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Routine activities and motor vehicle theft : a crime-specific analysis

John Heith Copes

To the Graduate Council:

I am submitting herewith a thesis written by John Heith Copes entitled "Routine activities and motor vehicle theft : a crime-specific analysis." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Sociology.

Neal Shover, Major Professor

We have read this thesis and recommend its acceptance:

James Black, Michael Benson

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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C. W. Minkel

Associate Vice Chancellor and Dean of the Graduate School

Routine Activities and Motor Vehicle Theft:

A Crime-Specific Analysis

A Thesis

Presented for the

Master of Arts Degree

The University of Tennessee, Knoxville

John Heith Copes

May 1998

DEDICATION

This thesis is dedicated to my parents, Glenda Vincent and Gary Copes, whose love and support made possible my education.

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I thank my major professor, Dr. Neal Shover, for his guidance, insightful comments, and patience, as well as the other members of my committee, Dr. James Black and Dr. Michael Benson. I also thank my peers in the Sociology department, particularly Andy Hochstetler and Sean Huss who provided answers to my numerous questions. Last, I owe a great debt to my good friend Buffy. Without her help and encouragement I would not have finished this thesis.

ABSTRACT

The routine activities approach to crime (Cohen and Felson, 1979; 1980) predicts that changes in the routine daily activities of populations affect the availability of targets and, thereby, shape the crime rate. Previous research using routine activities theory has focused on aggregate crime types. This study, by contrast, is a crime-specific analysis. I use social and physical characteristics of census tracts to explain motor vehicle theft in a Louisiana parish. Multiple regression analysis shows that measures of potential offenders, suitable targets, and guardianship explain variation in the rate of motor vehicle theft. The predicted relationship between guardianship and the rate of motor vehicle theft was not found. These findings are consistent with prior research. They suggest also that crime-specific measures are an appropriate method for examining the merits of routine activities theory.

TABLE OF CONTENTS

LIST OF TABLES

Chapter I

Theoretical Orientation and Problem

The interrelationship between humans and the physical environment is of central importance to social ecologists. From the social ecology perspective, crime and other social behaviors cannot be understood without viewing them in their environmental context. Although, the social ecology of crime has a long history, dating back to the moral statisticians of the nineteenth century, the best-known social ecologists were sociologists at the University of Chicago in the early decades of the twentieth century (e.g., Park and Burgess, 1925; Thrasher, 1927). By showing that some neighborhoods had consistently high rates of crime despite complete population turnover, Chicago sociologists suggested that urban areas could be criminogenic. Interest in the ecology of crime waned for some time, but it has recently been revitalized (e.g., Brantingham and Brantingham, 1984; Stark, 1987; Bursik, 1988). Development of the routine activities approach was instrumental in this revitalization.

The routine activities approach is based on two axioms. The first axiom is that crime is the result of a convergence in time and space of three elements: motivated offenders, suitable targets, and the absence of capable guardians against the violation. The first element, motivated offenders, refers to the size of the offender pool. In most routine activities research, the presence of motivated offenders is assumed. That is, offenders are thought to always be present in a population, in varying degrees. In addition, offenders are thought to rationally select targets based on maximizing gains and minimizing costs.

The second element is the presence of a suitable target. The suitability of targets is determined by: accessibility and inherent resistance. More accessible targets are more likely to be stolen. Gould (1969), for example, found that the increase in the availability of cars led to an increase in the rate of auto theft. The inherent resistance of targets to attack also determines its suitability. That is, the weight or size of an object may render it unstealable by a would be offender. An expensive object may be left alone because it is too heavy or too big to steal. Refrigerators are expensive items that are not often the targets of theft because of the difficulty involved with moving them. Automobiles on the other hand often are targets of crime because they provide their own means of transportation.

Guardianship, assumes three forms: formal social control, informal social control, and target hardening activities. Formal social control refers to police, courts, and other official agents. Prior research indicates that the effect of formal controls on crime rates is minimal. Informal control includes individuals and small groups of people who protect property from victimization through their presence. Target hardening activities are those behaviors that make targets more difficult to steal, such as, adding locks, lights, and alarms.

The second axiom is that changes in the structure of everyday life influence the volume, location and type of crime by influencing the likelihood of a convergence among the three elements. Whereas most criminological theories explain crime trends by positing variation in the number of persons predisposed to offend, Cohen and Felson (1979; 1980) argue that structural changes in a society's work, leisure, and education patterns increase criminal opportunities without necessarily increasing criminal motivation. When applied to the problem of areal variation in crime, an area can have an increase in crime even when the supply of offenders remains constant simply by providing more criminal opportunities. An example of this is the looting that often occurs after a disaster. During these situations criminal motivation has not increased but the number of available targets in the absence of guardians has increased.

Prior Research on Routine Activities

The routine activities approach is used to explain temporal and spatial patterns of crime rates. In Cohen and Felson's original article (1979), they posited that structural changes in society either facilitate or impede criminal opportunities and thereby influence long-term crime trends. Their analysis showed how changes in work, leisure, and education patterns correlated with rising crime rates in the United States. Tobias (1967) showed how changes in transportation, currency, and commerce influenced nineteenth century English crime rates, and Gould (1969) demonstrated that the increase in the circulation of money between 1921 and 1965 led to an increase in the rate of bank robberies. Routine activities is also used to explain short-term temporal crime trends. The times of day that homicide rates are highest, for example, are related to the sociodemographic characteristics of an area (Messner and Tardiff, 1985).

The routine activities approach also provides an explanation for variation in crime rates across nations, cities, and neighborhoods. Bennet (1991) examined 52 nations using macro-structural measures of routine activities and found a significant relationship between these measures and property crime, but not with personal crime. An examination of the 124 largest urban areas in the United States found that cities where people participated in more nonhousehold activities had higher rates of property crime (Messner and Blau, 1987). The participation in nonhousehold activities was hypothesized to increase the amount of criminal opportunity increasing the likelihood of targets and offenders converging.

In addition, numerous investigators have shown that some urban areas have significantly higher rates of crime than others. A study of 676 American suburbs found that measures of routine activities significantly explained rates of property crime and arson (Stahura and Sloan, 1988; Stahura and Hollinger, 1988). A study of residential city blocks in Cleveland, Ohio found that crime occurred more frequently on blocks with bars or taverns (Roncek and Maier, 1991) and on blocks adjacent to public high schools (Roncek and Faggiani, 1985). Crime was less frequent on blocks without these facilities. Also, Sherman et al. (1989) analyzed more than 300,000 calls to the police in Minneapolis and found that 50.4 percent of the calls came from only 3.3 percent of the city's addresses and intersections. These "hot spots" included large department stores, bars, convenience stores, and a public housing apartment building. These high crime areas attract both offenders and targets and thereby increase criminal opportunities.

While the routine activities theory is widely used and tested, it is not without criticisms. One of the earliest criticisms of the theory was that it only accounted for direct-contact predatory crime. Felson (1987) combated this criticism by expanding the theory to account for exploitative, mutualistic, competitive, and individualistic crimes. Other criticisms are directed at the research methods used to test the merits of the theory.

One of these methodological criticisms is the lack of empirical testing of the physical location where offenders, targets, and guardians converge. The typical routine activities study has focused on how the lifestyles of individuals shape their travel patterns and chances of victimizations (e.g., Kennedy and Silverman, 1990). These studies are useful in helping to understand the relationship between lifestyles and victimization. However, it is also important to understand how the characteristics of an area influence the crime rate. Because of the emphasis that Cohen and Felson (1979) placed on the spatial ecology of crime, places would be a more appropriate unit of analysis.

Another methodological criticism is the aggregation of crimes into one or two categories. Aggregating crime creates problems because certain variables influence crimes differently. When crimes are aggregated, it is not possible to determine the effects that variables have on specific crimes. Guardianship, for example, is often measured as the percentage of females who work outside of the home. This assumes that the level of guardianship decreases when no one is home to protect the property. This is logical if we are studying burglary because leaving home leaves it unprotected. Using this measure makes less sense if the target is an automobile because when people travel they take their car with them. Therefore, the number of persons home does not adequately measure guardianship for all crimes. This result is similar to Cantor and Land's (1985) finding that guardianship is related to theft but not to violent crimes. Another example of this problem is shown in an examination of the 124 largest urban areas in 1980. Messner and Blau (1987) found that measures of nonhousehold activities were significantly related to burglary and larceny but not to motor vehicle theft. By assuming that leaving home reduces guardianship, they were unable to explain variation in rates of motor vehicle theft. These findings suggest that future research should avoid pooling crime types. The use of general measures for concepts may confound the relative importance of offenders, targets, and guardianship. Operationalizing concepts crime-specifically will better show the influence variables have on specific crime rates.

Routine Activities and Motor Vehicle Theft

Motor vehicle theft has received little attention from investigators. Most studies are usually descriptive; that is, they describe the types of motor vehicle thefts, the models of cars most frequently stolen, or the characteristics of arrested offenders, without placing it in a theoretical framework. When motor vehicle theft is used in a theoretical study it is only one crime in an aggregation of property crimes, as is the case with prior research using the theory of routine activities. Nevertheless, findings from the descriptive studies and the routine activities literature indicates that the temporal and spatial distribution of motor vehicle theft are influenced by the presence of offenders, suitable targets, and the absence of capable guardians. Urban areas, for example, that have a large pool of potential criminals tend to have a high rate of motor vehicle theft. City blocks with bars have nearly twice as many auto thefts as city blocks without them (Roncek and Bell, 1981; Roncek and Maier, 1991). Further, blocks adjacent to high schools have higher levels of auto theft than blocks located more distant from high schools (Roncek and Faggiani, 1985).

Prior research also indicates that the rate of motor vehicle theft is related to the availability of automobiles. Gould (1969) and Mansfield et al. (1974), for example, found that the increase in the availability of cars between 1921 and 19

rate of auto theft during this same period. Within specific urban

cars and the places they are stolen from is determined by work and

city's auto theft rate, for example, has been shown to fluctuate with m

the population, such as vacationers and tourists (e.g., McPheters and St

population and the number of cars increase, so do the opportunities to find a convenient car to steal.

In addition to the size of the offender pool and the availability of targets, level of guardianship influences theft rates in a given area. A sufficiently low level of capable guardianship must exist for offenders to avoid detection and arrest, as evidenced by the fact that nearly 74 percent of auto thefts are committed during the evening hours (Hope, 1987). The nighttime makes it easier for car thieves to go undetected because darkness shields them from being seen. A study in England found that parking lots with attendants had lower auto theft rates than lots without attendants (Clarke, 1983). Similar findings occurred in an Australian study (NRMA, 1990) and a Canadian study (Engstad, 1975), suggesting that the presence of informal guards serves to reduce motor vehicle theft.

Another way car thieves protect themselves from detection is to steal cars that can be concealed easily. Cars stolen to be exported to Mexico, for example, tended to be the same types of cars made and sold there (Field, Clarke, and Harris, 1992). It should be noted also that increasing target hardening measures, such as alarms and locks, is the best way to protect a car from being stolen. However, examining targets hardening is beyond the scope of this study.[1]

The size and density of a given population can affect an area's ability to provide an adequate level of protection against crime. As population density increases, the effectiveness of informal social control decreases. With a large number of people in a given area it becomes increasingly difficult to determine who is there for legitimate reasons and who is not. In regards to motor vehicle theft, a large population means that car thieves are shielded against detection because it is not possible for a passerby to know if the thief is the actual owner of the vehicle.

Hypotheses

The focus of this investigation is on how the characteristics of urban areas affect the rate of motor vehicle theft. Using the concepts of routine activities, I hypothesize that the rate of motor vehicle theft will be associated with an area's sociodemographic and physical characteristics. Sociodemographic characteristics include the age, sex, race, income, and population distribution of an area. Physical characteristics include the number of roads, cars, and multiple-unit houses in a given area. Because these characteristics structure routine daily activities, they affect the locations where potential offenders and suitable targets are likely to converge. Consequently, three bivariate hypotheses about motor vehicle theft are suggested:

> **Hypothesis 1** - The rate of motor vehicle theft varies directly with the supply of potential offenders.

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[1] For more detail about types of cars which car thieves steal, see Karmen (1981), Harlow (1988), and Clarke and Harris (1992a).

Hypothesis 2 - The rate of motor vehicle theft varies directly with the availability of vehicles.

Hypothesis 3 - The rate of motor vehicle theft varies inversely with the level of capable guardianship.

Areas with large numbers of offenders, with large numbers of targets, and with low levels of guardianship are expected to have high rates of motor vehicle theft. This is expected because these areas provide more criminal opportunities.

Chapter II

Data and Methods

Previous macro-level examinations of the relationships between routine activities and street crime have used geographic areas of various size as units of analysis. One can conclude from these studies that the evidence of a relationship between crime rates and urban areas is strong at any level. However, it is problematic to aggregate data to cities or nations because these areas are less homogeneous than smaller areas (Blalock, 1982). Aggregation of dissimilar units confounds the effects of the variables of interest in macro-level studies. Standard methodological procedure calls for disaggregating variables to the smallest level possible.

The units of analysis for this study are the 41 census tracts in Lafayette Parish, Louisiana. Census tracts are "small, relatively permanent statistical subdivisions of a county. [They] usually have between 2,500 and 8,000 persons and, when first delineated, are designed to be homogeneous with respect to population characteristics, economic status, and living conditions" (U.S. Bureau of the Census, 1990). I used census tracts in this study because they are the smallest aggregate areas that possess the environmental features that are thought to increase the chance of a convergence among the three components of predatory crime. City blocks are too small to possess these traits.

Operationalization of Concepts

Dependent Variable. Table 1 provides a list of the variables and the manner in which they are measured. The dependent variable for this study is the rate of motor

Table 1. Variables, Measurements, and Hypothesized Relationships

Variables	Measurement	Hypothesized Relationship To Motor Vehicle Theft Rate
Motor Vehicle Theft Rate	(# thefts/ # cars) X 1,000	
Offenders		
Percent Poor	# Below Poverty / Population	Positive
Percent Black	# Blacks / Population	Positive
Percent Young-Males	# Males age 15-24 / Population	Positive
Targets		
Road Density	# Roads / Square Miles of the Census Tract	Positive
Car Density	# Cars / Square Miles Of the Census Tract	Positive
Guardianship		
Multi-unit Housing	# Multi-unit Housing[a] / # Housing Units	Positive
Population Density	# People / Square Miles	Positive

[a] Structures with five or more housing units.

vehicle theft.[2] It was measured using data made available by the Lafayette, Louisiana, city police department. Police officials provided incident reports on all motor vehicle thefts for the years 1994 through 1996.[3] For every automobile reported stolen, police reports included: time, date, location, make, model, estimated value when stolen, and estimated value after recovery. Although, information on 1507 stolen vehicles was provided, 69 incidents contained incomplete data and were excluded from the analysis. Generally, crime rates are calculated as the number of crimes per population. This method is appropriate if the potential targets at risk are individuals but not when the targets are property items. When motor vehicle theft rates are calculated per inhabitants, its frequency is often underestimated. A more appropriate way to measure rates of motor vehicle theft is per registered vehicle. Clarke and Harris (1992b), for example, found that in 1987 and 1988 the auto theft rate per 1,000 individuals was 5.6, while the rate per 1,000 cars was 8.9. The motor vehicle theft rate for this study was determined for each census tract by dividing the number of thefts by the number of vehicles in that tract and

[2] Motor vehicle theft is defined as "the theft or attempted theft of a motor vehicle, it includes the stealing of automobiles, trucks, buses, motorcycles, motorscooters, snowmobiles, etc. This definition excludes the taking of a motor vehicle for temporary use by those persons having lawful access" (Uniform Crime Reports, 1996: p. 49).

[3] Crimes reported to the police often underestimate the actual number of offenses because victims often do not report the crime. These data, however, are still the best measures we have for the amount of crime (Nettler, 1974). Current victimization studies show that motor vehicle theft has the highest reporting rate of all Type I offenses. Motor vehicle thefts reporting rate for 1991 was 74 percent compared to 28 percent and 50 percent for household larceny and household burglary respectively. The high rates of reporting are attributable to several factors including the desire to recover the vehicle, insurance purposes and the fear that the vehicle may be used for another crime. The high reporting rate for motor vehicle theft makes reports to the police an appropriate source of data for analysis.

then multiplying the quotient by 1,000.

To determine the number of motor vehicle thefts for each census tract within the parish, I mapped their locations using U.S. Census Bureau Topologically Integrated Geographic Encoding and Referencing (TIGER) files and a software program entitled ArcView. TIGER/Line files are computer readable maps that were created to aid census and survey programs (U.S. Bureau of the Census, 1991). The TIGER/Line data base includes information for all census features, including streets, blocks, tracts, and counties.

ArcView is a desktop mapping program that allows the researcher to manipulate computer generated maps and create overlays. You can, for example, create a map of a county and overlay a map of census tracts or roads on top of it. ArcView will also map addresses by placing a dot on the specified location. By mapping the locations of motor vehicle thefts and overlaying them on a census tract boundary map, I was able to determine the rate of motor vehicle theft for each tract.

A draw back to using TIGER/Line files is that they often contain incomplete data. In some areas, the full range of street numbers are not included, which creates problems in locating some addresses. In this study of 1,438 usable reported motor vehicle thefts. I plotted 1,279 specific incidents (89 percent) on the map. Due to missing street data in the TIGER files, I was unable to plot 159 thefts (11 percent).

Independent Variables. The independent variables represent the sociodemographic and physical characteristics of census tracts. Measures of the independent variables used in the analysis are taken from the Lafayette MSA, Louisiana published volume of the 1990 Census.

Offenders. Statistics from the Uniform Crime Report (UCR) and past studies were used to determine characteristics of potential car thieves. The UCR annually publishes incidence and prevalence data as well as limited demographic data on persons arrested for eight Index crimes. Motor vehicle theft is one of the eight Index crimes for which information is published. The UCR and prior research suggest that those most frequently arrested for motor vehicle theft are young, male, poor, and black.[4] Data from the UCR show that blacks represent 28 percent of those arrested for all Index crimes and 38 percent of those arrested for motor vehicle theft. An examination of the 124 largest Standard Metropolitan Statistical Areas in 1980 supports these findings (Messner and Blau, 1987). Therefore, the percentage of blacks was used as a measure of potential offenders.

Nearly a century of research has supported the contention that crime is primarily a practice of young males. Data from the UCR show that males represent 80 percent of those arrested for all crimes and 87 percent of those arrested for motor vehicle thefts. People 21 and under were arrested for 34 percent of all crimes and 62 percent of all motor vehicle thefts. The relationship between motor vehicle theft and young-males has been confirmed by numerous studies (Sanders, 1976; Higgins and Albrecht, 1981; Tremblay et al., 1994). Young-males is operationalized as the percentage of males aged 15 to 24 for each tract.

The relationship between poverty and Index crimes is a controversial issue. Many

[4] The low clearance rate for motor vehicle theft (14 percent) makes it difficult to determine the true characteristics of car thieves. It is possible that the characteristics of those arrested differ significantly from those who avoided detection.

researchers believe that motor vehicle theft, like other types of crimes, is primarily a product of the disadvantaged groups (McCaghy, Giordano, and Henson, 1977). A current macro-level analysis found that the level of poverty in an area was significantly related to motor vehicle theft (Messner and Blau, 1987). Therefore, a measure of social class (percent below the poverty level) is also used as an indicator of potential offenders.

Explanations for these relationships between sociodemographic characteristics and crime range from police discretion in arrest patterns to biological traits of the offender. Regardless of the mechanisms scholars emphasize, they still assume the existence of racial, gender and age disparities. Determining the mechanisms for these links is beyond the scope of this paper. What is clear is that percent black, percent young- male, and percent poor are appropriate measures of potential offenders.

Available Targets. The supply of available motor vehicles is operationalized by two indicators: the density of cars and the density of roads in each census tract. These variables represent physical environmental features of the census tract that affect the availability of cars, and therefore opportunities. Car density is measured by dividing the total number cars in a census tract by its size, in square miles. This variable will measure the number of cars located in a tract on a fairly stable basis.

Automobile traffic also influences the availability of vehicles in an area. Wilkins (1964), for example, found a positive relationship between car theft and the number of cars on the road. A direct measure of car traffic is not available at the tract level so an indirect measure is used. One that is commonly used is the square feet of roads in an area. Another study used the square feet of roads as a crime-specific measure of available cars

(Boggs, 1965). These findings suggest that roads are an appropriate measure of traffic flow. Road density is measured by dividing the number of roads that were in or passed through the tract by its size, in square miles.

Guardianship. Insufficient levels of guardianship serve to increase the level of crime in an area. Crime will therefore be more prevalent in areas where social or environmental conditions hamper its ability to provide adequate guardianship. The level of guardianship is operationalized by two variables: population density and the percent of housing that are occupied by multiple-unit structures.

Research data shows that densely populated areas exhibit high rates of crime (Gillis, 1974). There appears to be an inverse relationship between population density and an area's ability to provide informal guardianship. A large number of people in a relatively small area make informal surveillance against crime difficult. I measured density by dividing the total number of people in a tract by its area, in square miles.

Because untended parked cars are the main targets of motor vehicle theft, cars parked on the street or in large lots are at a higher risk of being stolen. Multiple-unit housing interferes with people's ability to provide adequate protection for their cars by forcing them to leave them unattended in dangerous areas. I measured this variable as the percentage of housing occupied by multiple-unit structures. A multiple-unit structure is defined as a structure with five or more housing units.

Census Tract Descriptive Data

Before presenting the results of multiple regression analysis it is helpful to examine the univariate and bivariate relationships. The univariate results will help the reader understand the sociodemographic makeup of the area.

Univariate. Table 2 presents the dependent and independent variables for each census tract. The data show that the rate of motor vehicle theft varies widely across census tracts. The mean rate of motor vehicle theft across all census tracts, for the three-year period, is 14.67. There are two tracts with no reported car thefts; the most theft-ridden tract has a motor vehicle theft rate of 64.21. Figure 1 shows a dot map of the locations of motor vehicle theft.

The percentage of poverty in a tract ranges from 3.20 to 62.40, and has a mean of 22.20. Percent black has the greatest range of the offender variables (.15 to 98.53 percent). Its mean is 22.19. The percent of males aged 15 to 24 ranges from 4.87 to 39.44 and has a mean of 8.49. Available targets are measured in terms of density. The density of cars per tract ranges from 50.62 to 3303.31 and has a mean of 1013.49. Road density ranges from 1.72 to 119.17 and has a mean of 32.97. The most densely populated tract has 8455.00 people per square mile while the least densely populated tract has 78.88 persons per square mile. Its mean is 1912.00. The mean percent of housing consisting of multiple unit dwellings is 13.36. It ranges from no multiple-unit dwellings to 61.50 percent of the housing units.

Bivariate. The bivariate relationships show how well the variables correlate with one another. The zero-order correlation matrix is presented in Table 3. All but two of the independent variables are significantly correlated in the hypothesized direction with motor vehicle theft. The young-male variable is not significant, but is in the predicted direction. The correlation between motor vehicle theft and the percent of housing in multiple-unit

Table 2. Descriptive Data of Dependent and Independent Variables for Each Census Tract

Census Tract	Theft Rate	Percent Poor	Percent Black	Percent Young-Male	Population Density	Percent Multi-unit	Car Density	Road Density
1.00	64.21	44.20	40.20	13.08	3448.75	7.67	1596.38	97.50
2.00	41.45	50.00	83.51	8.56	3335.56	.15	1474.44	66.67
3.00	27.84	38.20	23.02	13.76	3366.67	36.60	2125.50	119.17
4.00	12.50	62.40	36.66	39.44	8455.00	61.50	1200.00	90.00
5.00	9.87	15.00	1.92	10.52	2368.18	11.19	1842.91	69.09
6.01	9.92	17.90	7.24	10.11	3278.52	11.62	2352.78	40.00
6.02	13.90	22.40	9.62	6.83	2773.33	13.46	2014.00	54.00
7.00	63.03	40.30	83.06	9.90	874.23	.13	402.77	31.15
8.00	59.99	54.40	87.96	7.47	5760.00	.45	2056.00	101.67
9.00	43.14	57.70	98.53	7.02	5630.00	3.92	1912.50	90.00
10.01	10.56	18.30	24.49	6.51	3941.65	2.30	278.60	12.47
10.02	11.63	20.90	23.16	8.38	2195.00	47.33	1337.78	23.33
10.03	3.95	8.30	15.72	8.12	834.60	7.17	557.64	16.40
11.00	57.88	40.60	52.88	6.68	3295.26	14.80	1536.63	53.68
12.00	30.04	21.00	42.94	7.48	929.21	12.62	634.05	21.75
13.00	36.57	40.20	63.68	7.14	1178.44	10.62	589.36	22.00
14.01	3.30	3.20	5.56	5.92	933.58	17.03	628.30	20.38
14.02	.39	11.30	4.52	4.87	310.16	.36	196.47	6.28
14.03	3.81	6.90	2.67	8.50	949.64	31.37	655.71	22.14
14.04	1.93	9.10	4.77	6.89	479.29	2.78	370.61	13.75
14.05	5.53	14.60	10.17	8.65	1702.19	35.99	1355.22	34.38
14.06	9.63	3.60	7.84	6.98	1029.26	33.31	769.41	23.70
14.07	3.54	3.90	1.79	8.77	1305.83	30.17	1060.04	24.17
14.08	21.85	13.60	6.54	5.91	134.92	.98	89.38	6.48
14.09	1.32	12.70	17.31	7.01	546.16	6.86	339.43	9.64
14.10	.70	18.00	12.55	6.99	181.30	3.71	114.87	3.52
15.00	8.23	12.40	5.13	8.11	2377.62	31.66	1966.33	45.71
16.00	4.46	4.20	.15	5.51	3269.00	.00	2468.00	34.00
17.00	6.13	4.50	1.58	6.24	3692.00	6.33	2608.00	40.00
18.00	17.41	13.00	8.46	9.19	4156.88	37.50	3303.31	51.88
19.01	.45	14.60	13.14	6.67	78.88	.65	50.62	1.72
19.02	.62	16.80	4.34	6.64	711.82	4.33	491.73	12.27
19.03	8.08	25.80	15.79	9.45	597.42	1.46	458.32	12.10
19.04	.84	10.30	7.34	6.92	1798.00	27.45	1195.10	28.00
19.05	1.41	15.00	16.28	8.09	250.16	6.69	170.82	5.52
20.01	2.32	28.20	44.83	7.07	210.59	.63	126.53	4.12
20.02	.00	22.60	19.46	6.20	372.11	1.14	235.96	9.68
21.01	.00	27.70	20.02	5.83	402.27	13.98	251.73	6.67
21.02	.52	20.00	22.38	7.06	314.78	.37	215.60	5.44
21.03	.59	34.80	40.86	7.01	733.02	11.47	391.67	16.51
21.04	1.10	11.20	15.10	6.63	190.56	.21	128.54	4.93
Mean	14.67	22.19	24.47	8.49	1912.00	13.36	1013.49	32.97
S. D.	19.23	15.78	26.12	5.28	1873.16	15.30	858.99	30.79

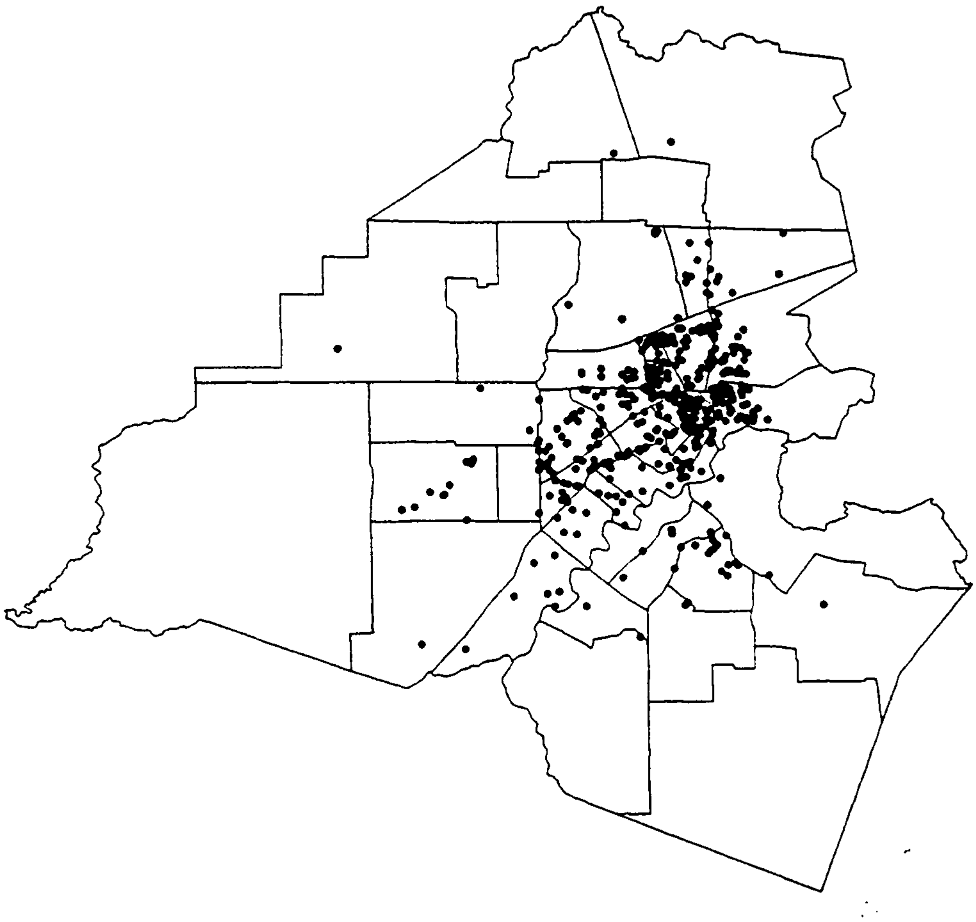

Figure 1. Locations of Motor Vehicle Thefts in Lafayette Parish, Louisiana (1994-1996) NOTE: A dot may represent more than one theft at a specific location.

Table 3. Zero-Order Correlation Matrix

	Theft Rate	Percent Poor	Percent Black	Percent Young-Male	Car Density	Road Density	Population Density	Percent Multi-Unit
Theft Rate	1.00							
Percent Poor	.70*	1.00						
Percent Black	.77*	.85*	1.00					
Percent Young-Male	.12	.48*	.11	1.00				
Car Density	.32**	.14	.04	.16	1.00			
Road Density	.64*	.63*	.43*	.48*	.72*	1.00		
Population Density	.45*	.57*	.37**	.61*	.71*	.81*	1.00	
Percent Multi-Unit	-.09	.02	-.21	.58*	.36**	.33**	.39**	1.00

* $p \leq .01$
** $p \leq .05$

structures is neither significant nor in the predicted direction.

As is usually the case in social science data, the independent variables for this study are correlated. High correlations can pose a problem in multiple regression analysis. As Table 3 shows, some of the correlations are high, suggesting that multicollinearity problems may exist (Lewis-Beck, 1980). Techniques to handle multicollinearity are discussed later.

Chapter III

Data Analysis and Findings

Hypotheses are tested using a two-stage strategy of ordinary least squares regression analysis (OLS). First, I examine the hypotheses using four models. The first model includes only the variables representing potential offenders. The second model includes only the suitable target variables. Model three includes only the guardianship variables. Model four combines all of the independent variables into one equation. These models are designed to determine the relative and simultaneous effects of the independent variables in explaining variation in motor vehicle theft. The strength of each variable is assessed by examining its standardized beta coefficient.

It is difficult to compare the coefficients because the variables often have different measurement units and variances. It is therefore necessary to standardize the beta coefficients so that they are comparable. Standardized coefficients are interpreted as the average standard deviation change in the dependent variable associated with an average standard deviation change in an independent variable when the others are held constant.

In the second stage, I create single indicators for each theoretical construct by standardizing the variables into z-scores[5] and then adding them together. I then regress the dependent variable on these single indicators. The R^2 calculated after this step is used to determine how much variance in motor vehicle theft is explained by the independent

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[5] A standardized score tells how many standard deviation units above or below the mean a value falls. The most commonly used standardized score is the z-score. In z-score notation, the mean is 0 and the standard deviation is 1.

variables. Higher R^2s imply a more complete explanation of the dependent variable.

The F-statistic is used to test the null hypothesis, that the multiple correlation (R^2) is zero. That is, it checks to see if the correlation between the independent and dependent variables is due to measurement error. The value of the F-statistic needed to obtain statistical significance is determined by the degrees of freedom in the denominator and the numerator. As the number of degrees of freedom increases, the value of F needed to obtain significance decreases.

Results

Stage One. Use of OLS multiple regression requires there be an absence of perfect multicollinearity between any two variables. That is, there should not be a perfect linear relationship between any two variables. While perfect multicollinearity almost never occurs in practice, high multicollinearity can still cause serious estimation problems. Therefore, it is necessary to determine if this problem exists. High correlations do not adequately assess the problem of collinearity. More intense diagnostics must therefore be implemented.

One method used to test for high multicollinearity is to regress each independent variable on the other independent variables. If the R^2 from any of the equations approaches 1.0, then there is a problem with multicollinearity (Lewis-Beck, 1980). All of the R^2s for the regressed independent variables are high, the highest being that for percent poor (R^2 =.90). These findings verify that multicollinearity exists with these variables.

As Fox (1991) states, there is no "quick fix" to multicollinearity problems. In most circumstances one can only make the best out of a bad situation. Nevertheless, there are ways to deal with this problem (Lewis-Beck, 1980). One way to deal with it is to increase the sample size. As sample size increases the likelihood of multicollinearity decreases. Another way is to combine those independent variables which are highly correlated into a single indicator. This technique should only be applied if it makes conceptual sense. It is not appropriate to combine variables that are not theoretically congruent. A final way to handle multicollinearity is to drop one of the collinear variables from the model. A problem with this technique is the commission of specification error. To make this method more acceptable, it is advised to create another equation by discarding the other collinear variable.

In order to remedy the current problem, I chose to systematically discard collinear variables from the model. I chose this technique because combining variables would run counter to the goals of this stage of the analysis. Combining collinear variables into an indicator at this point would not allow me to assess the individual relationships. Therefore, the best solution for this study is to systematically discard collinear variables.

The bivariate correlations show that two sets of collinear variables exist (see Table 3). The first set is percent black and percent poor. The second set is population density, road density and car density. I discarded these variables systematically to determine how they influenced one another.

Because of the complexities of the various models, it may be helpful to provide a quick overview of the findings from stage one before going into the specifics of each model. Overall, the four models in stage one indicate that most of the variables are significantly correlated to the rate of motor vehicle theft. That is, percent black, percent poor, road density, car density, and population density are related to the rate of motor vehicle theft in the hypothesized direction. Percent multiple-unit dwellings is also significantly related to the dependent variable but in the opposite direction. The results of the first three models after accounting for collinearity are displayed in Table 4.

In the first model, motor vehicle theft is regressed on the independent variables representing potential offenders (see Columns 1 to 3 in Table 4). Percent poor, percent black, and percent young-male accounted for 61 percent of the variance in motor vehicle theft. However, only percent poor achieved statistical significance. When percent black is dropped from the equation, the standardized coefficient for percent poor increases dramatically and becomes significant. The percentage of young males in a population is not found to be significantly related to rates of motor vehicle theft.

In the second model, motor vehicle theft is regressed on the variable representing target suitability (see Columns 4 to 6 in Table 4). The variables car density and road density accounted for 45 percent of the variance in the rate of motor vehicle theft. In this model, road density is significantly related to motor vehicle theft before and after controlling for car density. Car density, on the other hand, is only significant when road density is excluded from the model.

In the third model, motor vehicle theft is regressed on the variables representing guardianship (see Column 7 in Table 4). These variables account for 29 percent of the variation in motor vehicle theft. In this equation, population density is significantly related to the rate of motor vehicle theft. Multiple-unit housing, on the other hand, is significant but in the opposite direction as was hypothesized. The collinearity diagnostic showed that

Table 4. OLS Regression Estimates for Partial Models Predicting the Rate of Motor Vehicle Theft

	Model 1			Model 2			Model 3
Variable	(1) Offender Model	(2) Excluding Poor	(3) Excluding Black	(4) Target Model	(5) Excluding Road	(6) Excluding Car	(7) Guardianship Model
Offender Pool							
Percent Poor	.23	----	.84*				
Percent Black	.58*	.77*	----				
Percent Young-Male	-.06	.03	-.28				
Suitable Targets							
Road Density				.84*	----	.64*	
Car Density				-.28	.32*	----	
Guardianship							
Percent Multiple-Units							-.32*
Population Density							.58*
R^2	.61	.60	.55	.45	.10	.40	.29

NOTES: Only the standardized coefficients are shown. Density was not excluded from the guardianship variables because it was not highly correlated with multiple-housing units. All F values were significant at the .05 level.
* $p \leq .05$

these two variables were not collinear, therefore, neither was excluded from the model.

In the final equation motor vehicle theft is regressed on all of the independent variables (see Table 5). All of these variables combined account for 75 percent of the variance in rates of motor vehicle theft. The results of the full equation indicate that after controlling for the other variables only percent black and road density are significantly related to motor vehicle theft. When collinear variables are systematically excluded, percent poor and car density become significantly related to the dependent variable. Percent young-male, multiple-unit housing, and population density remain statistically insignificant for explaining variation in rates of motor vehicle theft throughout the model.

Stage-Two. The second stage of the analysis is designed to determine the strength of the theory for explaining motor vehicle theft. To do this, a single indicator for each theoretical construct (offender pool, suitable targets, and guardianship) was created by standardizing and adding together the constituent variables. Offender pool was created by adding the standardized scores of percent poor, percent black, and percent young-males together. The available targets indicator was created by adding the z-scores of road density and car density together. Guardianship was created by standardizing population density and percent multiple-unit housing and adding them together.

Motor vehicle theft was then regressed on these three indicators. Table 6 displays the results of the regression of motor vehicle theft on the newly formed independent variables. Only offender pool and suitable targets were related to the dependent variable in the hypothesized direction. Guardianship was significantly related to motor vehicle theft but in the opposite direction. An examination of the standardized beta coefficients

Table 5. OLS Regression Estimates for all Independent Variables Predicting the Rate of Motor Vehicle Theft

Independent Variables	Excluding Poor	Excluding Black	Excluding Road Density	Excluding Car Density	Excluding Population Density	Full Model
Percent Poor	----	.59*	.14	-.19	-.17	-.17
Percent Black	.63*	----	.69*	.73*	.69*	.74*
Percent Young-Male	-.04	-.32	.06	-.03	-.10	.02
Road Density	.51*	.50*	----	.62*	.54*	.56*
Car Density	.13	.01	.42*	----	-.04	.10
Multi-unit Housing	-.05	-.05	-.05	-.05	-.05	-.07
Population density	-.24	-.08	-.19	-.17	----	-.24
R^2	.75	.67	.69	.75	.74	.75

NOTE: Only the standardized beta coefficients are shown. All F-statistics are significant at the .05 level.
* $p \leq .05$

Table 6. OLS Regression Estimates for Single Indicators Predicting the Rate of Motor Vehicle Theft

Variable	β	b	S.E.
Offender Pool	.64	5.20*	2.93
Suitable Targets	.74	15.35*	3.41
Guardianship	-.66	-7.56*	2.16

* Statistically Significant at the .01 level.
R^2 = .64
F = 22.25; significance of F = .000.

(β) reveals that suitable targets is the strongest predictor of rates of motor vehicle theft. This finding supports the idea that opportunities strongly influence the rate of crime in an area.

The independent variables offender pool, suitable targets, and guardianship combined to explain 64 percent of the variance in the dependent variable. All the variables reach statistical significance at the .01 level. The F-statistic, which measures the significance of the model, is significant at the .000 level (F = 22.25). From this statistic we can conclude that the relationship between the independent variables and the rate of motor vehicle theft is not due to sampling or measurement error.

Summary of Results

The foregoing results suggest several conclusions about the relationship between routine activities and motor vehicle theft. The first stage of the analysis was intended to determine the relative and simultaneous effects of each independent variable. The results show that percent black and road density provide the strongest explanation for the variation in rates of motor vehicle theft. The nature of these relationships suggests that as the percentage of blacks and the density of roads increase so does the rate of motor vehicle theft even after controlling for the other variables. The results also show that both the percentage of poor people and the density of cars in an area are significantly related to motor vehicle theft only when collinear variables are excluded from the equations. The nature of the relationship is similar to that described for percent black and road density.

Young-males is the only offender variable that does not significantly explain variance in motor vehicle theft. Similar results were found for rates of arson in American suburbs (Stahura and Hollinger, 1988). In fact, the direction of the relationship indicates that having fewer rather than more young-males in an area increase the rate of motor vehicle theft. What makes this finding so unusual is the overwhelming evidence that young-males account for the vast majority of property crimes. One explanation for this finding is that areas with a high proportion of young people also have fewer cars[6] thereby decreasing opportunities. It is possible that young-males leave their neighborhoods when looking for a car to steal. The current data set, however, does contain the necessary information to test this hypothesis. Another explanation is that percent youth does not vary much across census tracts, with the exception of Tract 4.00, (see Table 2). Consequently, it has little potential to explain much of the variation in motor vehicle theft.

The most interesting finding from these analyses is the relationship found between the guardianship variables. Population density is not a significant predictor of rates of motor vehicle theft after controlling for the other variables. This finding suggests that the relationship between population density and rates of motor vehicle theft is somehow tied to the other independent variables. Another unusual finding is that the percentage of multiple-unit housing significantly explains variation in rates of motor vehicle theft but in the opposite direction as hypothesized. The direction of this relationship suggests that as the percentage of multiple-unit housing increases, the rate of motor vehicle theft decreases. This is not the only study to have found these contradictory results. Other

[6] There is an inverse relationship between percent young-males and the total number of cars in an area ($r = -.27$), however it is not significant. This relationship implies that areas with more young-males have fewer cars and thus fewer opportunities.

measures of guardianship have not provided support for the theory (Bennet, 1991). Prior research suggests a possible explanation for these findings. A large proportion of vehicles are stolen from non-residential, business areas, or places where people generally do not live. Therefore, the population and the percentage of multiple-unit housing do not provide satisfactory explanations for rates of motor vehicle theft.

The results of the second stage of the analysis indicate that the routine activities variables are important predictors of motor vehicle theft rates. These variables explained a large proportion of variance in the rate of motor vehicle theft. A look at the beta coefficients for each independent variable shows that size of the offender pool and the number of available targets explain roughly the same amount of variation in rates of motor vehicle theft. The level of guardianship significantly explained motor vehicle theft rates but in the opposite direction as was hypothesized. These findings are compatible with the results of the first analysis and with prior research.

Chapter IV

Conclusion and Discussion

This study explains variation in motor vehicle theft rates by examining differences in the sociodemographic and physical makeup of census tracts. The analyses showed that the number of potential offenders and the availability of vehicles explains variation in rates of motor vehicle theft. Also, it found that the measures of guardianship did explain variation in rates of motor vehicle theft, but in the opposite direction as hypothesized. These findings suggest that crime-specific measures are an appropriate method for examining the routine activities approach.

In brief, the results of the regression analyses support the two hypotheses that the rate of motor vehicle theft varies directly with the supply of potential offenders, and with the availability of vehicles. The data, however, did not support the hypothesis that the level of capable guardianship is inversely related to the rate of motor vehicle theft. These findings are consistent with prior research on routine activities. The majority of these studies find strong or moderate support for offender and target variables. They usually provide weak or no support for guardianship variables (Stahura and Hollinger, 1988; Stahura and Sloan, 1988; Massey et al., 1989; Bennet, 1991).

Shortcomings

One problem with using aggregate-level data is that the relation between the independent and dependent variables can be interpreted in numerous ways. The findings from this study show that certain social and physical characteristics of areas contribute to higher rates of motor vehicle theft. Using the logic of routine activities theory, as was done in this study, these findings can be interpreted as the result of increased opportunities. That is, certain social and physical characteristics of areas act to increase criminal opportunities. An increase in these opportunity enhancing characteristics results in an increase in the rate of crime.

These same results can also be interpreted from another standpoint. Social disorganization theory, for example, interprets higher crime rates as the function of weakened social controls. The social and physical characteristics associated with high motor vehicle theft rates are thought to weaken an area's ability to provide informal social control, instead of increasing opportunities. What is missing from this study is an examination of the intervening variables that cause certain individuals to participate in crime.

Another shortcoming of this study is that the results may not be generalizable to other areas. All data were collected from a single parish in Louisiana. It is possible that this parish is unique in regards to motor vehicle theft. Altough, the data are consistent with what others have found and with what we would expect.

Implications

First of all, implications for future research on routine activities and crime include the need for more research investigating the role that guardianship plays in influencing crime rates. This study and numerous others have failed to support the hypothesis that level of guardianship is inversely related to crime (Bennet, 1991; Massey et al., 1989; Miethe and Meier, 1990; 1994). The weak support for the guardianship variables can be explained in two ways, one theoretical and the other methodological. Theoretically, it may be possible that the level of guardianship is not as important to crime prevention as suggested by Cohen and Felson. Another, more likely, possibility is that researchers have not adequately measured aggregate levels of guardianship. The measures used in macro-level research may not be those factors that prevent crime at an individual level. It is possible that those factors that guard against crime at the individual level are difficult or impossible to aggregate to a macro-level. More exact examinations of the relationship between guardianship and crime rates need to be conducted.

Second, routine activities theory often assume the presence of motivated offenders and stress the importance of opportunities for crime. This assumption does not appear to be justified. Results from this study show that the size of offender pools is a good predictor of areal variation in the motor vehicle theft rate. Future research therefore should examine the interaction between the offender pool and theft opportunities.

Third, future research should be conducted to better explain the relation between specific variables and the crime rate. Competing theories give different meanings to the same variables. The relationship between single-parent households and crime, for example, is said to be the result of opportunities and weakened social controls. Future research should be conducted to determine whether it is opportunities, weak controls, or a combination of the two, that cause people to translate their motivations into criminal acts.

Finally, this study shows that crime-specific analyses are an accurate way to examine the merits of the routine activities theory. Too many prior studies have aggregated crimes into types. We should not assume that general measures will work equally well for all types of crime. Future research should be conducted examining other crimes using specific measures.

Social ecology of crime theorists develop explanations for the relationship between characteristics of the environment and rates of crime. Understanding the role of the environment in creating opportunities for crime benefits explanations of current crime trends. Recent declines in the rate of Index crimes have been explained in numerous ways. The politically conservative explanation, for example, is that the drop in crime rates is due to zero-tolerance policies. They assume that get tough programs have led to the reduction in crime rates. Social ecologists provide a different explanation. They concentrate on variables more proximate to the criminal decision than judicial policy; lower crime rates may be due to a reduction of the size of the offender pool and/or reduced criminal opportunities. A demographic characteristic of the 1990s is that there are fewer young people, the people known to commit a majority of the Index crimes. Because crime is the result of a convergence between offenders, targets, and incapable guardianship, the removal of any element is sufficient to reduce the rate of crime. Therefore, the reduction in the offender pool can be attributed for the recent decline of many crimes. Viewed from the social ecology standpoint we are not so quick to judge current conservative policies as effective. If we are to understand crime trends, examinations of economic and demographic characteristics of the environment must continue.

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Vita

John Heith Copes was born December 8, 1970 in Lafayette, Louisiana. He graduated from Lafayette High School in May 1988. In the Fall of 1988 he entered the University of Southwestern Louisiana and double-majored in psychology and sociology. He received his B.S. in 1993. In 1994, he entered graduate school at the University of Tennessee to pursue a Master's degree in sociology with an interest in criminology. He received his Master's degree in December 1997.

He is currently pursuing a Doctor of Philosophy degree with a major in Sociology at the University of Tennessee, Knoxville, where he is employed as a teaching associate for the department of sociology.