the block-group level. The results should supplement the findings from previous trajectory analyses and shed some light on the debate between these two distinct perspectives.

TIME INTERVAL SELECTION

Before applying time series methods, it is necessary to decide on the appropriate time interval in order to prepare data for the following analyses. The past literature, dealing with the impacts of disorders on crime (violence), presents a rather ambiguous idea about the appropriate time interval to be used (see Taylor, 1996; Kelling and Sousa,

2001; Harcourt and Ludwig, 2006 for example). The BW thesis, although suggesting a temporal order between disorder and crime, does not specify the optimal time length from the presence of disorder until the occurrence of crime. As a result, previous scholars who examine the validity of the BW thesis use various time intervals, depending on the availability of data. For example, Skogan (1990) illustrated a gradual process between presence of signs of disorder, occurrence of crime and neighborhood decline. Yet no estimate or suggestion of the length of this process was given in his work. Kelling and Sousa (2001) used annual data in an analysis examining the effect of broken windows policing on the violent crime rate. In the same study, bi-weekly data were also analyzed to demonstrate the changes of crime rates in response to BW policing within several police precincts. Thus, it is reasonable to conclude that Kelling, as one of the original authors of the BW thesis, does not assume that there exists a most appropriate time interval to use when studying the effects of disorder on crime. In replicating the Kelling and Sousa study, Harcourt and Ludwig (2006) adopt year as the interval of analysis. Finally, Taylor (1999) used disorder assessed by researchers in 1981 to predict crime rates in the early 1980s and even crime rates in the early 1990s, a decade later.

In sum, there is no consistent guidance about the “proper” time interval between disorder and crime in theories or past studies. Some studies use annual data to examine the disorder-crime link (like Kelling and Sousa, 2001) while other studies use monthly data to examine the time trend between disorder and crime (see Corman and Mocan, 2005 for an example).

In the second part of the analyses presented below, monthly data is used to examine the association between violence and disorder time series. Since there is no

clear theoretical guidance on this issue, I use monthly data for a practical reason. Using annual data, which means 16 years of data points, does not lend much power to time-series methods in examining the longitudinal trends. Using monthly data increases the data points from 16 to 192, and this longer period of observation lends more power to the subsequent analyses.

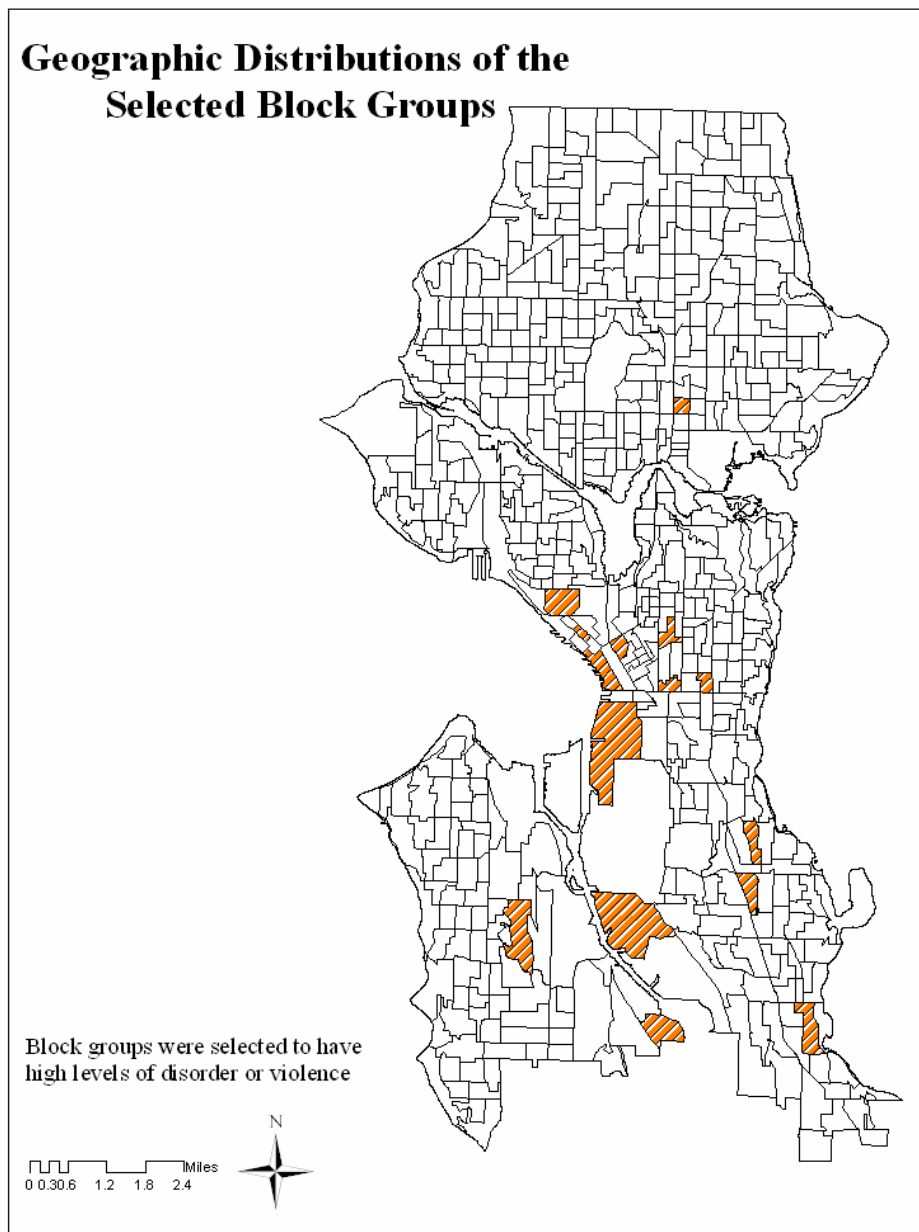
In addition to changing the time interval specification from year to month, only a selected number of block groups were used for the following analysis. As mentioned at the end of the last section, I selected a sample of block groups for time series analysis for several reasons. First, if I use all 570 census block groups, with only 192 observations, spatial auto-correlation will severely bias the time series results. Second, to include all 570 block groups would require 13,680 ($570 \times 12 \times 2$) equations in order to examine each pair of time series within each block group.⁴³ This volume of analysis is unwieldy and beyond the capabilities of the current research. For these reasons, I decided to develop a more strategic analysis plan. In order to avoid spatial autocorrelation overwhelming the model, as well as to manage the task within a reasonable scope, 15 high-rate block groups were included in the analyses.

The qualifications for the inclusion of 15 block groups are discussed as follows. First, I selected block groups that were either classified in the highest disorder trajectory group for all three types of disorder or were classified in the highest violent trajectory but not in the highest disorder groups. Instead of randomly selecting a small sample, I use the first criterion to assure that all chosen block groups contain a sufficient amount of observations for Granger causality tests to be meaningful. Another reason that I chose to

⁴³ This number equals the total number of Granger causality tests that I would need to conduct in order to test both the Granger causality of levels and differences among variables. Note that this number does not include the number of unit root tests which are a prerequisite before conducting the Granger causality tests.

use high-rate block groups is also because the findings of these places are more significant from both theoretical and policy standpoints. From Wolfgang's Philadelphia cohort research to Sherman and Weisburd's hotspots study, then to Galdwell's "law of the few", we know that most of the problems are accounted for by a small group of people (or places). Thus, focusing on all block-groups rather than the "hot spots" might attenuate the results. There were 27 block groups in total that fit the descriptions. Another criterion was applied to these 27 block groups to avoid problems that spatial auto-correlation might cause. I only selected block groups that were not adjacent to other selected block groups. These two criteria together filtered the original 570 block groups into the final sample of 15 block groups for the time series analyses. Among the 15 chosen block groups, 5 were ranked "high" on disorder classification, 8 were ranked "high" on violent classification, and 2 of them were classified as "high" on both violent and disorder classification. The geographic locations of the selected block groups are shown in Figure 7-1.

Figure 7-1. Geographic Locations of the 15 Selected Block Groups



To test the possibility of whether this purposeful sample influenced the patterns of the following analysis, I ran two sets of *t*-tests comparing the differences of structural variables (drawn from both the 1990 and 2000 census) between the selected and unselected high disorder-violence block groups as well as testing the differences between the selected block groups versus all of the remaining block groups. The results are

presented in Table 7-1. I begin with comparisons based on the 1990 census information because this was the beginning period of the study. This information should tell us whether those high intensity block groups began with similar traits.

The results show that there is no difference between the selected block groups and the unselected block groups on all ten traditional social disorganization variables measured in 1990. As for the 2000 census, only two variables—MEDINC and RENTER—show a significant difference between the two comparison groups. The findings of the *t*-tests offer confidence in the sample selection of this analysis by suggesting that the use of the selected sub-sample did not introduce any systematic bias into the results. As such, the results obtained from the 15 selected block groups should be generalizable to the rest of the high intensity block groups.

Another set of comparisons concerned the differences between the selected block groups versus the remaining block groups in Seattle. In brief, these two groups are significantly different regarding HETERO, COLLEGE, UNEMPLOY, MEDINC, RENTER, and MOBILITY variables in both 1990 and 2000. Additionally, YOUTHMALE is significant in the 1990 comparison and LINGISO is significant in the 2000 comparison. All the directions of the differences follow the expectations of the traditional social disorganization theory. The high intensity groups tend to be more heterogeneous, have less college educated residents, have higher unemployment rates, have lower median incomes, have a higher percentage of renters in the area, and have a higher population mobility rate. Not surprisingly, there are substantial differences between the high intensity block groups and the rest of the population, which largely does

not have any disorder or violence problems. Thus, the purpose of this comparison is just to provide an overview of which characteristics differentiate these two groups.

From these comparisons, the characteristics of the 15 selected block groups are very similar to the 12 unselected block groups that were also identified as violence or disorder hotspots by the first criterion. Therefore, the findings of the 15 selected block groups should be generalizable to all high-disorder/high violence block groups. Thus, I am confident that the use of the selected sample in the Granger causality tests should not introduce any systematic bias to the results.

Table 7-1 *t*-tests for Selected Sample Bias Using 1990 and 2000 Census Information

	<u>Comparison for 1990 Information</u>				<u>Comparison for 2000 Information</u>			
	<i>Selected vs. Unselected</i>		<i>Selected vs. All</i>		<i>Selected vs. Unselected</i>		<i>Selected vs. All</i>	
	<u><i>t-value</i></u>	<u><i>Sig. Values</i></u>	<u><i>t-value</i></u>	<u><i>Sig. Values</i></u>	<u><i>t-value</i></u>	<u><i>Sig. Values</i></u>	<u><i>t-value</i></u>	<u><i>Sig. Values</i></u>
POPDEN	-1.93	0.065	-0.50	0.620	-1.70	0.107	0.61	0.544
HETERO	-0.20	0.842	2.23	0.026*	1.14	0.267	2.63	0.020*
YOUTHMALE	2.04	0.052	2.10	0.036*	0.54	0.594	0.67	0.515
FHH	0.98	0.336	1.47	0.163	1.25	0.224	1.49	0.158
LINGISO	-0.41	0.688	1.40	0.163	-1.77	0.090	2.15	0.032*
COLLEGE	0.84	0.409	-3.05	0.002**	0.49	0.627	-3.62	<0.001**
UNEMPLOY	-1.90	0.076	2.33	0.02*	-1.29	0.209	3.09	0.002**
MEDINC	0.91	0.374	-11.55	<0.001**	3.58	0.001**	-5.22	<0.001**
RENTER	-1.29	0.210	7.97	<0.001**	-3.08	0.005**	4.14	0.001**
MOBILITY	0.98	0.337	4.38	<0.001**	-0.74	0.468	4.15	<0.001**

*Statistically significant at the $p \leq .05$ level; ** statistically significant at the $p \leq .01$ level.

UNIT ROOT TESTS AND STATIONARITY

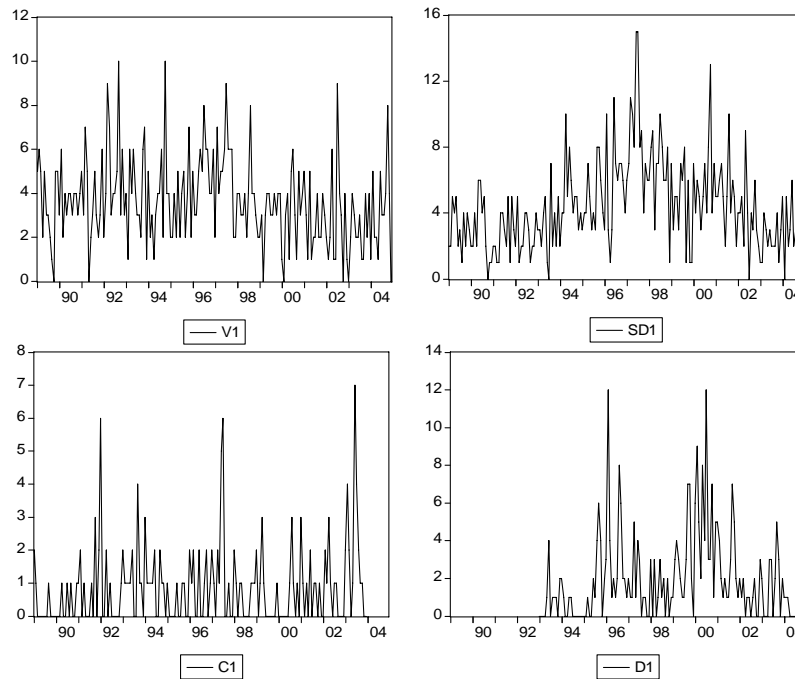
To test the hypothesis that disorder intensity impacts levels of violence, we must first determine whether the standard Granger-causality framework can be implemented, or if the model should be examined by testing for cointegration between the variables. The choice of method depends on the properties of the individual time series data. For example, the cointegration test is used to detect whether two (or multiple) time series are moving in a similar pathway. Thus, time series used in the test need to demonstrate a deterministic trend first. More details about the related terminology like deterministic, unit-root and stationary can be found in Chapter 5.

The monthly data of each of the four time series across 15 block groups are shown in the following pages (see Figure 7-2). Figures in panel (a) to panel (o) represent four separate time series within each of the selected block groups. Reviewing the 15 sets of time trends, it seems like the monthly trends of violence and disorders fluctuate in a much larger magnitude compared to the annual trends presented earlier. The fluctuations, however, do not seem to have any designated pattern or direction. The spikes and valleys deviating from the main trends seem to be systematic and the trends always return to the original mean levels.

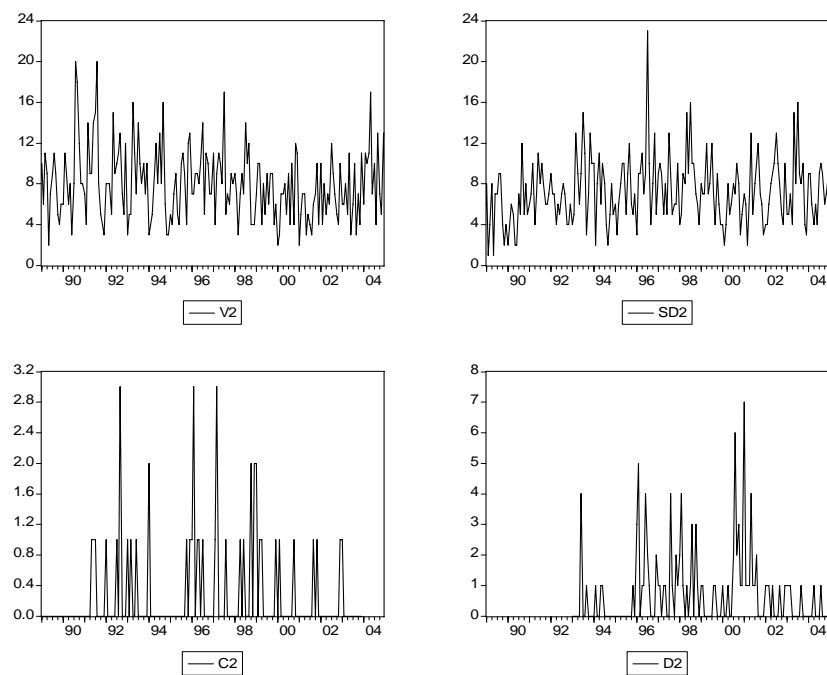
Figure 7-2. Violent and Disorders Time Series Plots (by Month)

(V=Violence, SD=Social Disorder, C=Complaint, D=Dumping)

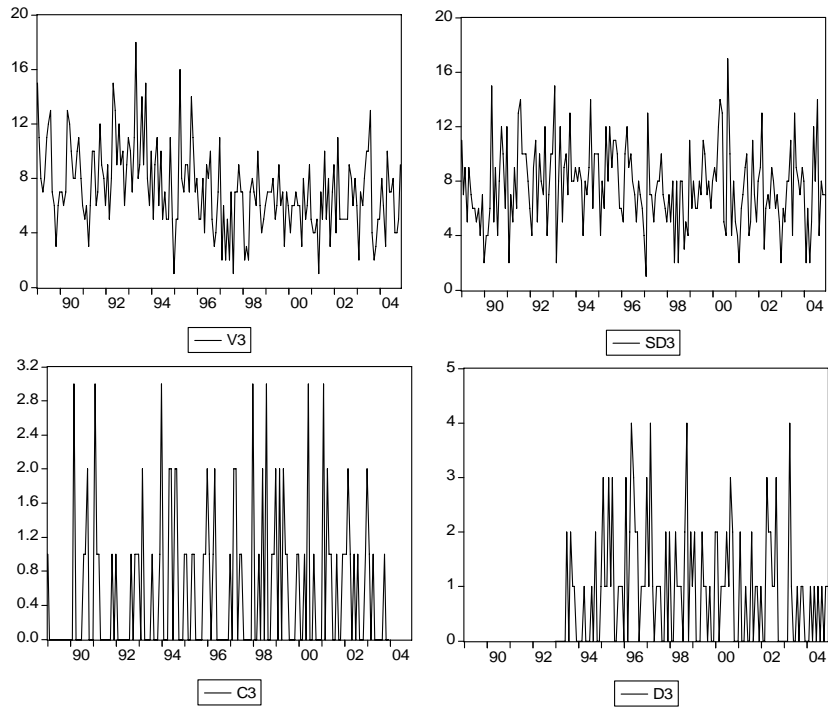
(a) Block Group 1



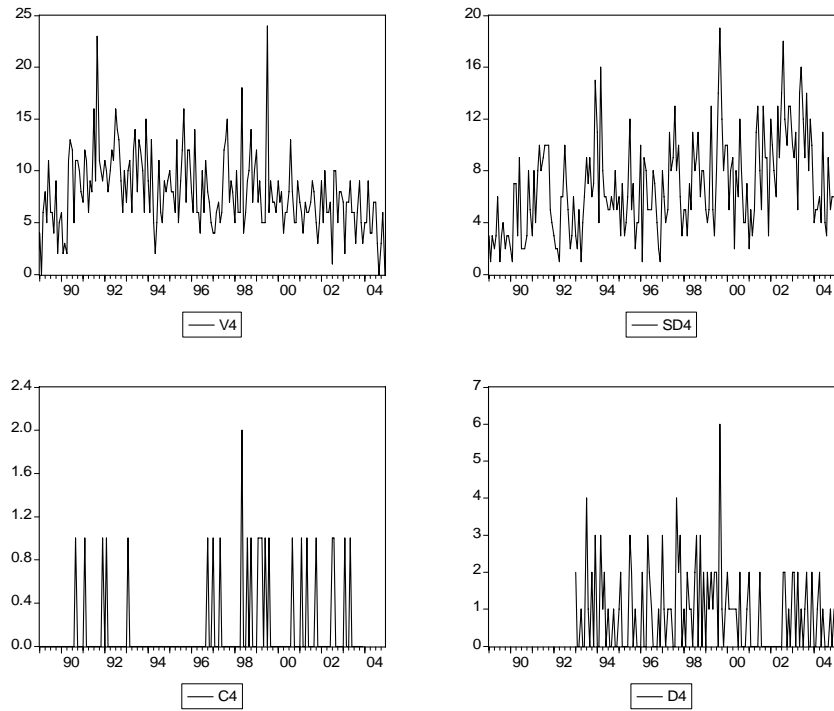
(b) Block Group 2



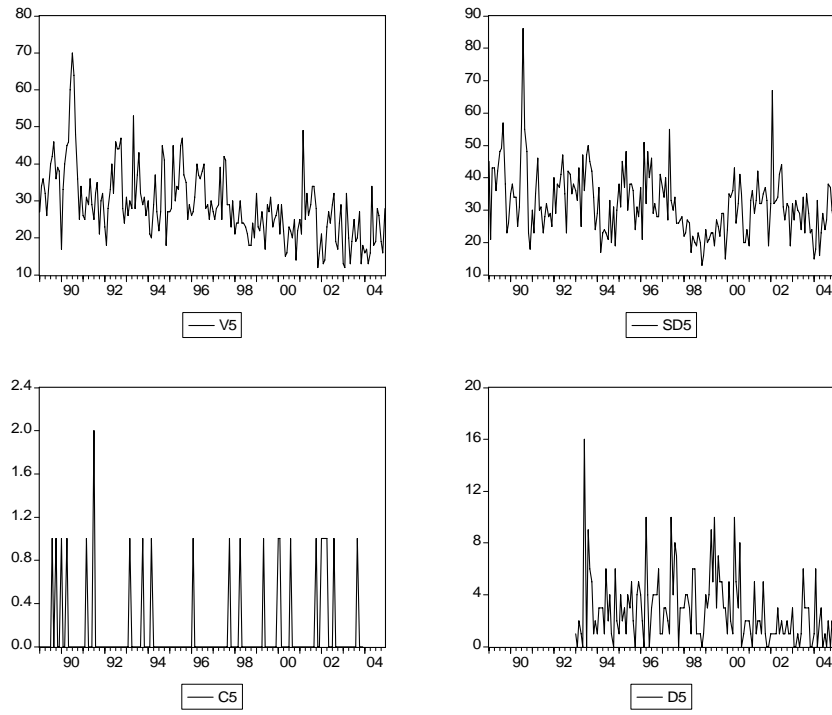
(c) Block Group 3



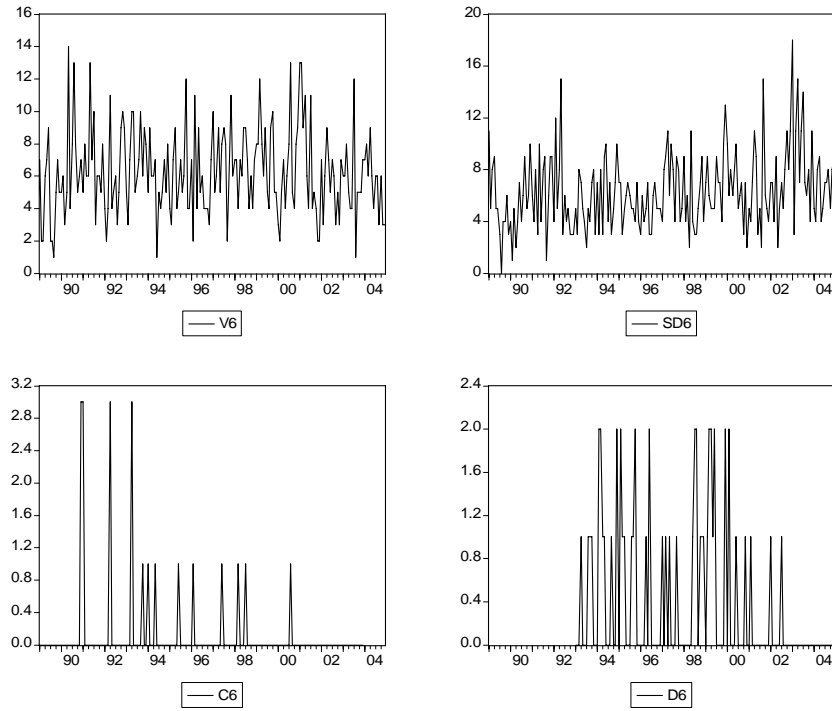
(d) Block Group 4



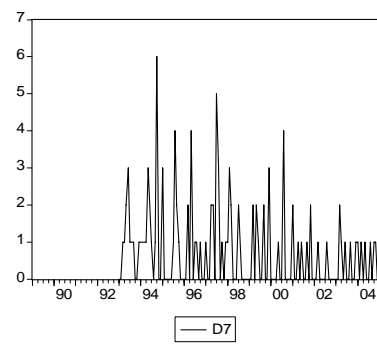
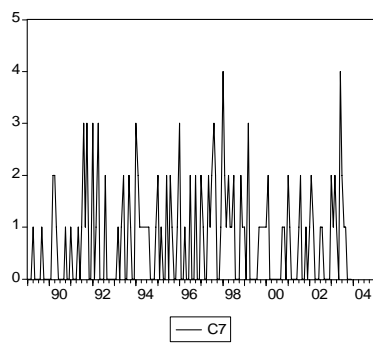
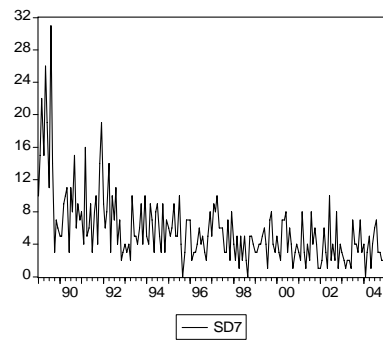
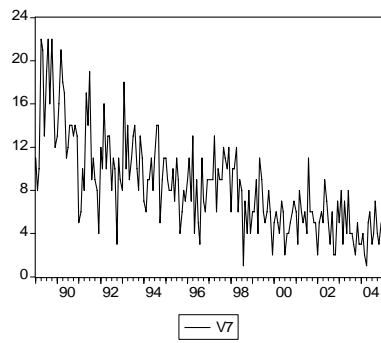
(e) Block Group 5



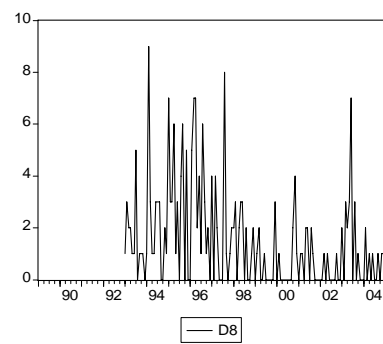
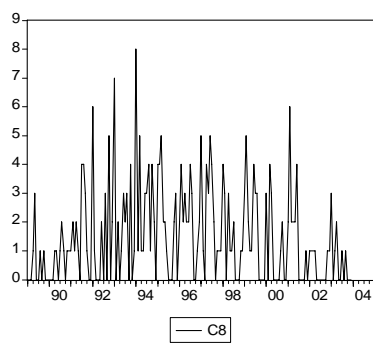
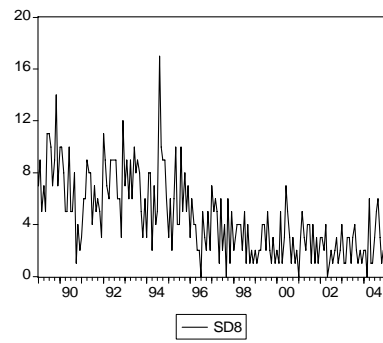
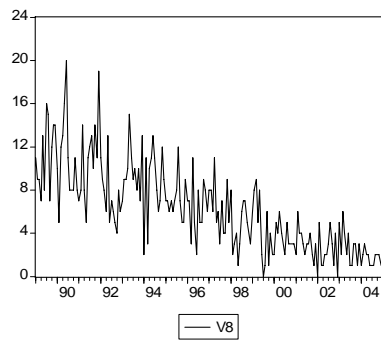
(f) Block Group 6



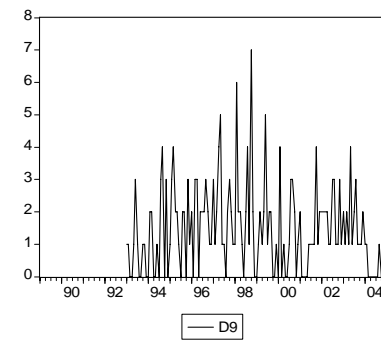
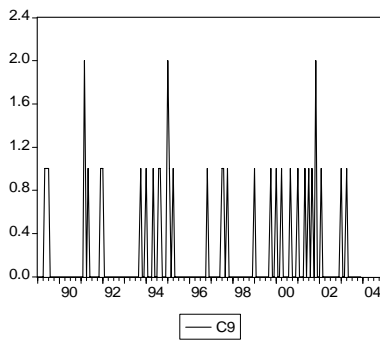
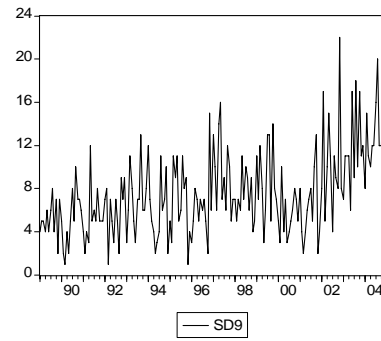
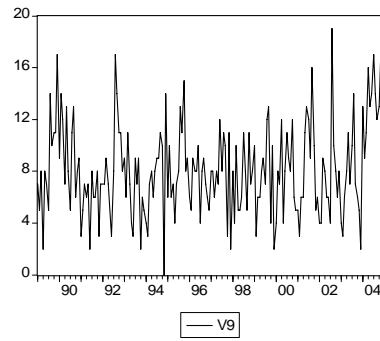
(g) Block Group 7



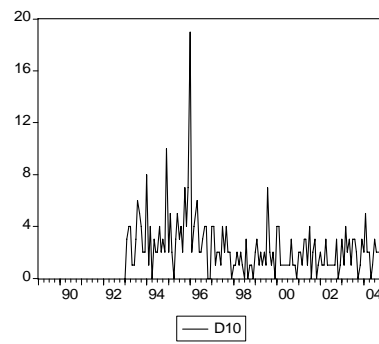
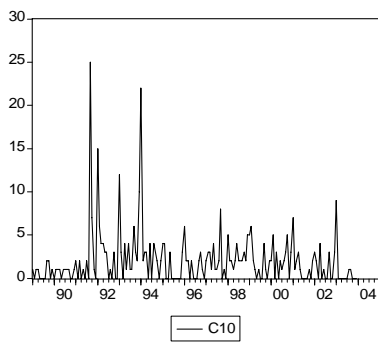
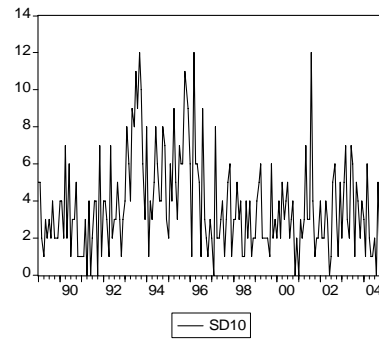
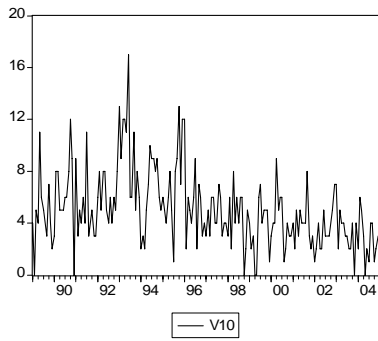
(h) Block Group 8



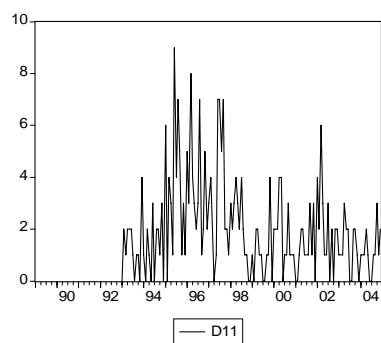
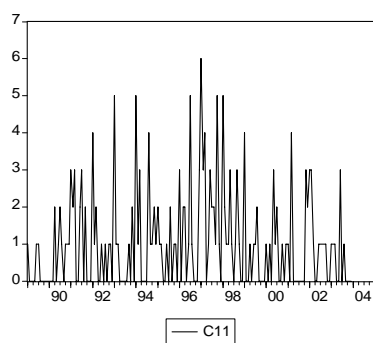
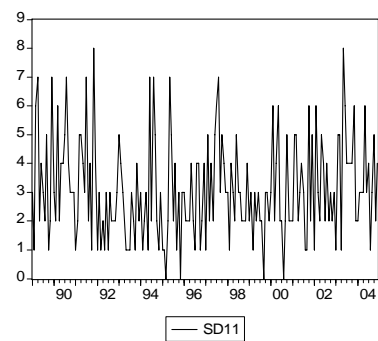
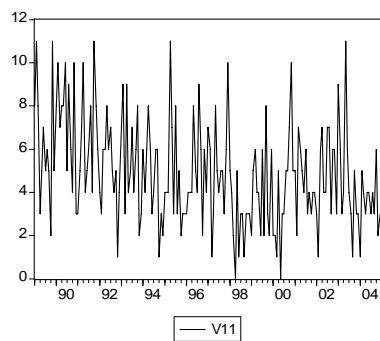
(i) Block Group 9



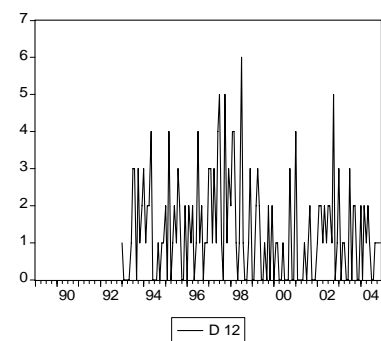
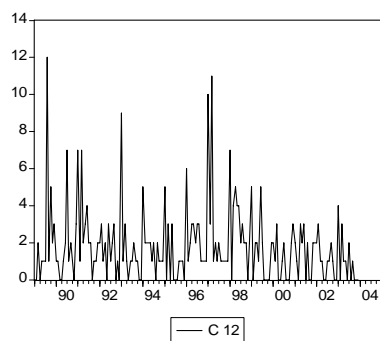
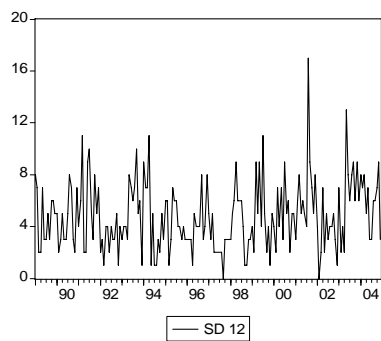
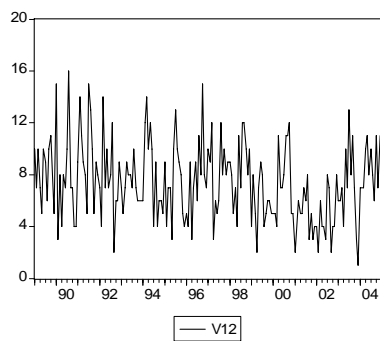
(j) Block Group 10



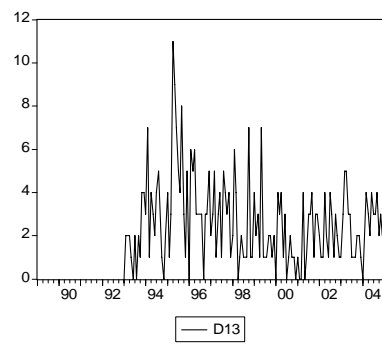
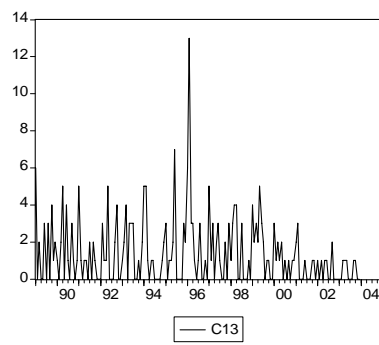
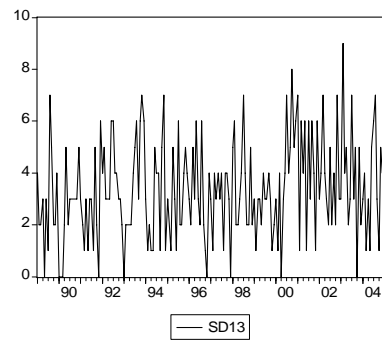
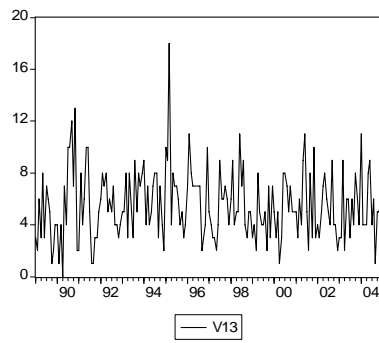
(k) Block Group 11



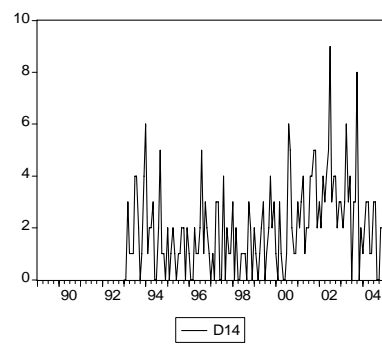
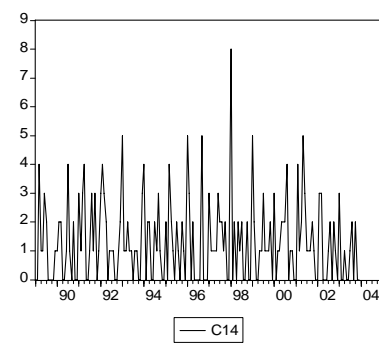
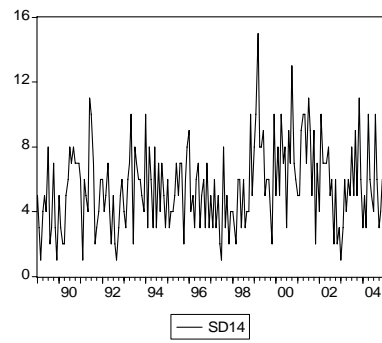
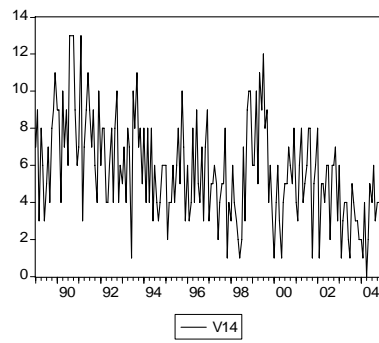
(l) Block Group 12



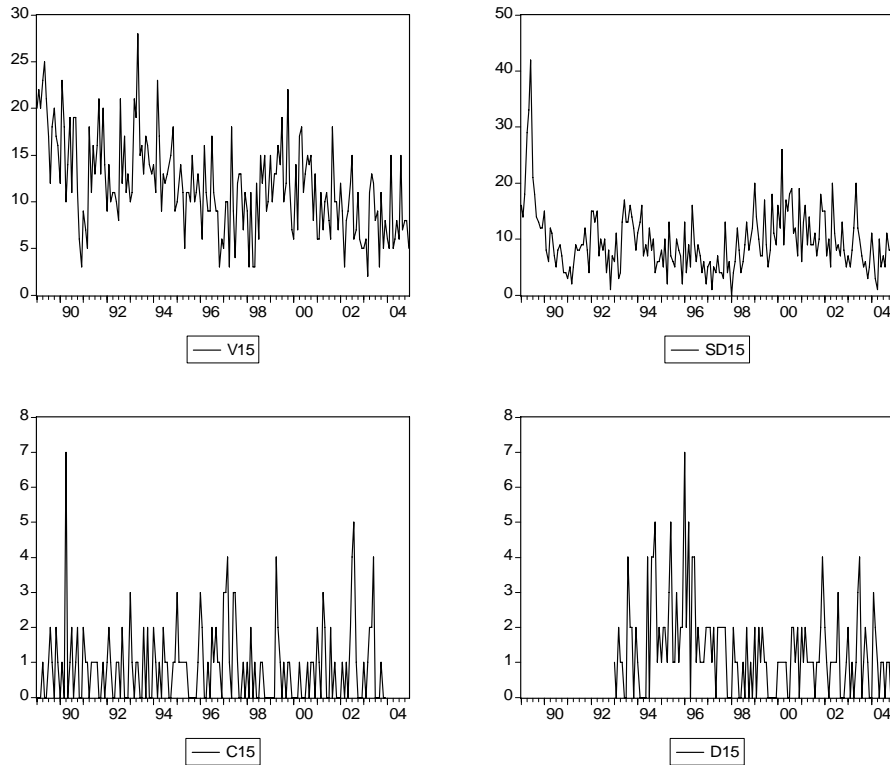
(m) Block Group 13



(n) Block Group 14



(o) Block Group 15



In Figure 7-2, all 60 trends seem to be pretty steady with some white noise. Some series move upward and others move downward; all appear to return to the mean or to the mean with a constraint. Thus, the next step is to test for stationarity of all these trends with unit-root tests. For a time series to be stationary, it means the series always has a tendency to return to a specific value. On the other hand, time series are considered to have the unit root property if they deviate from their mean levels with no tendency to return to the original mean levels (see O'Brien, 1999; Enders, 2004). Detailed descriptions about unit root and stationarity can be found in Chapter 5. This test is important because if it is found that the time series are not stationary, then it will be necessary to difference the time series until the differenced values are stationary before

conducting Granger causality tests. On the other hand, cointegration tests can only be used when the variables involved are integrated of order (I).

From reviewing all 60 time series, it appears that they might all be stationary. But formal tests are required in order to assure the conclusion statistically. I used Augmented Dickey-Fuller (ADF) tests to examine whether a series has a unit root issue.⁴⁴ Based on scatter plots, the following unit root tests include intercepts but not deterministic trends in the estimated equations.⁴⁵

The results from ADF tests on a total of 60 time series (4 different types of trends across 15 block groups) are listed in Table 7-2. All 60 t-values are significant at the conventional .05 level. Therefore, I reject the null hypothesis that a unit root is present for all 60 trends and conclude that all trends are stationary. In other words, the results of unit root tests show that violence, social disorder, complaint, and illegal dumping trends are all stationary series with tendencies for the respective levels of these variables to return to a specific value.

⁴⁴ Enders (2004) argues that the ADF test has weak power to reject the null hypothesis of a unit root as the confidence intervals for the t-statistics of the ADF exceed those for regular t-statistics. Additionally, when too many regressors are included in the model, the power of Dickey-Fuller test is further reduced. Consequently, if the null hypothesis of a unit root is rejected based on the ADF result, we should be confident that the sequence of data does not contain a unit root as this would mean it was rejected despite the low power of the test.

⁴⁵ I also performed unit root tests on the four variables including deterministic trends. The ADF tests show a more significant result than the intercept only model. However, from the examination of scatter plots, there was no reason to include trend variable. Thus, I only report results from the intercept-included models.

Table 7-2. Summary of Test for Stationary (Unit Root Test)

	<i>Violence</i> γ (t-statistic)	<i>SD</i> γ (t-statistic)	<i>Complaint</i> γ (t-statistic)	<i>Dumping</i> γ (t-statistic)
<i>Block Grp 1</i>⁴⁶	- .88 (-12.12**)	- .36 (-4.3**)	- .78 (-10.7**)	- .61 (-7.9**)
<i>Block Grp 2</i>	- .83 (-11.56**)	- .77 (-10.92**)	- .91 (-12.19**)	- .77 (-9.44**)
<i>Block Grp 3</i>	- .69 (-10.20**)	- .95 (-13.14**)	- 1.02 (-13.57**)	- .93 (-11.10**)
<i>Block Grp 4</i>	- .78 (-10.85**)	- .56 (-8.62**)	- 1.02 (-13.59**)	- 1.08 (-12.90**)
<i>Block Grp 5</i>	- .40 (-6.84**)	- .56 (-8.61**)	- .97 (-12.85**)	- .94 (-11.16**)
<i>Block Grp 6</i>	- .87 (-12.06**)	- .61 (-5.49**)	- .85 (-11.40**)	- .61 (-5.89**)
<i>Block Grp 7</i>	- .24 (-4.01**)	- .31 (-4.02**)	- .89 (-11.85**)	- .97 (-11.51**)
<i>Block Grp 8</i>	- .22 (-3.81**)	- .23 (-3.37*)	- .84 (-11.32**)	- .44 (-3.09*)
<i>Block Grp 9</i>	- .58 (-6.58**)	- .43 (-4.62**)	- .99 (-13.24**)	- .87 (-10.45**)
<i>Block Grp 10</i>	- .39 (-4.60**)	- .44 (-4.66**)	- .81 (-10.99**)	- .84 (-10.13**)
<i>Block Grp 11</i>	- .81 (-11.42**)	- .99 (-13.58**)	- .93 (-12.34**)	- .53 (-5.36**)
<i>Block Grp 12</i>	- .63 (-7.04**)	- .80 (-11.28**)	- .75 (-7.21**)	- 1.00 (-11.84**)
<i>Block Grp 13</i>	- .86 (-12.01**)	- .93 (-12.88**)	- .82 (-11.30**)	- .75 (-9.26**)
<i>Block Grp 14</i>	- .48 (-5.91**)	- .61 (-6.73**)	- 1.04 (-13.88**)	- .74 (-9.12**)
<i>Block Grp 15</i>	- .37 (-4.48**)	- .31 (-4.20**)	- .88 (-11.83**)	- .66 (-6.13**)

NOTE: 1. Null Hypothesis: a unit root is present.

2. At the 5% significant level, the Dickey-Fuller critical value is -2.87.

At the 1% significant level, the Dickey-Fuller critical value is -3.46

⁴⁶ In order to keep the confidentiality of the selected census block groups, I labeled them in a numerical order so the identity of block group will not be identified from the statistics.

EXPLORING THE RELATIONSHIPS BETWEEN TIME SERIES

What matters more, for both theoretical and policy implications, than determining the pattern of a single trend is the long-term relationship between the level of violence and the levels of social and physical disorders. Theoretically speaking, the finding of a long-term relationship between disorder and violence can help inform the debate regarding the BW thesis and the SR perspective. From a policy standpoint, whenever the level of disorder increases, police must decide whether to target disorder or to simply allocate proportional manpower based on the severity of crime.

GRANGER CAUSALITY TESTS

Granger causality is a test of causality that examines whether the lags of one variable enter into the equation for another variable; that is, whether current and past values of one variable help to forecast future values of another variable (see Enders, 2004). Friedman and Kuttner (1992) define Granger causality by emphasizing changes rather than levels of values, arguing that the real issue is whether *fluctuations* in one variable help predict future *fluctuations* in another variable that are not already predicted on the basis of the second variable itself or other readily observed variables.

Again, the strength of Granger causality is to examine whether the information contained in one series is useful in predicting another series. The usefulness of Granger causality tests can be best illustrated by using the questions of interest of the current study. Without discussing the origin of disorder, Wilson and Kelling argue that disorder leads to future crime. Assuming Wilson and Kelling are right, we should expect the changes in disorder (both social and physical) are useful in predicting future changes in

crime. This is the basic idea of Granger causality. In the original Broken Windows article, it was not clear whether the levels of disorder or the changes of disorder are criminogenic. Thus, in the current study, I use both levels and changes of disorder and violence in Granger causality tests to capture different mechanisms. Essentially, Granger causality tests were used to establish whether levels/fluctuations in social or physical disorders are useful for predicting subsequent levels/fluctuations in violence.

In this study, I use Granger causality to examine causal association in the sense of explanatory power. If the past values of social or physical disorder (or changes in these measures) help predict the future values (or changes) of violence more so than the other way around, then I can conclude that disorder causes violence. The results should inform us about the mechanism between disorders and violence. Specifically, the results should shed light on both the direction of causation between disorder and violence and whether the way disorder and violence are operationalized (as counts versus fluctuations/changes) result in different conclusions.

The Causal Impacts between Disorder and Violence (in Levels)

First, I performed Granger causality tests to determine whether the level of one variable affects the other. Table 7-3 shows the results of the Granger causality tests between the levels of disorder and violence. The main purpose of this analysis is *not* to examine the dynamic within *each* of the block groups, but to understand the general causal direction between disorder and violence across the selected 15 block groups. One-hundred and eighty null hypothesis tests were conducted to explore the causal direction

between disorders and violence across the 15 block groups.⁴⁷ Thus, I will only discuss the following results in a more global fashion rather than reviewing the individual results. Significant findings are bolded in Table 7-3 to ease comprehension of 180 significance test results and to make the tables more self-explanatory.

Among the 180 significance tests 24 reached .05 statistical significance levels. A total of 180 tests can be categorized into three groups of hypotheses. The first group of tests (45 tests) concerning the BW thesis examines the causal impacts of various types of disorder on violence. Across all 15 block groups, we find that in four of them social disorder significantly causes violence; in one block group complaints show a causal impact on violence; and within only one block group does illegal dumping affect violence significantly. As such, among the 45 statistical tests that are concerned with the effects that the BW thesis suggests, only six reached significance level at .05.⁴⁸

The second group of tests explores whether violence has a causal influence on disorder, which is opposite to what the BW thesis argues and different from the SR statement. Skogan (1990) reminds us of the potential impacts crime may have in promoting further disorder in neighborhoods. From Table 7-3, the violence time series is found to have statistically significant impacts on disorder (either social disorder or dumping) in 12 out of 45 tests. Specifically, violence shows significant impacts on

⁴⁷ In the current study, I allowed two lags to be included in the model to test if one variable Granger causes another variable. The selection of appropriate time lags was determined by the empirical results. Including more than two time lags does not improve the test results (time lags of up to six months were considered). Also, the total number of time intervals used in the tests varies as the original variables cover different time spans. Here is the exact number of observations used in the test of each dyad: SD-V (190), C-V (178), D-V (142), C-SD (178), D-SD (142), and D-C (130). The number of observation included in each of the tests accompanied with the selection of high intensity block groups should guarantee sufficient power to detect a causal effect if any exist.

⁴⁸ Here I adopt the traditional .05 level as the decision making criterion for a more lenient test. If I would follow the guideline of multivariate analysis, Bonferroni correction should be used and the significant criterion should be adjusted by the number of tests conducted. With this standard, only one test result is significant.

illegal dumping among seven block groups, and social disorder within five block groups. The number of complaint incidents, however, is never found to be causally influenced by violence within those selected block groups. Sometimes, violence has shown causal impacts on both social disorder and dumping. For example, in block groups 5, 7, 8, and 10, I found the level of violence to be causing the levels of social disorder and dumping. Reciprocal effects, or instantaneous causality, (when results for both “violence causes disorder” and “disorder causes violence” tests are significant) are also found in three block groups. In block group 7, dumping and violence are instantaneously causing each other. In block groups 7, 8 and 10, social disorder and violence also share an instantaneous causal relationship.

The third group of hypotheses addresses the interactions between various types of disorder. In the earlier section, I mentioned the possibility that the effects of one type of disorder on violence may be mediated by the other type of disorder. This possibility is very unlikely to be true given the fact that there is weak support found in the first set of hypothesis testing. Nonetheless, it is still interesting to see whether the occurrence of one type of disorder will introduce another type of disorder. This information can be important in the study of urban pathology. Again, there are a few associations found between different types of disorder, yet, these effects are not systematic. Among 90 tests, only six are significant, just barely higher than what we would have found if those numbers are assigned by chance (which would be 4.5 tests out of 90 tests at a .05 significance level). Clearly, there is no mediating or interaction effect between social disorder and physical disorder on violence.

Overall, the findings of the Granger causality tests among the levels of these four variables do not provide support for the BW thesis' argument that disorder has causal impacts on violence, regardless of the type of disorder on which we focus. The second group of hypothesis evidences stronger empirical support (26% significant) than either the group one hypothesis (13% significant) or group 3 (6.7% significant) hypothesis. In sum, in the sampled block groups, I found that the violence and disorder series are mainly independent of each other. Thus, the results provide little evidence for the notion that disorder serves as a precursor of violence at places. In the next section, I will repeat the same analyses using the difference between two time points rather than the actual level of violence and disorder.

Table 7-3. Granger Causality Tests for Levels

Hypothesis	Null	<i>BG 1</i>		<i>BG 2</i>		<i>BG 3</i>		<i>BG 4</i>		<i>BG 5</i>		<i>BG 6</i>	
		<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>F</i> Value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>F</i> Value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value
Disorder	SD→V	5.16**	<0.007	1.04	0.357	0.58	0.559	0.33	0.716	2.21	0.112	0.98	0.377
→Violence	C-/→V	1.32	0.271	1.51	0.223	2.02	0.136	1.04	0.357	1.79	0.169	0.47	0.623
	D-/→V	0.33	0.720	0.29	0.746	1.10	0.337	0.81	0.445	1.09	0.339	0.11	0.897
Violence	V→SD	0.28	0.759	0.07	0.931	0.24	0.788	0.13	0.876	9.00**	<0.001	0.39	0.677
→Disorder	V-/→C	0.23	0.798	0.25	0.783	1.41	0.248	0.30	0.742	0.55	0.578	0.63	0.534
	V-/→D	0.07	0.936	4.39*	0.014	0.43	0.652	9.88**	9.8E-05	9.52**	<0.001	0.11	0.899
Interactions	SD→C	1.46	0.234	0.32	0.724	2.31	0.103	0.33	0.721	0.12	0.884	0.74	0.480
Between	SD→D	0.004	0.996	0.38	0.682	0.47	0.629	3.00	0.053	4.53*	0.012	0.52	0.597
SD and PD	C→SD	1.27	0.283	0.54	0.584	0.75	0.474	2.86	0.060	0.94	0.394	1.54	0.218
	C-/→D	1.85	0.161	0.05	0.955	0.81	0.448	0.24	0.788	1.44	0.241	0.19	0.830
	D→SD	0.22	0.803	0.86	0.424	0.65	0.521	0.68	0.510	0.14	0.870	0.77	0.464
	D-/→C	4.09**	0.019	0.55	0.578	1.63	0.200	0.06	0.945	0.07	0.929	0.05	0.950

Note: -/→ implies does not Granger cause. The abbreviations denote for each variable (V= violence, SD=social disorder, C=complaints, D=dumping).

*Statistically significant at the $p \leq .05$ level; ** statistically significant at the $p \leq .01$ level.

Table 7-3. Granger Causality Tests for Levels (continued)

Hypothesis	Null	<i>BG 7</i>		<i>BG 8</i>		<i>BG 9</i>		<i>BG 10</i>		<i>BG 11</i>		<i>BG 12</i>	
		<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>F</i> Value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value
Disorder	SD→V	11.51**	1.9E-05	4.05*	0.019	0.11	0.896	3.83*	0.024	0.07	0.932	1.41	0.247
→Violence	C-/→V	1.09	0.337	0.15	0.859	0.79	0.457	1.40	0.250	1.02	0.363	3.27*	0.040
	D-/→V	4.01*	0.020	0.13	0.877	0.41	0.662	1.80	0.170	1.37	0.257	1.21	0.301
Violence	V→SD	8.01*	<0.001	12.38**	9.0E-06	1.52	0.221	9.49**	<0.0001	10.61**	4.3E-05	0.85	0.428
→Disorder	V-/→C	0.60	0.548	1.51	0.224	0.01	0.994	1.03	0.359	0.74	0.480	0.10	0.908
	V-/→D	9.90**	9.7E-05	6.74**	0.002	2.16	0.119	6.82*	0.002	1.51	0.224	0.50	0.607
Interactions	SD→C	1.76	0.175	0.12	0.889	0.68	0.509	1.70	0.186	0.56	0.571	1.37	0.257
Between	SD→D	3.01	0.053	0.90	0.410	0.27	0.767	12.90**	7.4E-06	1.10	0.335	0.08	0.925
SD and PD	C→SD	0.73	0.484	0.99	0.375	2.33	0.100	1.21	0.300	0.11	0.895	0.85	0.431
	C-/→D	0.81	0.445	4.99**	0.008	0.57	0.565	0.48	0.622	0.10	0.906	0.38	0.683
	D→SD	0.62	0.538	0.78	0.460	0.04	0.965	7.28**	0.001	1.85	0.162	0.50	0.605
	D-/→C	0.44	0.643	0.13	0.876	0.55	0.577	0.21	0.809	1.54	0.218	1.49	0.230

Note: -/→ implies does not Granger cause. The abbreviations denote for each variable (V= violence, SD=social disorder, C=complaints, D=dumping).

*Statistically significant at the $p \leq .05$ level; ** statistically significant at the $p \leq .01$ level.

Table 7-3. Granger Causality Tests for Levels (continued)

Hypothesis	Null	<i>BG 13</i>		<i>BG 14</i>		<i>BG 15</i>	
		<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value
Disorder	SD-/→V	0.04	0.960	0.52	0.593	3.02	0.051
→Violence	C-/→V	0.44	0.648	0.70	0.497	1.17	0.314
	D-/→V	0.06	0.945	0.28	0.756	0.55	0.577
Violence	V-/→SD	1.44	0.241	1.20	0.302	3.73	0.026
→Disorder	V-/→C	0.58	0.559	1.64	0.198	0.68	0.508
	V-/→D	7.73**	0.001	0.20	0.817	0.03	0.966
Interactions	SD-/→C	0.53	0.593	0.11	0.898	0.63	0.533
Between	SD-/→D	0.25	0.778	0.24	0.787	0.02	0.983
SD and PD	C-/→SD	0.56	0.574	1.24	0.291	0.84	0.435
	C-/→D	0.41	0.661	1.50	0.227	0.911	0.405
	D-/→SD	3.12	0.047	3.39*	0.037	2.30	0.104
	D-/→C	0.84	0.436	1.50	0.227	0.24	0.785

Note: -/→ implies does not Granger cause. The abbreviations denote for each variable (V= violence, SD=social disorder, C=complaints, D=dumping).

*Statistically significant at the $p \leq .05$ level; ** statistically significant at the $p \leq .01$ level.

The Causal Impacts between Disorder and Violence (in Differences)

The previous results from Granger causality tests fail to support the idea that levels of disorder predict future levels of violence. This results might not be surprising to many researchers who study the crime drop (like Eck and Maguire, 2000; Greene, 1999) or explore social ecology at place (like Sampson and Raudenbush, 1999; 2002). However, past social disorganization literature points out that the extent of disorganization might not matter as much as sudden changes in the social environment on the creation of crime (Heitgerd and Bursik, 1987). That is, when a block group continues to experience a high level of disorder, perhaps equilibrium has been reached quickly within the area and thus the actual magnitude of current disorder does not matter any more in terms of predicting the future violence rate. To be extra cautious before I draw the conclusion that disorder does not cause violence and they are more likely to be independent time series, I repeat the previous analyses by using the fluctuations of disorder and fluctuations of violence rather than levels of each as was done above.

The results of whether the changes in disorder affect the changes in violence are shown in Table 7-4. I again test the same three groups of hypotheses, the causal effects of disorder on violence, the causal effects of violence on disorder, and the interactional effects between various types of disorder. Compared to the results from Granger's causal tests on the levels of disorder and violence, the results from causal analysis of fluctuations of disorder and violence are even less supportive. Only 20 F-values out of 180 reached significance at the .05 level. For group 1 regarding the causal effects of disorder on violence, only two out of 45 tests is significant (see the first three shaded rows). This value is even lower than what we would expect to find merely by chance (which would be 2.25). Based on the findings, I

can conclude that the changes in the disorder rate do not carry any useful information to forecast changes in the violence rate. Combined with the previous findings, neither the levels nor the changes of disorder help predict future levels (or changes) of violence. The second group of hypotheses examines the causal effect of changes in violence on changes in disorder. The results presented in Table 7-3 show that changes in violence significantly affects changes in social disorder only in three block groups and affect changes in dumping in four block groups.

The more significant finding of this exercise arises from the interrelationships between different types of disorder (see the shaded rows in the bottom of the table). Changes in the frequency of illegal dumping lead to changes in social disorder behavior in four block groups. In another three block groups, changes in social disorder actually result in changes of dumping behavior. In block group 14, social disorder and dumping are found to be instantaneously causing each other. Regardless of these significant results (11 out of 90 tests), the patterns of the relationship between disorders still indicate an inconclusive finding. Overall, there is no conclusive finding found in the Granger tests among the changes of disorder and violence. I also fail to find evidence that supports the main idea backing up broken window policing that changes of disorder will affect changes of violence.¹²

Table 7-4. Granger Causality Tests for Differences

Hypothesis	Null	<i>BG 1</i>		<i>BG 2</i>		<i>BG 3</i>		<i>BG 4</i>		<i>BG 5</i>		<i>BG 6</i>	
		<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>F</i> Value	<i>F</i> Value	<i>P</i> value	<i>F</i> Value	<i>F</i> Value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value
Disorder	SD-→V	1.11	0.333	1.27	0.284	0.13	0.878	0.21	0.811	1.52	0.222	0.90	0.410
→Violence	C-→V	1.00	0.371	0.38	0.683	2.06	0.130	1.50	0.226	2.96	0.055	0.87	0.419
	D-→V	0.25	0.780	0.84	0.434	1.05	0.352	0.39	0.678	0.99	0.375	0.14	0.871
Violence	V-→SD	0.58	0.558	0.16	0.855	0.25	0.779	1.40	0.250	5.59**	0.004	0.28	0.756
→Disorder	V-→C	0.48	0.620	0.10	0.909	1.41	0.247	0.65	0.525	1.06	0.350	0.51	0.602
	V-→D	0.09	0.911	5.19**	0.007	0.08	0.927	6.43**	0.002	6.66**	0.002	0.67	0.512
Interactions	SD-→C	2.42	0.092	0.35	0.702	0.87	0.420	0.78	0.458	0.19	0.827	1.19	0.307
Between	SD-→D	0.07	0.933	1.00	0.371	0.61	0.545	3.82*	0.024	6.84**	0.001	0.10	0.906
SD and PD	C-→SD	1.59	0.206	0.69	0.503	0.92	0.400	2.85	0.06	0.98	0.388	0.77	0.463
	C-→D	0.45	0.639	<0.01	0.996	0.97	0.383	0.03	0.967	4.26*	0.016	0.33	0.717
	D-→SD	0.29	0.749	1.25	0.288	0.29	0.751	0.27	0.762	1.28	0.281	1.27	0.285
	D-→C	4.48*	0.013	0.21	0.813	0.74	0.477	0.09	0.917	1.08	0.344	0.03	0.971

Note: -/→ implies does not Granger cause. The abbreviations denote for each variable (V= violence, SD=social disorder, C=complaints, D=dumping).

*Statistically significant at the $p \leq .05$ level; ** statistically significant at the $p \leq .01$ level.

Table 7-4. Granger Causality Tests for Differences (continued)

Hypothesis	Null	<i>BG 7</i>		<i>BG 8</i>		<i>BG 9</i>		<i>BG 10</i>		<i>BG 11</i>		<i>BG 12</i>	
		<i>F</i> Value	<i>P</i> value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>F</i> Value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>p</i> value
Disorder	SD→V	2.58	0.078	0.98	0.379	0.12	0.883	1.72	0.182	0.56	0.573	4.73**	0.009
→Violence	C-/→V	0.62	0.538	0.91	0.403	0.24	0.786	1.01	0.365	1.75	0.177	2.93	0.056
	D-/→V	1.76	0.176	3.97*	0.021	0.76	0.470	2.28	0.106	1.26	0.288	1.01	0.366
Violence	V→SD	4.05*	0.019	0.02	0.982	0.52	0.593	0.70	0.498	9.14**	<0.001	0.45	0.636
→Disorder	V-/→C	0.91	0.406	0.76	0.467	1.23	0.296	0.74	0.480	0.13	0.880	0.01	0.992
	V-/→D	1.18	0.310	2.24	0.111	4.28*	0.016	0.54	0.585	1.78	0.172	0.14	0.870
Interactions	SD→C	2.45	0.089	2.21	0.113	0.42	0.655	2.68	0.072	0.19	0.828	1.35	0.261
Between	SD→D	0.58	0.560	0.19	0.828	0.07	0.936	2.78	0.066	1.66	0.195	1.31	0.273
SD and PD	C→SD	0.15	0.861	3.56	0.031	2.17	0.117	3.52*	0.032	0.03	0.974	1.69	0.188
	C-/→D	0.90	0.408	4.01*	0.021	1.06	0.349	0.13	0.881	0.13	0.875	0.80	0.451
	D→SD	2.55	0.082	0.27	0.764	0.08	0.924	5.66**	0.004	3.73*	0.027	0.04	0.965
	D-/→C	0.90	0.411	1.06	0.348	0.24	0.791	0.08	0.925	0.61	0.546	0.43	0.651

Note: -/→ implies does not Granger cause. The abbreviations denote for each variable (V= violence, SD=social disorder, C=complaints, D=dumping).

*Statistically significant at the $p \leq .05$ level; ** statistically significant at the $p \leq .01$ level.

Table 7-4. Granger Causality Tests for Differences (continued)

Hypothesis	Null	<i>BG 13</i>		<i>BG 14</i>		<i>BG 15</i>	
		<i>F</i> Value	<i>p</i> value	<i>F</i> Value	<i>F</i> Value	<i>p</i> value	<i>F</i> Value
Disorder	SD-→V	0.05	0.952	0.06	0.939	1.49	0.227
→Violence	C-/→V	0.06	0.939	0.49	0.612	0.97	0.383
	D-/→V	0.51	0.599	0.36	0.701	2.14	0.122
Violence	V-→SD	1.09	0.339	1.07	0.344	0.46	0.631
→Disorder	V-/→C	0.61	0.545	1.89	0.155	1.76	0.175
	V-/→D	2.68	0.072	0.01	0.992	1.39	0.252
Interactions	SD-→C	1.37	0.257	0.11	0.895	0.92	0.402
Between	SD-→D	0.09	0.917	7.17**	0.001	0.22	0.800
SD and PD	C-→SD	0.12	0.890	0.81	0.445	0.64	0.528
	C-/→D	0.02	0.976	0.56	0.572	1.50	0.228
	D-→SD	3.39*	0.036	5.76**	0.004	0.65	0.524
	D-/→C	1.75	0.179	0.11	0.892	0.55	0.580

Note: -/→ implies does not Granger cause. The abbreviations denote for each variable (V= violence, SD=social disorder, C=complaints, D=dumping).

*Statistically significant at the $p \leq .05$ level; ** statistically significant at the $p \leq .01$ level.

CHAPTER 8: DISCUSSIONS AND CONCLUSIONS

In this dissertation, I examined two main questions that are critical to disorder related research. The first question tests whether there is a longitudinal relationship between disorder and violence. The second question concerns the causality between disorder and violence. These two questions bear importance to both place-based criminology and public policy. I also examined the differential effects of social disorder and physical disorder on violent crime. The implications of the findings will be discussed in this chapter. To answer these questions, I used both trajectory analysis and Granger-causality tests, which were both developed to capture dynamic time-varying patterns.

In the past literature, studies examining the disorder-crime link at places were constrained by several factors. First, there were no quality longitudinal data available for a thorough examination of the underlying mechanism between crime and disorder. Second, the unit of analysis of past studies had largely been at the macro level. Third, the use of static methodology might prevent scholars from finding a dynamic relationship between crime and disorder. Lastly, the potential effects of different types of disorder were not scrutinized in the prior studies.

This study advances upon the previous literature in many aspects. First, I used four different databases collected by three independent sources from the city of Seattle. These data cover various dimensions and thus, provide comprehensive information regarding violence and disorder at places. Next, I chose census block groups as the unit of analysis. The census block group was found to divide crime space in a meaningful

way (see Chapter 4 for detailed information). Additionally, the size of census block groups is appropriate for the current study and adjusted by the corresponding population density (see Chapter 4 for detailed explanations). Thus, by using census block group as the unit of analysis, I can explore the dynamic relationship between disorder and violence at micro places. Third, I used several methods including trajectory analysis, joint trajectory analysis, and Granger causality tests to reveal associations between violence and disorder trends. Results from each type of analysis contain unique pieces of information to solve the disorder-violence puzzle. Finally, I used different types of disorders (social disorder and physical disorder) to examine potential differential impacts on violence across types of disorder.

Below I discuss the findings of this research in the context of their implications for disorder-violence research, place-based criminology theories, and broken windows policing. At the end of the chapter, I detail the limitations of the current study and provide suggestions for improvement in future research.

IMPLICATIONS FOR DISORDER-VIOLENCE RESEARCH

Are disorder and violence causally related or merely co-existing? This is a much-debated topic not only between scholars but also between scholars and practitioners (see the exchange between Bratton and Kelling, 2006 and Harcourt, 2006). Wilson and Kelling's (1982) well-known *Broken Windows* article sketched the mechanism of how the existence of disorder leads to the occurrence of crime. Bratton's order maintenance policing tactic (or BW policing) implemented this idea to its extreme in both New York City and the city of Los Angeles. In fact, in the annual conference of American Society

of Criminology in 2006, Bratton claimed that the ideas of the BW policing came from his street enforcement experiences which happened to coincide with Wilson and Kelling's ideas, and the skepticism against it was just an attack from ignorant academics in ivory towers.

The ideas expressed in the BW policing model led to the main question of this dissertation: Does disorder lead to violence? I sought to answer this question by analyzing both the longitudinal patterns of disorder and violence and the causality between the two phenomena. In the following section, I will summarize the findings of my study and then I will discuss the meanings of the findings under different theoretical frameworks.

Relationship between Disorder and Violence

The findings from trajectory analyses show that violence, social disorder and physical disorder each follow a distinct pathway. The violence trajectories were generally declining over time; the social disorder trajectories were very stable; the physical disorder trajectories (measured by complaint data) followed a bi-modal pattern; and another physical disorder trajectory (measured by illegal dumping) exhibited a bell-shaped pathway.

Overall, violence and physical disorder trends fluctuate over time. The magnitude of fluctuation is greater for both the illegal dumping and complaint trends compared to the violence trend. Unlike the violence and the physical disorder trends, the total volume of social disorder at each trajectory group remains quite constant---it almost seems as if social disorder is part of the social norm and is not affected by any other variables. Additionally, the relative standing of a block group based on each type of problem

behavior did not change over time. In other words, if a block group began with a high violence rate in 1989, it stayed in the high-rate group all the way throughout the whole 16 year period (for a similar finding using a different unit of analysis, see Weisburd et al., 2004).

Comparing the patterns of these four types of trajectories side-by-side, there is no evidence to suggest that they follow each other or that there exists any meaningful association between the trends. The results from joint trajectory analyses, however, provide further information about the co-morbidity between the variables. That is, whether the occurrence of one trait corresponds to the occurrence of another. The conditional probabilities of observing one certain violence trajectory pattern with a given disorder trajectory assignment offer some support for the notion that disorder and violence at least co-exist at places. More specifically, the findings suggest that a block group with a low level of disorder (or no disorder) is less likely to experience violence problems. However, block groups that have high disorder problems are not necessarily also plagued by violence, although some of them are. This means that having no disorder can be seen as a powerful protective factor for block groups in preventing future violence---- as there is less than one percent of a chance that a block group will have a high level of violence if it has negligible disorder problems. I call these block groups “healthy” block groups as they are free of social disorder, physical disorder and violence problems. By the same standard, I call the block groups plagued by both violence and disorder issues as “unhealthy” block groups. Unlike healthy block groups, unhealthy ones are not that easy to diagnose. Although having high disorder can be a risk factor to increase the chance that a block group experiences violence, only about 30% of block

groups that show a high level of disorder also show a high level of violence. This means that by using disorder as a risk factor, we will have a 70% chance of making an incorrect prediction of where high violence places would be located. Perhaps lack of disorder and having high-disorder are not the two sides of the same coin. Or perhaps there is not a linear relationship between disorder and violence. In the healthy block groups, the dynamic between disorder and crime works very differently from the dynamics in the unhealthy block groups. Figuring out the exact risk/protective factors associated with disorder and violence should be the important next move. The detailed implications of this idea will be discussed further in the later sections.

With this in mind, I conclude that based on the high concordance rate in those healthy block groups, the association between disorder and crime hypothesized by Wilson and Kelling may exist. Their logic about the BW idea that places with no disorder have no crime is qualified by the findings. Besides the healthy block groups, there are only a few of those really unhealthy block groups; the rest of them are semi-unhealthy---with one of the problems (either disorder or violence), but no other symptoms. In the unhealthy block groups, however, the moderate discordant rate between violence and disorder reminds us that caution is necessary before drawing final conclusions regarding these two social problems. Having high levels of disorder does not predispose a block group to be violence ridden. Thus, more research is needed to understand the mechanism by which a healthy block group transforms into an unhealthy one or how an unhealthy one recovers from symptoms. Also, it is important to know why some semi-unhealthy block groups do not have all the symptoms (e.g., high disorder block groups with no violence).

The results of the trajectory analyses confirm the “co-existing” nature of the association between disorder and violence. Both the BW thesis and the SR perspectives agree on the point that there exists a positive association between disorder and violence. The disagreement between the two is about the specific type of association involved in the process. The BW thesis argues that disorder should lead to violence while the SR perspective suggests that the association is purely correlational and driven by a third factor—collective efficacy. To further explore the issue with respect to the type of association between disorder and violence, I selected a sub-sample of census block groups to conduct the causality test.

Causality between Violence and Disorder

As discussed earlier, the consistency between trajectory classifications is very high among the healthy block groups. However, from both theoretical and policy standpoints, we want to focus our attention on the problematic segments of the society---the semi-healthy or unhealthy block groups---so we can plan effective policies to reduce problems. In doing so, we need to first understand the mechanism between disorder and violence in those places. Thus, the second part of the analyses—time-series analyses---was devoted to this question using the high risk block groups.

Fifteen block groups were selected that were either high in the level of disorder or violence (the selection processes were detailed in Chapter 7). The results of unit-root tests indicate that all 60 time series (four series for each 15 block groups) are stationary. This means that the fluctuations of violence, social disorder and physical disorders at those block groups were just some random ups-and-downs surrounding the mean values

of the series. Overall, none of the series show any deterministic patterns or sudden changes over the 16 years.

In this part of the analyses, Granger causality tests were performed to examine the causal association between the levels, as well as the fluctuations, of disorder and violence. First I use levels of violence and disorder as the main variables to conduct the Granger causality tests. I conducted three groups of hypotheses in the Granger test. The first group of hypotheses consists of 45 tests concerning the BW thesis. The 45 tests did not show supportive evidence. In the second group of hypothesis, I examined whether violence has a causal impact on disorder. Within 1/4 of the block groups, violence is found to have a causal impact on social disorder or illegal dumping. In other words, in those block groups, when a sign of violence appeared disorder soon followed. The third group of hypotheses was examining the inter-relationships between various types of disorder. Only six out of 90 tests reached significance level and the findings did not point to any specific direction of relation.

Then I repeated the same tests using changes (or fluctuations) of violence and disorder as my variables. The second set of tests yield even less supportive findings for the BW thesis. When testing the causal effects of disorder on violence, only one out of 45 tests reached significance level. The null findings indicate that changes in the disorder rate do *not* lead to a crime reduction benefit as it is commonly suggested. In contrast, changes in violence are found to be causally related to the changes in disorder in about 1/4 of the block groups. Perhaps police should begin to refocus on violent crime rather than disorder as the findings suggest reduction of violence might also lessen the disorder problem.

In sum, the findings from the Granger causality tests (using both levels and fluctuations of the variables) do not provide support for the causal statement of the BW thesis. Among the selected high-rate block groups, disorder is rarely found to cause violence. Violence seems to cause disorder at a higher frequency. Between social disorder and physical disorder, there are some causal associations but no consistent findings that would indicate that one type of disorder has impacts on the other type.

Overall, the findings suggest that disorder does not cause violence in these unhealthy or semi-healthy block groups. Meanwhile, violence was found to cause disorder at these places. There are some significant associations among variables but the relationships are neither consistent nor meaningful within those hotspots.

DISORDER AND VIOLENCE: CAUSAL OR CO-EXISTING

Recall that I listed five possible ways that disorder relates to violence in Chapter 3. Each of the possibilities represents a different perspective. Here I use Figure 3-1 to illustrate how the findings fit into these five possibilities. The first step is to differentiate between possibility 1, which suggests a null association between disorder and violence, from possibilities 2-5 which argue that at least some type of association exists between the two variables. Based on the conditional probabilities obtained from the joint trajectory analysis, it is obvious that possibility 1 is not supported. There is indeed a moderate to high level of association between disorder and violence at places. Between disorder and violence, there exists at least a correlational relationship. Next, I use the findings from the Granger causality tests to separate among possibilities 2-5 judging by the level of significance and the direction of the causality tests. According to the results

from both sets of Granger tests, I did not find evidence supporting possibility 3 which indicates that disorder may be a cause of violence. Thus, possibility 3, which represents the BW idea, does not hold true based upon the empirical evidence. Regarding possibilities 4 and 5, the evidence is also far from conclusive. As for possibility 4, I found that 30% of the tests support the idea that violence causes disorder. In an examination of possibility 5 regarding Skogan's non-recursive idea, I noted that only four sets of non-recursive relationships between disorder and violence were found in the tests. After examining all the possibilities in my tree plot, possibility 2 seems to be the only one that is not falsified by the empirical evidence.

In sum, the results of the Granger causality tests combined with the association tests from trajectory analysis support possibility 2 which represents a non-causal relationship between disorder and violence. In the majority of block groups, there is no causal association between disorder and violence despite the strong spatial correspondence between these two phenomena.

Under the circumstance of an apparent association between disorder and violence yet no causality, a risk /protective factor approach might be a useful way to decompose the etiology behind both disorder and violence at places (see Catalano and Hawkins, 1996; Hawkins et al., 1992; Weisburd et al., forthcoming). The risk and protective factors approach is commonly used in the field of medicine and public health to prevent the social and behavioral health issues such as diabetics and heart disease (Catalano and Hawkins, 1996; Hawkins et al., 1992). This approach is widely applied to assess problems which do not have a clear, known root cause. The goal of the approach is to identify the risk factors that increase the likelihood of occurrence of the problems as well

as protective factors that reduce the odds of the problem behavior. Once identified, interventions can be brought to reduce these risk factors and/or enhance the protective factors (Hawkins et al., 2002). As noted in the earlier sections, it is obvious that we cannot establish a clear causal association between disorder and violence---despite the significant association between the two at places. Once we identify the protective factors in the healthy places, we can try to enhance the protective factors in the unhealthy block groups while reducing the risk factor associating with high crime in these places.

Social Disorder vs. Physical Disorder

From the previous analyses, it is apparent that social disorder and physical disorder associate with violence in about the same magnitude.⁴⁹ Over 80 % of the total block groups with low social disorder also have negligible violence. The comparison using low physical disorder block groups shows a similar result. As for the high social disorder block groups, 80% of the block groups have a moderate to high level of violence, including 30% of the high violence block groups. Again, a similar pattern is found using high intensity physical disorder block groups.

The geographic correspondences between the social disorder-physical disorder dyad and violence further confirm the previous findings. The findings can be summarized in two points. First, block groups assigned to the high violence trajectory are always located within the areas with a high level of social disorder---though places having high social disorder do not necessarily have high violence rates. In other words, to locate a high violence block group, social disorder provides more accurate information

⁴⁹ The physical disorder measure from the complaint data also shows a similar relationship with violence in some areas, but a somewhat different relationship in the others. Due to the data inconsistency (which will be addressed later in this chapter), here I only use illegal dumping data to represent physical disorder.

than physical disorder. Perhaps it is because that people involved in disorderly behaviors are also more likely involved in violence, regardless of environmental factors.

Additionally, these people might provide visible targets for motivated perpetrators or they might be the instigators of violent behavior. Second, places that are low in both social disorder and physical disorder are also free of violence problems. When a block group is very healthy by one criterion, it is also likely to be healthy by another standard. On the other hand, when a block group starts to show any signs of a disorder problem, it is very unlikely that it will exhibit a low rate of violence. High physical disorder block groups, though not informative of where the high violence block groups are located, are predictive of where the *low* violence block groups will *not* be. The spatial concordance between disorder and violence points out a possibility that there may exist a connecting mechanism that governs both disorder and violence at places.

Another interesting finding that emerged from the spatial analysis is the concentration of disorder and violence in the downtown area. Regarding this specific finding, different theories might provide different explanations. As for social disorganization theory, downtown areas have long been considered the hot-bed of crime and other social illness. It suggests that the concentration of business and disadvantaged residents within the center city naturally results in the creation of “hotspots” of crime and other problems in the areas. Strain theory might argue that the areas with high levels of deprivation, population density, disorder and family disruption will lead to the concentration of strained people. Thus, violence might be chosen as a potential coping mechanism in response to strains (see Agnew, 2006). The routine activities approach will conclude that downtown areas provide more activity spaces that people can access

by foot. Violence and disorder are both products of human behavior. Thus, it is not surprising that areas with more human activity naturally lead to higher levels of violence and disorder. The BW thesis will suggest that a broken window in a more populated area attracts more attention from would-be offenders than would one in a rural area.

Therefore, it is more important to repair the broken windows in urban areas. Above and beyond these theoretical possibilities, it is equally plausible that police practice also contributes to this downtown concentration phenomenon. Police tend to patrol downtown areas more often and thus are more likely to record or discover disorder and violence in these areas. This possibility, however, is not an issue as the same concentration patterns were also found by using the illegal dumping data.

In sum, the exploratory spatial analysis shows that if a place has no disorder problem, then it will also be violence-free. The results of the Granger causality tests presented earlier already show that there is no causal association between disorder and violence. Thus, the fact that disorder (social and physical disorder) generally cluster with violence might indicate that they share the same underlying causal factors at places. The findings also show that the spatial relation of social disorder and violence appears to be stronger and more consistent than that of physical disorder and violence. This further suggests that social disorder and violence may share similar underlying causal factors, while physical disorder and violence may be driven by largely different latent factors. As such, social disorder needs to be given a higher priority than physical disorder if we want to understand the spatial distributions of violence.

Assessment of Theoretical Perspectives

Different theories expect a different pathway connecting disorder and violence. In addition, the separation between social disorder and physical disorder is rarely mentioned in these theories. In the end of Chapter 3, I summarized different theoretical perspectives in terms of disorder's role and its expected relation to crime. Here I will use the findings of the current study to verify different theoretical arguments mentioned in Chapter 3. The results will be detailed and discussed in the following paragraphs.

1. Causal vs. Spurious Relationship between Disorder and Violence

From the previous discussion, we know that the main point that differentiates several key theories is the connecting mechanism between disorder and violence: whether it is a causal or spurious relationship. From the findings, it is clear that there is definitely a positive association between disorder and violence; however, further examinations showed that the causal hypothesis is not supported. This particular finding provides us with a first standard: whichever theory argues for a causal relationship between disorder and violence needs to reassess its theoretical framework. Among all the theories mentioned in Chapter 2 and 3, the broken windows thesis and Wilson and Boland's deterrence argument specifically argue for a causal direction between the two variables. Various types of social disorganization theory suggest a spurious relationship. Routine activities theory, however, pays no attention to disorder and thus has no set opinion about the relationship between disorder and crime.

Using the first criterion, I conclude that the BW thesis and Wilson and Boland's deterrence perspective need to reconsider the role that disorder plays in the crime equation. Social disorganization theory is not challenged by the first criterion as SD

claims a spurious relationship between disorder and violence. The RA theory is not concerned about disorder and thus, is not examined in the first round of judgment.

2. Social Disorder vs. Physical Disorder: The Differential Theoretical Implications

Additionally, the findings from spatial correspondence rates between disorder and violence also indicate the qualitative differences between social and physical disorder. In the earlier sections, I showed that social disorder associates with violence more so than physical disorder. This particular finding challenges most of the theories reviewed in this dissertation by revealing the importance in differentiating the theoretical meanings of social disorder and physical disorder.

For example, the social disorganization perspective has gone through different stages of development. Traditional social disorganization used physical disorder to characterize deterioration of the environment while social disorder was not examined. In Sampson's version of social disorganization theory, social disorder and physical disorder are studied together but are not expected to relate to crime differently. In general, social disorganization theory is not concerned about the difference between social and physical disorder. As for the BW thesis and other versions of the incivilities thesis, they often talk about the different elements contained within each type of disorder, but they do not expect them to have separate effects on crime either. In fact, public policy which follows the BW perspective often focuses on both cleaning up the physical environment (trash and graffiti clean-up) and the eliminating disorderly behavior (arrest of the metro fare-beaters and public drunks, etc.). In the RA approach, as mentioned earlier, disorder is not

included within the three key elements (target, offender and guardianship) and is never explicitly discussed.

Overall, there is a lack of concern about the separation between social and physical disorder in the aforementioned theories. This seemingly minor point might actually bring important insight to enrich theories which examine urban pathology. Basically, the findings of the current study show that social disorder and physical disorder might represent different theoretical concepts or mechanisms that are related to crime. In the following paragraphs, I outline some potential suggestions of how each theoretical perspective can benefit from this finding in advancing the theories.

From the social disorganization perspective, places with more social disorder might have a more disadvantaged environment or have a lower level of mutual trust between residents than places with more physical disorder, a crucial point for the more recent reformulations of the theory by Bursik and Sampson. As such, this may explain why places with social disorder are more likely to have a higher level of violence.

For the incivilities thesis, it is also important to note that perhaps the cleaning up of the physical environment and the elimination of disorderly behavior actually target different populations. It is also possible that they might reach crime reduction effects through different pathways. The BW thesis is often criticized as an overly simplified theory (Sampson and Raudenbush, 1999). A careful examination of social disorder and physical disorder might help to advance the theory.

For the RA approach, it is likely that the presence of social disorder and physical disorder lead to different types of spatial convergence of the three elements and in turn lead to different crime rates. Social disorder involves human activities and thus, the

occurrence of social disorder provides an easy convergence of the three elements at places. Additionally, the anonymity that sometimes accompanies the presence of social disorder might also contribute to a higher level of violence at places. The presence of physical disorder is not as criminogenic as social disorder, though it might provide an environment that attracts the would-be offenders to the areas to commit deviant behaviors. This possibility explains why places with a high level of physical disorder are rarely crime free.

3. The Theoretical Importance of Disorder

As for the implications for other place-based theories, it is obvious that disorder, especially social disorder, should be considered when researchers specify the crime equation. Particularly, the findings show that the importance of disorder in criminological studies comes from its value as a source of information about the root causes of crime, rather than its association with crime. In other words, disorder, when defined properly, can be viewed as an analogous behavior to crime in place-based criminology. The fact that disorder does not cause violence in the current study suggests that targeting disorder would not help to relieve crime problems. Nonetheless, we can still use disorder to get a better idea of the extent of the crime problem. Additionally, disorder can also provide information about different dimensions of a city including diversity, urbanization, and median income to name just a few. Thus, measuring disorder offers a short hand for researchers to comprehend an area in a much more subtle way than the measurement of crime can offer. Moreover, as mentioned in the earlier section, a lack of disorder can be viewed as a protective factor that reduces the risk of a place of having

violence. Understanding the risk factors and protective factors behind this mechanism can also provide further theoretical insight in the study of crime and places.

4. The BW Thesis vs. the SR Perspective

In terms of answering the debate between the BW thesis and the SR perspective, the findings challenge the notion proposed by the BW thesis. From Granger causality tests, disorder was not found to be causing violence in the high intensity block groups. More specifically, among the high risk block groups, disorder and violence associate with each other in a non-causal way. Based on logical consistency, I conclude that this finding fails to provide support to the BW thesis. The spurious statement argued by Sampson and Raudenbush is more promising. However, this cannot be viewed as a validation of Sampson's social disorganization theory (the collective efficacy version), as this is simply a test of one aspect of the hypothesis's chain of events. It is only possible to test whether disorder and violence are causally related with the current data. It is not possible, however, to test if structural variables contribute to disorder and/or violence for the current study. Nor is it possible to test whether collective efficacy mediates the effects between structural variables and disorder/violence as outcome variables.

I conclude my discussion with two theoretical statements based upon the empirical findings. First, there is an association between disorder and violence at places. The association manifests on the fact that disorder and violence tend to spatially cluster together. This finding confirms many of the previous studies which suggest a positive association between disorder and other types of crime (see Weisburd et al., 1992 for an example). Second, the association that exists between disorder and violence is not causal

but merely correlational. This particular finding extends the previous literature of disorder and crime by confirming the spurious nature of the relationship with quality longitudinal data.

Additionally, the findings show that it might be misleading to study disorder and its association with crime without making clear distinctions between social disorder and physical disorder. Not all types of crime, disorder or other problem behaviors are the same, even though we usually refer to them with an overarching label (Weisburd et al., 1992). The differential effects between social and physical disorder remind us of the risk of using a “one-size-fits-all” mentality when studying crime. Therefore, it is crucial for future research, not just for place-based research, to scrutinize the meanings and effects between various types of problem behavior.

Before discussing the policy implications of the findings, it is necessary to first review the limitations of the current study.

LIMITATIONS

There are a few limitations of the data which need to be considered. First, the inconsistency of the complaint dataset needs to be taken into account when generalizing the results. After several exchanges with the people who managed the data, I learned that there was a large scale of layoff in 1994 that resulted in a shortage of manpower in the agency. In addition, during the same period of time, there was a budget cut that terminated two programs concerning renter housing registration and housing inspection. These two factors together likely explain why the data show a big dip in the number of incidents around 1995. Second, in addition to the data issue of the complaint database, the interpretations of what the data represents also need to be made with caution. The vast majority of incidents in the complaint records come from citizens' calls. Thus, it is possible that the complaint data may better represent residents' willingness to intervene in community affairs (i.e., collective efficacy) rather than reflecting the actual amount of physical disorder in the areas. If this speculation is true, that would also explain why we do not observe a high volume of physical disorder problems in the center areas of Seattle where violence, social disorder and illegal dumping data all show a high concentration of problems—i.e. perhaps residents in these disorganized areas are unlikely to call in to file physical disorder complaints. However, this is only speculation and I cannot draw any definite conclusions about what phenomena the complaint data best represent.

Another limitation regarding the data is that violence and social disorder are all drawn from a police incident database. Thus, it is possible that the shared variability due to police enforcement practice results in a higher level of spatial concordance. However,

as mentioned earlier, the types of behavior included in the social disorder measure are qualitatively different from the violent offenses that I used in this study. As such, the fact that these two variables shared the same data source should not bias the results---though caution is still needed when considering the implications of the findings.

Fourth, the lack of information about the root causes of disorder and violence needs to be explored in future research. Recall that this study did not intend to answer the question about the root causes of crime and disorder. Thus, the importance of neighborhood characteristics on the occurrence of crime and disorder is not tested here and needs to be examined in future research. Additionally, as noted above, one cannot test Sampson's theory without taking into account the effects of structural variables and collective efficacy.

Finally, the use of a selected sample in the time series analysis might constrain the ability of the current study to find other possible patterns of relation among disorder and violence if the selected sample has a systematic bias. Comparing the structural characteristics of the 15 chosen block groups and the 12 unselected ones, I did not find any statistically significant differences using the 1990 census information (Table 7-1). As for the 2000 census information, the selected block groups were found to have a significantly higher average income but a lower percentage of renter-occupied housing. Aside from these two variables, these two groups show comparable characteristics. Thus, the use of the selected sample should not bias the results in any systematic way. More information about the comparison is detailed in Chapter 7.

Finally, the fact that this study uses information from the city of Seattle may call attention to the generalizability of the findings. As discussed in Chapter 4, Seattle has

some unique features compared to other big cities. For example, in Seattle, Asians account for 13.1 % of the population compared to the average 3.64% in the US (Census Bureau, 2002). This limitation of relying on a sample from a specific region or group, however, is not uncommon in the field of sociology and criminology. The well-known Chicago school developed their theory based on observation of a single city (Shaw and McKay, 1942). Sampson and Laub's age-graded theory was solely built upon 1,000 male juveniles (500 delinquent juveniles and another 500 conventional counterparts) who lived in Boston during 1940s and 1950s (Sampson and Laub, 1993; Laub and Sampson, 2003). Nonetheless, the uniqueness of Seattle reminds us that caution is needed when applying the results from the current study to other cities. Thus, future research needs to cross validate the similarities and dissimilarities between Seattle and other cities before generalizing the results. Conversely, Seattle's crime trend mimics the overall crime trends observed in the other major cities (see Blumstein and Wallman's *The Crime Drop in America*, 2000). This should lend confidence that the findings of the study should not be too different from what would have been found in other cities if appropriate data were available at other places.

In sum, there are some limitations of the current research that need to be considered and improved in future research.⁵⁰ For a comprehensive test of the BW thesis and the SR perspective, one needs to collect information including important structural characteristics as well as collective efficacy and residents' fear of crime. Also, more

⁵⁰ Some might argue the use of a different time scale at different stages of analysis can contribute to the particular findings. In the current study, this worry is not warranted. The monthly data used in the time series analysis were all stationary, which means a similarly stationary series should be observed if the data is aggregated by year. However, the monthly data show more spikes and valleys compared to the annual data. Specifically, the spikes and valleys concentrate in the early period of observation. It is possible that the monthly noise that occurred in the early 90s contributed to the crime drop in Seattle. Future research is necessary to examine whether specific events occurred during the period affecting the monthly patterns.

efforts are needed in understanding the mechanism connecting disorder and violence. Additionally, future research is needed to explore whether the uniqueness of Seattle biases the findings of the current study in any specific way. However, this study does serve an important purpose in examining the logical consistency in these theoretical perspectives based on the empirical results from studying longitudinal patterns of disorder and violence.

*FIXING BROKEN WINDOWS: THE SOCIAL MEANINGS OF BROKEN WINDOWS
POLICING*

The findings of this study are interesting from a policing standpoint, especially for broken windows policing. The BW thesis correctly identifies an association between disorder and violence. The problem, however, of the BW thesis is that it argues that a causal association runs from disorder to violence. The findings of this study, however, strongly suggest that disorder and violence merely co-exist on a correlational level. For instance, it is likely that a place with a high level of violence tends to attract people who have a tendency to behave disorderly. In this case, checking disorderly people might increase the chances of apprehending people who have also committed more serious crime--just like any other police tactic that widens the net of enforcement. With these caveats in mind, it is important to note that the BW thesis has many other contributions that are not to be undermined by its limitations.

The problem of the BW thesis is that it not only generalizes this limited phenomenon to all urban areas, but that it also reverses the causal order specified above by arguing that disorderly people gather together and *then* crime occurs. As noted in Chapter 2, my assessment of the validity of the BW thesis is not alone. Many studies

have argued that the broken windows thesis/policing does not have adequate empirical support (see Eck and Maguire, 2000; Harcourt, 2001, Harcourt and Ludwig, 2006; Taylor, 2001). Yet “fixing broken windows” has become a popular slogan among the general public and practitioners and many have come to believe the validity of this statement.

Why is it that many people in spite of their different political opinions have embraced the BW thesis with such enthusiasm? I believe the enthusiasm is related to the types of behavior that are considered disorderly. Just like violence, disorder is also defined by legal definitions. Unlike violence, however, there is much more room for ambiguity in defining disorder. If disorder does not cause violence, what would happen if we are now made to believe that certain types of behavior like loitering or public drinking is equal to something much more severe?

Harcourt has an excellent insight on this issue: *“The social meaning of the proposed police practices does not simply change our behaviors; it may fundamentally alter the way we think about and judge other people, and the way we relate to others”* (2001, page 218). By relating disorderly behavior to severe crime problems and emphasizing the danger of leaving disorder unattended, the BW thesis legitimizes the disproportional attention paid on underprivileged populations by the police. Of course this statement cannot be empirically examined in the current research. Nonetheless, it is important to consider the potential collateral consequences before we adopt a new policing strategy, especially when empirical evidence regarding its effectiveness in crime reduction is far from equivocal.

CONCLUSIONS

This study concludes, using innovative methods and comprehensive data, that there is a relationship between disorder and violence. The relationship, however, is spurious rather than causal. In terms of the theoretical implications, the results do not provide much support for theories which argue for a causal association between disorder and violence such as the BW thesis. The findings are more consistent with theories suggesting a spurious relationship between disorder and crime, like Sampson and Raudenbush's perspective. However, this study is not a comprehensive attempt to test the validity of both the BW thesis and Sampson's social disorganization theory, and future research should expand on it by modeling the impacts of structural factors and collective efficacy on disorder and crime. Additionally, the potential benefit of using a risk and protective factor approach in the future research should be considered.

The exploratory spatial analysis also revealed the differential relationship social disorder and physical disorder have with violence. This underscores the importance of looking at social disorder and physical disorder separately in future research. Theories concerning disorder and crime will benefit from taking into account the qualitative difference between social disorder and physical disorder.

The failure to support the broken windows thesis further challenges the legitimacy of broken window policing (or order maintenance policing). The empirical evidence from the current study does not support the proposed rationale of targeting disorder to achieve a crime reduction benefit. Nonetheless, the fact that there is a moderate to strong spatial association points to a new direction for broken windows policing. Even though disorder does not lead to crime directly, disorder and violence do tend to cluster together

at the same places. Targeting disorder may be an effective way to deploy police resources. The following should be considered before implementing this strategy: the definition of disorder, the social meanings behind this definition and any potential collateral consequences of these definitions coupled with a police crackdown on disorder. If certain types of disorder are predominantly performed by certain groups of people, then targeting these specific behaviors will risk unfair treatment of these groups. Police, along with researchers, need to scrutinize this issue carefully and be aware of the potential problems of the policy and modify it according to citizen's responses. These are the required steps for the making of quality public policy.

APPENDIX A. LISTS OF DISORDER DESCRIPTIONS

Social Disorder

OFFENSE	DESCRIPTIONS
DISORDERLY CONDUCT	DISORDERLY CONDUCT
DISP LIQUOR	SMC 12A.24.020 Disposition of Liquor
DIST-NOISE	DIST-NOISE
DIST-OTH	DIST-OTH
DRINK PUBLIC	SMC 12A.24.025 Drinking in Public
FIGHT	FIGHT
GAMBLE-BOOKMAKING	GAMBLING BOOKMAKING-19
GAMBLE-NUMBERS	GAMBLING NUMBERS/LOTTERY-19
GAMBLE-OTH	GAMBLING OTHER-19
GAMBLING-CONDUCT	GAMBLING CONDUCT
GAMBLING-PLAY	GAMBLING PLAY
GAMBLING-UNKNOWN	GAMBLING UNKNOWN
HARASS	HARASS
MARDI GRAS	MARDI GRAS
MENACE	MENACE
NUISANCE	NUISANCE PUBLIC-26
OBSCENE	PHONE CALLS OBSCENE-24
OBSTRUCT	OBSTRUCT
SODA-VIOL	STAY OUT OF DRUG AREAS
SUSP	SUSPICIOUS BEHAVIOR OR CIRCUMSTANCE
TRESPASS	TRESPASS
UNL POSS	UNLAWFUL POSSESSION OF ALCOHOL
DRG-OTH-COCAINE	DRG-OTH-COCAINE
DRG-OTH-HASHISH	DRG-OTH-HASHISH
DRG-OTH-HEROIN	DRG-OTH-HEROIN
DRG-OTH-MARIJU	DRG-OTH-MARIJU
DRG-OTH-METHADON	DRG-OTH-METHADON
DRG-OTH-MORPHINE	DRG-OTH-MORPHINE
DRG-OTH-OPIUM	DRG-OTH-OPIUM
DRG-OTH-OTH	DRG-OTH-OTH
DRG-OTH-UNKNOWN	DRG-OTH-UNKNOWN
DRG-POSSESS-COCAINE	DRG-POSSESS-COCAINE
DRG-POSSESS-HASHISH	DRG-POSSESS-HASHISH
DRG-POSSESS-HEROIN	DRG-POSSESS-HEROIN

OFFENSE	DESCRIPTIONS
DRG-POSSESS-MARIJU	DRG-POSSESS-MARIJU
DRG-POSSESS-METHADON	DRG-POSSESS-METHADON
DRG-POSSESS-MORPHINE	DRG-POSSESS-MORPHINE
DRG-POSSESS-OPIUM	DRG-POSSESS-OPIUM
DRG-POSSESS-OTH	DRG-POSSESS-OTH
DRG-POSSESS-UNKNOWN	DRG-POSSESS-UNKNOWN
DRG-SELL-COCAINE	DRG-SELL-COCAINE
DRG-SELL-HASHISH	DRG-SELL-HASHISH
DRG-SELL-HEROIN	DRG-SELL-HEROIN
DRG-SELL-MARIJU	DRG-SELL-MARIJU
DRG-SELL-METHADON	DRG-SELL-METHADON
DRG-SELL-MORPHINE	DRG-SELL-MORPHINE
DRG-SELL-OPIUM	DRG-SELL-OPIUM
DRG-SELL-OTH	DRG-SELL-OTH
DRG-SELL-UNKNOWN	DRG-SELL-UNKNOWN
DUI	DRIVING UNDER INFLUENCE OF ALCOHOL/DRUGS-21
DIST-FAMILY	DIST-FAMILY
FAMILY-DISTURBANCE	FAMILY DISTURBANCE-24
CURFEW	CURFEW VIOLATION
MIN CONSUME	MINOR CONSUMING ALCOHOL
MIN FREQUENT	MINOR FREQUENTING A TAVERN
MIN POSS	MINOR IN POSSESSION OF ALCOHOL
SERVING DRUNK	SERVING A DRUNK PERSON
STALKING	STALKING
UNL SALE	SMC 12A.24.090 UNLAWFUL SALE OF ALCOHOL TO MINOR
PROST	PROSTITUTION
SOLICITING	SOLICITING-26
VICE	VICE PROSTITUTION/PIMPING/PANDERING-16
ADULT ENT	VIOLATION OF ADULT ENT. ORD.
LIQUOR	LIQUOR

Physical Disorder

OFFENSE DESCRIPTIONS
ILLEGAL DUMPING
LITTERING
PROPERTY DAMAGE BY GRAFFITI
ABATEMENT PREMISES
HOUSING MF/SF VIOLATION
MINIMUM MAINTENANCE
SHORELINE
VACANT BLDG - COM
VACANT BLDG - MF
VACANT BLDG - SF
WEEDS
Z/ILLEGAL UNIT
Z/ILLEGAL USE
Z/INOPERABLE JUNK ST
Z/INOPERABLE VEHICLE
Z/JUNK STORAGE
Z/PARKING
Z/PERMIT CONDITIONS
ZONING MULTI/OTHER

APPENDIX B. OVERALL PROBABILITIES BETWEEN DISORDER AND VIOLENCE TRAJECTORY ASSIGNMENT

(a) Joint Probabilities between Violence and the Social Disorder Trajectory Assignment

Disorder		Violence Trajectory			
		Negligible	Low-Rate Decline	Moderate Decline	High Rate Decline
Social Disorder Trajectory	Low Rate Stable	0.469	0.064	0.00	0.00
	Moderate Stable	0.025	0.246	0.070	0.00
	High Rate Stable	0.000	0.002	0.086	0.039

(b) Joint Probabilities between Violence and the Illegal Dumping Trajectory Assignment

Violence Dumping		Violence Trajectory			
		Negligible	Low-rate Decline	Moderate Decline	High Rate Decline
Illegal Dumping Trajectory	Negligible	0.394	0.076	0.008	0.000
	Low Rate	0.093	0.171	0.056	0.005
	Moderate	0.002	0.048	0.063	0.035
	High Rate	0.000	0.009	0.025	0.016

(c) Joint Probabilities between Violence and the Complaint Trajectory Assignment

Disorder		Violence Trajectory			
		Negligible	Low-Rate Decline	Moderate Decline	High Rate Decline
Complaint Trajectory	Low Rate	0.349	0.115	0.044	0.021
	Moderate	0.139	0.173	0.066	0.013
	High Rate	0.004	0.022	0.037	0.016

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