Executive Summary:

Understanding Developmental Crime Trajectories at Places: Social Disorganization and Opportunity Perspectives at Micro Units of Geography

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"Neighbors next door are more important than relatives far away"

Chinese Folk Saying

Traditionally, research and theory in criminology have focused on two main units of analysis: individuals and communities (Nettler, 1978; Sherman, 1995). Crime prevention research and policy have also been focused primarily on offenders or the communities in which they live (Akers, 1973; Gottfredson & Hirschi, 1990). While the individual and the community have long been a focus of crime research and theory, and of prevention programs, only recently have criminologists begun to explore other potential units of analysis that may contribute to our understanding and control of crime.

An important catalyst for this work came from theoretical perspectives that emphasized the context of crime and the opportunities that are presented to potential offenders. In a ground breaking article on routine activities and crime, for example, Cohen and Felson (1979) suggest that a fuller understanding of crime must include a recognition that the availability of suitable crime targets and the presence or absence of capable guardians influence crime events. Around the same time, the Brantinghams published their influential book *Environmental Criminology*, which emphasized the role of place characteristics in shaping the type and frequency of human interaction (Brantingham & Brantingham, 1981 [1991]). Researchers at the British Home Office

in a series of studies examining "situational crime prevention" also challenged the traditional focus on offenders and communities (Clarke, 1983). These studies showed that the crime situation and the opportunities it creates play significant roles in the development of crime events (Clarke, 1983).

One implication of these emerging perspectives is that crime places are an important focus of inquiry. While concern with the relationship between crime and place is not new and indeed goes back to the founding generations of modern criminology (Guerry, 1833; Quetelet, 1842 [1969]), the "micro" approach to places suggested by recent theories has just begun to be examined by criminologists.[1] Places in this "micro" context are specific locations within the larger social environments of communities and neighborhoods (Eck & Weisburd, 1995). They are sometimes defined as buildings or addresses (e.g. see Green, 1996; Sherman et al., 1989); sometimes as block faces, 'hundred blocks', or street segments (e.g. see Taylor, 1997; Weisburd et al., 2004); and sometimes as clusters of addresses, block faces or street segments (e.g. see Block et al., 1995; Sherman & Weisburd, 1995; Weisburd & Green, 1995).

Recent studies point to the potential theoretical and practical benefits of focusing research on crime places. A number of studies, for example, suggest that there is a very significant clustering of crime at places, irrespective of the specific unit of analysis that is defined (Brantingham & Brantingham, 1999; Crow & Bull, 1975; Pierce et al., 1986; Roncek, 2000; Sherman et al., 1989; Weisburd et al., 1992; Weisburd & Green, 1994; Weisburd et al., 2004). The extent of the concentration of crime at place is dramatic. In one of the pioneering studies in this area, Lawrence Sherman and colleagues (1989) found that only three percent of the addresses in Minneapolis produced 50 percent of all calls to the police. Fifteen years later in a

[1] For a notable example of an early approach which did place emphasis on the "micro" idea of place as discussed here, see Shaw et al. (1929).

study in Seattle, Washington, Weisburd et al. (2004) reported that between four and five percent of street segments in the city accounted for 50 percent of crime incidents for each year over 14 years. These studies and others (Brantingham & Brantingham, 1984; Clarke, 1983; Curtis, 1974; Maltz et al., 1990 [2000]; Pyle, 1976; Rengert, 1980; Skogan, 1990) have established crime places as an important focus of criminological inquiry and practical crime prevention. In turn, a number of recent programs focused on specific places, often defined as crime "hot spots," have been found to have significant effects on crime and disorder (e.g. see Braga et al., 1999; Mazerolle & Terrill, 1997; Mazerolle et al., 1998; Sherman & Weisburd, 1995; Weisburd & Green, 1995).

In a prior NIJ study, Weisburd and colleagues (2004) also point to the importance of recognizing dynamic developmental trends across micro units of geography. Using group-based trajectory analysis (Nagin, 1999, 2005; Nagin & Land, 1993), they classify street segments (as measured by address ranges) in Seattle, Washington into trajectory groups that reflect distinct longitudinal crime patterns. Some trajectories were classified as stable, a few as increasing, and some as decreasing throughout the time span. These findings are particularly important because the city of Seattle, like most large American cities in the 1990s, experienced a large crime decline. The fact that Weisburd et al. found that most street segments in a city changed little in terms of crime during that period, and that some even experienced strong crime waves serves to reinforce the salience of looking more closely at crime at very small geographic units of analysis.

While scholars have provided a strong empirical basis for the assumption that crime is strongly clustered at crime hot spots and that there are important developmental trends of crime at place, existing research provides little insight into the factors that underlie these patterns.[2]

[2] For example, we could identify only three prior published studies that specifically examined developmental patterns of crime at micro places over time. One study conducted by Spelman (1995) looked at specific places such

What characteristics of places are associated with crime hot spots, and how do the characteristics of hot spots differ from places that are relatively crime free? Do high and low crime places differ in substantive ways that can be empirically identified? What accounts for the differing developmental crime trends that have been identified at micro units of place over time? What leads some micro places to experience a large decline in crime trends over time, while others in the same city experience crime waves and still others vary little in crime trends during the same period? Perhaps just as critical in increasing our understanding of micro units of geography and crime and place is exploring whether crime trends observed at such geographic units are simply reflections of higher order neighborhood or community effects, or if focus on these higher order geographic areas has led us to miss important insights about the causes of crime at the micro geographic level.

For the last century criminologists have focused on describing the nature and causes of individual offending. In this report we turn our attention to a different problem that has only recently drawn criminological attention, but has the potential to improve our predictions of crime and also our ability to develop practical crime prevention. Our focus is on how crime distributes across very small units of geography. A Chinese proverb suggests that "neighbors next door are more important than relatives far away." We argue that the action of crime research and practice should be focused much more on micro crime places.

Site and Methods

Seattle makes a good choice for a longitudinal study of places for several reasons. First, as a large city it has enough geography, population and crime to undertake a micro level study.

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as high schools, public housing projects, subway stations and parks in Boston, using three years of official crime information. Taylor (1999) examined crime and fear of crime at 90 street blocks in Baltimore, Maryland using a panel design with data collected in 1981 and 1994 (see also Taylor, 2001). These studies are limited only to a small number of locations and to a few specific points in time. The final study by Weisburd et al. (2004) examined all the street 'hundred blocks' in Seattle. This research extends that earlier work.

The distinguishing feature of Seattle was the length of the time for which they had crime data available. Moreover, Seattle was led at the time of our study by an innovative Chief of Police, Gil Kerlikowske, now the Director of the Office of National Drug Control Policy, who offered to facilitate the collection of data both from the police department and other government sources in Seattle.

The study period we used is 1989 – 2004. In 1990 the population of the city had begun to rebound for the first time in decades, reaching 516,259. This upward trend continued over the next decade and by the 2000 census there were 563,374 people living in Seattle (U.S. Census Bureau, 1990, 2000).

The geographic unit of analysis for this study is the street segment (sometimes referred to as a street block or face block). We define the street segment as both sides of the street between two intersections. Only residential and arterial streets were included in our study. We excluded limited access highways because of their lack of interactive human activity.[3] This left us with 24,023 units of analysis (i.e., street segments) in Seattle. We chose the street segment for a variety of theoretical and practical reasons. Theoretically, scholars have long recognized the relevance of street blocks in organizing life in the city (Appleyard, 1981; Brower, 1980; Jacobs, 1961; Taylor et al., 1984; Unger & Wandersman, 1983). Taylor (1997, 1998) made the case for why street segments (his terminology was street blocks) function as behavior settings. We also thought that crime data was unlikely to be accurately coded at the address level, and thus the street segment in our view represented a micro level of geography that was likely to include accurate crime information.

[3] The street centerline file we obtained from Seattle GIS included many different line types (e.g. trails, railroad and transit lines to name a few). Our study included only residential streets, arterial streets and walkways/stairs connecting streets.

Data

We used computerized records of crime incident reports to represent crime. Incident reports are generated by police officers or detectives after an initial response to a request for police service. We included a total of 1,697,212 crime records that were then joined to their corresponding street segments so that crime frequencies for each of the 24,023 segments for each year could be calculated.

The data collected about each street segment represents one of two (and in some cases both) major schools of criminological thought related to places. One school of thought emphasizes opportunity characteristics and the other emphasizes social disorganization characteristics. The temporal resolution of each characteristic is a calendar year (January – December). This resolution matches the crime data. Based on the opportunity theory perspective we collected data on 16 source characteristics for each street segment in Seattle. These characteristics were then aggregated to create the final 10 characteristics we focused on for the analysis (see Table A). Based on social disorganization theories we collected nine characteristics for each street segment in Seattle at the address level of analysis. These characteristics were then aggregated to create the final eight characteristics we focused on for the analysis (see Table B). Retrospective data collection was the single most challenging aspect of the research.

Table A: Opportunity Theory Characteristics Used in Analysis

Characteristic	Composition
Motivated Offenders	
• High risk juveniles	• Truant or low academic achieving juvenile residents
Suitable Targets	
• Employment • Residents	• Number of employees • Total juveniles + total registered voters
• Retail business-related Crime generators/Crime attractors	• Total sales for retail businesses
• Public facilities as Crime generators/Crime attractors	• Number of public facilities within 1,320 feet o Community centers o Hospitals o Libraries o Parks o Schools
Accessibility/Urban Form	
• Type of street • Bus stops	• 1= arterial, 0 = residential • Total number of bus stops
Guardianship	
• Vacant Land • Police station/Fire station	• Percentage of vacant land • Number of Police or fire stations within 1,320 feet
• Street lighting	• Watts per foot of lighting

Table B: Social Disorganization Characteristics Used in Analysis

Structural Dimensions (Variables within dimension)

• SES
  ○ Property Values
  (Weighted ranking of single- and multi-family housing)
• Public Housing / Assistance
• Mixed Land Use
• Racial Heterogeneity
  ○ Race of Public School Students
• Distance to Downtown
  ○ Urbanization
• Physical Disorganization
  ○ Physical Disorder

Intermediating Dimensions (Variables within dimension)

• Unsupervised Teens
  ○ Truant Juveniles (grades 3 – 12)
• Willingness to Intervene in Public Affairs
  ○ Voting Participation (Percent of Active voters)

Results

We think that our study has yielded a number of important findings for advancing the study of the criminology of place. In some cases, our work has only reinforced that of prior investigations. But in others, our research has broken new ground that we hope will continue to be explored by other researchers. We divide our discussion of our research findings into four distinct areas: 1) the distribution of opportunity and social disorganization across places; 2) the concentration of crime at place; 3) the geography of crime at place; 4) the correlates of crime at place.

The Distribution of Opportunity and Social Disorganization across Places

We began by identifying two major perspectives that have informed criminological understandings of place: social disorganization theories and opportunity theories.

For criminologists who have placed emphasis on social disorganization theory, social processes occur in relatively larger areas where social and economic forces influence the ability of communities to regulate and enforce norms on their members (e.g. see Bursik & Grasmick, 1993; Sampson & Groves, 1989; Shaw & McKay 1942 [1969]) . While social disorganization theory has not been seen as a key factor in understanding crime at micro units of analysis such as the street segment, we thought it was important to examine whether such structural factors as socio-economic status or physical disorder, or mediating concepts like collective efficacy, help us to understand what we have termed the criminology of place.

The importance of opportunity theories for understanding crime at place has a long history in criminology (Brantingham & Brantingham, 1981 [1991], 1984; Clarke, 1983, 1992, 1995; Cohen & Felson, 1979; Cornish & Clarke, 1986). A focus on crime naturally leads scholars to specific places or situations, and the opportunities that situations and places provide for crime. We expected at the outset that measures reflecting the opportunity perspectives would vary at the street segment level. However, we wanted to examine whether this assumption would be strongly supported by empirical data.

Looking both at structural and mediating variables we found that there are hot spots of social disorganization at the street segment level. For example, fully 50 percent of truant students are consistently found to reside on between 2 and 3.5 percent of the total street segments during the study period. Over 50 percent of reports of physical disorder were found on between 1.5 and 3 percent of street segments. And these hot spots were not simply part of contiguous hot

spots at larger geographic levels. They are not found only in specific neighborhoods. Rather they are distributed across the city landscape.

We also found strong evidence of spatial independence of social disorganization at street segments. While there are sometimes clusters of street segments with specific traits in what may be termed communities or neighborhoods, there is also significant street by street variation in such concentrations. This is an extremely important finding since it suggests that a perspective that has generally been seen as relevant at higher levels of geography shows concentration and variability at the street segment level. The fact that there are hot spots of social disorganization at this level raises the intriguing question of whether such hot spots are related to hot spots of crime (see later). But irrespective of that relationship our work is the first establish that social disorganization variables are concentrated at micro places and that they are spread across the city landscape.

Opportunity measures are as we expected also concentrated, and also evidence variability across places. The overwhelming finding is one of concentration at specific places. For example, 50 percent of high risk juveniles (a proxy in our work for "motivated offenders") are consistently found on between three and four percent of the total number of Seattle street segments. In turn, half of all the employees (a proxy for "suitable targets") in the city were located on less than one percent of Seattle street segments. There are hot spots of motivated offenders, suitable targets and capable guardians. This was not suprising given prior theorizing, but our data are among the first to illustrate this fact.

Finally, as with social disorganization measures we find that opportunity characteristics of places evidence much spatial heterogeneity. In statistical terms there is a significant degree of negative spatial autocorrelation evident in the variables we examine. In this sense while there

are hot spots of opportunities, such hot spots are not clustered only in specific neighborhoods. Our results suggest that characteristics reflecting opportunity theories are indeed associated with specific street segments, and are not simply reflecting larger area trends.

The Concentration of Crime at Place

Using 16 years of data and adding refinement to the definition of street segments our analyses follow closely those of prior studies of crime at place. Our study confirms prior research showing that crime is tightly clustered in specific places in urban areas, and that most places evidence little or no crime (Sherman et al., 1989; Weisburd et al., 2004). Fifty percent of the crime each year in Seattle was found at just five to six percent of the street segments in the city. We think this pattern is consistent enough to suggest a "law of concentration" of crime. Following prior study (see Weisburd et al., 2004) we were also able to show that there is a high degree of stability of crime at micro places over time. While there is overall stability in the trajectory patterns we observe in our study, there is also evidence of strong increasing and decreasing patterns of crime. One pattern of developmental trends we observe for example, suggest strong crime waves during a 16 year period of general crime declines in the city. More generally, our data suggest that crime trends at specific segments are central to understanding overall changes in crime in a city.

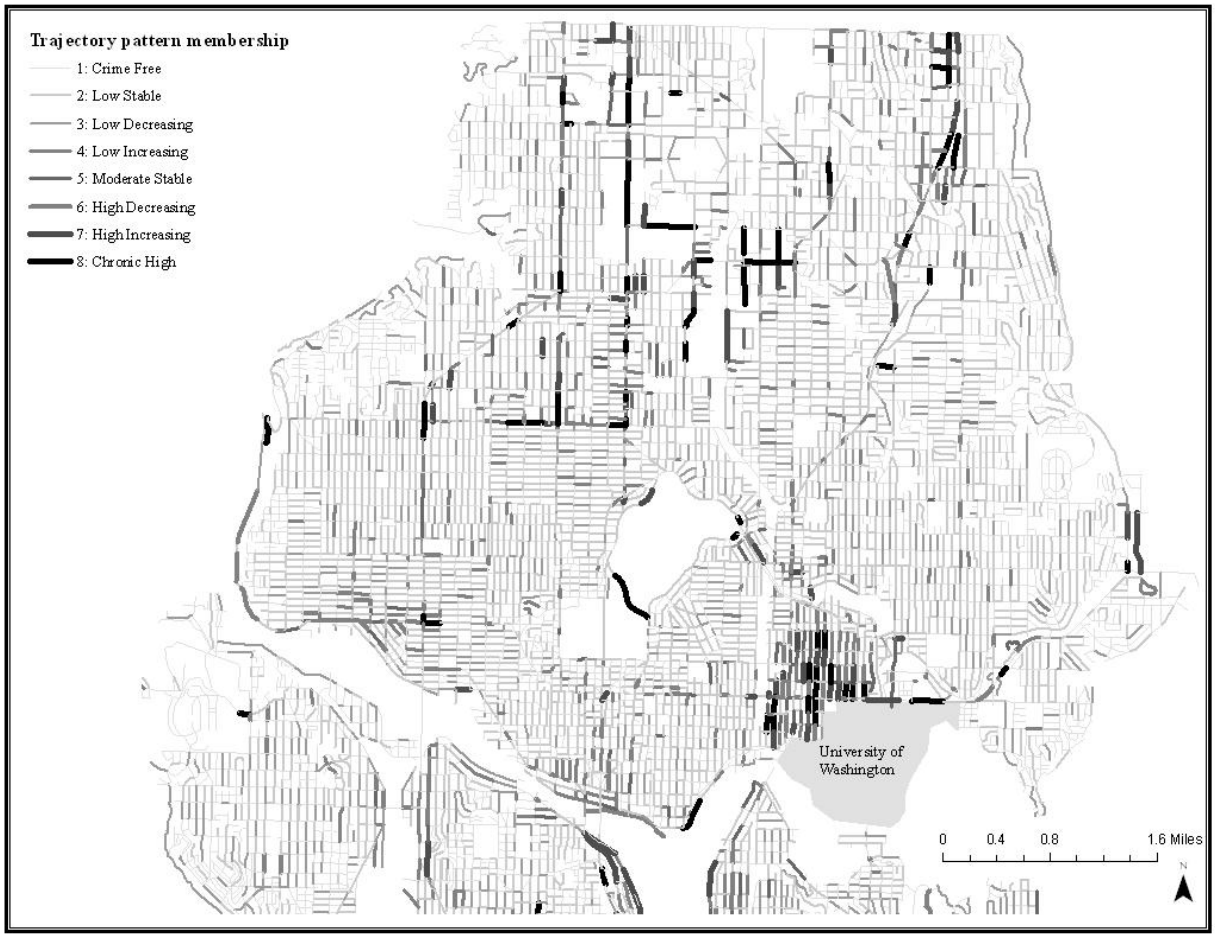
The Geography of Crime at Place

Our analyses of the geography of developmental patterns of crime at street segments provided important insights into our understanding of the processes that generate crime trends at street segments. Perhaps the key objection to our work would be that we have unnecessarily rarified our geographic analysis and that our choice of a micro place unit for studying crime has simply masked higher order geographic processes.

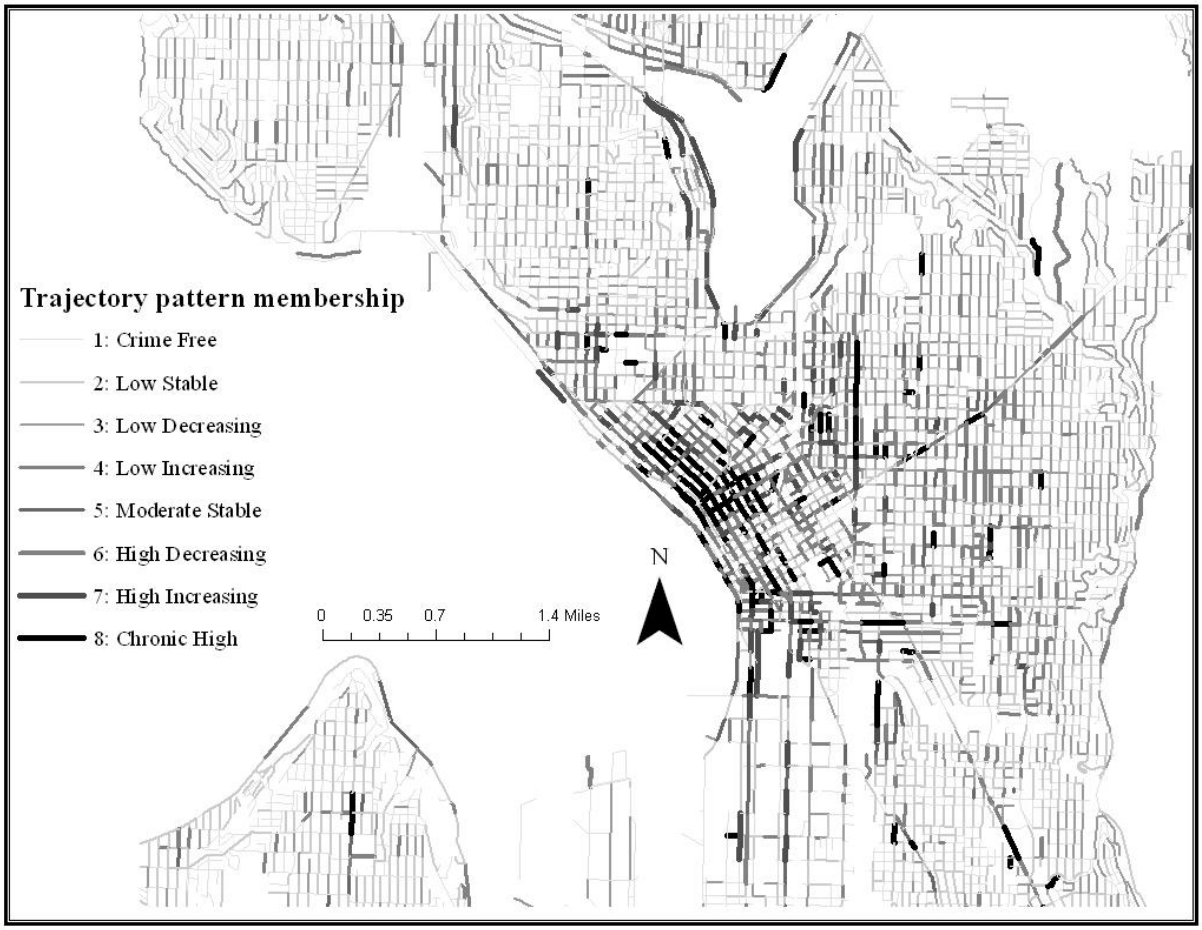
We do not find evidence suggesting that the processes explaining crime patterns at street segments come primarily from higher geographic influences such as communities. There are indications of the influence of higher order trends in our data. One example is the fact that higher crime street segments are not distributed at random, and are more likely to be closer to each other than would be predicted simply by chance (Figure 1). But these indications of macro geographic influences are much outweighed in our data by evidence of the importance of looking at crime at the micro level that we have defined as street segments in our study. There is strong street to street variability in crime patterns in our data, and such variability emphasizes the importance of studying crime at place at a micro unit of analysis. Evidence of spatial independence at the street segment level further reinforces this. Much of the action of crime comes from the street segment, as we have defined it. We think our findings suggest that it is time to move the geographic cone of criminological interests to the criminology of place.

Figure A: Geographic Distribution of Trajectory Group Membership

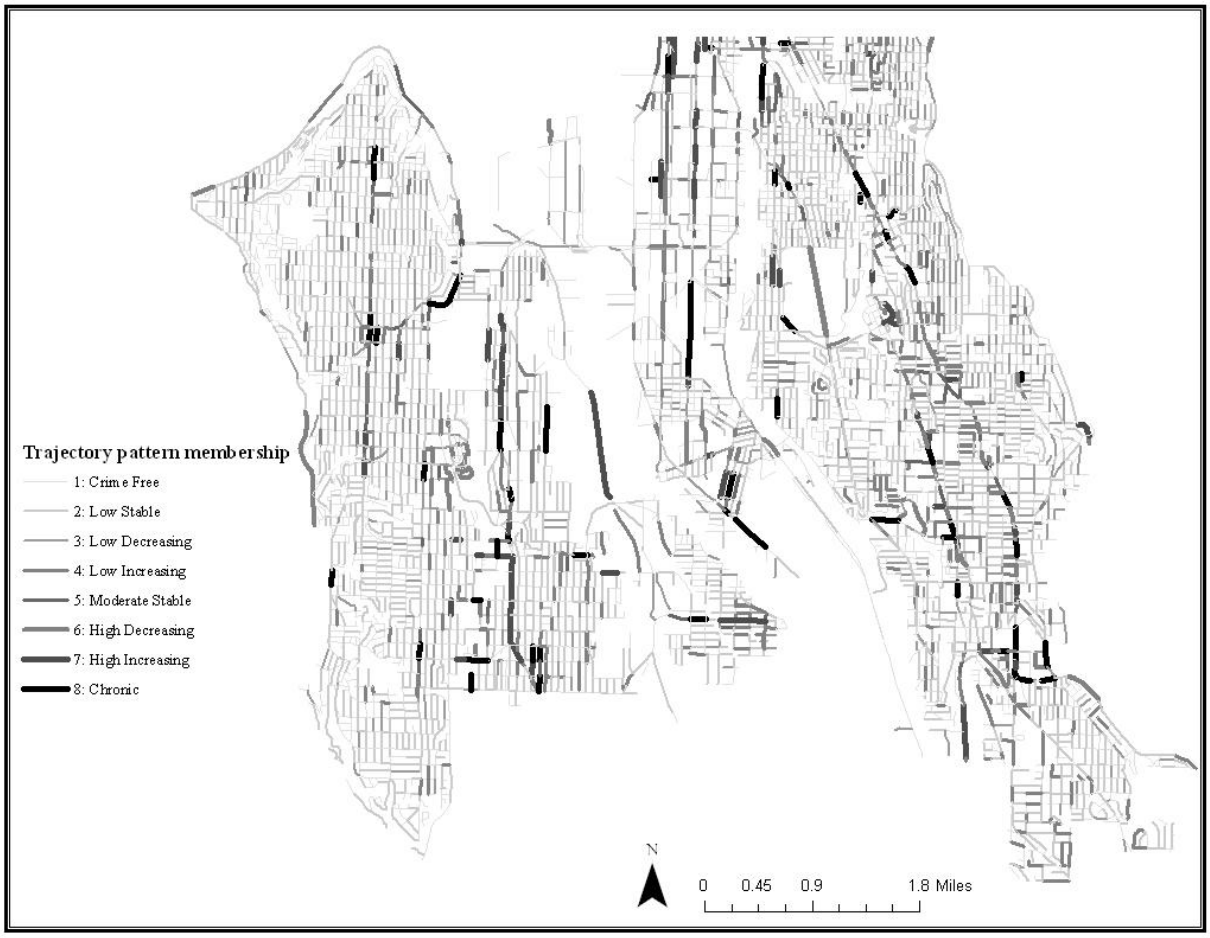
(a)



(b)



(c)



The Correlates of Crime at Place

Having established that an important part of the crime equation is generated at a very micro level of geography, it was natural to turn to the factors that would explain crime at place. Earlier we noted that characteristics of social disorganization and opportunity were concentrated at places and that they evidenced strong geographic heterogeneity. Can we explain selection to different developmental crime patterns with variables representing these key theoretical dimensions of place?

Our research has provided an unambiguous answer to this question. Looking at risk factors for crime, we found a large number of both opportunity measures and social

disorganization measures to significantly distinguish trajectory membership. Of the six structural indicators of social disorganization that we examined, five are directly related to crime levels of trajectories. In the case of mediating factors of social disorganization two key measures were related to the level of crime in trajectory patterns. Our ten measures of motivated offenders, suitable targets and accessibility are all linked strongly to initial crime levels of trajectory patterns. The relationship of these factors to developmental trends, while not as uniform, follows the patterns overall that would be expected.

Our risk analysis suggested the importance of both opportunity and social disorganization theories as correlates of crime at place. But we also looked at these factors in the context of an overall model explaining developmental patterns of crime at street segments. We used a direct method for comparing the influence of the two theoretical perspectives on crime patterns at places. It suggested that both perspectives are providing a strong explanation for developmental patterns of crime at place. The opportunity perspective provided an explained variance value of ("pseudo" R^2) of .66 versus .51 for the social disorganization measures. This suggests that a model exclusively concerned with opportunities for crime (as we measure them) is likely to provide a higher level of prediction of trajectory patterns. However, we think what is most significant here overall is that in the multivariate context, both perspectives maintain strong and significant influences on crime at place. Both social disorganization theory and opportunity theories need to be considered in understanding why crime varies across places.

In turn, the models presented point to the strength of these theories in providing explanation for crime at place. Our main model explaining trajectory group membership had a Pseudo R^2 value of .68 (Nagelkerke). Drawing from a recent article in the *Crime and Justice* series (see Weisburd & Piquero, 2008) we argued that in comparison to studies of crime and

criminality more generally prediction is very high in our model. The median value for R^2 in that study was only .36, and a quarter of the studies examined had values of less than .20. The average R^2 value for person based studies was about .30. In this context our Pseudo R^2 value above .60 implies that the criminology of place has much potential for explaining crime.

Policy Implications

We have shown so far that our findings have important implications for our understanding of crime. However, we also think that our work has direct implications for crime prevention policy. Our work reinforces a growing trend in crime prevention that seeks to focus efforts on the context of crime (Sherman, 1995; Weisburd, 2002; Weisburd et al., 2009), in our case on crime places.

While the efficiency of crime prevention approaches can be defined in a number of different ways, we think it reasonable to begin with a definition of efficiency that suggests that strategies are more efficient to the extent that they offer the same crime prevention value with a smaller number of targets. We find that five to six percent of street segments each year include half of all crime incidents. One percent of the street segments in the chronic trajectory group are responsible for more than a fifth of all crime incidents in the city. This means that crime prevention practitioners can focus their resources on relatively few crime hot spots and deal with a large proportion of the crime problem. Importantly, as well, places are not "moving targets." Place-based crime prevention provides a target that "stays in the same place." This is not an insignificant issue when considering the investment of crime prevention resources.

Evidence of the stability of crime patterns at places in our work, also suggests the efficiency of place based approaches. We show not only that about the same number of street segments were responsible for 50 percent of the crime each year, but that the street segments that

tended to evidence very low or very high activity at the beginning of the period of study in 1989 were similarly ranked at the end of the period in 2004. Accordingly, a strategy that is focused on chronic hot spots is not likely to be focusing on places that will naturally become cool a year later. The stability of crime at place across time makes crime places a particularly salient focus for investment of crime prevention resources.

Our work also reinforces the importance of focusing in on "places" rather than larger geographic units such as communities or police precincts. Our data suggest that crime prevention at larger geographic units is likely to suffer an "ecological fallacy" in which crime prevention resources are spread thinly across large numbers of street segments, when the problems that need to be addressed are concentrated only on some of the street segments in that area. Criminologists and crime prevention practitioners need to recognize that definitions of neighborhoods as "bad" or problematic, is likely to miss the fact that many places in such areas have no or little crime. In turn, crime prevention resources should be focused on the hot spots of crime within "good" and "bad" neighborhoods.

Our data also illustrate that criminologists and crime prevention practitioners can identify key characteristics of places that are correlated with crime. At a policy level, our research reinforces the importance of initiatives like "hot spots policing" that address specific streets within relatively small areas (Braga, 2001; Sherman & Weisburd, 1995; Weisburd & Green, 1995). If police become better at recognizing the "good streets" in the bad areas, they can take a more holistic approach to addressing crime problems.

Limitations

While we think our work has contributed a good deal to our knowledge of the criminology of place, we note in our report some specific limitations of our data. Perhaps most

significant is the fact that by necessity we were limited to retrospective data collection. Having noted that we were able to provide a more in depth view of crime at place than any prior study we know of, we think it important to recognize that retrospective data collection is by its nature limited. Many of our measures are proxies for variables we would have liked to collect but were unable to identify.

A second key limitation of our study relates to our use of observational data in understanding developmental crime patterns. While we examine the correlates of developmental crime patterns at places, we cannot make unambiguous statements about the causal patterns underlying our data. For example, reports of physical disorder are very strongly correlated with presence in more serious or chronic trajectory patterns. But our data do not allow us to establish that physical disorder leads to more serious crime problems. Even though we find that changes in physical disorder and changes in crime are related, it may be that a third cause unmeasured in our analysis is in fact the ultimate cause of the relationships observed. This limitation is not unique to our study, but one that affects all observational studies (Shadish et al., 2002). Nonetheless, it is important to keep this limitation in mind when considering the implications of our work.

Conclusions

For most of the last century criminologists and crime prevention practitioners have tried to understand why people become involved in crime and what programs can be developed to discourage criminality. Our work suggests that it is time to consider another approach to the crime problem that begins not with the people who commit crime but the places where crimes are committed. Our work shows that street segments in the city of Seattle represent a key unit for understanding the crime problem. This is not the geographic units of communities or police

beats that have generally been the focus of criminologists or police in crime prevention, but it is a unit of analysis that is key to understanding crime and its development.