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**SCHOOLS AS CRIMINAL 'HOT SPOTS': A
REPLICATION AND EXTENSION**

A Thesis

Presented to the

Department of Criminal Justice

and the

Faculty of the Graduate College

University of Nebraska

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

University of Nebraska at Omaha

by

Paula M. Kautt

November 1996

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ACCEPTANCE PAGE

THESIS ACCEPTANCE

Acceptance for the faculty of the Graduate College,
University of Nebraska, in partial fulfillment of the
requirements for the degree Master of Arts, University
of Nebraska at Omaha.

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Date December 4, 1995

Abstract

The rise of youth involvement in crime and the increase in crime associated with schools has prompted growing national concern and evoked serious scholarly attention. Traditionally, research involving youth and crime centers on offender rather than environmental characteristics. The purpose of this work is to shift the emphasis from the individual to the environment by replicating and extending the work of Roncek and associates which was based, in part, on Cohen and Felson's *Routine Activities* theory. The work by Roncek and associates demonstrated that residential blocks with or adjacent to public high schools have higher incidence of crime than other residential blocks.

In this study, all Cleveland schools registered with the Ohio Department of Education were used as independent variable measures for the dependent variable of Cleveland burglaries from 1989 to 1991. The school measures were decomposed into separate categories for public and private as well as for grade levels served. Thus, these distinctions differentiate between elementary, middle and high schools. Additionally, measures of adjacency and the effects of enrollment size were taken into account as independent variables. Other independent variables that controlled for social and environmental characteristics were also included. The analyses conducted were t-tests, regression analysis and Tobit analysis.

The results are somewhat surprising. Unlike the work by Roncek and associates, here public high schools were not found to have a significant effect--either for presence or adjacency. In fact, the only schools found to have significant effects were public

elementary schools serving grades kindergarten through five (k-5)--which had statistical significance for presence and primary adjacency.

Also, unlike previous findings, this study found that size of enrollment was a statistically significant variable. As indicated by the Tobit analyses, the effect above the limit for k-5 enrollment/presence shows an increase of .101 in burglaries per additional student on blocks with burglaries while the probability effect shows a .019 increase in the probability of a block without burglaries having one. For primary adjacency the effect above the limit shows an increase in the number of burglaries by .028 per additional student in the school to which the block with burglaries is adjacent while the probability effect indicates a .005 increase in the probability of an adjacent block without burglaries to have a burglary per additional student.

It is unclear from the data why these public elementary schools demonstrated an effect while other public elementary schools did not. Since most of the grades serviced overlap, the overall environment, facilities and activity levels should be relatively comparable for all public elementary schools. One possible explanation of this difference is that the majority of the public elementary schools are k-5 rather than any of the other variations. The effect could be based on sheer numbers. In any case, the need for further replications of these findings is clearly necessary before any meaningful conclusions can be drawn regarding the relationship between burglary and such schools. Clearly, the potential dividends of reducing burglary through controlling school enrollments are great and merit further attention.

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INTRODUCTION

Americans are deeply concerned about the amount of crime in the US. Perhaps, the most disturbing, surprising and tragic causes of this recent anxiety are the increasing crime problems in America's school systems and the expanding involvement of youth in crime. For example, burglary arrest rates for youths aged fifteen to seventeen steadily increased from 1950 to 1975 (Rubel, 1977: 148). These two nationwide trends call for research which links these new concerns to new developments in criminology about understanding crime incidents and the places where they occur.

Routine activities theory is one such development which emphasizes the importance of examining the conditions under and places in which crimes occur. Other recent research finds that crime is highly concentrated in small areas called hot spots, often centered on a facility that is part of the routine activities of particular types of individuals (Sherman *et al.*, 1989; Roncek and Maier, 1991). Schools are one focal point for the routine activities of youth. Accordingly, this research examines the importance of schools as focal points of hot spots of crime.

The media, parents, and politicians have lamented changes undergone by schools in the past decades, focusing specifically crime and violence in schools (Toby, 1983). Ironically, schools have not received much scholarly attention as crime facilitators and the majority of school-related incidences are not credited to the schools themselves (Felson, 1987). Two studies have documented that areas near public high schools have higher levels of crime than other residential areas (Roncek and Lobosco, 1983; Roncek and Faggiani, 1985). Yet, lower-level schools have been largely ignored as crime facilitators--

despite the fact that some crime problems in middle schools are worse than in high schools (Toby, 1983.). This research examines the effect of both primary and middle schools on burglary in the residential areas surrounding these schools and compares these effects with those found for areas near high schools.

There are three benefits of focusing on the effects of these schools. First, the research will identify whether one of the major foci of the routine activities of youth are associated with a particular type of crime. This demonstrates how one specific center of juvenile activities affects the crime vulnerability of the residents in the schools' surroundings. Furthermore, such research can educate both the public and policymakers of any long term risks and consequences associated the location of such facilities in residential areas (Roncek and Maier, 1991).

Second, this work approximates a quasi-experiment for public schools. Public schools are a unique land use since their distribution is not intended to be based on considerations of race or class.¹ As a result, isolating their effects on burglary should be relatively simple since their "locations will not be correlated with other demographic and housing characteristics which also affect crime."(Roncek and Lobosco, 1983: 599)

¹School location is intended to be based on population need. However, as many schools are funded by property taxes, it is argued that the quality, type, and number of schools in a given district can be affected by the population composition of the given district. For the current data set, a t-test for independent samples was conducted to determine whether the variables used in the later analyses had any association with school location. Only residential total population, block area in acres and percentage overcrowding were found to be statistically significant at the .05 level. Thus, for this study, the averages of racial heterogeneity, population percentage of African Americans, percentage of Hispanic population, value of owned housing, percentage of female headed households, etc. do not differ between residential city blocks with schools and those without them.

Third, focusing on a potentially criminogenic facility can lead to developing effective crime prevention measures. For example, contrary to the Kansas City Preventive Patrol Experiment, recent research by Green (1996) and Sherman and Weisburd (1995) demonstrates that concentrating preventative patrol efforts on criminal hot spots can produce decreases in criminal events without displacement to nearby areas. Thus, schools and their surrounding areas represent a potential focal point for such efforts.

Implications

Theoretically, if the presence of grammar, junior high and/or senior high schools on or adjacent to residential city blocks is associated with the number of burglaries on said blocks, it lends credence to both *Routine Activities* theory and to the identification of schools as hot spots for crime. This would have several implications for police policy. For example, as increased patrol has been found to deter crime at hot spot with little displacement (Green, 1996; Sherman and Weisburd, 1995) expanding the police presence at schools--especially during transitional periods when students are traveling to or from school--has the potential for having a significant impact on the burglaries in the surrounding areas of the schools.

Furthermore, residents of city blocks close to schools could make special target hardening efforts such as installing alarms, locking or barring potential points of access and/or acquiring a security system. Additionally, they could make their property less

attractive as a target by trimming back shrubbery that could conceal offenders as they approach to burglarize the home (Wright *et al.* 1995; Wright and Logie, 1988).

Moreover, the formation of neighborhood watch groups would improve the guardianship in such areas.

BACKGROUND

Ecological Criminology

The Chicago School: Ecological Criminology

From the mid 1800's, specific areas in cities have been consistently associated with high crime levels and concentrations of criminals--from London's 'rookeries' to the modern day *barrios* of Los Angeles. Frequently, these areas share common characteristics such as low income, ethnicity and dilapidated housing. Such commonalties inspired an ecological approach toward criminology.

These empirical regularities undoubtedly influenced McKenzie's *human ecology* (1925) which examined how people's movements in time and space are affected by the environment. This work became the foundation for the Chicago School of ecological criminology which attempted to build on his principles and extrapolate them to the criminal realm. Burgess's (1925) *Concentric Zone Model* described the spatial organization of a city, focusing on the importance of its central core. This marked the beginning of interest in urban ecology and became the foundation for early work in the ecology of urban crime. Ecological criminology is the study of how crime is affected by the social and physical environment, looking at space objectively, as a fixed quantity containing and shaping offenders' activities (Brantingham, 1983: 305).

Shaw and McKay (1931) analyzed the spatial patterns of delinquency in several cities, and consistently verified that the majority of areas were located in or near the

central business districts and major industrial developments. Their study outlined the basic model adopted by the Chicago School and was successful in accounting for differences in delinquency rates across the neighborhoods of cities in the free housing market of the 1920s and 30s. Other major developments in urban ecology were Hoyt's (1939) *sector model* and Harris and Ullman's (1945) *multiple-nuclei model* (Brantingham and Brantingham, 1983: 248, 310).

Later research on delinquency turned away from ecological criminology and began to focus almost exclusively on individuals by using survey analysis, in part, because earlier studies ignored underlying differences in and between areas. Also, as a result of increased zoning and housing programs in the cities of the 1940s, the early ecological models became less useful for analysis. Although Harris and Ullman's theory was eventually adapted to such cities and successful in explaining some criminal patterns, the new focus on individual traits and conditioning as the main causes of crime overwhelmed and was instrumental in the decline of ecological criminology (Brantingham and Brantingham, 1983: 315, 330-1). As a result, the Chicago school of thought and ecological criminology fell into disfavor for several years.

The Resurrection of Environmental Criminology

Eventually, investigators returned to ecological criminology, making substantial improvements in the methods and theory of the Chicago school. One of the first to reconsider to the ecological approach was Schmid (1960). His examination of Seattle

crime rates used census tracts and the characteristics of their social composition to analyze the spatial distributions of crimes. Although there were substantial problems with his methodology, Schmid's research rekindled interest in ecological criminology.²

Following this, Jane Jacobs (1961) described the ways in which informal social life in cities was being ruined by urban planning. Gerald Pyle *et al.* (1974) followed Jacobs' advances by examining crime patterns in an attempt to explain spatial and temporal aspects of crime distribution for Akron, Ohio. He isolated several major factors contributing to crime. The two most relevant to ecological criminology were environmental opportunities attracting crime and neighborhoods in a state of population and land use flux. Unfortunately, this work also suffered from the use of census tracts as the unit of analysis and inappropriate analysis strategies. He later examined Cleveland housing projects as nodes of criminal activity, recommending a decrease of housing density and dispersing it about the city, designing housing structures that discourage crime and desegregating such housing (Pyle, 1976).

Defensible Space

The next major development in facilitating the rebirth of ecological criminology came from a research tradition called *Defensible Space*. The *Defensible Space* approach entails the management, design, or manipulation of an environment in a systematic and permanent fashion to reduce the attractiveness of the area to potential offenders (Clarke,

²The pitfalls of using census tracts for micro-level spatial analysis will be detailed later, in the data section.

1983:225). The crux of the idea is to design buildings (in this case housing) to enable increased resident control of the area which would, theoretically, result in decreased victimization.

Newman (1972) compared two housing projects located across the street from each other. One was a typical high-rise housing project while the other was a low-rise that almost by accident employed defensible space designs and techniques. Newman found that the high-rise had a higher incidence of crime due mainly to design. Further support for this theory was demonstrated by Newman and Franck (1982) in their study of sixty-three housing projects across the United States. They found that defensible space features diminished the victimization of and fear of crime for residents in the projects as well as enhanced their control over the project's outdoor areas (Taylor and Harrell, 1996: 7-9).

Crime Prevention Through Environmental Design (CPTED)

The work by Newman (1972) was paralleled by the near simultaneous development of what has come to be called CPTED. In his book, whose title coined the term CPTED, C. Ray Jeffery postulated "...a more accurate presentation [of the criminal event] would be to say that crime is located in the environment...There are no criminals, only environmental circumstances which result in criminal behavior...to change criminal behavior we must deal directly with criminal behavior by removing the environmental reinforcement which maintains the behavior." (Jeffery, 1971: 177-185)

CPTED concentrates on where crimes occur and on how to reduce vulnerability in these settings. Design and layout, land use and circulation patterns, resident-generated territorial features, and physical deterioration are the four physical features stressed in the literature. Offenders prefer lucrative crimes involving minimal effort and risk. Thus, crimes occur with the convergence of potential offenders with suitable targets in an environment where odds of detection are small or allow for easy, unseen egress (Taylor and Harrell, 1996: 1-2).

One significant exploration of this approach was Duffala's (1976) study of Tallahassee convenience store robberies. Because of their desire for easy access to customers, such stores are placed in areas of high activity which makes them attractive targets to potential offenders. Duffala examined the proximity of such stores to major transportation routes, amount of traffic at the location, commercial activities of and land use in the surrounding areas. Although he did not find statistically significant effects for all three variables, Duffala contended that the interaction of all four were pertinent to the incidence of crime in convenience stores. His findings, thus, support the CPTED approach to crime prevention.

This study was subsequently replicated and extended by Jeffery *et al.* (1987) Hunter (1990), D'Alessio and Stolzenburg (1990) and Hunter and Jeffery (1991). All examined Florida convenience stores and found support for CPTED principles and tenets.

Routine Activities Theory

One of the major theoretical developments which reinvigorated environmental criminology was the emergence of *Routine Activities* theory by Cohen and Felson (1979). The impetus behind routine activities theory is the linkage between the change in Americans' routine activities and the sharp increase in the United States' crime rates of the 1960s and 1970s. Specifically, they isolated three necessary components of any criminal act. These are: a motivated and able offender, a suitable target and a lack of adequate guardians. The absence of any of these factors precludes successful crime completion. Thus, when controls on routine activities decrease, crime is expected to increase. Cohen and Felson (1979) further postulate that the effects of these components may be multiplicative rather than additive, meaning that target suitability, for example, exponentially increases with a decrease in guardianship.

Central to the theory is the assumption that crime feeds upon legitimate activities and opportunity. Routine activities, which Cohen and Felson define as commonplace activities which provide for basic population and individual needs--regardless of their biological or cultural origins, furnish offenders with suitable targets by converging potential victims and offenders in the presence of influences that are conducive or non-inhibiting to the commission or avoidance of criminal activity. Thus, the spatial and temporal structure of activities such as work, school and leisure are important for explaining crime rates of given communities. Furthermore, it is demonstrative of how

community structure and organization as well as societal technology levels afford circumstances conducive to crime (Cohen and Felson, 1979).

Aside from the convergence of the three elements, also fundamental to the argument is the recent proliferation of lightweight, valuable goods and the dispersion of daily activities away from the home made possible by the abundance of automobiles. In conjunction with this, relatively recent increases in female employment and automobility removed women from their traditional community roles--further reducing guardianship levels of their homes and broadening their range of routine activity nodes (Felson, 1987). This approach further contends that in-home and family activities carry less risk of crime than other activities.

Felson (1987) postulates that these factors account, at least in part, for the crime wave the United States experienced in the 1960s and 1970s. Data from national victimization surveys support these generalizations and Cohen and Felson's time-series analysis for 1947-1974 further demonstrates a "statistically significant the household activity ratio and official crime rate changes" that holds for both micro and macro-level studies (Cohen and Felson, 1979: 602-4; Felson, 1987). These findings suggest that routine activities theory is an effective method for explaining crime rates.

Key concepts in the formation of this theory are Zipf's (1950) *Principle of Least Effort*³, *Principle of the Most Obvious*⁴ and *Quick Risk Corollary*.⁵ The theory also drew

³Felson. p. 913. The concept that people tend to find the shortest route, spend the least time, and seek the easiest means to accomplish something. "If offenders travel minimal distances and often carry out illegal activities while en route to other ones, then their routines will set the stage for the illegal opportunities which come their way."(Felson, 1987: 913)

on Hawley's (1950) human ecology theory of community structure as well as Stone's demographic accounting⁶(Felson, 1993: 402). Based on the availability of social indicators and victimization surveys, Cohen and Felson developed *routine activity* theory.

Often offenses are committed in the course of an offender's routine activities and are therefore not necessarily near the offender's home (Cohen and Felson, 1979). Most offenders commit crimes close to activity nodes as demonstrated by Reppetto (1974) who found that only a fourth of adult burglars, who were most likely to be very experienced, were willing to travel significant distances to reach their targets. Cromwell *et al.* (1991:43-7) find further support for *Routine Activities* theory, citing evidence of offender opportunism and limited rationality. In fact, many offenders commit crimes on routes used for work, school, and leisure (Pyle, 1974; Brantingham and Brantingham, 1983). Thus, this theory succinctly addresses the distinctions between the routine activities of potential offenders and the effects such differences have on the crimes perpetrated (Gabor, 1990:44).

Some criticisms have been leveled at *Routine Activities* theory. Clontz (1995) eloquently details the various objections--contending the most serious to be its lack of

⁴Felson. (Cornish and Clarke, 1986) p. 913. ...people rely on ready information, including sense data...The reasoning criminal finds an interesting target on the route home from school, neglecting better targets not far from that route

⁵The offender will expose him/herself to as minimal risk for as little time and over as little space as possible.(Felson, 1987: 914)

⁶"Demographic accounting follows aggregates of people as they flow through the social system...Just as a business accountant keeps track of money, so the demographic accountant keeps track of people. Demographic accounts can help researchers to do more than trace specific flows of people through the social system. Such accounts can also help us to think about how different sectors of society depend on one another and build statistical models accordingly."(Felson, 1993: 401)

falsibility. The crux of his argument is that the presence of all three factors will always result in a criminal event while the absence of any one of them precludes such an event. Clontz's argument is circular, since the intention of the original theory is to account for the criminal event. It would be ludicrous to put forth a theory that does not address all factors involved. The fact that all the components of *Routine Activities* theory are necessary to account for a criminal event is an advantage rather than a liability since this demonstrates that none of them are superfluous. Furthermore, *Routine Activities* theory can be disproven by finding any case where the three components converge and a crime does not occur or where a crime occurs without one of these components.

Clontz further contends that *Routine Activities* theory removes the human element by assuming a "constant, standard individual" as victim or perpetrator. However, careful examination of the work of Cohen and Felson reveals that this assertion is overbroad and inaccurate. In fact, the individual component is the weakest link in *Routine Activities* theory. This is because of the difficulty associated with accurately measuring offender motivation. Not only is it problematic to elicit commentary, truthful or otherwise, from offenders on their individual motivations, but such offenders may not be consciously aware of such motivations or may lack the ability to articulate them--even when they are generally aware of what they are.

Environments and Individuals

Most crime can be viewed as the result of conscious and usually very rapid decisions about the attractiveness of criminal opportunities in various situations and

environments. Thus, situational prevention strategies can affect the likelihood that people will engage in crime. The main situational strategies of crime prevention are target hardening, surveillance and environmental management. Several studies find that environmental design and community awareness group serve to increase guardianship and decrease target suitability.(Cohen and Felson, 1979: 592)

Crime is not simply caused by a criminally minded person. Other situational conditions must be present, such as target availability and opportunity. The environment itself is a powerful inhibitor or facilitator of the criminal act. For example, the physical environment of convenience stores, bars and schools lend themselves to criminal activity. All have ready accessibility, because of the functions they serve.

An adequate criminal event theory should describe the nature and distribution of the criminal opportunities and demonstrate how offender choices are associated with the circumstances and situations at hand. Of course, the external factors are tempered by individual concerns. Yet, crimes are often perpetrated on impulse, where emotions, alcohol, or peer pressure may contribute substantially to the decision to offend. (Clarke, 1983:227-31)

Some crimes are significantly reduced by removing means to commit the crimes; this constitutes environmental management strategy. One common method is fortification of the potential target with bars, alarms, etc. also known as target hardening. Environmental management also consists of target removal or even the disguising of potential targets to make them less obvious to potential offenders (Clarke, 1983:243-4).

The linkage between movement and activity nodes is essential to spatial analysis of crime. Although the essential players are moveable, the crime itself generally occurs at a fixed point. The convergence of victim and offender, the flow of movement that brings them together, adds the temporal and spatial dynamics to crime analysis. As these movement flows vary with the time of day and the day of the week, the activity at and importance of criminal nodes⁷ subsequently depend on time and day (Brantingham and Brantingham, 1983: 232-33).

Specific areas are more subject to crime both because they have suitable targets and the offenders subjectively perceive these areas as feasible locations for criminal acts. Thus, spatial data crime analysis necessitates comprehension of potential offender intracity movements and perceptions (Brantingham and Brantingham, 1983: 333). Because of the difficulties in ascertaining offender motivation, one way of assessing which environments offenders perceive as good locations for crime is to identify where offenders are known or known not to commit crimes.

Spatial analysis of crime requires identifying and documenting crime-prone environments. Specific environments may attract persons willing to commit crime as well as allowing ready access to potential victims. This is because environments can affect perception. The cues that elicit criminal behavior in one individual may not produce them in another. Thus, the crime environment is constructed from the sum of its

⁷ The centers of activity at individual, city, [etc.]...levels are *nodes* or *nodal points*. A *node* is simply the origin of a destination or trip. The paths leading to the nodes are often called *routes*. The analysis of nodes and routes is the analysis of the spatial dynamics of crime." (Brantingham, 1983: 234-5)

objects and relationships that induce the offense. (Brantingham and Brantingham, 1983: 333)

Rational Choice Theory

‘Choice’ models emphasize situational context of crimes, concentrating preventive measures on specific offenses rather than crime in general (Clarke, 1993:232). Choice models extend routine activities theory to the psychological processes of the individual offenders. Crime locations are not completely random as there must be an intersection, in both time and place, between the offender and the victim before a crime can occur. Thus there is an underlying spatial structure to the occurrence of crime. As

Rossmo notes:

Crimes occur in those locations where suitable targets are overlapped by the offender’s awareness space...Disorganized offenders, for example, will usually hunt closer to their activity spaces, staying well within their comfort zone. Organized offenders will be more likely to search for victims in areas located further away from their home or workplace. (1993: 5)

Rational Choice Theory emerged from previous ‘CPTED/Defensible Space’ crime prevention research and efforts which suffered from allegations that it merely displaced⁸ the crimes they were designed to prevent.⁹ Cornish and Clarke argue that displacement occurs only under particular conditions. Their *Rational Choice Theory* assumes that offenders selectively respond to environmental and psychological cues regarding their

⁸ The forms of displacement are geographic, target, temporal, tactical and activity related.

⁹ ‘Situational’ crime prevention is a range of preventive measures, including defensible space architecture, target-hardening, and neighborhood watch designed to reduce the opportunities for, and increase the risks of, committing specific kinds of crime” (Cornish and Clarke, 1987: 934)

opportunities, costs, and benefits when weighing the decision whether or not to displace their efforts elsewhere. The rational choice perspective contends that crime is a result of interactions between situation, offense and offender characteristics. The offender's ultimate choice of offending results from at least some evaluation of environmental cues, offender objectives and possible courses of action (Cornish & Clarke, 1987: 934-5).¹⁰

Cornish and Clarke's models view offender decision-making as a process involving a series of sub-decisions, rather than the more deterministic approach used by most conventional crime theories. Their approach appreciates that an offender's readiness to commit crime does not always culminate in criminal behavior and draws attention to the necessity of differentiating between the various decisions and offender must make throughout the process of the criminal act (Cornish & Clarke, 1987: 933).¹¹ As Gabor (1990: 59) argues, the import of situational factors and their implications for crime must be determined as an essential step in understanding the emergence of crime and providing insight into the cues which influence offender decisions.

Cornish and Clarke depart from conventional ecological criminology by including offender background factors and problem solving skills along with situational factors. They do concede, however, that the immediate situation is more pertinent to the choice of offending than background factors. As a result, if the offender perceives the

¹⁰ "...rational choice theorists advocating situational measures concede that offenders cannot be regarded as fully rational, in the utilitarian sense (Feeney, 1986; Walsh, 1986). They recognize that offenders may have a limited capacity to acquire and process information and then to weigh against risk. They therefore speak of 'standing decisions' or habitual responses that govern reactions to opportunities, rather than independent decisions in relation to each new opportunity." (Gabor, 1990: 61-2)

¹¹ These not only include the decision to offend at a given moment or target selection but also the initial decision to offend in general, etc.

current situation as unfavorable to the contemplated offense, he/she will be less willing to go through with the crime¹² (Gabor, 1990:59-60). Offender willingness to exchange one offense for another depends entirely on the offenders perceptions whether the proposed substitute will accomplish the set goals and of his/her abilities, deftness, and dexterity to perform said crime (Cornish and Clarke, 1987: 935).

For better understanding of the factors that lead to or prevent criminal involvement, Cornish and Clarke (1986) advanced a series of decisions faced by potential offenders. These are risk, opportunity, motivation, reward, and target assessment. They postulate that these cursory assessments affect the decision to offend. Thus, if factors of potential targets are made sufficiently unattractive and/or difficult, crimes can be deterred. As a result, if such changes are made to targets along routes to activity nodes or at the nodes, they reduce the chances of victimization.

Hot Spot Analysis of Crime

As argued by *Routine Activities* theory, crime is systematically distributed throughout cities, occurring where demographic and housing conditions promote low levels of social control. Other factors contributing to crime are nonresidential land usage and large numbers of people using an activity node. Here, the more people that use an area, the greater the potential for offending and victimization (Roncek & Lobosco, 1983:

¹²“As for the factors most likely to lead them to abort an offense, the subjects revealed that risk-related considerations such as surveillability, signs of occupancy, and the presence of neighbors were more important than the potential rewards of an offense or the ease of access into a home.”(Gabor, 1990: 63)

599). These concepts are the premise for, supported by, and interrelated to hot spot analysis.

Criminal hot spot analysis is a relatively recent development that grew out of the traditional “pin maps” that adorned police precinct walls. Traditionally, the clusters of pins on such maps indicated areas where several crimes had occurred. With the advent of computers and advanced software, these wall maps are being replaced with computerized maps produced by specialized analysis divisions or personnel. While the concept and identification of hot spots predates computer advances, such technologies enhanced, quickened and simplified hot spot analysis greatly.

Sherman *et al.*'s (1989) evaluation of Minneapolis police calls for service revealed that most calls to police are produced by relatively few addresses. Such addresses are known as hot spots--a node of consistently recurring criminal activity. Generally, it is produced by a specific land usage that attracts both potential victims and offenders. For example, several studies have demonstrated high schools (Roncek and Lobosco, 1983; Roncek and Faggiani, 1985) and bars (Roncek and Bell, 1981; Roncek and Maier, 1991) as criminal hot spots. All of these findings lend further support to the *Routine Activities* theory.

The Great Metropolitan Reef and MetroQuilt: The Extension of Routine Activities Theory

Felson (1987,1993) enhanced the *Routine Activities theory* and environmental criminology as a whole by explaining how society and common activity nodes have changed in past decades and how this contributes to criminal victimization. Proliferation of cars, traffic arteries, and shopping malls served to undermine the traditional city community by killing pedestrian traffic and allowing broader service choices which were not available in previous years (Felson, 1987: 914-6). The proliferation of streets is important to the theory as they are the generally unsupervised routes by which anonymous offenders find potential victims (Felson, 1987: 917). Felson explained the concept best by saying:

because this sociocirculatory system leads so far so quickly, internal community interaction declines, although net movement increases. One cannot rely upon the 'natural' community areas, on immediate proximity, as the basis for symbiosis....The Principle of Least Effort has new consequences when the only effort needed is stepping on the gas pedal. (Felson, 1987: 916)

Modern society is ever expanding as demonstrated by the tremendous growth its metropolitan areas have and still undergo. Countless cities (Omaha, Denver, Columbus, Cleveland, *etc.*) have expanded to their boundaries and beyond, encroaching into suburbs which used to be isolated. Felson calls this pattern of expansion and subsequent motion the *Great Metropolitan Reef*. It's intense movement creates areas of increased risk and/or area that congregate offenders and targets while transmitting the subsequent crimes to the surrounding areas (Felson, 1987: 917-20).

This extension also examines how the recent development of "facilities," i.e. mini-malls, fitness centers, apartment complexes, *etc.*, have affected the original routine activities theory. As such, facilities are composed of several popular nodes in a single

location, it reduces the number of destinations and therefore the opportunities for victimization. Although the convenience the facilities offer does not provide a community, it does serve to regulate interactions between people, in general, and more specifically between potential victim and offender (Felson, 1987: 919). Thus concentration of nodes can reduce victimizations along activity routes. This new metropolitan form would be:

“The Great Metropolitan Quilt, a patchwork of coterminous facilities intervening between homes, businesses and the larger society...The city of the past was a collection of communities. Today’s American metropolis approximates a metroreef, with vestiges of community. The metroquilt of the future may combine many facilities with a few remaining traces of community and metroreef.” (Felson, 1987: 920)

Schools and Crime

Although school crime has always been a problem, the extent of it grew substantially from the late 1960’s onward (Rubel, 1977: 120).¹³ The problem was so extensive and pervasive that the 93rd Congress required the Department of Health, Education, and Welfare to survey the extent and seriousness of school crime.

The current public perception, however, that schools are plagued with violence, crime and disorder is not supported by empirical evidence. Systematic studies indicate that severely violent or costly crimes are a relative rarity in schools while only minor victimizations are common (Garofalo *et al.*, 1987:329). The National Institute of

¹³ This is not surprising when one examines the changes in population and number of schools during this period. The population of fourteen to seventeen year olds doubled between 1950 and 1975. Meanwhile and despite this increase, by 1975 there were fewer schools in the country than in 1950 and the average school size had increased substantially.(Rubel, 1978: 126)

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Education (NIE) conducted one national survey of victimization in 642 public junior and senior high schools. Students and teachers from these schools completed anonymous questionnaires with 31,373 student and 23,895 teacher questionnaires completed.

Additionally, several states conducted statewide studies of school-related offenses. Both concluded that school crime, like most crime outside school, was mainly nonviolent (Toby, 19:2-5).

For most of the year, school is the primary node of routine activities for youth. If concentrating individuals increases the opportunities for crime, then facilities that do so can become hot spots. Thus, the idea that a school's size is positively correlated with the number of offenders it produces and that large school grounds increase opportunity for crime are logical. After school functions may congregate potential offenders, releasing them unsupervised into the surrounding areas when the activity is over (Felson, 1993: 408).

Studies on the Link Between Crime and Schools

Most crime and school studies focus on the school itself and not the impact on surroundings. This reality is despite the 1978 report of the National Institute of Education (NIE) Safe School Study which found that the crime rate in a school's surrounding area was consistently associated with school-related violence and property loss¹⁴(Hellman & Beaton, 1986:103).

¹⁴“Examination of the pattern of suspension rates across Boston school districts reveals that suspension rates are higher in school districts that are experiencing higher rates of reported crime in the

The National Criminal Victimization Survey contains two categories regarding in-school victimization including within the building, on the property and on a school bus (Garofalo *et al.*, 1987). Garofalo *et al.* examined these data and analyzed the accompanying narratives finding that substantially more victimizations are related to the routines of attending school--such as waiting for a bus or walking to school--than within the school itself.¹⁵ Furthermore, significant portions of these victimizations resulted from peer interactions during routine activities that then escalated into criminal acts. Thus, students are a demonstrable and sizable pool of potential offenders who lack adequate guardianship during several school related routine activities (Garofalo *et al.*, 1987:321-9).

Since the routes to and from school are relatively unsupervised, (Garofalo *et al.*, 1987:333) it is not surprising that schools are credited with and experience only a fraction of the crime they generate.¹⁶ Furthermore, as a rule, school days conclude in the early afternoon long before people return from work. The advent of two income families, where the primary female no longer stays at home, leaves a substantial block of time where homes lack adequate guardianship. Thus, the homes *en route* from school can be

community... Both school suspension rates and community crime rates, in turn, are associated with the same set of community measures...they are related to...family and class structure, housing quality, and population density and stability...This result suggests a correlation between middle school violence and disruption and the community and that controlling community crime and violence and disruption in the schools involves changing the structure of the community, either physically or socially.”(Hellman & Beaton, 1986: 117-22).

¹⁵ Within school victimizations occurred mainly in “less supervised areas such as hallways and restrooms [rather] than in more controlled places such as classrooms and libraries.” (Garofalo *et al.*, :333)

¹⁶“If schools are great producers of property crime, official Illinois data indicates that very little ends up assigned to schools themselves. It appears that certain organizations suffer a fraction of the crime they probably [generate]--”(Felson, :921-3)

prime targets for the pent up hostilities and energies of students freshly released from the classroom. One of the obvious results can be juvenile crime.

The studies by Roncek and Lobosco (1983) and Roncek and Faggiani (1985) find results that provide support for the claims that areas near schools will be the sites of crimes, in very different cities. City blocks with high schools or those blocks directly adjacent to them had higher levels of crime. This pattern, however, did not extend further than one block beyond the high school (one block adjacency). Additionally, the enrollment size of the school apparently had no influence over the crime pattern, suggesting that the discovered effect is not a result of sheer numbers. Thus, the contention that direct proximity to public high schools produces additional crime on these blocks has substantial support (Roncek and Lobosco, 1983; Roncek and Faggiani, 1985).

Private high schools demonstrated very different patterns. For instance, burglaries are higher near public high schools but not private high schools. Differences were found for robbery, theft and crime total measures, with areas around public schools having a higher average of these crimes than areas around private schools. This is possibly due to the relative openness of public school grounds. However, other nonresidential land uses were found to affect crime near private schools (Roncek and Lobosco, 1983; Roncek and Faggiani, 1985).

People need to worry about potential victimization only when they are in areas that allow criminal motivation to blossom into criminal acts. Such areas have social control problems because they are intensely used and publicly available. This is the

explanation used for the crime effects of high schools since they are public places used regularly by numerous people (Roncek and Faggiani, 1985: 492).

Junior High Schools/Elementary Schools

In its 1978 report to Congress, *Violent Schools--Safe Schools*, the National Institute of Education (NIE) found that junior high schools had worse crime problems than senior high schools (Toby, 1983: 18-19). In fact, junior high schools have twice the rates of assault and robberies of senior high schools. One explanation for this is that junior high schools have a higher enrollment of involuntary students. Based on the premise that such students are the bulk of the problem, their dropping out might explain the decrease of such offenses in senior high schools (Toby, 1983:3). With this in mind, it is logical to test if the crime incidence differences between junior and senior high schools hold true for other crimes. Thus, the present study tests if similar differences are present for burglary.

Elementary schools should have higher levels of guardianship than their junior and senior high school counterparts. This difference should be the direct result of the age group of the students attending. Not only are the teacher to student ratios required to be much higher in elementary schools, but there is also an increased parental presence throughout the day--in the form of teacher assistants, recess monitors, crossing guards, or other volunteers--as well as before and after school when they deposit and retrieve their children. Additionally, children of this age group are not as self-sufficient as their older

counterparts and thus require more supervision. As a result, they are less likely to be released unsupervised into the surrounding neighborhoods in the same manner as their older counterparts.

By the same token, these increased levels of supervision at elementary schools results in their becoming an increased node of activity for the supervisory adults. Furthermore, such schools--unlike their counterparts--are equipped with playgrounds which serve to attract various age groups to the site during off hours and over the summer. Thus, elementary schools represent a paradox of possibilities. Their presence can either promote or deter criminality. As there is little research on these types of schools as facilitators of crime, it is logical to include them here.

BURGLARY

Studies have shown that burglary is often a 'spur of the moment' crime perpetrated by relative amateurs (Waller and Okihiro, 1978: 103) most of whom would not commit the crime if it necessitated complex abilities or substantial commitment (Gabor, 1990:56). Thus, the average burglar is only an occasional offender, who will transgress only--but not always--when both opportunity and incentive are present. Not only are such offenders generally amateurs, they are characterized by minimal social reinforcement for their crimes and rejection of their criminal status. Not surprisingly, juveniles commit the majority of occasional crimes.(Hepburn, 1984: 76)

Thirty one million burglaries and thefts occurred in 1994, comprising seventy three percent of the total victimizations for the year. Of these type of crimes, approximately only one third were reported to authorities. Fifty-four houses out of every thousand in the US were burglarized in 1994. One third of these burglaries were by forced entry while in the remainder, the offender entered through an open window or unlocked door.(Perkins & Klaus, 1996) This demonstrates not only the prevalence and relevance of the problem but also the opportunistic quality of burglary in general.

In their ethnographic analysis of burglary, Cromwell *et al.* (1991:46-7) note a high correlation between burglarized versus non-burglarized residences and their distance from a school. As found by a stepwise discriminant analysis, schools explained the highest amount of the variance as compared to other variables relevant to *Routine Activities* theory such as distance from other activity nodes (churches, businesses, parks, etc.). Thus, this is strong empirical evidence tying schools to incidence of residential burglary.

DATA

The City: Cleveland

Cleveland is an older, industrial city, and such cities are often regarded as having relatively serious crime problems. (Roncek and Maier, 1991:731) Furthermore, it is a natural choice since it was the site of the previous school/city block study by Roncek and Faggiani (1985) that this work will extend and replicate.

The population of Cleveland declined 11.9 percent between 1980 and 1990, from 574,000 in 1980 to 506,000 in 1990. However, this is not as severe a drop as the one experienced between the two previous censuses which was 33.6 percent. This apparent slowing of the decline may be due, in part, to the redevelopment of a decaying industrial area, the Flats, into an entertainment district and revitalization of the lakefront district. The overall population of Cleveland is roughly 506,000. The racial composition of Cleveland is approximately fifty-four percent Caucasian, forty four percent African-American and three percent Hispanic.

The most current UCR crime level reports indicate that burglaries in Cleveland decreased from 8,031 in 1993 to 8,007 in 1994 to 7,693 in 1995 (Federal Bureau of Investigations, 1996). This follows the national trend of declining burglaries over the past five years. In regard to other index crimes, robbery, aggravated assault, larceny-theft and the overall total of index crimes for Cleveland increased for these years, while murder, rape, motor vehicle theft and arson decreased. While there are some minor

fluctuations from the national averages, Cleveland generally follows the national crime trends.

Units of Analysis

Felson argues that “detailed location analysis is the best way to learn how crime reaches people”(1987: 921), thus the units of analysis will be the residential city blocks for Cleveland (as they were in the previous study by Roncek and Faggiani.) Using *all* residential blocks in Cleveland, enables avoidance of sampling error as well as the possibly misleading data that can result from using larger units of analysis (Roncek and Maier, 1991:729-30). City blocks are the smallest unit of analysis for areas of which population and housing data are available. The social, demographic and housing characteristics are derived from 1990 census data. The average population of residential city blocks is one hundred five persons per block and the average residential block area is 7.83 acres.

Residential blocks are defined as those that have enough people so that their population and housing data are not suppressed by the Census Bureau. Generally, the Census Bureau requires a city block to have at least five housing units (houses, apartments, condominiums or group homes) before it releases a city block’s characteristics. In 1990, Cleveland had 5,924 total city blocks. The number of residential blocks is as reported by the census is 4,813 however, it was discovered that this was inaccurate since fifteen of these had no residents. An additional forty-nine were excluded

from analysis because they did not have ordinary residential populations. These blocks were either the location of the city jail or entirely nursing homes, mental hospitals, college dormitories, ships, *et cetera*. Thus the final residential block count is 4,747.

Dependent Variable: Burglaries

The dependent variable is the number of police reported burglaries on Cleveland residential city blocks from January 1989 to October 1991. The November and December data for 1991 are not included as they were lost in the Cleveland Police Department computer system.

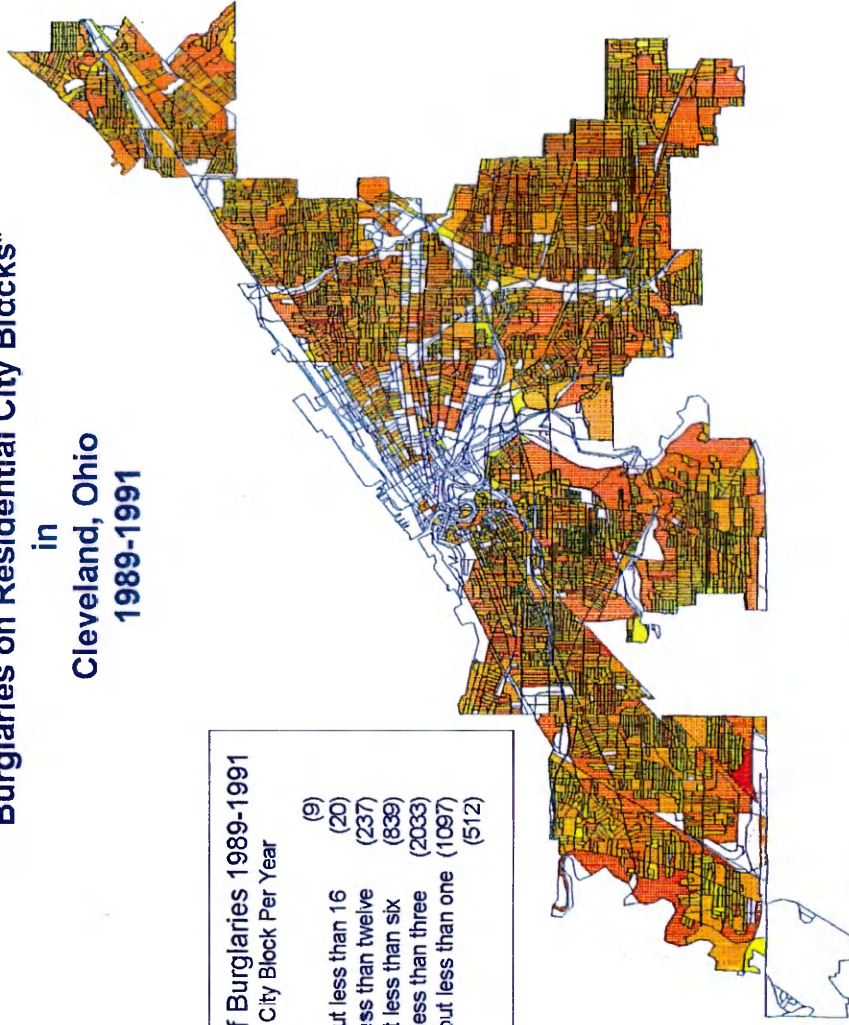
The burglary data consists only of those crimes reported to the police. While underreporting generally results in police data underestimating crime, such data are still important for estimating citywide crime incidence. Victimization surveys lack the precision required to identify the focus of hot spots within the city because to make valid inferences would require a substantial probability sample for each city block and no victimization survey has been able to afford this. Thus, while both data sources have their strengths and weaknesses (O'Brien, 1985), police reported data is the best option available for the present study.

In the raw data file there are 30,904 total burglaries. Of these, 10,554 occurred in 1989, 10,202 in 1990 and 10,148 in 1991. The analyses use the average numbers of burglaries over the three year period since the average has smaller numbers that are easier to discuss. I use the three-year span to smooth out possible year-to-year fluctuations.

Burglaries on Residential City Blocks* in Cleveland, Ohio 1989-1991

Average Number of Burglaries 1989-1991
Per Residential City Block Per Year

■	sixteen to 22.7	(9)
■	at least twelve, but less than 16	(20)
■	at least six, but less than twelve	(237)
■	at least three, but less than six	(839)
■	at least one, but less than three	(2033)
■	more than zero, but less than one	(1097)
■	no burglaries	(512)



*Completely nonresidential blocks are not shaded

All burglaries, residential and non-residential, are included in the analyses because the concentration of potential offenders assembled by schools can result in victimizing businesses as well as residences. For example, youths might be angered by perceived mistreatment by businesses and retaliate. However, since completely non-residential blocks will not have social data available, their compositions cannot be controlled for and they will thus be excluded from the analysis.

Burglary is selected primarily because it requires a specific site and location. Thus, police reports are more likely to include the specific address of such a crime than another--such as robbery. This feature of burglary not only makes it more readily adaptable to computer mapping programs and thereby facilitates the identification of criminal hot spots but also facilitates precise ecological analysis. Additionally, burglaries are fairly common, further facilitating statistical analysis.

The Cleveland Police Department raw data files for burglaries required massive data cleaning efforts before the data were suitable for analysis. For example, misspellings, colloquialisms and incorrect addresses were identified and corrected where possible. To do this, I cross-checked addresses with mapping programs, telephone directories, street address range listings and city maps. Of course, some addresses were unresolvable. The final count of usable crime addresses is 30,566 with 338 total burglaries lost. Approximately one third of these were clearly outside city limits and required exclusion. The balance either had no address assigned, assigned addresses that

did not exist,¹⁷ or unclear street references.¹⁸ The lost crimes represent less than one percent of the original data file and thus the remainder still constitute a reasonable estimate of the amount of burglaries on the residential city block. The average number of burglaries per residential block was 1.97.

Major Independent Variable: Cleveland Schools

The main independent variables measure the presence and enrollment size of the schools, both private and public on residential city blocks, and measure the proximity¹⁹ to these schools. These proximity variables are called primary and secondary adjacency. Primary adjacency, in this case, refers to those city blocks directly bordering on a city block that contains a school. Secondary adjacency describes those city blocks directly adjoining the city blocks that border the school blocks.²⁰ Initially, in the regression analyses, both measures are dummy variables. In the subsequent regression models as well as the Tobit analyses, these measures are the enrollment of the adjacent school.

Using the 1980 and 1990 telephone directories, I compiled a preliminary listing of three hundred thirty six schools in the Cleveland area. From this listing, I conducted a

¹⁷This refers to streets that were listed that do not exist in Cleveland, address ranges that do not exist on given Cleveland streets or a combination of the previous two. According to the census tract location of the crime as assigned by the reporting officer, these crimes fell within city limits.

¹⁸Several streets in Cleveland have North and South as well as East and West prefixes. Compounding this are the numerous streets and avenues that have common street names. As a result, several addresses without the proper prefix and/or suffix notation were unretreivable.

¹⁹ Proximity is included because the juveniles may take any of a variety of routes or directions from the school to reach their next destination. However, the effect will disperse over distance as the ultimate destinations of the students cause their routes to diverge.

²⁰Because primary and secondary adjacency are specialized types of autocorrelation, corrections for autocorrelation are not used since they would mask one of the effects I attempt to measure.

telephone survey to verify the address of each school, identify the grade levels serviced, and discern which schools were public or private and where private if there is any religious affiliation. This survey resulted in the loss of fifty six schools from the total, primarily resulting from closings and consolidation of districts. Fourteen other schools were not reached by the survey as their phone numbers had been changed, disconnected or were unlisted. Two hundred eighty public and private schools were subsequently identified and verified through telephone surveys.

This listing was cross-checked with Ohio Department of Education information²¹ to verify the schools' location within city limits. This resulted in a listing of one-hundred ninety-three schools with one-hundred twenty-seven public and sixty-six private. Maps one through four show the distributions of the major types of schools by census tract.²² Of these, six were present for only one of the three years covered by the crime data, four were present for two years of the study and the balance were present for all three years. One of the schools not present for the entire study was public, with the remainder being private.

Isolating the grade category for public schools proved to be more difficult than initially expected. Generally, grade levels fall into distinct categories. For example, grades K-5 are traditionally considered elementary schools while grades 6-8 are middle/junior high schools and 9-12 are high schools. Cleveland public schools between

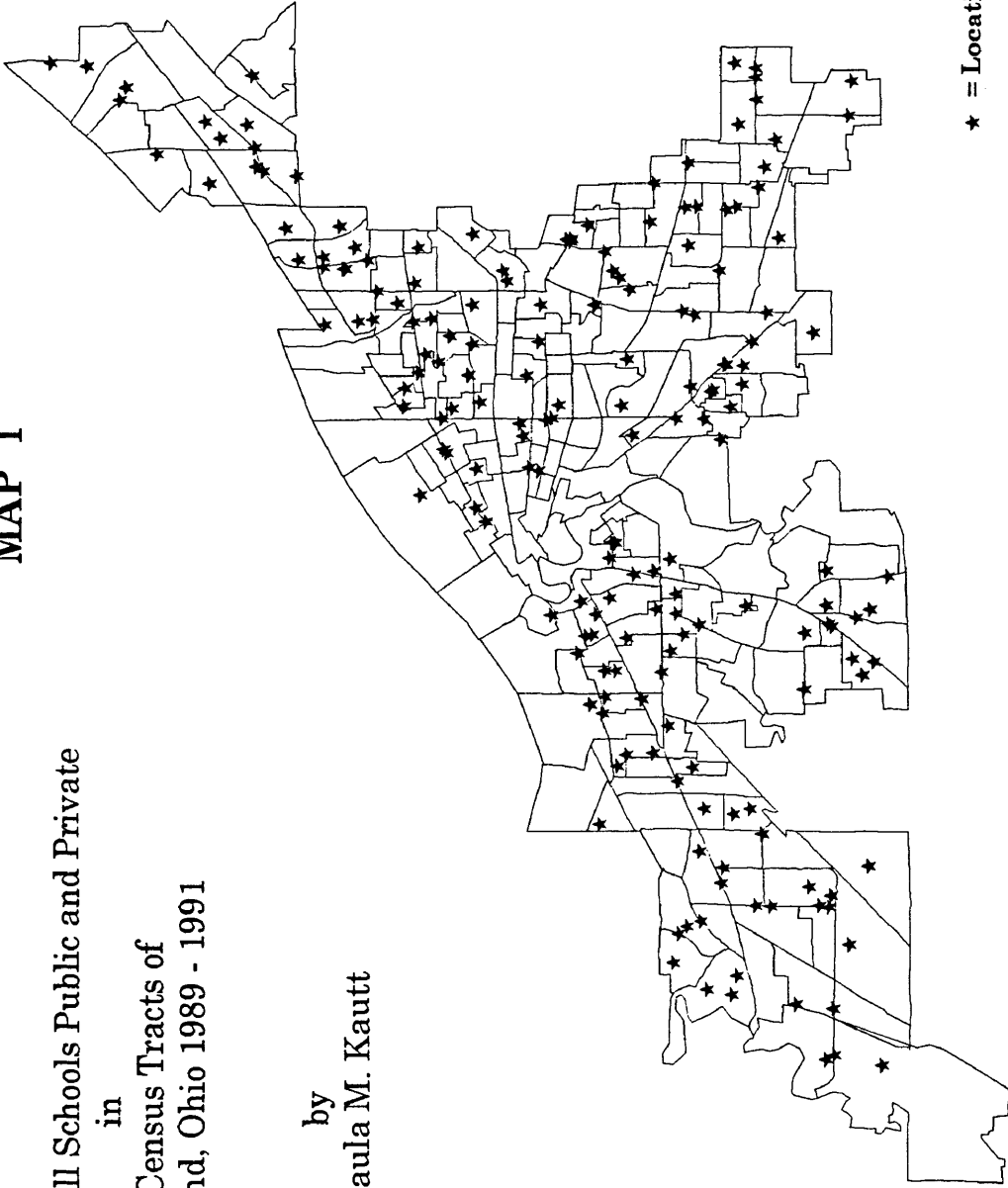
²¹The Ohio Department of Education data contained the name, address, phone number, school district, grade range, enrollment and status as public or private for each school within Cleveland city limits for the years 1989-1991.

²²For these maps, census tracts were used rather than blocks because the number of block boundaries would obscure the school locations.

MAP 1

Locations of All Schools Public and Private
in
the Census Tracts of
Cleveland, Ohio 1989 - 1991

by
Paula M. Kautt

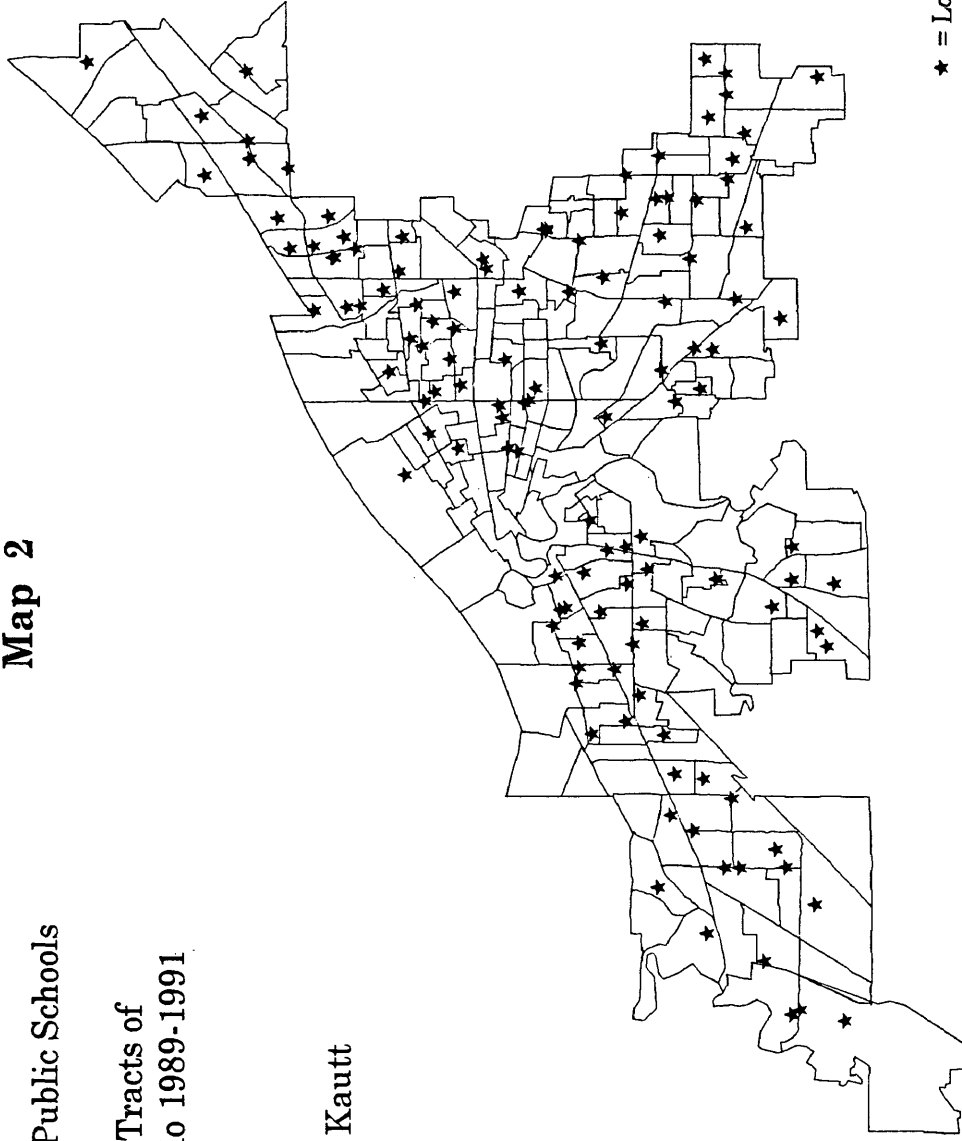


★ = Location of a school

Map 2

Locations of All Public Schools
in
the Census Tracts of
Cleveland, Ohio 1989-1991

by
Paula M. Kautt

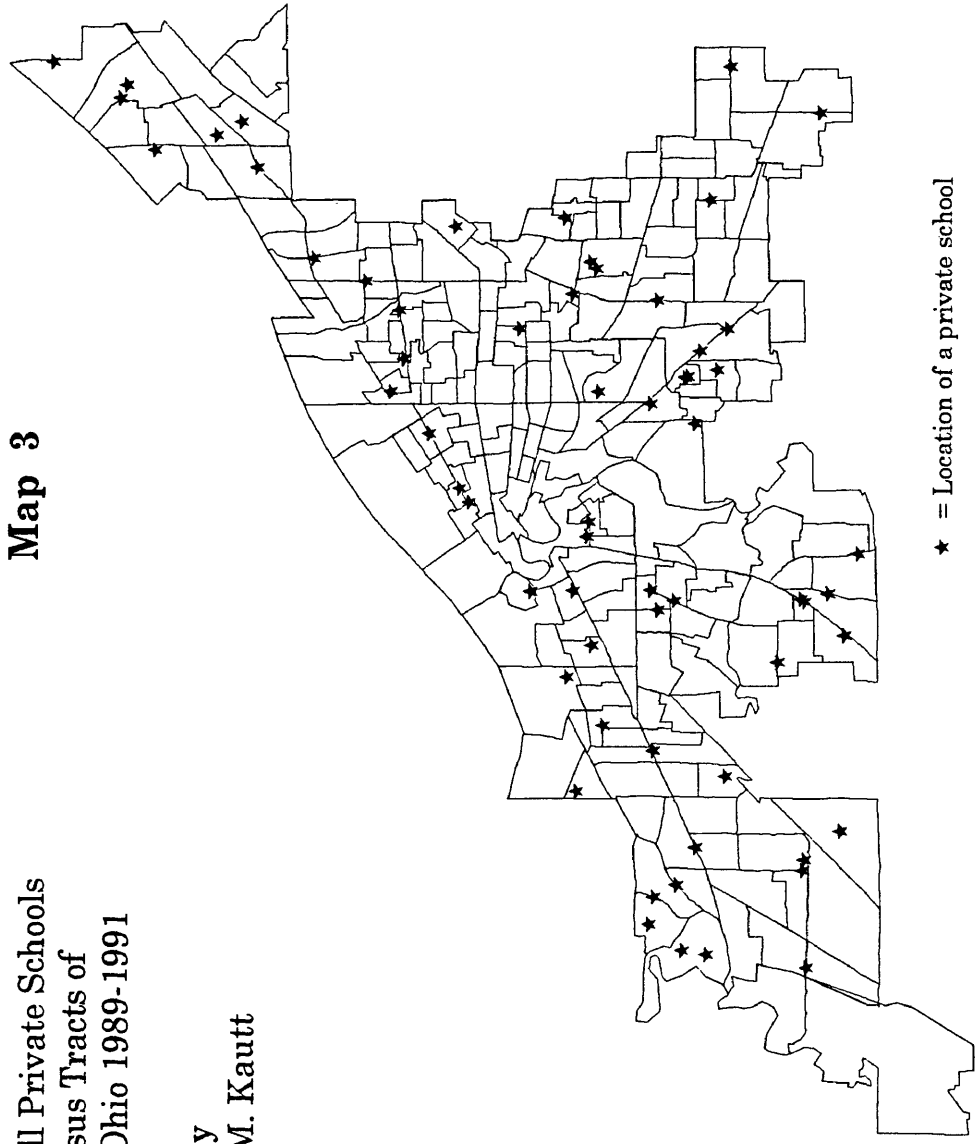


★ = Location of a public school

Locations of All Private Schools
in the Census Tracts of
Cleveland, Ohio 1989-1991

by
Paula M. Kautt

Map 3

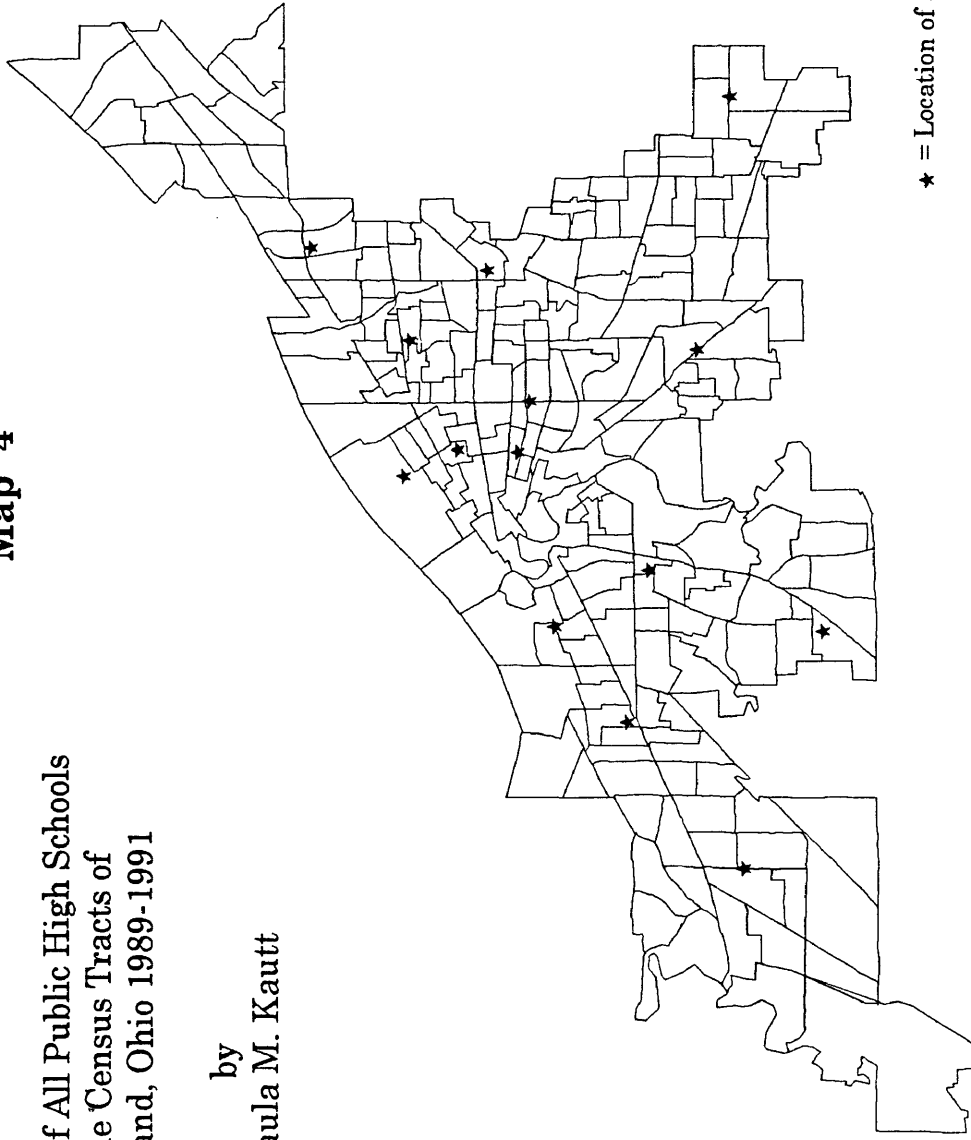


★ = Location of a private school

Map 4

Locations of All Public High Schools
in the Census Tracts of
Cleveland, Ohio 1989-1991

by
Paula M. Kautt

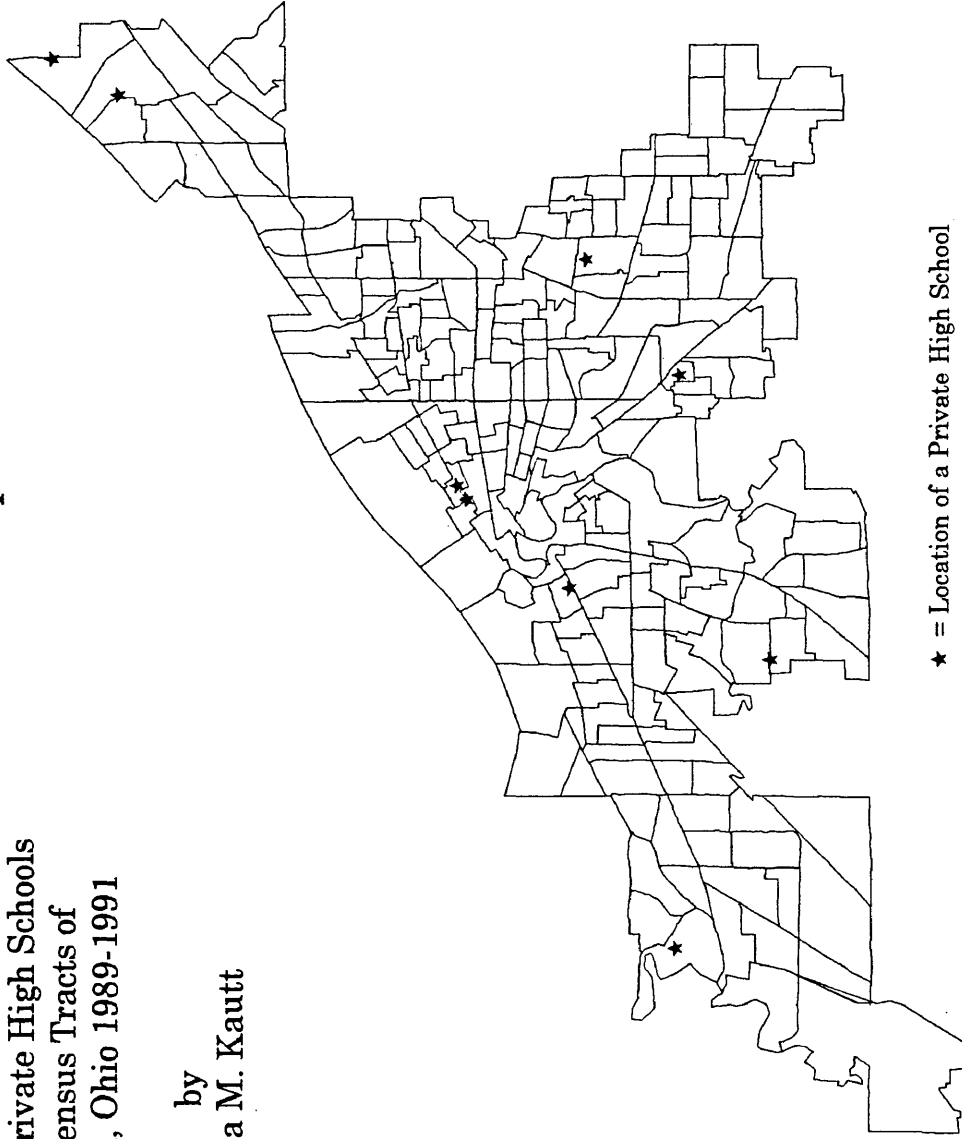


★ = Location of a Public High School

Map 5

Locations of Private High Schools
in the Census Tracts of
Cleveland, Ohio 1989-1991

by
Paula M. Kautt



★ = Location of a Private High School

1989 and 1991 had twelve distinct variations of grade levels serviced.²³ These were collapsed down into public high schools, public middle schools, public schools serving grades kindergarten (k) through three, public schools serving grades k through five, public schools serving grades k through six, and public schools serving grades four through six.

The final count of Cleveland public schools is one hundred eighteen. There are fourteen public high schools, nineteen public middle schools, ten grade k-three elementary schools, fifty-seven grade k-five elementary schools, eight grade k-six elementary schools and ten grade four-six elementary schools.

This task proved less challenging for private schools. The 1989-91 Cleveland private schools fell into only four categories²⁴ which were further collapsed into two categories: private elementary-middle and private high schools. The total number of private schools in Cleveland is sixty one. There are fifty-three private elementary schools and eight private high schools.

To identify the city blocks on which these schools are located, their addresses were geocoded by computer using version 4.0 of the MapInfo program licensed to the Criminal Justice Department and manually checked using city census block maps. Once this was completed, the blocks directly adjacent to those occupied by schools were identified, followed by those that are secondary adjacents. This was accomplished using the same mapping program to locate each block with a school and identify the

²³These were: K & 4-6, K-3, K-5, K-5 & 7, K-6, 5-8, 6-8, 6-8 & 12, 6-12, 7-8, 8-12 and 9-12.

²⁴These were: K-8, K-6, 1-8 and 9-12.

surrounding blocks that qualify as either primary or secondary adjacent. The census tract and block numbers were recorded for each of these blocks and entered into a master file. The resulting block plots were cross-verified using census block maps and a corrected Cleveland city map file.²⁵

One hundred four of the one hundred-eighteen public schools and fifty-nine of the sixty one private schools are located on residential blocks. For public schools, ten of the fourteen high schools, seventeen of the nineteen middle schools, nine of ten k-three elementary schools, fifty of fifty-seven k-five elementary schools, eight of eight k-six elementary schools and ten of ten four-six elementary schools are located on residential blocks. As for private schools, seven of the eight high schools and fifty-two of the fifty-three private elementary/middle schools were located on residential blocks. Thus, for the majority of the schools, census data for socio-demographics and housing are available for the block on which they are located. As a result, since the socio-demographic variables can be controlled for only these blocks, schools not located on residential blocks are excluded. This brings the final count of usable schools to one hundred sixty three. Naturally, primary and secondary adjacencies were still defined for these schools as they may still fall on residential blocks.

Independent Variables: Controls

²⁵The pre-existing MapInfo Cleveland city map file had many inaccuracies that needed correcting before the file could be used.

The control variables fall into several distinct categories. These are: social indicators and environmental variables. Such variables are useful for identifying different types of residential areas. Several are also integral components of criminological theory--including *Routine Activities*--further justifying their inclusion.

Indicators of family or household composition have demonstrated important effects on city block crime levels. Thus, the independent variables representing these characteristics are the percentage of primary individual households, the percentage of female headed households, and the percentage of persons over age 60.²⁶ Primary individual households are defined as those in which the head of the household does not live with relatives.

Previous research routinely found that minority and racially diverse areas have higher crime rates than other areas. Thus, the racial composition of an area is an important factor. Therefore, the percentages of black residents, Hispanic residents and a measure of nonblack racial heterogeneity are included as indicators of minority composition.

Racial heterogeneity measures deciles of black-nonblack heterogeneity. This is relevant since group dominance can become more ambiguous as racial proportions become nearer to equal, possibly promoting conflict. Using methodology similar to Roncek and Maier (1991), heterogeneity is defined as the actual percentage of black

²⁶Blocks that have substantial percentages of their populations residing in institutions, correctional facilities and hospitals are excluded because such blocks are not sufficiently residential. Furthermore, such populations are not stable nor are they representative of the true block composition.

population when the percentage is less than fifty percent. When the percentage is more than fifty percent, the racial heterogeneity measure is one-hundred minus the actual percentage of the black population.

To capture the socioeconomic status of blocks, I use the value of owned housing since household income is not available for city blocks. Additionally, rent can be an inaccurate indicator of socioeconomic states because of apartment sharing and the less stringent requirements for renting as compared to owning. Four hundred forty-two of the residential blocks were missing the owned value of housing and the value of owned housing for the group was substituted when.²⁷ This reduces the number of missing housing values from four hundred forty-two to thirty-five. When the block group value was missing, the average values for the census tract in which the block is located is employed. This substitution was made for twenty blocks, reducing the number of blocks without housing values to fifteen. As a last resort, the predicted values from a regression of housing value on rent for all blocks with both values reported is substituted for these last fifteen blocks. The equation used is:

$$\text{Housing Value} = 6801.192628 + (117.471715 \times \text{Rent})$$

²⁷ “A geographic block group is a cluster of blocks having the same first digit of their three-digit identifying numbers within a census tract or block numbering area. Generally, these contain between 250 and 550 housing units. In data tabulations, [such groups] may be split or averaged to present data for every unique combination of [land use].” (Department of the Census, 1991 ;A-4)

Thus, their demographic data should be consistently similar to the other members of the cluster. By using the average of the block group, any missing values are replaced by the values of the blocks in the immediate vicinity--resulting in a fairly accurate representation of the missing data for the block. For Cleveland, the average block group is comprised of six point five blocks. There are seven hundred twenty one block groups representing 4,747 blocks.

The control variables reflecting block environmental conditions are percentage of overcrowding, percentage of apartments and vacancy rates per 100 year-round housing units constitute the housing measures while resident population size and block area in acres are the measures of block size. As defined by the Census Bureau, percentage overcrowded is the percent of residents living in housing with 1.01 or more persons per room. The presence of apartments is measured by the percentage of housing units in structures with ten or more units. Thus, the percentage of apartments is merely the ratio of the number of units in such structures over the total number of units on each city block. The vacancy rate is measured per 100 year-round use housing units (Roncek and Maier, 1991: 736). Previous studies found these variables to have significant effects on crime (Roncek and Faggiani, 1985; Roncek and LoBosco, 1983 and Roncek and Maier, 1991) and these measures are important for theories about crime incidence those of Jane Jacobs, and Newman's *Defensible Space*.

METHODOLOGY

As a replication and extension of previous work by Roncek and associates, the procedures are essentially the same. Thus, several of the variables, analyses, the units of analysis, and data sources used remain relatively unchanged from their work. This, coupled with the use of Cleveland as the city and residential city blocks as the units of

analysis, also allows for comparison with the previous research findings of Roncek and Faggiani.

There are three main differences between this work and previous studies. First, this study includes all school levels whereas previous work focused only on high schools. Secondly, unlike the studies emulated here, I focus solely on the crime of burglary instead of all Part I Index Crimes. Finally, rather than primarily using regression analysis, I perform Tobit analyses.

Analyses

In analyzing the data, I used several statistical procedures. First, I conducted a T-test for the difference of means comparing blocks with schools (public and private, high school, middle, and elementary) to all other blocks. Zero order correlations were examined to identify uncontrolled associations and to test for multicollinearity. These provide a baseline against which to compare any controlled effects. Following this were several multiple regression analyses based on the correlations.

Multiple regression allows for the examination of the effects of the school-related independent variables after controlling for the influences of the demographic and physical characteristics of the block. This provides useful and well-defined measures of associations between variables, their strengths and the importance of schools in relation to the controls (Roncek and Maier, 1991: 747). Naturally, these regressions were checked for multicollinearity problems using the Variance Inflation Factor test and the Condition Index test. Had any such problems been detected, an attempt to correct them would have been made using residualization.

The final statistical technique used was Tobit, since the dependent variable, burglaries, is a censored dependent variable. Tobit will not only adjust for the nonnormal distribution of burglary, but will also provide more accurate measures of the effects of schools on burglaries in the surrounding areas (Roncek & Maier, 1991: 730). Thus, this technique is ideal for a city block analysis of burglaries since 512 of the 4,747 residential blocks do not have this crime. Since there is no such thing as a negative burglary, all of

the cases have zero as the lowest possible value, violating a regression assumption and necessitating the use of Tobit (Roncek, 1992: 503). Finally, Tobit will estimate the risk of burglary associated with having a school on a crime free block as well as the additional risk associated with having another school on block with burglaries already present.

RESULTS

T-test

The T-test for independent samples indicated that the average number of burglaries on blocks with any type of school differed significantly from the average on blocks without schools. The difference was statistically significant beyond the .01 level. The only other variables that had significant differences between these two groups of blocks were the area of the block in acres (.01), total population of the block (.05), and percentage of apartments (.05). Blocks with schools had larger average land areas and populations as well as higher average percentages of apartments. Table one shows the t scores for the three school measures presence, primary adjacency and secondary adjacency. Table two lists the means and probabilities for mere presence while Tables three and four furnish the same measures for primary and secondary adjacency respectively.

Table One
T-Tests for City Blocks with Schools, Primary and Secondary Adjacency

Variables	Blocks with Schools	Blocks: Primary Adjacency	Blocks: Secondary Adjacency
Burglary	-4.0849*	-6.6124*	-4.9310*
Primary Individuals	1.2133	.3636	.2918
Female Headed Households	-.6830	-1.6413	-.1001
% Over Age 60	.8881	-1.0169	-1.9551
% Black	.1199	-3.0031*	-3.0076*
Racial Heterogeneity	-.4244	3.2807*	-.4944
% Hispanic	-.3100	.9631	.8069
Mean Value of Owned Housing	.0694	.3491	.7882
Overcrowding	-1.0049	.1556	.3329
% Apartments	-2.0733*	-.9800	-2.1908*
Vacancy Rate	-1.4747	-1.1352	-.5497
Population	-2.2915*	-7.2614*	-6.8595*
Block Area	-4.4020*	-3.7484*	-4.8661*

* = P < .05

Table Two
T-test for Blocks with Schools

Variables	Mean W/O Schools	Mean W/Schools	T Score	Probability
Burglary	1.947	2.916	-4.0849	.0001
% Primary Individuals	14.140	13.015	1.2133	.2267
% Female Headed	15.639	16.439	-.6830	.4946
% Over Sixty	19.519	18.545	.8881	.3745
% Black	40.962	40.518	.1199	.9046
Racial Heterogeneity	4.614	4.923	-.4244	.6713
% Hispanic	5.357	5.702	-.3100	.7569
Mean Value of Owned Housing	38.133	38.038	.0694	.9448
% Overcrowded	3.088	3.619	-1.0049	.3165
% Apartments	5.011	8,284	-2.0733	.0397
Vacancy Rate	10.348	11.990	-1.4747	.1422
Population	104.317	131.670	-2.2915	.0232
Area in Acres	7.580	16.805	-4.4020	.0001

Table Three
T-test for Blocks with Primary Adjacency

Variable	Mean W/O Schools	Mean W/ Schools	T Score	Probability
Burglary	1.815	2.334	-6.6124	.0001
% Primary Individuals	14.185	14.007	.3636	.7162
% Female Headed	15.436	16.234	-1.6413	.1008
% Over Sixty	19.404	19.855	-1.0169	.3093
% Black	39.789	44.401	-3.0031	.0027
Racial Heterogeneity	4.843	3.941	3.2807	.0011
% Hispanic	5.454	5.074	.9631	.3355
Mean Value of Owned Housing	38.191	37.963	.3491	.7270
% Overcrowded	3.095	3.070	.1556	.8763
% Apartments	4.868	5.432	-.9800	.3271
Vacancy Rate	10.237	10.675	-1.1352	.2564
Population	97.467	124.398	-7.2614	.0001
Area in Acres	7.030	9.192	-3.7484	.0002

Table Four
T-test for Blocks with Secondary Adjacency

Variable	Mean W/O Schools	Mean W/ Schools	T Score	Probability
Burglary	1.808	2.120	-4.9310	.0001
% Primary Individuals	14.198	14.068	.2918	.7704
% Female Headed	15.620	15.663	-.1001	.9202
% Over Sixty	19.172	19.953	-1.9551	.0506
% Black	39.163	43.211	-3.0076	.0026
Racial Heterogeneity	4.556	4.686	-.4944	.6210
% Hispanic	5.481	5.202	.8069	.4198
Mean Value of Owned Housing	38.378	37.827	.7882	.4306
% Overcrowded	3.111	3.059	.3329	.7392
% Apartments	4.516	5.631	-2.1908	.0285
Vacancy Rate	10.265	10.452	-.5497	.5825
Population	95.098	115.840	-6.8595	.0001
Area in Acres	6.607	8.795	-4.8661	.0001

Regression Analysis

All the following regression analyses had statistically significant F tests which indicates that the explained variance in burglary for each of the regressions is significantly different from zero. Also, as indicated by the Variance Inflation Factor and Condition Index tests, there were no problems with multicollinearity in these analyses.²⁸ The first regression analysis was a baseline regression of the effect of census block data variables on burglary. This regression had an R-squared of .4954. Thus 49.5% of the variance was explained by these variables.

All but two of the census data control variables, percentage overcrowding and percentage Hispanic population, had statistically significant effects (.01). The beta weights (standardized regression coefficients) indicate that the most important of these variables was the actual block population, followed by the vacancy rate and the measure of racial heterogeneity. The block area in acres, the percentage of block population over sixty, the mean average value of owned housing and the percentage of primary individual households respectively were the next most influential factors. The percentages of African-American population, apartments, and female headed households were the least influential significant factors. All of the significant control variables had a positive effect on burglaries except for the percent of individuals over sixty and the mean value of owned housing which were expected to have significant effects based on past research.

²⁸A Variance Inflation Factor (VIF) value of four or larger or a Condition Index value of thirty or greater associated with two variance inflation decomposition proportions of .5 or greater indicate multicollinearity problems. The values for these regressions were well below this criteria. The VIF scores were all below three.

Analyses of the Effects of the Presence of Schools

The next regression added a dichotomous dummy variable representing the presence of the main independent variable, schools, on a block. This variable was significant (.01) and negligibly improved the R-squared to .4967. Thus, it is not surprising that the betas indicate this to be the least influential significant variable.

There was also minimal improvement with the addition of dummy primary adjacency values to .4976 and this was a significant variable (.01). Of the beta weights of the significant independent variables, this variable had the smallest beta weight. The addition of the secondary adjacency dummy variable did not explain any additional portion of the variance and was not a significant variable.

When the dummy variables indicating school presence were further broken down into public and private school components, the R-squared improved to .4974 from the baseline of .4954. Public school presence was statistically significant (.01) while the presence of private schools was not. Again, the betas indicate that public school presence was the least influential significant variable.

The addition of the primary adjacency variables raised the R-squared to .4985. Public school adjacency was positive and significant (.01) while the private school adjacency was not. The betas indicate public school adjacency to be the least influential significant variable. Like the previous regression, the addition of the secondary adjacency variable for either type of school did nothing to explain additional variance and neither measure was significant.

The next regression further refined the school variables by differentiating between public and private high schools and other schools. The R-squared improved to .4974 but the only significant variable was the presence of public schools that were not high schools. As indicated by the betas, this was the least influential significant variable. When primary adjacency was added, the only significant variable was for primary adjacency to a public non-high school (.05). Here, the R-squared improved to .4985 but the betas still indicated these to be the least influential significant variables. None of the secondary adjacency variables were significant despite the R-squared improvement to .4989.

Further refinement was made in the next regression where the schools were further divided into public high schools, middle schools and elementary schools as well as private high schools and elementary/middle schools. Of these, only public middle school presence (.01) and public middle school primary adjacency (.05) were significant. As indicated by the betas, the adjacency measure was the least influential significant variable followed by the presence variable. The R-squared value remained unimproved at .4985. The addition of the secondary adjacency variables improved the R-squared to .4990 but none of the added variables were significant. The improvement in R-squared is not important R-squared can increase simply due to increasing the number of independent variables, even if the added variables do not have statistically significant effects.

The next refinement was to further break down the presence and primary adjacencies by school types.²⁹ Here the presence of elementary grade k-five schools is statistically significant at the .01 level. The amount of variance explained improved slightly to .4983. The addition of primary adjacency dummy variables yielded only one significant variable--primary adjacency to public school grades k-five (.01). The R-squared improved to .4992. Again, the betas indicate that these school variables were the least influential significant variables.

When secondary adjacencies were added at this level of refinement, there was an increase in the amount of variance explained (From .4992 to .5010). Surprisingly, secondary adjacency to elementary grade k-three schools was negative and statistically significant (.05), despite the fact that neither such school presence or primary adjacency had significant effects. The presence of elementary grade k-five schools and primary adjacency to such schools remained significant. As indicated by the betas, all significant school variables remain the least influential of all the significant variables.

Analyses of the Effects of the Size of Enrollment

All of the previous regressions were recalculated with two major alterations. Instead of using dichotomous dummy variables to simply indicate whether or not a block was adjacent to a school, the enrollment for the adjacent school was used as the value for

²⁹These were private high schools, private elementary/middle schools, public high schools, public middle schools, public schools grades k-5, public schools grades k-3, public schools grades k-6, and public school grades 4-6.

the variable indicating such adjacency. In other words, instead of the number one indicating the adjacency of a block to a block with a school on it, the enrollment of the school to which the block is adjacent is the indicator of adjacency. Nonadjacent blocks have a value of zero on this measure. Likewise, instead of a dichotomous dummy variable indicating the presence of a school on a block, the enrollment of the school indicated its presence.

School enrollment values are used to test whether or not the sizes of the schools, not merely their presence, has any effect on the number of burglaries in the surrounding areas. From *Routine Activities* theory, it would be reasonable to expect that the higher the enrollment, the higher the number of people who use the school as an activity node. Thus, Crime near large enrollment schools would be higher than that associated with smaller enrollment schools.

The first of these regressions was the same as the original baseline regression with the addition of the any school enrollment variable. As expected, this variable was statistically significant at the .01 level and the R-squared improved from .4954 to .4970. Like the previous regressions that used dummy variables and as indicated by the betas, the significant school variable was the least influential of the significant variables. The addition of the primary adjacency/enrollment variable minimally improved the R-squared (.4973) but was not statistically significant. Adding the secondary adjacency/enrollment variable did not improve the R-squared and was not statistically significant.

The next refinement was to break down the enrollment/presence variable into subcategories of private and public schools. Neither of these variables was statistically significant and the R-squared minimally improved from the baseline to .4957. The addition of the primary adjacency/enrollment variables broken into public and private components also minimally improved the R-squared (.4960) but was not significant. Similarly, the equivalent secondary adjacency/enrollment negligibly improved the R-squared (.4961) and was not significant.

The next subdivision distinguishes among public high schools, public non-high schools, private high schools and private elementary/middle schools. The improvement of the R-squared from the baseline was to .4958 and none of these variables were significant. Neither the addition of the primary or secondary adjacency/enrollment variables improved the R-squared nor were they significant variables.

Next, these variables were further subdivided into public high schools, public middle schools, public elementary schools, private high schools and private elementary/high schools. The addition of the primary adjacency/enrollment variables improved the R-squared to .4962 but again, none of these variables were significant. Following this, the secondary adjacency/enrollment variables were added. While none of these variables were statistically significant either, the R-squared improved to .4973.³⁰

The final set of regressions, whose results are in Table 2, used all school categories of enrollment as independent variables. As with the dummy variables, the only

³⁰The R square will generally improve slightly with the addition of any variable.

statistically significant presence/enrollment variable was for public elementary grade k-five schools (.01). Here, the R-squared improved to .4974 from the baseline of .4954. Also significant was the primary adjacency/enrollment variable for these schools (.05). The R-squared improved to .4987. Again, the betas indicated these to be the least influential of the statistically significant variables. The addition of the secondary adjacency/enrollment variables improved the R-squared to .5000. Like the dummy regression, secondary adjacency/enrollment of public elementary grade k-three schools is negative and significant at the .05 level.³¹ This newest variable was, as indicated by the betas, the least influential significant variable.

³¹Thus, the only significant effect for secondary adjacency indicates that a residential block that is two blocks away from a k-three public school is expected to have significantly less burglaries than other blocks.

Table Five
Regression Results with All School-Related Variables

Variable	b Coefficient	Standard Error	T-Score	Beta Weight
Intercept	.245135	.08854757	2.768	0
% Primary Individuals	.008780*	.00192501	4.561	.06075426*
% Female Headed House	.007112*	.00208443	3.412	.04715929*
% Over Sixty	-.010815*	.00196125	-5.514	-.06708344*
% Black	.002636*	.00065488	4.026	.05525856*
Racial Heterogeneity	.021376*	.00261158	8.185	.8798114*
% Hispanic	.001454	.00217002	.670	.00786653
Mean Value of Owned Housing	-.005592*	.00101745	-5.496	-.06144890*
% Overcrowded	-.001629	.00445225	-.366	-.00402819
% Apartments	.005927*	.00160506	3.692	.04676371*
Vacancy Rate	.021693*	.00210367	10.32	.11512299*
Population	.012549*	.00026588	47.197	.59338825*
Area in Acres	.011823*	.00167183	7.072	.08371148*
Public HS Enrollment	.000707	.00041640	1.698	.01782030
Public MS Enrollment	.000377	.00062227	.605	.00637734
Public K-3 Enrollment	.001509	.00090656	1.664	.01718872
Public K-5 Enrollment	.001449*	.00046582	3.111	.03225884*
Public K-6 Enrollment	.000266	.00106686	.250	.00257805
Public 4-6 Enrollment	.001618	.00088698	1.824	.01884637
Private 9-12 Enrollment	-.000350	.00138986	-.252	-.00269694
Private MS/Elementary Enrollment	.000228	.00069239	.330	.00352053
Private HS Primary	.000265	.00031681	.838	.00888003
Private MS/Elementary Primary	.000271	.00023637	1.148	.01224890
Public K-6 Primary	-.000017036	.00044007	-.039	-.00040178
Public K-5 Primary	.000393*	.00016774	2.343	.02479686*
Public K-3 Primary	.000126	.00029349	.430	.00449892
Public 4-6 Primary	-.000251	.00029663	-.845	-.00880441
Public MS Primary	.000324	.00022999	1.408	.01470332
Public HS Primary	.000074516	.00012115	.615	.00640850
Private HS Secondary	-.000110	.00022768	-.485	-.00507259
Private MS/Elementary Secondary	.000049142	.00017048	.288	.00304737
Public K-6 Secondary	.000596	.00031894	1.868	.01941089
Public K-5 Secondary	.000103	.00012028	.857	.00907492
Public K-3 Secondary	-.000488*	.00023770	-2.053	-.02146542*
Public 4-6 Secondary	-.000362	.00022795	-1.588	-.01684102
Public MS Secondary	-.000129	.00015759	-.817	-.00853785
Public HS Secondary	.000054500	.00009079	.600	.00627043

R squared = .500 * = P < .05 N= 4747

Tobit Analysis

For the Tobit analyses, no dummy variables for school presence or proximity were used since the decomposition of Tobit effects into probability effects and effects above the limit is impossible for dummy variables. The decomposition depends on being able to compute a first-order partial derivative, which is not possible for dummy variables. The Tobit coefficients are similar to regression coefficients in that they indicate the association between the dependent variable, burglary, and the independent variable being examined. Similarly, the standardized Tobit coefficients are like the beta weights of regression in that the absolute value of their size ranks the independent variables by importance. Additionally, like Logit, if the standardized effect goes above one it is not an indicator of a problem with multicollinearity. This is merely an artifact of non-linear models. The effect above the limit indicates the effect of the independent variables on blocks that already have burglaries. The effect of each independent variable on burglaries is calculated. The probability effect gives the effect of the independent variables on blocks that do not already have burglaries. In other words, since these blocks have no burglaries, the effect of each independent variable is on the probability that these blocks will have a burglary given a unit increase in the independent variable. Currently, there are no standard errors or standardized coefficients for either the probability effect or the effect above the limit.

The Chi-squared test is a significance test analogous to the F-test in regression analysis. The Lemeshow pseudo R-squared³² is analogous to the R-squared in regression. However, here it is a measurement of the reduction in error rather than the amount of variance explained. Likewise, the standardized effect is analogous to the beta weights of regression analysis in that they can be used to rank the independent variables in order of importance.

The first Tobit analysis was a baseline with only the census control variables. The Chi-squared was statistically significant at .05 or better. The Lemeshow pseudo R-squared indicated a 18.17 percent reduction in the log likelihood.³³ Of the control variables, all were significant at the .05 level or better with the exception Hispanic population and percent overcrowding. The standardized effects indicate the vacancy rate to be the most influential significant variable, followed by the measure of racial heterogeneity, the block area in acres, block population, the percent of the block population over age sixty, the mean value of owned housing, the percent of block African-American population, percentage of apartments, percentage of primary individuals and the percentage of female headed households respectively.

The second Tobit analysis added simple school enrollment on a block as a new variable. The Chi-squared for this model was significant at the .05 level or better. The pseudo R-squared indicated a 18.29 percent reduction in the log likelihood. This was a

³²This is calculated using the difference in the log likelihood multiplied by negative two divided by the log likelihood of the intercept only model times negative two (Menard, 1995; 19).

³³ Since this measure is not a variance explained measure, it is not surprising that its values differ substantially from the squared multiple correlation.

significant variable (.01) and according to the standardized coefficient was the least influential of the significant variables. The effect above the limit indicated that this school variable produces a .067 change in the average number of burglaries per one student increase in the school present. Thus, the presence of an additional student would increase the number of burglaries by .067. The probability effect indicates a change of .013 in the probability of a block having a burglary when it did not have one originally for each additional student enrolled.

For the next Tobit analysis, the primary adjacency with enrollment of any school was added to the model. The Chi-squared for this model was statistically significant at the .05 level or better. The Pseudo R-squared revealed a 18.32 percent reduction in the log likelihood and this new variable was significant (.05). The standardized coefficients ranked this variable as the least influential of the significant variables. The effect above the limit indicates that this variable has the effect of increasing the number of burglaries by .0137 per one student increase in enrollment of the school for which a block has primary adjacency. The probability effect shows that the probability of a block without burglaries having a burglary increases by .002 per every student increase in enrollment.

Similarly, the addition of the general secondary adjacency variable to the model produced a Chi-squared that was significant at .05 or better but the pseudo R-squared remained virtually unchanged at 18.32 percent. This new variable was not significant.

The next Tobit analysis consisted of the same control variables but the school enrollment/presence variable was decomposed into two variables: public schools and

private schools. The Chi-squared for this model was significant at .05 or better and the Pseudo R-squared demonstrated a 18.29 percentage reduction in the log likelihood. While the variable for public school enrollment was significant (.01) the private school variable was not. Like the previous Tobits, here the standardized effects demonstrated the public school variable to be the least influential significant variable. The effect above the limit of this variable shows that burglaries increase by .073 per one student increase in enrollment of the public schools present on blocks that already have burglaries. The probability effect of this variable demonstrates that probability of a burglary occurring on a block that does not have any burglaries increases by .014 with each additional student enrolled in the public school present.

As expected, the Chi-squared for the subsequent Tobit additionally including the primary adjacency variables was significant at .05 or better. The pseudo R-squared indicated a 18.34 percent reduction in the log likelihood. Neither of the private school variables were significant but both public school variables were. Again, the standardized effects revealed that these were the least influential significant variables--with the enrollment/presence variable having more influence than the primary adjacency variable. The effects above the limit indicated that public school enrollment has the effect of increasing burglaries by .074 per additional student enrolled in the public school present on blocks that already have burglaries and each primary adjacency of such schools has the effect of increasing burglaries by .014 per student enrolled. The probability effects show that the probability of a burglary occurring on a block with no burglaries reported

increases by .014 per public school student present and .002 per additional student for each block primarily adjacent to such a school.

The addition of the secondary adjacency variables predictably resulted in a Chi-squared that was significant at .05 or better while the pseudo R-squared revealed a 18.35 percent reduction in the log likelihood. However the additional variable was not significant.

The subsequent Tobit further specified school type by distinguishing among public high schools, private high schools, public non-high schools and private non-high schools. The Chi-squared of this model was significant at .05 or better and the pseudo R-squared indicated a 18.28 percent reduction in the log likelihood. Of the new variables in this model, only public non high schools were significant (.01). The standardized effect demonstrated this to be the least influential significant variable. The effect above the limit indicated that each additional public non-high school on a block with burglaries increased the number of burglaries by .042 per student. The probability effect showed the presence of an additional public non-high school student in a school on a block without burglaries increased that block's probability of having a burglary by .015.

The addition of the primary adjacency variable for each of the previous school categories to the Tobit analysis predictably resulted in a Chi-squared significant at .05 or better and the pseudo R-squared demonstrated a 18.35 percent reduction in the log likelihood. Of the school variables, only primary adjacency to public non-high schools and the enrollment of these schools was significant (.05). The standardized effect for

primary adjacency indicates that this is the least influential significant variable. The effect above the limit indicates that the number of burglaries on a block that already has burglaries increases by .020 burglaries for each public school student on the block to which a block is primarily adjacent. Similarly, the probability effect indicates an increased probability of .003 for blocks without burglaries to have burglaries with each student enrolled in the adjacent school.

The addition of the secondary adjacency variable also resulted in a Chi-squared significant at .05 or better and the pseudo R-squared resulted in a 18.35 percent reduction in the log likelihood. Unfortunately, none of these new variables were significant.

The next Tobit analysis refined the school enrollment variables further into public high schools, public middle schools, public elementary schools, private high schools and private non-high schools. The Chi-squared for this model was significant at .05 or better and the pseudo R-squared indicated a 18.29 percent reduction in the log likelihood. The only significant variable was public elementary school enrollment (.01) and the standardized effect indicate this to be the least influential significant variable. The effect above the limit showed that for blocks that had burglaries already, the addition of an extra student increased the number of burglaries by .096. The probability effect demonstrated that for blocks without burglaries, the presence of each additional student increased that block's probability of having a burglary by .018.

The addition of the primary adjacency variables also resulted in a Chi-squared significant at .05 or better and a pseudo R-squared that showed a 18.36 percent reduction

in the log likelihood. Of these new variables, however, none were significant. Similarly, the addition of the secondary adjacency variables resulted in a significant Chi-squared and a pseudo R-squared showing a 18.36 percent decrease in the log likelihood. Yet, again, none of these new variables were significant.

The final refinement made to the Tobit analyses was the further decomposition of the school presence/enrollment variables into public high schools, public middle schools, public grades k through three schools, public grades k through five schools, public grades k through six schools, public grades four through six schools, private high schools and private elementary/middle schools. As expected, the Chi-squared for this model was significant at .05 or better and the pseudo R-squared indicated a 18.30 percent reduction in the log likelihood. Of these variables, only public schools grade k through five was significant (.01) and the standardized effect demonstrates this to be the least influential significant variable. The effect above the limit for this variable indicates a .101 increase in burglaries per additional student present on a block that has burglaries. The probability effect shows a .019 increase in the probability of a block without burglaries to have a burglary per additional student present.

The addition of the comparable primary adjacency variables to the model also resulted in a Chi-squared significant at .05 or better and the pseudo R-squared showed a 18.39 percent reduction in the log likelihood. Of the new variables, only primary adjacency to public schools serving grades k through five was significant (.05) and the standardized effect show it to be the least influential significant variable. The effect

above the limit shows this variable to increase the number of burglaries by .028 per additional student in the school to which the block with burglaries is adjacent. The probability effect indicates a .005 increase in the probability of a block without burglaries to have a burglary per additional student in an adjacent a k through five public school.

The addition of the secondary adjacency variables to the model resulted in a Chi-squared significant at .05 or better and the pseudo R-squared demonstrated a 18.45 percent reduction in the log likelihood. However, none of the new variables were significant. The results of this final Tobit, with the complete battery of school variables, is listed in Table 3.

Table Six
Tobit Results Using All School-Related Enrollment Variables

Variables	Tobit Coefficient	Standardized Coefficient	Effect Above Limit	Probability Effect
Intercept	.12430	0.0	.0828537	.0159498
% Primary Individuals	.0071617*	.0649203*	.00477354	.000918936
% Female Headed	.0068858*	.0598219*	.00458964	.000883534
% Over 60	-.0013149*	-.106847*	-.00876398	-.00168712
% Black	.0030671*	.0842234*	.00204433	.000393546
Racial Heterogeneity	.023235*	.125285*	.0154867	.00298128
% Hispanic	.0019413	.0137619	.00129395	.000249094
Average Owned Housing Value	-.0073639*	-.106020*	-.00490834	-.000944884
% Overcrowded	-.0027603	-.00893975	-.00183984	-.000354180
% Apartments	.0069596*	.0719444*	.00463884	.000893005
Vacancy Rate	.023438*	.162953*	.0156224	.00300740
Area in Acres	.012012*	.111422*	.00800624	.00154125
Population	.013232*	.819700*	.00881930	.00169777
Public HS Enrollment	.00077933	.0257360	.000519452	.0000999976
Public MS Enrollment	.00031443	.00697450	.000209577	.0000403449
Public K-3 Enrollment	.0016035	.0239328	.00106878	.000205746
Public K-5 Enrollment	.0015466*	.0451069*	.00103084	.000198442
Public K-6 Enrollment	.00041273	.00523071	.000275099	.0000529581
Public 4-6 Enrollment	.0017993	.0274518	.00119929	.000230870
Private 9-12 Enrollment	-.000022122	-.000223195	-.0000147452	-.00000283854
Private MS/Elementary Enrollment	.00037639	.00760272	.000250878	.0000482950
Public HS Primary	.000074128	.00835209	.0000494092	.00000951158
Public MS Primary	.00038054	.0226307	.000253647	.0000488286
Public K-3 Primary	.00014259	.00666683	.0000950406	.0000182950
Public K-5 Primary	.00042474*	.0351016*	.000283105	.0000544993
Public K-6 Primary	.000025943	.00001563	.0000172922	.00000332886

Public 4-6 Primary	-.00024135	-.0111084	-.000160870	-.0000309685
Private HS Primary	.00030493	.0133681	.000203248	.0000391265
Private MS/Elementary	.00034133	.0201808	.000227507	.0000437965-04
Primary Public HS Secondary	.000075356	.0113584	.0000502272	.00000966904
Public MS Secondary	-.0000022558	-.000196071	-.00000150358	-.000000289448
Public K-3 Secondary	-.00041411	-.0238674	-.0000276018	-.0000531351
Public K-5 Secondary	.00013179	.0152080	.0000878455	.0000169108
Public K-6 Secondary	.00064612	.0275830	.000430664	.0000829054
Public 4-6 Secondary	-.00033434	-.0203803	-.000222851	-.0000429002
Private HS Secondary	-.000063485	-.00382297	-.0000423153	-.00000814596
Private MS/Elementary Secondary	.000040514	.00329134	.0000270039	.00000519841

Lemeshow Psuedo R Squared = 18.45 * = P < .05 N = 4747

LIMITATIONS

Because data to measure other, non-residential uses on the residential city blocks were not available, I cannot directly address the effects of the presence of other land uses on residential blocks. As a result, the presence and possible influence of other potential “hot spots” such as bars, nightclubs, fast food chains, *et cetera* in close proximity of the schools cannot be accounted for.

Also, I cannot control for the effect of the street location of the schools. For example, the more roads that lead to a location, the more likely it is to be victimized. Furthermore, the type of road the school is situated on may also have an effects as busy thoroughfares produce more criminal incidences than quieter, less used streets. It would be desirable for future research or replications in this area to attempt to examine traffic count data from the Cleveland traffic engineering body. However, these data are likely to be available for only small portions of the street segments.

Another obstacle is the physical layout of the schools. For example, a fenced school yard is less accessible to the public than one that is not. Therefore, the school with the fenced yard would have a diminished activity level when compared with schools without fenced grounds simply because of the accessibility. Because on-site visitation was not possible for this research, this potential influence cannot be adequately addressed.

The number and type of after school activities may also pose a problem. Substantial activities at the school may increase guardianship but it also increases the

activity levels of the school and the surrounding areas. Unfortunately, there is no way to measure precisely the amount, type, and duration of after school activities for each school during the years covered by this study. Thus, the effects of this variable cannot be accounted for.

One possible limitation stems from the use of primary and secondary block adjacency to determine the spatial extent and distribution of the burglary pattern in relation to schools. Since the size of city blocks is not uniform, in some instances, both primary and secondary adjacent blocks on one side of a school are small physically while those on the other side are substantially larger. Thus, the proximity of the school to the secondary adjacent block is directly dependent to the size of the primary adjacent block.

For the sake of simplicity, the definition of primary and secondary adjacency applied to any block that touches the block with the school or any block that touches a primary adjacent block. However, irregular shapes and sizes of various blocks can result in blocks being defined as secondary adjacent that are further from the target block than some blocks that are closer but are not primary or secondary adjacent blocks according to the definition. In some cases, the block where the school is located covers a substantial area and is irregularly shaped. This problem is compounded when the school is itself located on the edge of this block. Although students (and others) may be able to travel directly across the portion of the block that is the school yard, the distance from the school to the primary adjacent block on the other side is substantial. As a result, the

effect of the school on this primarily adjacent block may be diffused by the distance between them.

There are programs that can take into account these potential difficulties--specifically those utilizing buffer zones or potential measures. Ideally, they should be used in conjunction with primary and secondary adjacency however, there are several factors that preclude their utilization. First, such analyses are currently beyond the scope of this research and researcher. Second, the facilities available for this study cannot support the programs necessary for such analysis. Finally, the results of such analysis are difficult to effectively explain and interpret.

While analyses using distance to school measures have the benefit of breaking down the areas into foot increments and therefore, allow for specific distances of the range of effect, they have outweighing drawbacks. Primarily, such analyses increase the difficulty of using census block data. This is because the delineation of the spatial effect is unlikely to fall on the block border. Instead, it will usually intersect one or more blocks. Thus, for meaningful and accurate interpretation, part of a block must then be excluded from the analysis. However, census data block cannot be subdivided to allow for the examination of block portions. As a result, block census data would be useless with these types of analyses alone.

Another difficulty in using these measures is that since they are in such small increments, the range of effect may end or begin in inconvenient places--such as part of a house, the middle of road or in a tree. Furthermore, they cannot take into account the

location of roads and other commonly traveled arteries as the analysis is concerned solely with distance. Using the area of the blocks as an independent variable helps to modify the distortions due to using simple adjacency measures because parts of physically larger blocks must also necessarily be more remote from a particular block than other smaller adjacent blocks.

Other factors that may influence the findings of this research are the unknown effects of busing upon the neighborhoods surrounding these schools. This factor is present for all public school groups. However, it may decrease as students reach the minimum driving age. Again, the scope of this influence is undetermined and unavailable for the years and city in question.

A related concern is the possible decrease in the number of students walking to school as they advance through grade levels. Naturally, only high school students will have access to automobiles for transportation. Middle/junior high school children may have access to bicycles, mopeds, *et cetera*. These factors may serve to expand the sphere of influence of the schools or conversely might remove potential offenders from the vicinity of the school to other nodes of activity and suitable targets. Additionally, they may vary between public and private schools, possibly serving to explain some of the differences in results between them. Yet, like previous concerns, no information on this is available.

In regard to the regression and Tobit analyses used, future research or replications should address the possibility of interaction terms. This is of concern to this study,

however, it is doubtful that such variables would be significant since the social variables did not vary significantly across all schools considered as a group.

Additionally, the Tobit analyses were not checked for heteroskedasticity. These analyses should be undertaken because Tobit does not produce consistent coefficients when heteroskedasticity is present. LIMDEP, the statistical package used for the Tobit analyses, contains procedures for testing and correcting for heteroskedasticity that are well accepted in econometrics.

Additionally, due to overriding factors, I was unable to conduct a “hot spot” analysis of the pattern of burglaries in relation to schools. Future research and/or replications may use MapInfo and STAC (Spatial and Temporal Analysis of Crime) or similar programs to conduct such an analysis of burglaries and isolate the areas on which burglaries center, with specific attention toward schools as loci. Doing so would help avoid any distortions due to crimes being concentrated across the street from each other on two or more city blocks rather than being concentrated on a single block (Block, 1995). The proportion of hot spots containing schools would provide another measure of the importance of these facilities. Buffers should be placed around each of the schools and the proportion of burglaries in these buffers totaled. This analysis would provide an additional check on the “hot spot” analyses which are only sensitive to the most important hot spots which may be centered on more criminogenic facilities such as housing projects.

Finally, this work was limited by the inability to use population potential and crime potential. These measures were precluded since FORTRAN was not available at the time of this research. Population potential measures the congestion levels of the city block environment and is calculated by dividing the cumulative sum of each surrounding block's populations by its distance from the block in question. This approximates the number of potential users for each block based on the premise that the people near a block are the most likely to use it. The values of population potential are large because they are divided by the fractions of a mile distance the examined city block is from other surrounding blocks. As a result, it is usually scaled by a factor of 10,000 and expressed as the tens of thousands persons per mile (Roncek and Maier, 1991: 736).

Crime potential measures the amount of crime around each block by including the effects of all possible causes of crime in the environment. This variable is computed in a similar fashion to that of population potential. The only difference is that it includes crime in the suburbs and the total number of index crimes for each block adjacent to the block in question is included in the numerator (Roncek & Maier, 1991: 737) There are potential problems with multicollinearity in using crime potential. However, these can be diagnosed and addressed using the Variance Inflation Factor and Condition Index tests as well as residualization and ridge regression strategies respectively. Both measures would have been useful in controlling for factors relevant to *Routine Activities* theory and thus should be included in any replication or future studies in this area.

DISCUSSION AND CONCLUSIONS

As revealed by the regression and Tobit analyses, the only school type with a significant effect on burglary were public elementary schools serving grades k through five. These effects were positive, indicating that the presence of these schools is associated with more burglaries. Furthermore, primary adjacency to such schools was the only significant adjacency variable in both regression and Tobit analysis. Regression analysis indicated that secondary adjacency to public elementary schools serving grades k through three was negative and significant, however, the Tobit analysis did not. These results are demonstrated in table seven.

These findings are somewhat surprising in light of previous research. While, these studies were limited to high schools, I expected the original significant school variables to remain significant across studies. On the other hand, the studies by Toby (1981, 1983a and 1983b) strongly supported the contention that middle schools may be focal points of criminal activity. Yet, neither expectation or hypothesis is supported by the current data. One finding that did remain constant was the insignificant effect of private schools on burglary. None of the private school variables had significant impact on burglary.

One possible reason for the difference in findings is the focus of this study on burglary alone rather than the UCR index crimes. Perhaps the characteristics of the other offenses and their perpetrators lend themselves more readily to perpetration near high schools and middle schools. By the same token, the environmental characteristics of such

schools may impede or preclude burglary but not other index offenses. Future studies or replications might include all index offenses in analyses of school crime that encompass high, middle, and elementary schools to test for these possibilities.

Still, the characteristics of such schools that contribute to burglary must be isolated if additional directions for policy change are to be found. It is unclear from the data

Table Seven
Significance of Independent Variables Across Analyses

Variable	Regression	Tobit
% Primary Individuals	Y	Y
% Female-Headed Households	Y	Y
% Over Sixty	Y	Y
% Black	Y	Y
Racial Heterogeneity	Y	Y
% Hispanic	N	N
Mean Value of Owned Housing	Y	Y
% Overcrowded	N	N
% Apartments	Y	Y
Vacancy Rate	Y	Y
Area in Acres	Y	Y
Population	Y	Y
General School Presence	Y	Y
General Primary	Y	Y
General Secondary	N	N
Public HS Enrollment	N	N
Public MS Enrollment	N	N
Public K-3 Enrollment	N	N
Public K-5 Enrollment	Y	Y
Public K-6 Enrollment	N	N
Public 4-6 Enrollment	N	N
Private HS Enrollment	N	N
Private MS/Elementary Enrollment	N	N
Public HS Primary	N	N
Public MS Primary	N	N
Public K-3 Primary	N	N
Public K-5 Primary	Y	Y
Public K-6 Primary	N	N
Public 4-6 Primary	N	N
Private HS Primary	N	N
Private MS/Elementary Enrollment	N	N
Public HS Secondary	N	N
Public MS Secondary	N	N
Public K-3 Secondary	Y	N
Public K-5 Secondary	N	N
Public K-6 Secondary	N	N
Public 4-6 Secondary	N	N
Private HS Secondary	N	N
Private MS/Elementary Secondary	N	N

analysis why public schools serving grades k through five affect burglary but the other public elementary schools did not. Logically, since some of the grades served overlap, the overall environment, facilities, and activity levels should be comparable for all public elementary schools. Perhaps the difference is an effect of the sheer numbers involved since sixty seven percent of the public elementary schools are categorized as k through five and the other categories comprise approximately eleven percent or less each. It is also possible that these schools have open grounds and are used by older youth for recreation since their grounds may be walking distance from their homes while higher grade schools may not be close to the homes of most older students.

Burglary, as shown by the data, is not only affected by the presence of or adjacency to k through five elementary schools, but also by the enrollment of these schools. This is a substantially different finding from previous work which indicated that enrollment had no effect. Here, the Tobit analyses reveal that larger enrollments of public schools serving grades k through five are associated with more burglaries for the blocks on which the schools are located as well as those directly adjacent to it. This is not only direct support for *Routine Activities* theory, but has serious implications for policy.

While the statistically significant school variables were the least influential of the significant independent variables, they are one of the most easily controlled by policy. For example, change in one of the control variables like owned housing value or racial heterogeneity would not only be time consuming but also quite difficult--if not impossible--to orchestrate. Conversely, if school enrollments are reduced, the burglaries

on the block with the school and those directly adjacent to it will drop proportionally. Thus, by limiting the enrollment of public schools serving grades k through five, the number of burglaries in the surrounding area can also be limited.

Furthermore, with recent studies indicating the effectiveness of specific preventive patrol in reducing offenses at criminal 'hot spots', such patrol might be concentrated on public elementary schools serving grades k through five. This intervention would be expected to be especially effective during the school peak activity times such as student arrival and departure times. Such patrol should not be limited to the school itself but rather it should encompass the surrounding areas as well--specifically the primary adjacent blocks. There is a definite need for future investigation of this possibility as well as potential interaction effects between preventive patrol and decreased enrollment.

The need for further replications of these finding is clearly necessary before any meaningful conclusions can be drawn regarding the relationship between burglary and k through five public elementary schools. The compelling findings of this study warrant additional research in the areas outlined as well as on its generalization to other locales. Clearly, the potential dividends of reducing burglary by merely reducing school enrollments are great and merit futher attention.

REFERENCES

- Bennett, Trevor. (1995) "Identifying, Explaining and Targeting Burglary Hot Spots" *European Journal on Criminal Policy and Research*. 3:3.
- Block, Carolyn Rebecca. (1995) "STAC Hot Spot Areas: A Statistical Tool for Law Enforcement Decisions." in Carolyn Rebecca Block, Margaret Dabdoub and Suzanne Fregley's *Crime Analysis Through Computer Mapping*. The Police Executive Research Forum. Washington, DC.
- Brantingham, Paul and Patricia Brantingham. (1983) *Patterns in Crime*. Macmillan Publishing Company. New York, NY.
- Brantingham, Paul and Patricia Brantingham. (1991) *Environmental Criminology*. Waveland Press. Prospect Heights, IL.
- Bureau of Justice Statistics. (1996) *National Crime Victimization Survey: Victimization Levels and Rates, Preliminary 1995*. US Department of Justice. Washington, DC. September 17, 1996.
- Bureau of the Census. (1991) *1990 Census of Population and Housing: Technical Documentation*. US Department of Commerce. Washington, DC.
- Clarke, Ronald V. (1983) "Situational Crime Prevention: Its Theoretical Basis and Practical Scope." in Michael Tonry and Norval Morris' *Crime and Justice: An Annual Review of Research. Volume 4*. The University of Chicago Press. Chicago, IL.
- Clarke, Ronald V. (1992) *Situational Crime Prevention: Successful Case Studies*. Harrow and Heston Publishers. New York, NY.
- Clontz, Kenneth A. (1995) *Residential and Commercial Burglaries: An Empirical Test of Crime Prevention Through Environmental Design*. The Florida State University School of Criminology and Criminal Justice. Tallahassee, FL.
- Cohen, Lawrence E. and Marcus Felson. (1979) "Social Change and Crime Rate Trends: A Routine Activity Approach." *American Sociological Review*. 44 (August).
- Cornish, Derek B. and Ronald V. Clarke. (1987) "Understanding Crime Displacement: An Application of Rational Choice Theory." *Criminology*. 25: 4

- Cromwell, Paul F., James N. Olson and D'Aunn Wester Avary. (1991) *Breaking and Entering: An Ethnographic Analysis of Burglary*. Sage Publications. Newbury Park, CA..
- D'Alessio, S. and L. Stolzenburg. (1990) "A Crime of Convenience: The Environment and the Convenience Store Robbery." *Environment and Behavior*. 22:2.
- Decker, Scott, Richard Wright, and Robert Logie. (1993) "Perceptual Deterrence Among Active Residential Burglars: A Research Note." *Criminology*. 31:1.
- Duffala, Dennis C. (1976) "Convenience Stores, Armed Robbery, and Physical Environmental Features." *American Behavioral Scientist*. 20:2.
- Farrell, Graham, Coretta Phillips and Ken Pease. (1995) "Like Taking Candy: Why Does Repeat Victimization Occur?" *The British Journal Of Criminology*. 35:3.
- Federal Bureau of Investigation. (1996) *Uniform Crime Reports: 1995 Preliminary Annual Release*. US Department of Justice. Washington, DC. May 5, 1996.
- Felson, Marcus. (1987) "Routine Activities and Crime Prevention in the Developing Metropolis." *Criminology*. 25:4.
- Felson, Marcus. (1993) "Social Indicators for Criminology." *Journal of Research in Crime and Delinquency*. 30:4.
- Gabor, Thomas. (1990) "Crime Displacement and Situational Prevention: Toward the Development of Some Principles." *Canadian Journal of Criminology*. January 1990.
- Garofalo, James, Leslie Siegel and John Laub. (1987) "School-Related Victimizations Among Adolescents: An Analysis of National Crime Survey (NCS) Narratives." *Journal of Quantitative Criminology*. Vol. 3-4.
- Gottfredson, Denise C. and Gary D. Gottfredson (1985) *Victimization in Schools*. Plenum Press. New York, NY.
- Gottfredson, Denise C., Richard J. McNeil III and Gary D. Gottfredson. (1991) "Social Areas Influences on Delinquency: A Multilevel Analysis." *Journal of Research in Crime and Delinquency*. 28:2
- Green, Lorraine. *Policing Places with Drug Problems*. Sage Publications. (1996) Thousand Oaks, CA.

- Hellman, Daryl A. and Susan Beaton. (1986) "The Pattern of Violence in Urban Public Schools: The Influence of School and Community." *Journal of Research in Crime and Delinquency*. 23:2
- Hepburn, John R. (1984) "Occasional Property Crime." in Robert F. Meier's *Major Forms of Crime*. Sage Publications. Beverly Hills, CA.
- Hunter, R.D. "Convenience Store Robbery in Tallahassee: A Reassessment." *Journal of Security Administration*. 138: 1&2.
- Hunter, R.D. and C. R. Jeffery. "Environmental Crime Prevention: An Analysis of Convenience Store Robberies." *Security Journal*. 2:2.
- Jacobs, Jane. (1961) *The Death and Life of Great American Cities*. Random House. New York, NY.
- Jeffery, C. Ray. (1971) *Crime Prevention Through Environmental Design*. Sage Publications. Beverly Hills, CA.
- Jeffery, C. R., R. Hunter and J. Griswold. "Using Computer Analysis to Pinpoint Robbery Sites." *Florida Police Journal*. 34:1.
- Koper, Christopher S. (1995) "Just Enough Police Presence: Reducing Crime and Disorderly Behavior by Optimizing Patrol Time in Crime Hot Spots." *Justice Quarterly*. 12:4.
- Maxfield, Michael. (1987) "Lifestyle and Routine Activity Theories of Crime: Empirical Studies of Victimization, Delinquency, and Offender Decision Making." *Journal of Quantitative Criminology*. 3:4.
- Menard, Scott. (1995) *Applied Logistic Regression Analysis*. Sage Publications. Beverly Hills, CA.
- Miethe, Terrance D. and David McDowall. (1993) "Contextual Effects in Models of Criminal Victimization." *Social Forces*. 71:3.
- Miethe, Terrance D. and Robert F. Meier. (1990) "Opportunity, Choice, and Criminal Victimization: A Test of a Theoretical Model." *Journal of Research in Crime and Delinquency*. 27:3.
- Miethe, Terrance D., Mark Stafford and J. Scott Long. (1987) "Social Differentiation in Criminal Victimization: A Test of Routine Activities/Lifestyle Theories." *American Sociological Review*. 52.

- National Institute of Justice. (1980) "Crime Prevention Through Environmental Design: The School Demonstration in Broward County, Florida." *Executive Summary*. US Department of Justice. Washington, DC.
- Newman, Oscar. (1972) *Defensible Space*. MacMillian. New York, NY.
- O'Brien, R. M. (1985) *Crime and Victimization Data*. Sage Publications. Beverly Hills, CA.
- Perkins, Craig and Patsy Klaus. (1996) "Criminal Victimization 1994." *Bureau of Justice Statistics Bulletin*.
- Perez, Jacob. (1992) "Patterns of Robbery and Burglary in Nine States, 1984-88." *Bureau of Justice Statistics: Special Report*. US Department of Justice. Washington, DC.
- Pyle, Gerald F. (1976) "Spatial and Temporal Aspects of Crime in Cleveland, Ohio." *American Behavioral Scientist*. 20:2.
- Pyle, Gerald F., Edward W. Hanten, Patricia Garstang Williams, Allen L. Pearson II, J. Gary Doyle and Kwame Kwofie. (1974) *The Spatial Dynamics of Crime*. The University of Chicago. Chicago, IL.
- Reiss, Albert J. and Michael Tonry. (1986) *Communities and Crime*. University of Chicago Press. Chicago, IL.
- Repetto, Thomas A. (1974) *Residential Crime*. Ballinger. Cambridge, MA.
- Roncek, Dennis W. (1992) "Learning More From Tobit Coefficients : Extending a Comparative Analysis of Political Protest." *American Sociological Review*. 57.
- Roncek, Dennis W. and Donald Faggiani. (1985) "High Schools and Crime: A Replication." *The Sociological Quarterly*. 26: 4
- Roncek, Dennis W. and Antoinette Lobosco. (1983) "The Effect of High Schools on Crime in their Neighborhoods." *Social Science Quarterly*. 64: 3
- Roncek, Dennis W. and Pamela A. Maier. (1991) "Bars, Blocks and Crimes Revisited: Linking the Theory of Routine Activities to the Empiricism of 'Hot Spots.'" *Criminology*. 29: 4.

- Rossmo, Kim D. (1993) "A Methodological Model." *American Journal of Criminal Justice*. 25:2
- Roundtree, Pamela Wilcox, Kenneth C. Land and Terance D. Miethe. (1994) "Macro-Micro Integration in the Study of Victimization: A Hierarchical Logistic Model Analysis Across Seattle Neighborhoods." *Criminology*. 32:3.
- Roundtree, Pamela Wilcox and Kenneth C. Land. (1996) "Burglary Victimization, Perceptions of Crime Risk, and Routine Activities: A Multilevel Analysis Across Seattle Neighborhoods and Census Tracts." *The Journal of Research in Crime and Delinquency*. 33:2.
- Rubel, Robert J. (1977) *The Unruly School*. Lexington Books. Lexington, MA.
- Sherman, Lawrence W. and David Weisburd. (1995) "General Deterrent Effects of Police Patrol in Crime 'Hot Spots': A Randomized, Controlled Trial." *Justice Quarterly*. 12:4.
- Sherman, Lawrence W., Patrick R. Gartin and Michael E. Buerger. (1989) "Hot Spots of Predatory Crime: Routine Activities and the Criminology of Place." *Criminology*. 27:1.
- Taylor, Ralph B. and Adele V. Harrell. (1996) *Physical Environment and Crime: A Final Summary Report Presented to the National Institute of Justice*. US Department of Justice.
- Toby, Jackson. (1983) "Violence in School." in Michael Tonry and Norval Morris' *Crime and Justice: An Annual Review of Research. Volume 4*. The University of Chicago Press. Chicago, IL..
- Toby, Jackson. (1983) "Violence in Schools." *Research in Brief*. National Institute of Justice.
- Toby, Jackson. (1981) "Crime in American Public Schools." *The Public Interest*.
- Waller, Irwin and Norman Okihiro. (1978) *Burglary: The Victim and the Public*. University of Toronto Press. Toronto..
- Wright, Richard and Robert H. Logie. (1988) "How Young House Burglars Choose Targets." *The Howard Journal of Criminal Justice*. 27:2.

Wright, Richard, Robert H. Logie, and Scott H. Decker. (1995) "Criminal Expertise and Offender Decision Making: An Experimental Study of the Target Selection Process in Residential Burglary." *The Journal Of Research in Crime in Delinquency*. 32:1.

Zipf, George. (1950) *The Principle of Least Effort*. Addison Wesley. Reading, MA..