CRIME IN THE THIRD DIMENSION:

A STUDY OF BURGLARY PATTERNS

IN A HIGH-DENSITY RESIDENTIAL AREA.

by

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Crime in the Third Dimension: A Study of Burglary Patterns in a High-Density Residential Area

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ABSTRACT

This exploratory study examines the pattern of target selection for residential burglary in a high density neighbourhood in Vancouver, British Columbia. It specifically examines the burglary (break and enter) rates of apartment suites and buildings in relation to the travel paths of potential offenders. Targets may be selected by burglars, in part, because of the proximity of the apartment suite to normal travel paths. Travel paths and crime patterns may be viewed at varying levels of aggregation, from macro levels such as "neighbourhood" to such micro levels as the apartment building. This thesis focuses on the micro level of analysis.

Beginning with the assumption that ground floor suites are closer to the travel paths of potential offenders than suites on upper floors, this study examines the burglary rates on different floor levels of apartment buildings. The burglary/travel path pattern is tested in a six by eight block high-rise residential area centrally located within the West End of Vancouver, British Columbia. A direct relationship is found between burglary rates in buildings and the proportion of the ground floor suites within buildings. The burglary rate increases as the proportion of ground floor suites increase. The rate also varies by building height, with ground floor apartment suites having the highest rates. The research also shows that burglary rates in this area of Vancouver do not vary by differences in overt security, in number and type of entrances, or by the amount of landscaping. As might be expected, these variables do not explain all of the variance in the burglary rates. Further in depth research exploring more about travel paths, accessibility and target choice is necessary. As well, further analysis of what attracts potential burglars to an area is needed.

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CHAPTER I

INTRODUCTION

Recent research into patterns of criminal activity suggests that the degree to which an area is accessible to potential offenders influences the amount of criminal activity in that area (Brantingham and Brantingham, 1975a, 1975b, 1977, 1981, 1984; Clarke, 1980; Mayhew *et al*, 1976; Jeffery, 1971). Distinct patterns of criminal activity are found at the neighbourhood level (Brantingham and Brantingham, 1977; Molumby, 1976), along major traffic arteries (Brantingham and Brantingham, 1978, 1981; Duffala, 1976) and near sites of high activity (Brantingham and Brantingham and Wong, 1990; Brantingham and Brantingham, 1984; Rengert, 1981). Additional studies reveal that criminal activity in certain areas of our cities is influenced by the permeability of street networks (Beavon, 1984; Bevis and Nutter, 1977).

What is suggested by these studies is that how well an area is known by potential offenders and how accessible an area is to potential offenders impact on the amount of crime and the patterns of crime in that area. Identifiable patterns of criminal activity are found in areas that are highly visible, highly travelled, or in proximity to sites of high activity. Whether similar patterns of criminal activity are identifiable at more micro levels of analysis has yet to be examined. This thesis will examine whether similar patterns of criminal activity can be identified at such discrete levels of analysis as the individual apartment building. To date, very few studies have examined high density dwellings, even though much of our urban lifestyle revolves around apartment build-

ings (Waller and Okihiro, 1978; Molumby, 1976; Brantingham and Brantingham, 1975a, 1975b; Reppetto, 1974).

This thesis will explore patterns of criminal activity and accessibility within multiple storey residential buildings. Specifically, it will examine whether within apartment buildings a large proportion of crime occurs in those areas of the building that are more accessible to the set of potential offenders who do not reside there. That is, whether within the apartment building, ground floor apartment suites at the street level are more at risk of a crime than units located on upper floors. For non-residents, access to a particular apartment should strongly affect its selection as a target for crime. As one moves away from the area of the ground floor, and up through the building, accessibility to apartment suites should decrease. And so should crime. If this is the case, it should follow that apartment buildings with a smaller proportion of their apartment units on the ground floor (as in high-rises) should have lower crime rates than apartment buildings with a higher proportion of apartments units on the ground floor (as in low-rise walk-ups). The over all crime rate of apartment buildings should decrease as the proportion of units located on the ground floor decreases.

This thesis is a historical case study and is exploratory in nature.[1] The specific study area is a six by eight block residential area centrally located in a high density residen-

1 The writer would like to point out that this study was originally started in 1981. At that time, the hypothesis under examination was generally established, the design of the study was set and while the data were compiled, and for the most part, organized, it was not analyzed until January, 1991. In light of these circumstances, this study is a historical, case study.

tial neighbourhood of Vancouver, British Columbia, known as the West End. The specific crime under examination is residential burglary. To test the relationship between accessibility and burglary rates, four years of crime data are used. All completed residential burglaries recorded by the Vancouver City Police in the West End of Vancouver, British Columbia for the period 1 January, 1977 through 31 October, 1980 are analyzed. For these data, specific building and floor burglary rates are calculated.

Residential burglary is examined for several reasons. First, it is an offence that must occur in a physical edifice (*Canadian Criminal Code* sec. 348). Therefore, it provides a readily identifiable location and is easily recorded. Second, residential burglary has serious repercussions for both victim and society.[2]

The individual victim faces the potential risk of violence in an unexpected confrontation with a burglar in action (Brantingham and Brantingham, 1978). It is the resident who bears the financial expense of replacing stolen items and meeting rising insurance costs (Maguire and Bennett, 1982; Conklin and Bittner, 1973). Burglary victims recount intense emotional feelings of vulnerability, fear, invasion of privacy and the association of burglary with the fear of personal assault (Clarke and Hope, 1984; Maguire and Bennett, 1982; Walsh, 1980). These intense psychological traumas may plague many of them for years (Rengert and Wasilchick, 1985; Maguire and Bennett, 1982; Waller and Okihiro, 1978). For the victim of burglary, the sense of invasion and

2 Common law "burglary" is defined by a number of Criminal Code sections dealing with breaking and entering premises. Residential break-ins are punishable by up to life imprisonment (*Canadian Criminal Code* sec. 348).

then fear is further exacerbated by the knowledge that few burglars are caught and stolen property is rarely recovered (Rengert and Wasilchick, 1985; Brantingham and Brantingham, 1984; Clarke and Hope, 1984; Maguire and Bennett, 1982; Waller and Okihiro, 1978).

The broader repercussions of residential burglary for society are evident as the threat of burglary contributes to a general atmosphere of distrust (Clarke and Hope, 1984) and to high levels of concern and fear about crime (Brantingham and Brantingham, 1978, 1981, 1984; Waller and Okihiro, 1978; Inciardi, 1978). Beyond that, residential burglary is costly: individuals charged with burglary fill our courts and prisons despite low crime clearance rates.

As noted earlier, this thesis is a historical case study. It is exploratory in nature and is a first step in looking at a high density urban area, in what hopefully will become a trend in site selection studies.

Overview of Thesis

This chapter presents a brief introduction and includes statements of the intent of this thesis and a general overview of the empirical study that will be undertaken.

Chapter Two presents an overview of the previous research on residential burglary and an examination of the various research approaches to it, together with an analysis of the assumptions underlying them.

Chapter Three will consider the literature on target choice, focusing on the individual level of analysis. The chapter examines the reasoned, constrained decision process apparently followed by potential offenders. The chapter closes with an examination of a spatial opportunity model that suggests how potential offenders may move through the environment in search of available targets.

Chapter Four examines spatial patterns of burglary as they have been found at different levels of analysis. Studies of burglary that have focused on patterns at the neighbourhood level, at the street level, and at particular types of high activity sites will be examined in light of the importance of target accessibility and activity levels.

Chapter Five presents a brief review of possible additional factors influencing burglary rates at the apartment level, drawn in particular from the works of Newman, (1972, 1980) and Brown and Altman (1981).

Chapter Six sets out the research design used in this case study and provides a description of the environmental data available for the West End.

Chapter Seven sets out the findings of this research. The statistical procedures used to examine the hypothesis include multiple regression and analysis of covariance. While the hypotheses of the study are statistically supported by the data, there are limitations in the study and caution must be used in interpreting the results.

Chapter Eight presents a discussion of the results and sets out the conclusions of this study.

CHAPTER II

RESIDENTIAL BURGLARY

As noted in the introduction, the purpose of this thesis is to examine the pattern of a residential burglary at a small level of aggregation, that is, within a multiple storey residential building. However, to help set a context for this thesis, this chapter will examine how residential burglary has been studied by researchers in the past.

A review of the criminological literature on residential burglary reveals that much of the research has focused on the characteristics of the burglar, or on the social and economic characteristics of the household resident who has been burglarized. For easier presentation, this chapter has been subdivided into sections which deal with burglary from the burglar's perspective and from the perspective of the resident victim. Research into the process of target selection by a potential offender is the focus of the next chapter.

Burglary From The Burglar's Perspective

Much of the traditional criminological literature on the residential burglar seems mesmerized by the "professional" character of the criminals studied. Although there is no consistent definition in the criminological literature as to what exactly a "professional" burglar is (Maguire, 1982), the idea seems generally to refer either to an individual who exhibits a long-term commitment to crime as a source of livelihood or to one who makes use of high levels of skill and sophisticated tools to commit the crime

(Inciardi, 1978; Reppetto, 1974; Scarr, 1973; Shover, 1972a; Sutherland, 1956). In this view, a burglary usually involves extensive planning in selecting the target and it usually involves more than one person (Inciardi, 1978; Shover, 1972a). The professional burglar depicted in this older literature appears to have extensive contacts and associations with other crime professionals (Shover, 1972a; Sutherland, 1956).

Walsh (1980) provides an interesting historical overview of burglary in England, during the nineteenth century and the early decades of the twentieth century. Professional burglary was organized into many complicated grades and cliques: "...the subculture of craft burglary has never been so extensive, distinct and well-organized since this time" (Walsh, 1980:26). The burglars of this time period often used an assistant as a "look-out" or to receive the stolen goods. Burglars used a variety of slang, cants and even a "secret" language. Walsh's account provides reports of the "skill" required and of the different *modus operandi* employed. For example, "creeping burglars", so called because such burglars entered the bedrooms of residents while they were asleep in bed, carried housebreaking tools that included pen-torches, palette knives, rubber suction cups, diamond-glass cutters, lock-picks, and so on (Walsh, 1980).

In North America, historical information about the nature of burglars can be gleaned from magazines, newspaper articles, biographies, and autobiographies depicting "my-life-of-crime". These accounts are for the most part descriptive, but they include a perspective on the offender's view of the crime. By recounting burglars' daily lives, these reports provide descriptions about their underlying motivations, their family relationships, the techniques they devised to commit their burglaries and their *modus*

operandi. These accounts also provide information about the various elements of the crime, including the time, place, and location of the event. What can be gleaned from these biographies and newspaper articles is the planning involved in evaluating opportunities and selecting targets. For instance, burglars would regularly peruse the society pages of the newspaper to determine the whereabouts of wealthy residents, or make plans to learn the regular working habits and movements of servants so as to determine when a particular residence would be unoccupied.

But in treating these accounts as a major source of information about burglars, the researcher must use caution. Such personal accounts represent only a small number of burglars. Additional problems that must be considered when dealing with research based on personal interviews or written memoirs include possible inaccurate reporting due to memory failure, lack of knowledge, or deliberate lies on the part of the burglar (Brantingham and Brantingham, 1984). In writing memoirs or in responding to general interview questions, names, places, and dates may be omitted or fictionalized by the researcher in order to protect the confidentiality of those involved. Moreover, this information is often presented so that it cannot be verified, or cross checked, or compared with other studies (Brantingham and Brantingham, 1984). However, such memoirs and interviews are usable if used in conjunction with results from other research methods.

More recent studies by Shover (1972a), and Inciardi (1978), who based their research on detailed interviews with convicted burglars, examine the professional burglar, his trade and his association with other crime professions. But the "professional"

burglar is a relatively rare phenomenon. Cromwell *et al* (1991) describe only five of the 30 informants in their burglary study as "professional" burglars. Of 135 convicted burglars, and nine non-incarcerated burglars in Shover's study (1972a), only ten burglars (about seven percent) were considered by him to meet his definition of "professional". Rengert and Wasilchick (1985) noted that of 31 burglars they interviewed, they would have labeled only one individual (about three percent) "professional".

Cromwell *et al* provide a good general description of the professional, whose technical expertise and organizational skills are appreciably better than those of the majority of burglars.

They are differentiated from other categories by the level of their technical skills, their organizational abilities, and the status accorded them by peers and generally by law enforcement authorities ...Their status is recognized and accepted by others...and they are accorded "respect" befitting that status" (1991:51)

The Contemporary Burglary: Kids and Journeymen

While interest in the "professional" burglar continues (Cromwell *et al*, 1991), and while we still use the term "professional" in the textbooks, it is in reference to a term from the past. The classic accounts and memoirs of the "professional" burglar are historically situated and no longer fit what we know about the contemporary offender.

The contemporary burglar, with possible exceptions, is not like the historical professional. Burglars, like the ones described by Cromwell *et al* (1991) or Rengert and

Wasilchick (1985), or Bennett and Wright (1984) are no match for the "professional" burglars of the past (Walsh, 1980). The bulk of contemporary burglary is not committed by professionals. A composite profile of today's burglar suggests he is usually male[3] and young, in his teens or early twenties (Bennett and Wright, 1984; Waller and Okihiro, 1978; Reppetto, 1974; Chimbos, 1973). Today's burglar prefers unoccupied residences (Cromwell *et al*, 1991; Clarke and Hope, 1984; Maguire, 1982; Waller and Okihiro, 1978) and tends to use little force in gaining entry (Waller and Okihiro, 1978). He has few skills, and little of the sophistication or expertise ascribed to burglars in the nineteenth and early twentieth century accounts.

Interviews with contemporary offenders reveal that burglars are concerned with whether or not they will be seen, whether or not the residence is occupied, how easy it is to get in and how quickly they can escape undetected (Cromwell *et al*, 1991; Rengert and Wasilchick, 1985; Bennett and Wright, 1984).

Indeed, because he is usually seeking easy access, today's burglar is most likely to use such simple methods as entering an unlocked door, breaking a window, prying open a door, or crashing through a door by "direct impact" (Cromwell *et al*, 1991; Rengert and Wasilchick, 1985; Maguire, 1982; Waller and Okihiro, 1978; Reppetto, 1974). Once

3 Female burglars do exist, however, statistically speaking, they are rare. Of the 30 burglars Cromwell *et al*, 1991 interviewed, three were females. In Canada, statistics for 1989 give the male to female charged burglar ratio as 22:1 (Jackson & Griffiths, 1991). For easier presentation, in this thesis the term "he" will be used in reference to burglars.

inside the residence, the burglar is generally seeking cash or high valued portable goods (Cromwell *et al*, 1991; Rengert and Wasilchick, 1985). Furthermore, he may be in the house for no more than just a few minutes (usually less than ten minutes) (Cromwell *et al*, 1991; Rengert and Wasilchick, 1985; Maguire, 1982; Walsh, 1980).[4] All of which supports the argument that burglars seek easy access into and quick escapes from their targets.

This change, from the professional to the amateur, traced in the literature on how a typical burglar behaves, minimizes the seriousness of residential burglary. This is not to say there are no serious burglaries committed by professional burglars against targets of high value, or that burglaries are not committed at night, or that no violence is suffered by occupants, or that the cost to the victim is any less, or that the trauma experienced by the victim is less. But the general picture that seems to emerge from the research is of a burglar who is searching for accessible, unguarded targets by examining cues from the urban environment in the course of his everyday activities (Cromwell

4 Why such a change in the nature of burglary? Cohen & Felson (1979) provide some insights with their "routine activity" model which, like other opportunity models, holds that normal movements and activities of both victims and offenders play a role in the occurrence of crime. They propose that economic and social changes since World War II, have resulted in a greater volume of lightweight targets of small or moderate value (jewellery, T.V., sound systems). Simultaneously, the routine activities of our society changed and continue to change. The number of guardians at home decreases as more women participate in the work force and increased recreational time means more time spent away from the home. With the coming of age of the baby boomers, between 1960 and 1980, there is an increase in the number of potential offenders. For a potential offender, such developments meant increased volumes of vulnerable targets of a more portable size, along with increased unguarded/unoccupied residences. Consequently, special skills are unnecessary.

et al, 1991; Rengert and Wasilchick, 1985; Bennett and Wright, 1984; Clarke and Hope, 1984).

Burglary From the Victim's Perspective

In keeping with Wolfgang's argument that the victim also plays a role in the criminal act (1956), much of the literature on residential burglary examines the householder who has been burglarized (Maguire, 1982; Walsh, 1980; Waller and Okihiro, 1978; Reppetto, 1974; Chappell, 1965). Characteristic of this form of burglary research are comprehensive interviews and questionnaires which focus on the prevalent differences between householders who have been burglarized and householders who have not been burglarized.

In these surveys, information is gathered for a particular time period from respondents who live in a particular jurisdiction such as a census tract or neighbourhood. The responses that residents give are analyzed against such demographic, socioeconomic, and behavioral characteristics as sex, age, race, marital status, occupation, income and personal habits. This is a common research approach in the burglary literature and is evident in the works of Walsh (1980), Waller and Okihiro (1978), Reppetto (1974), Scarr (1973) and Chappell (1965).

Interviews with householders whose homes have been burglarized provide us with an important perspective on the act of burglary. These interviews can provide the researcher with useful evidence to help validate data obtained directly from offenders (Cornish and Clarke, 1986). At a personal level, knowledge about the financial and

psychological stress to the victim is collected. Maguire (1982) illustrates the psychological impact of burglary on the victim through a thorough examination of householders who have been burglarized: their traumas and fears and the overall feeling of helplessness that comes from not knowing who the intruder is and whether or not it might happen again. These fears are shared by many victims. Few victims appear unaffected by the experience (Clarke and Hope, 1984).

While this type of research provides both insights into the effects of burglary on individual victims and descriptive information about the characteristics of burglary victims, the research methods employed contain some pitfalls. Methodological problems such as sampling difficulties, subjectivity of responses, faulty respondent memory, and the honesty of those being interviewed are factors that limit their generalizability. Therefore, the results of such surveys should be interpreted in conjunction with research based on other data sources and techniques (Brantingham and Brantingham, 1984).

An underlying assumption in much of this literature is that the *resident* is the target of the burglar. The resident victim certainly feels the social, psychological and economic consequences of a burglary. But it is of particular interest for this thesis that the evidence also strongly suggests that the burglar's interest is more in a potential target - occupancy as an element in its accessibility to him - than in the characteristics of the occupants. For instance, Waller and Okihiro (1978) found that in Toronto the more families in the household, the more two-parent families, and the more persons in a family, the lower the burglary rate (1978:51). In Maguire's 1982 English study, based

on 1,304 recorded cases, 75 percent of the residences were empty at the time of the burglary (1982:49). Even signs of occupancy may act as a deterrent to a potential burglary. For example, a light left on or a vehicle parked close by were identified as reasons not to burglarize a dwelling (Bennett and Wright, 1984:195). Cromwell *et al* note that 90 percent of their informants would not enter a residence that they knew to be occupied (1991:24).

CHAPTER III

SELECTING A BURGLARY TARGET

In recent years, researchers have changed the way burglary is examined. Research methodologies, that is to say, mapping of official and unofficial crime data, interviewing both incarcerated and non-incarcerated burglars, and conducting field observations and surveys, remain similar. However, there has been a noted shift in how crime-specific data are examined. This shift has two dimensions. First, the focus of inquiry has moved to target choice and the decision process followed by offenders (Cornish and Clarke, 1986; Walsh, 1980; Brantingham and Brantingham, 1978). Second, there has been a change from the macro to the microlevel of analysis, focusing on the characteristics of the actual target site.

This chapter will examine the literature that has explored the burglar's selection of a target. During the last fifteen years, research examining target selection has focused on the judgments of burglars and on the factors influencing burglars in their decisions to commit offences. In addition to this, a group of researchers has developed a model based on concepts borrowed from human geography and environmental psychology that allows them to speculate how potential offenders structure the search process in order to locate an "attractive" target within a known environment. Since this thesis centres on an examination of crime sites within the urban setting, such a model may prove useful in providing insights into the spatial patterning of residential burglary within apartment buildings.

Target Selection: Reasoned Choice

Much of the research into patterns of burglary conducted over the past decade and a half has focused on the strategies and decision processes followed by burglars in selecting target premises. A constrained, reasoned choice model aimed at producing a "satisficing" outcome that balances the burglar's conception of an "ideal" target against a concrete opportunity occurring in a real social setting under particular personal pressures has emerged as the current best understanding of the target choice process.

Initially articulated in theoretical papers by Mayhew *et al* (1976) and the Brantinghams (1978); and developed further theoretically by Cornish and Clarke (1986) and empirically by Walsh (1980), Maguire (1982), Bennett and Wright (1984), Rengert and Wasilchick (1985), and Cromwell, *et al* (1991), this model assumes that people choose to commit burglaries on the basis of a constrained but reasoned judgment. These judgments are based on *available* information. They conclude that some current need will be met by committing a burglary and that the *current* situation represents an opportunity for a reasonable measure of benefit from the crime (in terms of money, excitement, status acquisition, or something else), at an acceptable level of risk (of being caught, of being confronted by the home-owner, of being bitten by a dog and so forth).

Borrowing from the work of Herbert Simon (1978, 1982) on broader models of decision making and risk taking, the model assumes that a burglar's reasoned choice

of target is (like most other human decision making) one of bounded rationality: facts will be incompletely known and perceived when the decision is taken. Further, burglars, like other people, will create personal ideal decision models,[5] then violate their own rules, making "reasonable" simplifying assumptions and taking "reasonable" shortcuts in specific situations, under specific emotional and instrumental pressures (Cornish and Clarke, 1986; Brantingham and Brantingham, 1978). That is, burglars will choose and attack "satisfactory" targets rather than waiting for long periods of time for the ideal target opportunity to appear. Burglars are assumed by this model to engage in satisficing rather than maximizing behaviour (Cromwell *et al*, 1991:89).

The reasoned choice model is quite different from the maximizing rational criminal model that is central to the thinking of the classical criminologists (e.g., Bentham, 1789). The maximizing rational choice model assumes that criminals, like other people, make calculated, logical choices about whether to commit a crime or to remain within the law. Decisions are made on the basis of complete information about potential gains and potential risks in such a fashion as to maximize personal gains and minimize personal risks (Barlow,1990). The maximizing rational choice model predicts that potential criminals will gather complete information on a potential criminal opportunity and act on that opportunity only when they calculate that so doing will correspond with a utility maximizing strategy (Cornish and Clarke, 1986).

5 These are called "templates" by the Brantinghams (1978) and by Cromwell *et al* (1991).

The general consensus throughout the current burglary literature is that the maximizing model of rationality is too rigid to reflect real human conduct (Cromwell *et al*, 1991; Barlow, 1990; Clarke and Cornish, 1986; Bennett and Wright, 1984). The classical approach to rational choice should be tempered by the knowledge that information is limited and that other factors, both internal and external to the individual, influence behaviour. For instance, in addition to biological constraints, there will be many social and psychological factors influencing any particular set of circumstances that will be beyond the knowledge and calculation of the offender. Other factors such as personal moods, individual perceptions, or the influence of alcohol or drugs might play a constricting role each time the criminal makes a target decision (Cromwell *et al*, 1991; Bennett and Wright, 1984).

Cromwell *et al* (1991) interviewed non-incarcerated drug addict burglars. One of the purposes of their study was to explore whether drug usage affects the target selection decisions made by residential burglars. Their reasoning was that if residential burglars are habitual drug abusers, the mind-altering nature of the drugs may well influence the character and quality of their decision-making processes. Cromwell *et al*'s (1991) results indicate that drug usage probably does affect the judgment of a burglar by changing his central nervous system arousal pattern, thereby changing the number of environmental cues utilized in the decision-making process in comparison to the number of cues utilized when not on drugs. In any case, their findings generally support a constrained rational choice model in which burglars are not attempting to maximize the outcome of their burglary, but rather are generally seeking *satisfactory* (satisficing) strategies. All of this is consistent with the contemporary opportunity

theory that burglars make decisions based on the information available at the time and that they take into consideration the environmental cues available to them.

Rengert and Wasilchick (1985) interviewed a small number of incarcerated burglars about their usage of time as it relates to the routine activity cycles of both women who work in the home and women who work outside the home. For instance, they found that many burglars worked out timings and learned that many residences are empty, unguarded, and therefore accessible to them between 10:30 a.m. and 2:00 p.m. For the burglars interviewed by Rengert and Wasilchick, this then became the prime time for their burglary activities. This is evidence that burglars anticipate the time(s) that residents are absent from the home, and make reasoned decisions about the appropriate time to break in on the basis of cues found in the circumstances surrounding the target.

It is evident in these studies that burglars make decisions and respond selectively to characteristics of the environment. Interviews with both incarcerated and non-incarcerated offenders about their decisions to select a target for a burglary are made at many stages, and, invariably, before proceeding to the next stage, the decisions made by burglars take into consideration different factors and characteristics about the urban setting (Cromwell *et al*, 1991). In particular, burglars are consistently interested in characteristics that seem to them to show that the residence is accessible (Cromwell *et al*, 1991; Nee and Taylor, 1988; Wright and Logie, 1988; Rengert and Wasilchick, 1985; Bennett and Wright, 1984). They are interested in cues about accessibility; whether

anybody is home, whether they will be seen, how to get into a place and how to get out quickly.

As noted in the Introduction, the starting point of this thesis is the actual crime site, in this case, the burglarized apartment unit within the apartment building. Consequently, any explanations for criminal activity at this particularly small level of analysis must first accommodate a data base at the street address level of detail. Second, a model that allows criminologists to speculate how potential offenders may perceive and interpret what may be a "good" target when examining apartment residences in the urban setting requires a focus on the urban setting. Each of these will be examined in the next two sections.

Levels of Analysis

Patterns of criminal activity can be identified at three separate levels of analysis: macro, meso and micro (Brantingham and Brantingham, 1984, 1991; Beavon, 1984; Harries and Georges-Abeyie, 1980). Macro analysis describes studies at high levels of spatial aggregation, such as studies of the distribution of crime between countries or between provinces or between cities. Research at the meso level of analysis explores crime within a metropolitan area or a city or even a neighbourhood. Crime data are frequently correlated with census tracts or neighbourhoods (Brantingham and Brantingham, 1990). Micro level analysis explores the actual sites where crimes occur.

One difficulty with using data at the macro and meso levels is that they may not include information about activity patterns and criminal opportunity structures (Bran-

tingham, Dyreson and Brantingham, 1976) that might occur at more detailed levels of aggregation. For instance, the incidence of burglary targets on a city block or in a building are not directly measured in census data, even at the smallest level of aggregation available in Canada, the enumeration area.

In this thesis, burglary is examined in a high density residential area of Vancouver, B.C. To study the target attractiveness of criminal opportunities for residential apartment suites requires a particularly detailed level of analysis. An environmental data base at the street address level, at least, is needed.[6]

Individual Perceptions About Environment.

Before describing the research in detail it is necessary to define some general concepts. "Environment" is by no means a single term. A review of the urban geographical literature shows researchers have used complex and varied meanings. Entire disciplines around "environmental studies" focus exclusively on different aspects of the role environment plays in our lives. The term "environment" used in physical geography may refer to the physical reality composed of objective elements such as climate

6 According to Beavon (1984), it was only recently that this address level of aggregation became functionally usable by criminologists. It has only been with the increased use of computers that some police departments are now recording crime at the address level (Beavon, 1984). Patterns of burglary, at such micro levels of analysis as the apartment building have previously been masked or obscured by analysis of crime patterns at higher levels of aggregation (Brantingham and Brantingham, 1976, 1977, 1984, 1991; Beavon, 1984; Harries and Georges-Abeyie, 1980). With increasing use of computers by police and the consequent development of the ability to record data more efficiently and accurately at the address level, such micro levels of crime analysis are now open to researchers.

and topography. Urban geography sometimes refers to the manipulative, physical structure characteristics of our urban settings. Sometimes environment is a "behaviour" setting (Barker, 1968); sometimes it is a cultural or legal setting. What is important to note is that incorporated into most definitions of "environment" is a subjective component. Interacting with or within an environment depends on an individual's perceptions shaped by his/her experiences and the social systems and cultural norms in which he/she is embedded.

A fundamental proposition of these interactive approaches to the concept of environment is that individuals derive information from their environment and process this information in such a way as to make decisions about their behaviour (Ittleson, 1974). Information about the environment is ongoing, is interpreted and essentially, fundamental to everyday living and to the maintenance of a sense of well-being (Maslow, 1968).

Individual Perceptions of Targets for Burglary

People, including those who commit crimes, learn about their environment by interacting with it. They move about the city and develop, in passing, information about its places. They make decisions, all kinds of decisions, on the basis of this urban information. By travelling through the urban setting, people gather information and make decisions about everyday activities such as work, school, shopping, recreational and leisure activities.

While everyone uses this information to shape legitimate activities, potential offenders also use such knowledge to evaluate and select targets for crime. For instance, research generally shows that a house burglar will first single out a general area of the city where potential targets may exist (Brantingham and Brantingham, 1977; Reppetto, 1974). Then, within that general area, the burglar will identify target sub-areas that offer more anonymity (Cromwell *et al*, 1991; Brantingham and Brantingham, 1975a, 1977; Reppetto, 1974) or that exhibit what the burglar feels are "useful" characteristics, such as poor street lighting or high bushes (Phelan, 1977; Rengert, 1975); or that provide easy street access (Bevis and Nutter, 1977). The areas and sub-areas are generally on streets on which the burglar frequently travels (Rengert and Wasilchick, 1985; Beavon, 1984; Bevis and Nutter, 1977). Once the burglar is within a target sub-area, a specific housing unit or target will be selected based on characteristics of the residences: Are people home? Is someone watching? Does entry look easy?

In areas with a high degree of homogeneity, potential burglars may be keyed to specific signs of activity in and around the home that might indicate interference with their plans. For example, they might interpret a bike lying on the front lawn, or a sprinkler going or laundry on a clothesline as a warning sign (Altman, 1975). Over-all, the literature based on interviews with burglars indicates that selection of a target may be keyed to activity and specifics such as ease of access or ease of exit (Cromwell *et al*, 1991; Nee and Taylor, 1988; Rengert and Wasilchick, 1985; Bennett and Wright, 1984). The Brantinghams have combined concepts from urban and human geography into a model that allows criminologists to speculate how potential offenders may perceive and interpret apartment residents in the environment when selecting their target for a

burglary. In the next section, details about the complexities underlying environment and some of the concepts in human geography and environmental psychology will be examined.

The Brantingham's Crime Site Selection Model

The Brantinghams (1978, 1984, 1991) propose a model for examining how targets might be selected by potential offenders. They speculate how a potential offender may engage in a partially structured search process to select a target. This model may be used for studying residential burglary. The assumption on which their model is based is that people who commit crimes behave like other people most of the time (Brantingham and Brantingham, 1991). People, including those who commit crimes, learn about their environment by moving through it. By travelling through the urban setting, people gather information and make decisions about everyday activities such as work, school, shopping and/or recreational and leisure activities (Rengert and Wasilchick, 1985; Cohen and Felson, 1979).

A criminal's mobility through an urban area, like that of non-criminals, will develop knowledge about the urban area. The area through which an individual moves is called "action space". "Action space" is dominated by regular human activities surrounding home, work, shopping, recreation and the subsequent movement by individuals between these activity points. An individual's mobility through the area of his "action space" develops his "awareness space". "Awareness space" tends to be dominated by regular activities and the movement between these activities. But where non-criminals use this information for activities that are considered legal, criminals use

their knowledge to evaluate and select targets for a crime (Brantingham and Brantingham, 1978, 1981, 1984). As they travel from place to place, offenders make conscious or unconscious mental notes about the desirability of certain targets. Criminals will probably commit most of their offenses in parts of the urban area with which they are familiar and through which they regularly travel (Brantingham and Brantingham, 1978, 1984, 1991).

The environment of our cities consists of physical features. How the man-made physical features are used, and, more specifically, how the characteristics of these features are interpreted by individuals, must be considered. Individuals, whether consciously or sub-consciously, are influenced by the many signals, or cues about its physical, spatial, cultural, legal and psychological characteristics (Brantingham and Brantingham, 1978). These cues are used by potential criminals to evaluate opportunities.[7]

To summarize, offenders looking for a target search for cues in the environment that emit messages of accessibility. But first, some form of search process must take place in order for a crime to be committed. The search process is influenced by the objective site characteristics and by the criminal's perception of what is a "good" target. His search process is also influenced by limitations of the physical environment and his knowledge of the environment. The knowledge, or awareness space, that offenders

7 It must be remembered that these influences are not deterministic. They are tempered by the individual's perceptions, which are in turn influenced by his/her past experiences and a myriad of other social, biological, and psychological factors

have of the environment and its potential opportunities, should largely depend on regular activities and past experiences. Those areas that offenders frequent probably form the dominant portion of their awareness spaces (Brantingham and Brantingham, 1977, 1984, 1991).

Brantingham and Brantingham (1978, 1984, 1991) speculate that an offender engages in a partially structured search process in which he locates first an attractive target or neighbourhood, then an attractive sub-area, for example, a block, then a building within this sub-area, and finally, a unit within the building. An offender may follow this process after deciding to commit a crime, but will probably pass through the location of an area or sub-area or even the location of a building during normal non-criminal daily activities.

In the criminological literature, there is evidence of this. Studies with incarcerated offenders indicate they generally keep their eyes open for targets, and if they see an attractive target, they try to remember it for future reference (Cromwell *et al*, 1991). Rengert (1981) and Rengert and Wasilchick (1985) found that offenders selected their targets from within a narrow "activity space", that is, areas they passed through in daily journeys from home to work or school, and to the main social and shopping locations they frequent. Porteous (1973) made similar observations of juvenile delinquents in Victoria, B.C.

To close this chapter, the contemporary trend in examining patterns of crime is to consider the decisions made by offenders by examining details of the crime site in relation to the way people perceive their environments, and the way they move through

their environments. In the next chapter, aggregate patterns of burglary, at micro levels of analysis, are examined. Patterns of burglary are found at the city block level (Brantingham and Brantingham and Wong, 1990; Brantingham and Brantingham, 1981) and the street level (Beavon, 1984; Bevis and Nutter, 1977), as well as at site-specific levels (Roncek and Pravatiner, 1988; Roncek and Lobosco, 1983; Brantingham and Brantingham, 1981). The underlying theme of these studies is that within urban space, those areas or specific landmarks that are highly active or are highly accessible experience higher rates of crime.

CHAPTER IV

AGGREGATE PATTERNS OF BURGLARY

The contemporary approach to understanding the dynamics of crime patterning focuses on specific crimes at low levels of spatial aggregation (Brantingham and Brantingham, 1984; Harries and Georges-Abeyie, 1980; Clarke, 1980; Jeffery, 1971, 1976). As noted in the previous chapter, this trend has been influenced by several recent developments. First, there is an increased focus on the target choices and the decision processes of offenders (Clarke and Cornish, 1986; Brantingham and Brantingham, 1978; Mayhew *et al*, 1976). Second, recent criminological literature shows that examination of the physical nature of urban settings can prove advantageous in increasing our understanding of criminal activity. Brantingham and Brantingham (1977, 1978, 1984, 1991), Bennett and Wright (1984), Clarke (1980), Mayhew *et al* (1976), Jeffery (1971, 1976) all promote such an approach. Third, because of increasing use of computers by police and the consequent increase in ability to record address level data more efficiently and accurately, micro level crime analysis has become increasingly feasible (Beavon, 1984).

This chapter describes past research on the spatial patterning of burglary at low levels of aggregation. Specifically, it will examine patterns of burglary found at the city block level (Brantingham and Brantingham, 1975a, 1975b, 1977) and the street level (Beavon, 1984, Bevis and Nutter, 1977), as well as at site specific levels (Roncek and Pravatiner, 1989; Roncek and Lobosco, 1983; Brantingham and Brantingham, 1981).

According to these studies, nodes of high level urban activity experience higher rates of crime than areas where activity is not so intense.

Traditional Spatial Studies

Interest in the spatial patterns of criminal activity by researchers and historians has a long history in the field of criminology (Jeffery, 1976; Voss and Peterson, 1970; Morris, 1958). This history is rooted in the efforts of the nineteenth century European cartographers (e.g. Guerry, 1831, Quetelet, 1842, Mayhew 1862), the work of the social ecologists of the Chicago School of Sociology (e.g. Shaw and McKay, 1929; 1942) and the factor analytic school of the 1950's and 1960's (Brantingham and Brantingham, 1984). In their search for the etiology of crime, these early researchers looked at relationships between crime rates, criminal residences and the social conditions of the area without linking the ideas that are now appearing (Brantingham and Brantingham, 1984; Jeffery, 1971, 1976; Baldwin and Bottoms, 1976; Voss and Peterson, 1971; Morris, 1958).

Because the focus of the earlier waves of research were so different, details of their findings provide little information that is useful to the current enquiry. But what is of particular relevance to this thesis is that in conducting their studies, the earlier researchers confined their studies to analysis of relatively large aggregations of people and space, and did not penetrate to the micro levels of analysis that are at the centre of environmental criminology. Moreover, they paid attention to the home location of the offender, rather than to the location where the crime occurred. They attended to the person instead of to the event.

Conducting their studies on the residence of the offender or combining residence and crime site locations into one aggregate unit of analysis had serious repercussions for the traditional researchers' ability to analyze criminality. When the distinction between the home location of the offender and the location of the crime site are not clearly made, there are major problems in interpreting results (Brantingham and Brantingham, 1981, 1984; Jeffery, 1976; Morris, 1958). As Baldwin and Bottoms (1976) have shown, it cannot be assumed (as the traditional researchers often seemed to do) that the crime site and the offender's residence are closely connected in time and space.

Assuming that the attributes and features of a study area where a high percentage of offenders reside also describes the attributes and features of the area where the crime occurred leads to misjudgments and errors in analyzing the criminal event (Brantingham and Brantingham, 1984, 1991; Baldwin and Bottoms, 1976). According to Jeffery (1976), researchers in the social ecology tradition were examining the social characteristics and problems of the criminal residence area and not the characteristics of the environment surrounding the crime site. Although the location of the crime was, according to Jeffery (1976) presumed by researchers to be under examination, what was actually explored instead was the "social disorganization" of areas where offenders live. This tells us little, empirically, about the places where crimes are committed, unless we assume that home location and crime site are always identical.

In recent years, environmental criminologists have taken a new approach to analyzing crime. They have begun to examine crime sites at micro levels of analysis. In recent studies, they have begun to show that property crimes concentrate near areas of

high activity and high accessibility. The next few sections describe burglary patterns associated with several micro-level settings in the environmental criminology literature.

Travel Paths and Patterning of Burglary

Research following the environmental approach to criminology finds that crimes are clustered in places that fall within the activity spaces of large numbers of people. Nearness to major transportation arteries, for instance, influences a location's burglary rates.

Studies generally find that higher rates of burglary are found along major transportation routes and in those areas within close proximity to them (Beavon, 1984; Maguire and Bennett, 1983; Brantingham and Brantingham, 1978; Duffala, 1976; Baldwin and Bottoms, 1976). Concentrations of burglary are identifiable along the fringe of major transportation arteries (Duffala, 1976; Luedtke *et al*, 1970). Rengert and Wasilchick (1980) note a strong relationship between burglary targets and the principal pathways connecting home to work and home to recreation locations. Porteous (1973), found that in Victoria, B.C., juvenile gangs committed property offences along, or in close proximity to, their routine paths of travel between home, school, and recreational habitats.

Predictably, remote inaccessible locations tend to experience less crime. Interesting studies conducted by Beavon (1984) and Bevis and Nutter (1977) show that different levels of accessibility as produced by different types of street networks affect the

property crime rates of city blocks.[5] Examining city streets laid out in a grid system, or streets that have a T-shape or an L-shape, or the form of a cul-de-sac, it has been found that city blocks of residential areas considered inaccessible as a result of the complexity of the street system have consistently lower rates of property crime, than those streets that were more accessible.

Activity Nodes and Patterning of Burglary

Examining what crimes occur around specific activity nodes within the urban setting is another example of micro level crime analysis. There is evidence in the literature that the occurence of burglaries varies in patterns related to high activity landmarks. Certain landmark sites, such as bars and taverns, influence crime rates due both to the nature of the activities that occur there and to the volume of people they attract. If accessibility and activity in and around these landmark sites are high, then crime rates of entire blocks and neighbourhoods are affected.

The Brantinghams (1981) find that property crime rates vary inversely with distance from well-known fast food restaurants. Other studies looking at high activity sites such as bars and taverns report similar findings (Roncek and Pravatiner, 1989; Roncek and Bell, 1981; Engstad, 1975). Even though there may be little crime reported within such sites, such high activity locations appear to generate significant rates of crime near

5 These studies do not look exclusively at burglary. Burglary is only one of several property-related offences that are considered.

themselves. Such sites are referred to as "hot spots" and "crime generators" (Brantingham and Brantingham, 1981).

The findings of these studies suggest that these hot spots attract large numbers of people for varying lengths of time and at different times of day. High activity nodes that attract large volumes of people become part of their awareness space and activity space, which means these places can serve as a starting point for other activities, such as burglary target searches (Brantingham and Brantingham, 1984).

In conclusion, contemporary research into patterns of crime at micro levels of analysis examine the permeability and accessibility of individual travel paths (Beavon, 1984; Bevis and Nutter, 1977), the general movement patterns of individuals (Rengert and Wasilchick, 1985; Porteous, 1977; Turner, 1975) and the attractiveness of specific sites (Roncek and Pravatiner, 1988; Roncek and Lobosco, 1983; Roncek and Bell, 1981). While these studies examine criminal activity patterns at levels of analysis smaller than the traditional spatial studies highlighted at the beginning of this chapter, they do not extend to such a small level of analysis as the individual apartment building.

Earlier research into burglary rates for multiple storey apartment buildings did not consider patterns of crime in relation to permeability or accessibility of the residences to the travel paths of individuals. Rather, the focus of research at this particularly small level of analysis has been on the direct relationship between the architectural design of the apartment building and criminal activity.

In the next chapter, the literature on the theory of "defensible space" will be examined.

CHAPTER V

DEFENSIBLE SPACE AND CRIME

In 1981, when the data for this study was collected, Oscar Newman's theory of "defensible space" was a dominant influence on micro analysis of burglary; it held sway through the 1970's and into the early 1980's (Poyner, 1983). Since then, researchers who hold to environmental perspectives on crime have moved away from Newman's work, and though his work is no longer regarded as central, it served as an important stepping stone from which new ways of thinking could emerge about how burglars select targets.

The statistical analysis presented in Chapter VII incorporates variables from the theory of defensible space. The value of including these in the data base is that the results obtained through analysis help document the limitations of previously held theories.

Today, the deterministic nature of the theory of defensible space is easily recognized, thanks to the work of Beavon (1984), Mayhew (1979), Mawby (1977) and Bottoms (1974).

Typical of the period dominated by Newman's work is the view that the physical characteristics of the urban setting have a direct effect on the quality of relationships that develop between people. These relationships, in turn, affect the incidence of criminal behaviour. Jacobs (1961), one of the first to look at city environment as an in-

fluence on sense of community, based her work on personal experiences and observations. She treated the environment of the city street as a major influence on criminal behaviour. Newman looks at a narrower dimension; he deals with the architectural design of the building as the main influence on people's behaviour.[9]

Another model, related, though a little different, is the one set out by Brown and Altman (1981). They treat the concept of privacy and other such concepts found in the theory of defensible space. They limit their model to the relationship of single-family dwellings to residential burglary.[10]

Another significant difference between the models mentioned above is the role played by the individual. In the theory of defensible space, individual motivation, for instance, in a decision to commit a burglary, is minimized. According to Newman, it is the characteristics of the physical environment that is the dominating influence on the burglary rate. In contrast to Newman, Brown and Altman say that people interpret their environments, rather than the other way around. In other words, the later theories recognize the underlying sequential decision processes involved when a burglar decides to commit a burglary.

9 Jacobs (1961) and Newman (1972, 1980) do not look exclusively at burglary. Burglary is only one of several property-related offences that they consider.

10 Brown and Altman's privacy model is restricted to residential burglary, however it has not been empirically tested. Brown and Altman also note that should their model be tested with residential burglary, their model is best limited to what they define as "professional" burglary and single family dwellings (see Brantingham and Brantingham, [eds.] 1981).

The common thread running through the "defensible space" literature is that the design of our cities (Jacobs, 1961) and the architectural lay-out of buildings within the urban setting (Brown and Altman, 1981; Newman, 1972, 1980) influences the quality of relationships that develop between people. These relationships, in turn influence the incidence of criminal behaviour.

Certain physical configurations in the lay-out and design of our buildings, streets and cities will generate and facilitate communication, while other physical arrangements tend to thwart the development of links between people. The communication between residents, according to Brown and Altman (1981), Newman (1972) and Jacobs (1961), help identify who belongs and who does not, and what behaviour is acceptable and what behaviour is objectionable. Crime can be prevented by designing our cities (Jacobs, 1961) and our public housing projects (Newman, 1972) using specific architectural forms that promote communication and mutual defense on the part of residents. According to Brown, the manner in which one establishes one's territory can establish the desired degree of openness to outsiders. An individual can regulate the type of and the amount of social interaction that occurs. Should one's territorial boundary be invaded, varying degrees of responses may occur. Areas of cities or public housing projects or single family dwellings deficient in design are vulnerable to increased acts of crime. In the next few sections, the proposals of Jacobs, Newman, and Altman for examining crime will be presented.

Jacobs's Safe Cities

Jacobs proposes a model for "safe" cities that includes diversifying city land uses to combine commercial activities with residential areas. She focuses on the places where crime is committed and the physical characteristics of those places. Jacobs argues that city streets are unsafe because they are deserted. This problem can be solved by encouraging "eyes on the street", specifically the eyes of local residents and people who are passing by. Buildings must be oriented to the street. The people in these buildings then become watchers if there is some activity to watch. She advocates more use of night stores, restaurants, pubs and bars. Amenities like this draw people around and residents, she argues, then like to watch from their windows. Natural surveillance (or informal controls) may result (in general see, Bennett and Wright, 1984; Mawby, 1977).

But as noted in the previous chapter, findings of contemporary studies show that areas of increased activity and specific sites that attract volumes of people tend to have higher rates of crime (Roncek and Pravatiner, 1989; Brantingham and Brantingham, 1984; Roncek and Lobosco, 1983; Roncek and Bell, 1981).

While Jacobs's model is not examined in detail in this thesis, the works of Jacobs (1961) stimulated research into the relationship between crime and the urban environment (Newman, 1972; Jeffery, 1971; Angel, 1968; Boggs, 1966). Perhaps the best known of these subsequent researchers is Oscar Newman, who examined the relationship between the physical and social characteristics and crime rates in several public housing projects in New York City (1972). This study led him to develop the concept of "defensible space."

Newman's Defensible Space

The central theme of Newman's work is that architectural design can strongly affect the amount of crime in residential areas. He argues (1972) that there are certain architectural designs that would be least likely to promote criminal behaviour.[11] Building designs that would influence the behaviour of residents to defend their area from criminal acts would reflect characteristics that make up what Newman calls "defensible space"; places that residents can and will defend from criminal intrusions by outsiders.

Newman (1972) outlines components of good architectural design - design that forms an environment in which the residents have a sense of community. The residents of such an environment will protect and maintain their living space. In addition, potential criminals will perceive this territorial influence and will be deterred from committing crime in this area. According to Newman, opportunities for crime can be prevented by designing into housing projects perceived zones of territorial influence and opportunities for surveillance.[12] Public housing deficient in these architectural designs that promote "defensible space" are vulnerable to increased acts of crime.

Newman's analysis of the way in which design factors such as high-rise public housing and large undifferentiated open spaces create an impersonal environment con-

11 Again, Newman does not look exclusively at burglary. Burglary is only one of several property related offences that he considers.

12 It is not the intention of this thesis to provide in-depth explanations of these concepts: territoriality, surveillance, image or environment. For detailed presentation and review of defensible space, see Beavon (1984), Mayhew (1979), Mawby (1977) and Bottoms (1974).

ducive to crime has been most compelling. He argues that when large residential complexes are subdivided into smaller components so that each can be controlled naturally, crime decreases (see Beavon, 1984). To illustrate his argument, Newman examines two adjacent public housing projects in New York City, one low-rise, the other high-rise. The number of units per acre and the types of families occupying both are similar. But rates of crime in the high-rise are four times higher (Newman,1972).

The low-rise is designed, according to Newman, to create "defensible space". There are only six or eight units to a complex and in each, windows and doors overlook the street and inner courtyard. Residents easily recognize each other and, having visual access to the street, can spot strangers and intruders. According to Newman, the design features of the high-rise lack the features of defensible space, leaving open a potential battlefield for vandals, muggers and gangs. As a result, residents feel no sense of identity with their surroundings outside their individual apartments.

The rather physical, pragmatic nature of these approaches has generated a lot of interest and research into the notion that through altering the physical lay-out of our urban setting crime can be reduced (for a review see Brantingham and Brantingham, 1984; and Beavon, 1984). But due to Newman's exclusive focus on the physical environment, his work (1972) has severe limitations.

Criticism of Newman's Work

While the concept of defensible space is noteworthy, Newman's work has been criticized on other grounds. (1) Newman does not accurately account for the social-

economic differences between those living in the projects he studied; (2) there are errors in his calculations; (3) he does not consider the possible biases in the crime data; and (4) there is not enough detail given about the design differences between the projects which might effect territorial feelings (Bottoms, 1974).

Mawby (1977) presents an important appraisal of the theoretical validity of Newman's concept. Newman has failed to consider that the key elements of defensible space might contain contradictions in themselves and might include factors which threaten as well as enhance security. Mawby (1977) proposes, for instance, that if opportunities are made to increase surveillance, crimes by residents against other residents may also increase. As noted in the previous chapter, contemporary research shows that areas that attract volumes of people are also noted for higher levels of crime. Furthermore, offenders may not arouse suspicion once they are in private areas. Burglars may instead be given "cover".

Newman (1972) openly promotes a direct cause and effect relationship between the environment and human behaviour. He assumes that the design features displayed by a residential area affects everyone equally. This is clearly untenable and his work has been fiercely criticized by Beavon (1984), Mayhew (1979), Mawby (1977) and Bot-

toms (1974), among others, on the grounds that it promotes crude "environmental determinism" in the role played by the physical environment on the rate of crime.[13]

Most of the literature to date has been highly critical of Newman's over-simplified, practical, common-sense approach to crime. This does not mean that further research into the theoretical concepts of "defensible space" should be ignored. Rather than focusing exclusively on the physical characteristics of the urban environment as an explanation of crime, the focus of current research is to have an understanding of how potential offenders may perceive and interpret the characteristics of the urban setting.

One early model that does accommodate individual interpretation of the urban setting is the "territorial and privacy " concept developed by Altman (1975) and later further developed by Brown and Altman (1981). Essentially, according to Altman, the manner in which one establishes one's territory can establish the desired degree of "openness" to outsiders. An individual can regulate the type of and the amount of interaction that occurs. Should one's territorial boundary be invaded (as in a burglary), varying degrees of responses may occur. In this manner, there are striking similarities to "defensible space".

13 In spite of these criticisms, the ideas of Newman were popular in the United States. Several "crime prevention through environmental design" projects were implemented. Evaluation of these projects and additional research (Newman, 1980) resulted in a reformulation of the "defensible space" model. Newman's "purified" (Van Soomeren, 1989) model became less physically deterministic. In his later work, Newman discusses "communities of interest", for example, clusters of residents sharing more or less the same lifestyle and family cycle. Architecture and urban planning play a role in the development of social cohesion (Bottoms & Xanthos, 1991; Van Soomeren, 1989; Bottoms, 1974).

Brown and Altman's "Territoriality and Privacy"

This model is an extension of Altman's 1975 analysis of privacy and territoriality concepts, and in keeping with earlier "defensible space" models utilizes these concepts in relation to crime. Unlike Newman (1972), Brown and Altman (1981) emphasize a "sequential-decision making" process whereby in their selection of a target residence, potential burglars attend to external displays and boundaries of the residence. The residence reflects cues as to the degree of "openness" to outsiders.

Physical objects such as fences, a cared for lawn, sign-posts and so forth denote ownership. Based on these cues, the burglar makes a series of decisions about the accessibility of a particular residence. The more a residence reflects the characteristics attributed to "possession", the less accessible a residence appears to a potential burglar.

Similar to the "defensible space" concepts, the fundamental concept underpinning Brown and Altman's model (1981) is the concept of "privacy". Altman (1975) defines privacy as a process whereby one selectively closes or opens one's inner self to outside stimulation, whether it be in a physical sense or a social one. One's personal privacy is controlled by a variety of behavioural techniques which can be communicated by verbal or non-verbal messages, by the individual or group or culture. The manner in which one displays personal effects or establishes physical or symbolic barriers establishes the degree of access to the distancing of one's self from the social and physical environment.

Contrary to Newman, privacy is a process and a dynamic concept whereby one can make the boundaries of one's personal privacy accessible to outsiders on some occasions and inaccessible on other occasions. But, similar to "defensible space", an individual's need for privacy influences the establishment of a boundary or "territory". With a territory, an individual can regulate the type of and amount of social interaction that occurs. Should one's territorial boundary be invaded by an outsider, varying degrees of responses may occur depending the nature of the territory violated.

The conceptual framework of Altman's 1975 model of privacy was applied to residential sites and neighbourhoods in 1981. Brown and Altman's basic thesis was that the less a residence or a neighbourhood or an area reflects the qualities of a "private" territory, the more accessible it is to intrusion by a burglar.

Newman maintains that private areas promote increased surveillance among residents thereby making outsiders more readily identifiable. Altman's thesis is that private areas, due to their obvious boundary markings, have less chance of being misconstrued by a potential criminal as an accessible target for a burglary. Private areas promote "detectability", that is, the degree to which a resident of an area can detect or sense intruders (1981).

One significant difference from Newman (1972), is that Brown and Altman allow for the role of individual perception in the selection of a target for crime. While Newman (1972), ignores the role of human behaviour in the decision to commit a burglary, Brown and Altman recognize the significance of the interaction that exists between the environment and the human organism. Consistent with the reasoned choice model

reviewed in Chapter III, Brown and Altman maintain that burglary involves "sequential decision making" (1981). This process involves an examination and assessment by the burglar of the external displays and boundaries established by the owner of the residence. These displays provide cues to the residence's accessibility to outsiders. The less the residence has the features of a private territory, the greater the probability of a burglary.

As with "defensible space", this model is subject to problems. First, the premises underlying the concepts are open to misinterpretation and contradictions. The "primary", "secondary", and "public" dimensions can be interpreted either way: the establishment of boundaries may reflect privacy or, by their very presence provide "cover" for the burglar once access is attained.

Second, the assumption here is burglars go through a sequence of events in deciding to commit a burglary. In the early versions of "defensible space", the environment remains stable and influences a stable individual. In the privacy-territorial model, the environment is also static, one that remains the same while the burglar goes through a sequence of events (1981), while the barriers that determine whether the classification of a territory is private, secondary or public are not static. For example, hedges, trees, and other landscape items, may not be attractive to a burglar during daylight hours, but any appear less foreboding if it is night time. But then again, at night time, a residence that may reflect "open" accessibility during daylight hours, but at night, lighting in the house may reflect occupancy.

Third, accessibility is restricted to "openness" or "closedness". What is noted in Chapter II is that accessibility must be broader in its definition and include the location in time and place, and the knowledge and previous experience of the individual. Accessibility may also refer to the location of the crime site, its location in proximity to other targets and in relation to the travel paths of potential offenders. How an individual travels there, how aware of the place an individual is, as well as the ease of entry and exit into an area of potential targets as well as the ease of entry into the actual target site should be considered (See Chapter IV; Brantingham and Brantingham, 1991, 1984).

In summary, the concepts of "defensible space" theory used to explain criminal acts are fraught with problems. However, these ideas concerning territoriality, privacy and surveillability continue to offer a popular view with which to examine patterning of crime (see Coleman, 1985). It is the combination of value as historical perception and the contribution to the data base for this study that justifies inclusion of some defensible space variables in the analysis of the data in this thesis. Details of the definitions and measurements of these terms will be presented in the next chapter.

CHAPTER VI

RESEARCH DESIGN OF THE CASE STUDY

As outlined in Chapter I, this thesis is exploratory in nature. Specifically, its purpose is to begin to examine whether the apparent accessibility of apartment units to potential offenders affects burglary rates. Burglary rates by floor within apartment buildings as well as burglary rates by building in the West End will be examined. Ground floor apartments are closer to the street (on street level) and hence to the "awareness space" of potential offenders[14] and may be more at risk than apartment suites located on higher floors. Stated another way, accessibility to apartment suites theoretically decreases as one moves up through the apartment building away from the ground floor. Based on this, it would follow that apartment buildings with a smaller proportion of their apartment units on the ground floor (as in high-rises) would have a lower burglary rate than apartment buildings with a higher proportion of apartment suites on the ground floor (as in walk-ups). Consequently, what should be found is that the amount of burglary in apartment buildings will decrease as the proportion of units located on the ground floor decrease.

In this chapter, the research design of the case study is outlined. For easier presentation, this chapter is subdivided into sections. In the first section, the concepts used in testing the hypothesis are operationalized. The second section includes the history and

14 The working assumption is that burglars are from outside the building.

geographical characteristics of the West End, including details of the six by eight block study area. A third section outlines the collection and categorization of the apartment building data used in the analysis. In the fourth section, details about the burglary data base and the burglary rates calculated in this study are presented. The findings of the study along with the shortcomings underlying the study are the focal point of Chapter VII.

The Concepts

Action Space/Awareness Space

Research that explores the search for a target by a burglar has been, and is, inter-disciplinary. As noted in Chapter III, many of the concepts developed in the literature are based on general approaches used in geography and environmental psychology. It is suggested that a burglar's mobility through an urban area influences his knowledge of the area. The area through which an individual moves is called his/her "action space". "Action space" refers to that part of the environment which has a place useful to the individual and with which the individual is therefore familiar (Horton and Reynolds, 1971). "Action space" is usually dominated by regular human activities surrounding travel to and from home, work, shopping and recreation. An individual's awareness space is the "space" in and around a person's "action space". An individual becomes

aware of the areas adjacent to or part of where activity happens.[15] A person never is aware of all parts of an urban area. We all have areas we do not know, but we become aware of some areas. Frequently, we become most aware of areas near where we regularly go. That is, "action space" and "awareness space" tend to be dominated by regular activities and the movement between these activities.

With the development of "action space" and "awareness space", individuals, in order to classify and code the information they interpret from the environment, develop "mental maps", "templates" or "cognitive images" of different types of settings. These "templates" influence how an individual perceives his/her environment and subsequently how he/she behaves. (In general, see Downs and Stea, 1973; Appleyard, 1970; Lynch, 1960). "Cognitive mapping" is a concept referring to the way an individual simplifies his/her environment. Our environment is infinitely too big and complex and impossible to know entirely. Consequently, it is hypothesized in the environmental literature that individuals may develop a template for what a park looks like, or what a friendly restaurant looks like, or, in the case of a burglar, what a "good" or "easy-to-reach" target looks like. Although, these templates contain individual variations, human perception with its underlying developments have some universal similarities. Therefore, the suggestion is that these similarities are patterned and may be identified (Brantingham & Brantingham 1978, 1984, 1991).

15 For a more detailed review of how these concepts interact and are employed to examine everyday individual behaviour within a city, see Horton and Reynolds, (1971).

Within the literature, there are different ways to measure an individual's action space and awareness space. It may be estimated through interviews. For example Cromwell *et al*, 1991, conducted "ride alongs" with "free" burglars in Texas to examine how burglars located their targets. Groups of non-incarcerated burglars were transported while the burglars gave directions as to how they found their targets.[16] A second way may be through cognitive maps (Lynch, 1960). In this case, incarcerated burglars may be provided with a map and asked to draw or describe the route they used to locate their target.

In addition to these techniques, urban planning departments may have records that measures how many people travel through an area. Such measures can give an aggregate estimate of whether the area belongs to the awareness space of a large number of people. For example, the use of traffic flows of a particular area, could be used as a crude measure of how many people travel to or from an area by bus or by automobile. Pedestrian flows may be used as an indication of the numbers of people who walk to and from these areas. Again, these are crude indicators but they can provide rough estimates of how well an area is known to people, including those who commit crimes.

While not explicitly tested in this thesis, the West End is, I believe, a well-known and an often frequented area of the city. It is part of the awareness space of many people.

16 In the writer's opinion, such a technique as "ride along" for collecting information about a burglars activity spaces poses serious ethical questions. Researchers are risking introducing other potential residential burglary targets into the awareness space and activity spaces of active burglars.

Consequently, it is in the awareness space of many potential burglars. There are several reasons for this argument and they are outlined in the next few paragraphs.

First, the West End is part of the core of Vancouver and adjacent to Stanley Park. The park has an international reputation. Visitors and city residents visit the park and, when going to the park, frequently travel through on the edge of the West End. In the criminological literature, studies examining crime as it relates to identifiable landmarks suggest that types of land use such as fast food restaurants (Brantingham and Brantingham, 1981), bars (Roncek and Pravatiner, 1989), or high schools (Roncek and Lobosco, 1983) may influence crime rates. The premises of these studies are that the volume of people such landmarks attract, and sometimes because of the nature of the activities carried on there, and their juxtaposition with other land uses, can affect the distributions of crimes. It is reasonable that Stanley Park, due to its international reputation, should also be a well-known landmark and in the awareness space of many people. All of which consolidates the argument that the West End is within the awareness space of a large number of people.

Second, the proximity of the West End to the downtown business core of Vancouver probably means it is well known to many people. People travel around and through the West End to get to work, to go shopping, or to get to entertainment spots.

Third, another example of large volumes of people moving through the West End is its traffic, which is heavy enough to cause problems. In 1974, city hall officials, in an attempt to preserve the neighbourhood atmosphere, constructed traffic barriers to re-

route the much of the vehicular traffic away from the residential areas to designated thoroughfares in the West End.[17]

Fourth, the streets in the West End form a grid system. Recent studies in criminology examining property offence rates in relation to the permeability of street systems suggest that the grid system of streets, more so than other types of streets (e.g. culs de sac or "L" or "T" shaped streets may increase the permeability of neighbourhoods to travellers (Beavon, 1984; Bevis and Nutter, 1977). All of this contributes to the argument that the West End is a well-known area and part of the awareness space of many people. Consequently, it is in the awareness space of many potential burglars.

Accessibility

A burglar must not only be aware of a target or target area, but he must also find the target accessible. Accessibility is a term that means that a person can actually get to or reach a place. Accessibility is not a simple concept. In part, it refers to the ability to reach a point physically. For example, the Lions in the North Shore (Vancouver) mountains are clear. They can be seen, but cannot be reached by most people. The trails at the base of Seymour Mountain, however, can be reached, but few people are aware they exist. For a place to be accessible, there must be some way to get there and people must be aware that the place exists. Accessibility is tied to awareness spaces.

17 In this case study, this meant between two and five city blocks.

The accessibility of any one place can, as a consequence, be influenced by whether the place is "strong" within someone's awareness space or "weak". When a place is only "weak", an individual may choose to go to some place that is "strong". For example, in the evening when you go out to buy some bread and milk you may go to the nearest store, but mostly you go to a store nearby, but not necessarily the nearest that you know very well. Or, if you are going to a store you have known well and you see a store that is open during your trip, you may stop at this store you just saw. That store, as in migration studies, could be an "intervening opportunity". The target must be seen and it must be accessible.

In the literature on burglary, accessibility concerns the ease of entry to the target. As one burglar commented, "If it takes more than two minutes to get in, forget it" (Cromwell *et al*, 1991). As noted in Chapter II, burglars most likely use such simple methods of entry as entering an unlocked door, breaking a window, prying open a door, or crashing through a door by "direct impact" (Cromwell *et al*, 1991; Rengert and Wasilchick, 1985; Maguire and Bennett, 1982; Waller and Okihiro, 1978; Reppetto, 1974). Furthermore, the burglar may be in the house for no more than just a few minutes - usually less than ten (Cromwell *et al*, 1991; Rengert and Wasilchick, 1985; Maguire, 1982; Walsh, 1980). Accessibility also includes leaving an area. It is a consistent finding throughout the criminological literature, in interviews with incarcerated and non-incarcerated burglars, that an escape route is a crucial factor taken into consideration when selecting a target for a burglary (Cromwell *et al*, 1991; Nee and Taylor, 1988; Bennett and Wright, 1984; Maguire, 1982; Waller and Okihiro, 1978).

In this study, three general measures of accessibility are used. The measures look at "ease of access". Accessibility allows a burglar to approach a property. If a building has many entrances, many units with balconies and even a large proportion of units on the ground floor with windows that can be reached standing on the ground, the "ease of access" to the building probably increases. In this study, general measures of accessibility include:

balcony ratio = number of balconies on the main floor/the total number of ground floor suites * 100

entrance ratio = number of entrances into the building (including sliding glass windows)/the total number of ground floor suites * 100

ground floor apartment ratio = number of apartments on main floor/total number of building suites * 100

The study also uses a slightly more complex perspective on accessibility. The study looks at an estimate of the number of turnings from the street to the apartment unit. In the urban geography literature a means to measure distance or accessibility is to count turns or "turnings". This technique uses the "Manhattan" (city block) metric. It is a measuring device used to determine the distance between two places (Coffey, 1981). A "turn" is defined as a change in direction of a path or a break in a travel path. When travelling down a street, whether on foot or by automobile, one may make a left turn or a right turn at an intersection. Crossing a street is also defined as a turning as it is a passage through a break. Each turning increases one's perception of distance. In the criminological literature, Beavon (1984) used Manhattan metric "turnings" to measure accessibility and criminal activity.

What is suggested here is that "turnings" can also be applied at smaller levels of aggregation including the floor level of the apartment suite within the apartment building. If one considers the lay-out of an apartment building, accessibility is greatest on the ground floor. Not only can burglars gain access or easy exit by the main door and/or by the secondary entrances to the building, but also, each apartment on the main floor has windows and/or patio doors, and/or balconies as well as an entrance from the hall way. Where accessibility is greatest, targets that are located on the more travelled paths of offenders are more likely to be a part of a person's awareness space. However, as one proceeds up through the building, the number of turnings necessary to get to the upper floors increases. The number of turnings increases as one crosses the entranceway, enters an elevator or ascends the stairs. As one moves up through the building, the number of turnings increases at each floor. Consequently, where there are conceivably numerous turnings, those upper floor apartment suites become less accessible. Accessibility, measured by turnings, decreases the further one moves up through the building and away from the ground floor.

Target Attractiveness

Additional variables under consideration include target attractiveness. Burglars may be pulled toward targets with goods worth stealing. The attractiveness of a target to a burglar may be reflected in the physical care of the building. It was noted in my visits to the sites, that the more modern buildings are less dilapidated than older buildings. The general observation made by the writer is that the physical care of the building appeared to correspond to the relative age of the building. The older converted

single family dwellings are the least cared for and the modern high-rises and walk-ups are the most cared for. It may be argued that for a burglar, new buildings may suggest increased affluence of the residents who occupy them. For the purposes of this study, the age of the building is used as one proxy of target attractiveness. The age of each apartment building is determined by subtracting the year the building was constructed (as recorded by the Vancouver City Water Board) from 1981 (the year the data for this thesis was initially compiled).

Age = 1981 - year the building is constructed

Another measure of target attractiveness is the dollar value of the property. Buildings that have higher dollar values may reflect the affluence of the occupant. As the building value and land value is known for each property (Vancouver Water Board), it is possible to determine an average price per apartment suite.

T cost = cost of building + cost of land / total number of apartment units in the building.

These monetary and age measures are crude indicators of an apartment or apartment building's general attractiveness to the criminal population, but they are the best indicators available for this study.

Security

Burglary rates may also be influenced by obvious security measures. There is a great amount of variability in locking systems in apartment buildings. Some have no locks on entrance doors. Others have locks and elaborate phone systems. In some urban centres, apartment buildings may even have doormen. Some research suggests that

burglars may be influenced by locks (Bennett and Wright, 1984; Walsh, 1980; Reppetto, 1974; Scarr, 1973).

In this study, security is briefly examined in terms of whether the front door of the apartment building is locked.[18] The general observation made by the writer is that multiple storey buildings had variations of telephone intercom services, security buttons, and locked doors. It should be noted, that despite the varying types of security "hardware", and even though some buildings were "technically" secure (i.e. building doors were initially locked), in all instances with all multiple storey apartment building types, the writer gained access to the a lobby or a hallway simply by walking in. Many security doors were propped open or were held open by the tenants.[19]

Security = front door of apartment building locked.

Before providing details about the West End study area, it should be noted that observations of the study area and the collection of the data from City Hall and the Vancouver City Police were collected and compiled by the writer. While this may ac-

18 This is by no means to imply that burglars gain access to a building solely via the main door. Burglars may also seek entry to the building via service doors and secondary entrances. The burglar may or may not gain access to the apartment suite via balconies and/or windows and so forth. If the ground floor window is also a patio door (i.e. sliding glass door), it is included in the entrance count. Otherwise, windows were not included as a measurement in this study.

19 Observations about the apartment buildings were collected during daytime hours on weekdays. While this may be the usual time many burglaries occur (Rengert & Wasilchick, 1985; Waller & Okihiro, 1978; Scarr, 1973), the writer's physical appearance may not be perceived as typical of a person searching for a target for burglary. Access to apartment buildings may not have been so easy had the writer been young and male.

commodate better internal reliability in the study, it cannot be guaranteed that the recording of this data is error free.

"Defensible Space" Features

While this thesis examines accessibility as a potentially important variable to be considered when examining patterns of burglary, other competing ideas are also tested. Oscar Newman's (1972) measures of "defensible space" retain some popularity. Measures of "defensible space" are used to see if they prove to be as good or better at explaining burglary rates in buildings.

Newman (1972) promoted the importance of "private spaces" and examined the proximity of the building entrances to the street. As mentioned before, Newman thought that "space" around private residences would be less attractive to criminals if it seemed private, and not public. He looked at entrances to the apartment buildings to see whether they were set back, thereby providing some inner court area or more green space, or whether the building is effectively "on the street". Private spaces are also measured by the amount of landscape "coverage" for each building. Shrubs, trees, bushes, along with such structures as half-walls, fences, and gates, depending on their permeability, could provide private space. The writer visited all sites and made observations about the distance the building is set back from the road and the type of shrubs.

landscape = amount of shrubs, trees, bushes, half-walls, fences and gates measured according to high, medium or low.

entrance = entrance of building "set back" or "on the street".

In considering "defensible space", Newman (1972), and more recently Coleman, (1985) suggest that the lay-out and structural design of walk-up apartment buildings in general increase chances for residents to survey their residences and their surrounding areas. Consequently, residents in walk-ups have better "informal" social controls and this may result in lower nuisance problems, including lower crime. This is in conflict with the accessibility ideas under study in this thesis.

As noted in the previous chapter, the literature on burglary has shown no strong reason for expecting "defensible space" variables to be important, but they are included because the idea of "defensible space", security and the value of goods influencing crime is still attractive to some. Due to these previous ambiguous research results, it is not expected that there will be significance in the relationship between residential burglary and the independent variables of target attractiveness, security and defensible space features.

The West End

The study area for this thesis is located in a section of Vancouver, British Columbia known as the West End. Adjacent to the downtown core of Vancouver, the West End is and will remain a designated high density residential area (Kelly, 1979; Hartwick, 1972; Collier, 1971). This area is referred to as the "... most densely populated residential area in Canada" (Collier, 1971:1). Bounded on the east by Burrard Street, on the

west by Stanley Park, on the south by English Bay, and on the north by Coal Harbour, the West End consists of ninety-six city blocks.[20]

One of the oldest sections in the city of Vancouver, the West End originally developed in the late nineteenth century as an exclusive residential area for Canadian Pacific Railway executives. Dubbed "Blue Blood Alley", this area was set aside for high income earners (Urban Renewal, 1979; Collier, 1971; Urban Renewal, 1963). But, due to its proximity to the centre of Vancouver, it readily became an area of high population growth. The conversion of large single family residences into multiple family residences, along with the re-subdivision of large estates into smaller lots for additional dwellings has been ongoing since approximately 1905 (Urban Renewal, 1979).

During World War I population pressures led to the sub-division of many of the estates and the construction of the first apartment buildings. As early as the 1920's, this area was designated by city officials as an area desirable for high density residential living (Collier, 1971). By 1930, seventy-eight apartment dwellings (Collier, 1971; Urban Renewal, 1963) were completed, and since that time, a steady replacement of old estate houses by apartment complexes has continued. All of this has consolidated the trend toward high-rise development.

20 As noted earlier, due to the fact that the environmental data and the recorded burglary data were collected in 1981, this study is a historical case study.

The last completed census covering the time frame for the residential burglaries is 1981. According to that Census the population of the West End was a relatively diverse one in terms of age, ethnic composition and occupation. There was a mix of ages which differed little from the population averages for the city of Vancouver. Numbering approximately 36,000, the West End was characterized by a disproportionately small number of young people below age twenty, while older groups, that is people over 55 years old, had a larger than average representation (Brantingham and Brantingham and Butcher, 1986; Urban Renewal, 1963). There was a high percentage of single persons ages twenty to thirty-five, with females dominating. These demographic characteristics had remained relatively stable since World War II (Brantingham and Brantingham and Butcher, 1986; Kelly, 1979; Urban Renewal, 1963).

Although the West End is unique in Canada, it does have some similarities with other high density residential areas located close to the downtown core of Canadian cities. The other core areas, like the West End, tend to draw younger, single people with no children, and older people without families. The dominant occupations tend to be sales, clerical, service workers and professionals, all of whom tend to go out more, who patronize entertainment and recreational facilities, are generally more mobile and willing to move (Kelly, 1979; Collier, 1971). The usual explanation given for this is that apartment buildings provide relatively few accommodations for families with children and that the location of these areas relative to the downtown core is closer to employment and entertainment facilities (Collier, 1971; Urban Renewal, 1963).

The West End is noted for its "transient" lifestyle and "fast living". However, what needs to be pointed out is that the demographic characteristics described earlier have remained relatively uniform since World War II (Kelly, 1979; Urban Renewal, 1963). Furthermore, the majority of residents who reside in the West End have an average length of residence of 4 years (Brantingham, Brantingham and Butcher, 1986; Kelly; 1979; Collier, 1971). The West End is an area known for ongoing demolition and re-construction zones. In this study, such factors can be said to contribute to methodological instability. But what is of significance is that all the demolition and construction typical of the West End has been toward high-rise development or other types of multiple family dwelling units (Kelly, 1979; Urban Renewal, 1963).

There are differences to be noted between the West End and other areas of Vancouver City. In addition to the differences in population characteristics, differences were also noted in the physical construction of apartment buildings found in the West End and those found in other parts of Vancouver. In the West End, 25 percent of the apartment suites consisted of bachelor suites, 57 percent were one bedroom accommodations and 13 percent were 2 bedroom suites (Urban Renewal, 1963:27). The corresponding figures for the City of Vancouver were 10 percent, 59 percent, and 18 percent respectively (Urban Renewal, 1963:27).

Details of the Study Area in the West End

The study area is a specific sub-area within the West End. The sub-area is the centre of the West End. It is a six by eight block area bounded by three commercial streets: Denman Street on the west, Davie Street on the south, Robson Street on the

north, and one main thoroughfare artery, Thurlow Street, on the east. The study area accommodates approximately 300 buildings, including multiple storey apartment buildings, boarding houses, townhouses and single family dwellings. Because this study focuses on multiple storey buildings, this latter group including boarding houses, townhouses and single family dwellings are not included in this study.

Description of the Environment Data Set

For the descriptive information about the buildings, land use maps provided information about the physical lay out for those buildings built prior to 1977. There are gaps in the description of buildings built between 1977 and 1980, the years for which burglary data were collected. Furthermore, in many of the apartment complexes, the number of residential suites did not necessarily correspond to the floor of the building. For example, in some buildings, apartment units may be numbered A,B,C,D, or be numbered 1E, 2D, which may or may not correspond to the floor location. Therefore, descriptive information as to the number of floor and specific floor location of the apartment unit was assembled by the writer by visits to the site.

In this study area, different types of multiple storey residential buildings are noted. There are modern high-rise apartments and townhouses built since the 1950's which appear to be the trend for future development. As well, there are residential buildings that are four to six storeys, residential buildings of two and one half storeys with basement and/or top floor apartments, single family houses converted to boarding houses or up/down duplexes. Although, this latter category continues to be found throughout the study area, it is giving way to the more modern structures noted earlier.

In regard to the physical condition of the apartment buildings, the observations made by the writer are that the physical care of the buildings appears to correspond to the apparent age of the building: the older converted single family dwellings are the least cared for, and the modern high-rises are the most cared for in terms of physical appearance.

The residential apartment buildings included in this study area are typical of the kinds of accommodations built during the 1950's, 1960's and 1970's in other large Canadian cities. The physical exterior characteristics and forms of the apartment buildings varied somewhat, but the physical configurations are rectangular shapes, curved, L-shaped, or pentagonal. Nonetheless, whatever the exterior shape of the buildings, they are essentially similar in their basic concepts. Each apartment building has on each floor a central access corridor from which direct entry to the apartment unit is made. All apartment suites within the buildings are single storey. There is access to each floor, reached through a central lobby. Some of the entrance ways contain gates or have sitting areas as part of the entrance space. Within the apartment building, the immediate home environment is the residential suite or apartment unit. This area typically consists of a living-room, kitchen, dining-area, combined with a bathroom (as in a bachelor suite), or one or more bedrooms and perhaps an adjoining balcony.

In high rise and walk-up apartments, one point to note is the manager's office. For most apartment buildings, with the exception of a sign on the hall door, there is no obvious physical difference between the manager's unit and the apartment units within the building in terms of its physical lay out or appearance. In many instances, the office

is located within the residential suite of the building manager. In these instances, such units are included in the data base. Burglaries occurring in these units are classified by police records as residential, and they are included in the data base of this study. Burglaries of a manager's office which is physically separate from the residential unit are not included in the analysis.

In some buildings, the roof tops are used as areas of additional open space or for penthouse suites. They are generally used for leisure or recreational activities such as growing small gardens and flowers or sun-tanning. Access to these areas is from the apartment units on the top floor.

As noted in the general description of the study area, the area contains single family houses converted to boarding houses or up/down duplexes. This type of building continues to be found throughout the area, but is giving way to the more modern multiple storey buildings. Burglaries that occur in these boarding houses are excluded from the study, even though they are residential burglaries and the buildings are multiple unit accommodations. The decision to exclude rooming house burglaries is due to difficulty in ascertaining the exact location of the burglarized units. Police records are not consistent in distinguishing between burglaries of private quarters occupied by tenants and those dedicated as communal living area for boarders. To avoid confusion in the burglary count, rooming houses are not included in the study. Single family dwellings and burglaries occurring in townhouses and duplexes are also not included for the obvious reason that they are not multiple-storey dwellings. For similar reasons, burglaries that occur in daycare areas, high schools, churches, or the community drop-in centre

located within the boundaries of the study area are not included. There is a senior citizen community centre located within the study area. This centre provides residential living quarters for seniors, and its physical design is that of an apartment building. It consists of self-contained apartment suites and its physical design is like that of other apartment buildings found within the area. Burglaries occurring in the apartment units within this centre have been included in the data base.

It is the general practise of builders, architects and urban planners to eliminate the number thirteen in their floor counts. Usually for superstitious reasons, the thirteenth floor is not counted but is considered the fourteenth floor. Consequently, on land use maps or in description of buildings provided by urban planners, building with thirteen storeys would be described as a 14 storey building. However, in order to provide a more accurate reading of patterns of residential burglary in apartment buildings, and the relationship of the pattern of burglary to the ground floor or the top floor of the building, the thirteenth floor in this study is counted. Therefore, a building designated as a twenty storey building in the land use map is counted as a nineteen storey building in this study.

As noted earlier, descriptive information as to the number of floors within the building and the specific floor location of the apartment unit is assembled by the writer. Each burglarized unit is located within the building as to whether it occurred on the ground floor, the basement, the top floor, the fifth floor, or whatever floor.

Apartment buildings are categorized into three types:

1. *High-rise apartment* buildings are in excess of six stories. This category also includes high-rises that are rentals and condominiums. Of the 70 buildings classified as high-rise, only a small number are noted to be condominiums (n = 8). Consequently, they are counted with rentals.

2. *Middle-size apartment.* These are apartment buildings with 4 - 6 floors and have an elevator. Again condominiums and rentals are collapsed.

3. *Walk-ups.* These are apartments characterized by 3 stories or less. Generally speaking, they have no elevators.

The number of apartment buildings under investigation includes 185 multiple storey buildings of which 76 are walk-ups, 39 are middle-apartment buildings (4-6 storeys), and 70 buildings are high-rises (over 6 stories). There are approximately 9,000 apartment suites. After eliminating burglaries occurring in boarding houses, townhouses and duplexes, and after eliminating burglaries recorded in locker rooms, storage bins and laundromats, there are 879 recorded residential burglaries.

This area is selected because it is firmly bounded by Davie, Denman, Robson, and Thurlow, which are similar commercial and high traffic streets. The six by eight block study area historically has been and continues to be referred to as a high-rise residential area. While types of housing vary from small apartments to large apartment buildings, they are mixed together in a fairly uniform manner. In this way the area has

homogeneous variety. As well, the area has common landscaping, and a regular street grid system. It can be seen as a fairly uniform area.

Second, as previously noted, in an effort to control the high traffic flow through the West End, physical traffic barriers were placed to re-route the traffic away from the designated residential areas of the West End back to the major thoroughfares of Davie, Denman, Robson, and Thurlow (Kelly; 1979). The re-routing increased traffic flow along those major streets and simultaneously created a boundary around a multiple-storey residential area. In so doing, it produced a well defined study area.[21]

As noted earlier, due to the West End's proximity to the business centre of Vancouver and to the tourist attractions of Stanley Park as well as its proximity to the com-

21 Even though much of the thoroughfare traffic has been re-routed to the designated arteries, the study area remains well-known. As noted earlier, for several reasons, it can be argued that the West End, and the study area located within it, is within the awareness space of many people including those who commit burglaries.

mercial areas along Robson, Davie and Denman, the study area within the West End is probably within the general awareness space and high activity space for many people. Although this is not an official part of this thesis, the characteristics of the population sample are reasonably consistent with the general demographic characteristics of the West End's general population. It is, perhaps, possible that the results of this study can be generalized to the rest of the West End.[22]

The Data Base

This study looks at residential burglary patterns in a six by eight block area in a high density neighbourhood known as the West End. The legal definition of break and

22 In 1981, the researcher supervised a survey in the study area and compiled social-demographic characteristics of the residents on a random sample basis. The sample was based on a geographically staged random sample procedure similar to that employed in the NCS cities surveys. A ten percent random sample of the blocks in the target area, and a ten percent random sample of buildings on each selected block, were chosen. Dwelling units in selected buildings were over sampled in order to allow for refusals. The first available adult at each selected dwelling unit was interviewed. Interviews were conducted on Sunday afternoons in the autumn, during Canadian Football League playoffs, in an effort to find people at home and to prevent a sampling bias toward unemployed females. After refusals, 91 interviews were conducted.

The characteristics of the population sample are reasonably consistent with general West End patterns, given recent trends toward gentrification. The sample was 54 percent male, and highly educated: 13 percent had completed post-graduate education; another 9 percent had graduated from college; another 25 percent had completed high school. Twenty-three percent had incomes under $10,000; 30 percent had incomes between $10,000 and $20,000; 13 percent had incomes between $20,000 and $30,000; and 13 percent had incomes of $30,000 and over. Ethnically, the sample was representative of the West End: 86% were Caucasian; 4% East Indian; 3% Oriental; and 7% from other ethnic groups. Most respondents (87%) rented. Almost 60% of the respondents had lived in the area five years or less, while 26% had lived in the West End ten years or more. Almost three-quarters had lived in the specific building for less than five years; half for less that two years; a fifth under six months (Brantingham, Brantingham, & Butcher 1986:148-149).

entry as stipulated by Section 348 *Canadian Criminal Code* is the one used by Canadian police officials to record what is being called residential burglaries in this thesis.

This study deals specifically with residential burglary. It does not include attempted residential burglaries.[23] The study examines all residential burglaries reported to and recorded by the Vancouver City Police for the forty-six month period from January 1, 1977 up to and including October 31, 1980. Each residential burglary recorded in police files included a specific address, including the apartment number. The burglary must be an actual residential burglary occurring within a residential apartment suite located within a multi-storey residential building to be included in the data base.

In gathering the data for this thesis there is no attempt to utilize the technique of random sampling. Sampling is not used for several reasons. First, despite suitable police reporting records for this study, residential burglary, as with crime in general, remains a relatively low frequency event (Maguire, 1982).[24] A second consideration is the size

23 A consideration to be made is the difference between a residential burglary and an attempted one. In an effort to clarify any likely confusion, the writer questioned several members of the Vancouver City police force. The general consensus employed by police members is that if a residence displayed marked signs of entry, such as bashing on the door, jemmying of the lock, tampered or broken windows or any other indications of illegal entry, and if personal items were disarrayed or missing, a residential burglary was recorded. However, if visible signs of entry were the only indication, but no physical entry into the residential suite was obvious, then an attempted residential burglary was recorded.

24 According to the Home Office (1980), the risk of burglary in England and Wales during 1980 was approximately 25 per 1,000 dwellings. In Toronto, the risk was 26.4 burglaries per 1,000 dwellings (Waller Okihiro, 1978). According to Brantingham & Brantingham (1984:23) "Only a few homes in a thousand are apt to be burglarized in a year's time".

of the study area. The area had approximately 9,000 apartment units. This is a small geographical area for study, which suggests use of actual occurrences, rather than random sampling. The omission from this study's data base of burglaries occurring in rooming houses, townhouses, duplexes, and single family residences, and of burglaries where the apartment number was not included or was otherwise erroneously recorded, suggested that to insure sufficient data counts, all residential burglaries occurring in a multi-storey building within the six by eight block study area that did qualify for inclusion should be counted. These would be identified by their precise floor location within the apartment building. The effects of this decision not to sample will be discussed in the statistical section of Chapter VII.

Initially, information about residential burglaries compiled from Vancouver City Police records are at the block level. That is, each burglary is recorded according to a block number, for example, the 800 block or the 900 block of Broughton Street, and the building it occurred in. Each burglary file number was then checked by the writer against a police-address file that indexed burglaries according to the street address. The writer also determined whether the address was for a residence or for a commercial establishment. Commercial burglaries are excluded. The file also distinguished whether the burglary occurred in the residential suite, the apartment building foyer, a storage locker, building laundromat, and so forth. Where apartment storage lockers or bins, or apartment laundromats are burglarized, they are not included in this analysis. This is because lockers and bins are usually located in the basement of the building and are physically separate from the residential suites.

Residential Burglary Rate

In the past, crime rates have usually been expressed in terms of the number of crimes occurring per units of population (Brantingham and Brantingham, 1984). While a population number may be appropriate as a denominator for ratios for some offenses such as homicide, assault, or rape, or for other crimes where the target is a person, the general use of a population base as a denominator for property-related crime categories may be inappropriate and yield misleading patterns (Brantingham and Brantingham, 1984, 1991; Beavon, 1984; Harries, 1981; Rengert, 1981; Clarke, 1980; Boggs, 1966). A more accurate rate for assessing potential targets for property offenses is one that examines the offence in relation to the number of targets at risk to the crime under examination (Brantingham and Brantingham, 1984, 1991; Rengert, 1981; Boggs, 1966).

To examine the hypothesized patterns of residential burglary at the building level as well as examining burglary at the floor level within the building, it is necessary to establish separate measures or rates of residential burglary. Two rates are used: burglary rates per apartment building and burglary rates for floors within apartment buildings.

To examine the relationship between building height and burglary rates, the following rate is calculated:

Burglary rate per building = Total number burglaries in the building/total number of units in the building * 100.

For the purposes of examining the relative risk of units and different floors within the building a risk ratio is calculated:

Burglary rate per floor = Total number of burglaries on the floor/ total number of units on the floor * 10.

Official Crime Records

Prior to analyzing the data in this study, the residential burglary rates, there are various problems and limitations that accompany the use of data gathered from official police reports (Gove, Hughes and Geerkens, 1985). Essentially, the centre of the controversy is that information collected is limited in its ability to measure accurately the true amount of crime within a given time frame, within a given geographical area (Beavon, 1984). This is not to say that officially recorded data are unworthy of analysis, for criminological research cannot substantially advance without using it. Rather, it is important to note that the use of official statistics by researchers should not be taken as true measures of the actual extent of crime. What is presented here is based on the idea that the use of official police data is an important available form of information, despite having many identifiable faults.

The central issue in the debate about the use of official statistics revolves around the "dark figure", that is, the amount of crime that goes undetected, unreported or unrecorded (Gove, Hughes and Geerkin, 1985). In the literature, there are several common reasons given why crimes may not be reported by a citizen. The criminal behaviour may not be perceived as a crime by the victim or the witness. The victim may know a crime has been committed but, for many reasons he/she might not report it because he/she may empathize with the offender or may regard the harm done as too trivial, or the victim may dislike or not trust the police, or he/she may fear reprisals, or he/she may fear his/her own deviant activity will be exposed, or he/she may feel that nothing

would be achieved by calling the police. (In general see Gove, Hughes and Geerkin, 1985; Hood and Spark, 1974).

With regard to the specific crime of burglary, it may be more common than police statistics reveal. But there is some indication in the literature that the estimated burglary rates may have a rough correspondence with what is happening in the community (Gove, Hughes and Geerkin, 1985). Reporting burglars to the police decreases with the number of attempted burglaries and the number of burglaries completed without force (e.g. in instances where doors are unlocked or windows are open). Reported residential burglary is greatest when there is forced entry. Burglaries with the greatest loss and the greatest amount of threat are reported to police officials most often (Brantingham and Brantingham, 1984). Over-all, completed burglaries in an area where forced entry is usually necessary may have higher reporting rates.

However, what must be pointed out is that official statistics are the only source of information about burglary patterns over an extended period of time for a micro-environment analysis. It is conceptually feasible that victimization surveys could be frequently repeated in a micro-environment for four or five years, but the cost, given the number of people who would have to be sampled to examine burglary by floor in apartment buildings, would be extensive. These victimization surveys would have to be frequent, since new residents do not necessarily know about previous burglaries in their new homes.

Given the characteristics of the West End, it is unlikely that burglary reporting patterns are likely to change. Official burglary statistics are likely to reveal the same

spatial pattern that repeated, cumulative victimization surveys would, but are likely to be more accurate about the spatial patterning of burglary than a one-time-only survey. A survey covering only a short time-frame is likely to distort spatial patterning seriously. Official statistics are a better source of information.

CHAPTER VII

FINDINGS

The purpose of this chapter is to outline the statistical analysis used in this study and to present the findings. For easier presentation, this chapter has been sub-divided under several headings. The first section describes the relationship of recorded residential burglary to the height of the building. The second section examines the relationship between the residential burglary rate and the floor level of the building; that is, do rates vary from floor to floor in a building. The third section describes whether the presence of apartment suites on the ground floor influences the residential burglary rate of the apartment buildings. Statistical tests used include analysis of variance, multiple regression and analysis of covariance. Before presenting details on each of these sections, a general overview of the statistical techniques will be presented.

The Statistical Analysis of the Data

The use of statistical techniques to analyze the possible effect that the floor location of an apartment suite may have on the residential burglary rate of a building serves two purposes. First, statistical techniques allow a researcher to summarize the data. Through the use of statistical analysis, a researcher can attempt to isolate the effects of one variable on another. Second, statistical analysis allows for inductive generalizations. Inductive logic allows one to make generalizations about some population on the basis of a sample drawn from this population (Blalock, 1961). Statistical analysis in this

study is more descriptive in nature. As noted in the previous chapter, using the entire population of residential apartment units in the study area is necessary to make it possible to explore burglary rates. Crime is rare. Any inferences from this study have to be to other time periods or other residential areas, while such inference can be made based on the research, it would not be a statistical inference to a population (Greenberg, 1979; Blalock, 1961).

The use of significance tests on the data allows the writer to help describe the variations in residential burglaries in different buildings and/or on different floor levels in a multiple storey residential building. Statistical tests allow the writer to measure the strength of a relationship among variables and between variables and to determine the direction of that relationship. While the study area may not be representative of other high density residential neighbourhoods in Vancouver, the results may be similar to results found in other high density neighbourhoods in cities of similar size and similar characteristics. Findings from this study will add to the already existing body of literature on spatial-opportunity models.

Statistical Techniques

In each of the subsequent sections, statistical techniques are used to test the relationship between the dependent variable, that is, the amount of reported residential burglaries, and independent variables, including measures of building accessibility, "defensible space", target attractiveness and building security. Despite the findings of any relationships, it must be pointed out that the relationship between any of these vari-

ables could be the result of confounding factors. The techniques used include analysis of variance, multiple regression and analysis of covariance.[25] In Table 1, a list of variables used in the statistical analysis is displayed.

Residential Burglary by Building

Looking at buildings over-all, the mean recorded residential burglary rate is 13.94 per 100 units in the study area. That is the average across all of the buildings is nearly 14 burglaries per 100 units (see Table 3). Some suites are being burglarized multiple times while others are never targets. The variance is quite high (standard deviation is 14.05).

Some buildings have high rates; some buildings have low rates (see Table 2). The lowest rate is zero (thirteen buildings have no burglaries). The highest rate in one apartment building is 72.7 per 100 units. Over-all, 50 percent of the buildings have rates below ten per 100 units; 75 percent have rates below 19 per 100 units. But ten percent have rates over 30 per 100 units (Table 2).

25 The statistical analyses that are performed in this thesis utilize SPSS-X.

Table 1

LIST OF VARIABLES IN THE STATISTICAL ANALYSIS

VARIABLE	NAME	CALCULATION
Age of building	AGE	1981 - (Year of construction)
Ratio of balconies on ground floor	BALC	Number of balconies on the main floor/the total number of ground floor suites * 100.
Security	LOCK	Whether main door was secure.
Landscape coverage	COVER	Dummy variable coverage. Landscaping measured as high, medium, low.
Ratio of entrances on the ground floor	ENTRE	Number of entrances into the buildings/the total number of ground floor suites * 100.
Average cost of apartment	T COST	Cost of building + cost of land per # of suites in the building.
Height of building	FLOOR	Number of floors in apartment building.
Burglary rates per 100 units	BER	Total number of burglaries in the building/the total number of units in the building * 100.
Burglary rates per 10 units	BER1	Total number of burglaries on the floor/the total number of units on the floor * 10.
Location of entrance	ENT	Positioning of the main entrance as to "on the street" or "set back" away from the street.
1st floor apartment ratios	APT	Number of apartments on main floor/the total number of building suites * 100.

Table 2

BURGLARY RATES CUMULATIVE PERCENTAGES

BURGLARY RATE	CUMULATIVE PERCENT OF BUILDING
0	7.6
< 2 per 100	14.0
< 4 per 100	20.5
< 6 per 100	29.2
< 8 per 100	39.2
< 10 per 100	52.0 *
< 12 per 100	58.5
< 14 per 100	4.9
< 16 per 100	67.8
< 19 per 100	75.4 **
< 20 per 100	78.9
< 22 per 100	81.3
< 25 per 100	84.2
< 33 per 100	90.1 ***
< 50 per 100	95.9
< 60 per 100	98.9
< 67 per 100	99.4

* 52 percent of buildings have burglary rates below 10 per 100 units.

** 75 percent of buildings have burglary rates below 19 per 100 units.

*** 10 percent of buildings have burglary rates over 30 per 100 units.

Table 3 shows that the mean residential rates for walk-up apartments is 17.96 burglaries per 100 units, (n = 76) while middle sized apartments (4-6 storeys) average 16.30 per 100 units (n = 39). High-rise apartments are obviously lower at 8.26 per 100 units (n = 70). The mean burglary rate for walk-ups and middle apartments buildings are obviously close.

Table 3

MEAN RESIDENTIAL BURGLARY BY BUILDING TYPE

TOTAL POPULATION 13.94 (n=135)

WALK-UP	MIDDLE SIZE (4-6)	HIGH-RISE
17.96 (n=76)	16.3 (n=39)	8.26 (n=70)

A one-way analysis of variance was run to determine if the burglary means for walk-ups and middle-size apartment buildings are significantly different from the third building type - high-rise apartment. In light of the fact that there are only a maximum

of three floors difference in the height of walk-up apartment buildings and those classified as middle apartments (4-6 storeys), an argument can be made that middle-apartments and walk-ups can be examined as one category.[26]

The results of the analysis are displayed in Table 4. They show that two significant groups are identified: one group consists of walk-ups and middle-rise buildings while the second group consists of high-rises. The burglary rates in walk-ups and middle-rise buildings are different from burglaries in high-rise apartment buildings (F ratio = 7.577 p. = .0007 d.f. = 2 (Table 4).

Examining the same variables, but excluding those buildings where zero residential burglaries are recorded, shows that the difference between the residential burglary mean according to building type is more pronounced. The results of the one way analysis of variance are displayed in Table 5. The mean of each building type varies substantially over the mean rate. The mean residential burglary rate for walk-ups is increased to 20.71 per 100 units (n = 64), while the middle sized apartment average is 17.18 per 100 units (n = 37). High-rise apartment buildings remain significantly lower at 8.99 per 100 units (n = 57) (F ratio = 12.1 p. = .000 d.f. = 2).

26 By using the sub-command "contrast", the amount of recorded residential burglary that occurred in residential walk-up buildings and middle apartments is compared to recorded residential burglaries in high-rise apartments.

Table 4

ONE-WAY ANALYSIS OF VARIANCE:

TESTS FOR THE RELATIONSHIP BETWEEN BUILDING TYPE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	2849.2343	1424.6172	7.575	0.0007
WITHIN GROUPS	168	31593.2441	188.05		
TOTAL	170	34442.4784			

SCHEFFE PROCEDURE

RANGES FOR THE 0.05 LEVEL

MEAN	GROUP	GROUP 3	GROUP 2	GROUP 1
8.8320	GRP 3			
16.3019	GRP 2	*		
17.9081	GRP 1	*		

* Denotes pairs of groups significantly different at the 0.05 level.

Table 5

BURGLARY RATE

	ALL BUILDINGS	BUILDINGS WITH AT LEAST ONE BURGLARY
WALK-UP	17.96 (n=76)	20.71 (n=64)
APARTMENT (4-6)	16.30 (n=39)	17.18 (n=37)
HIGH-RISE	8.26 (n=70)	8.99 (n=57)
	f=7.147	f=12.1
	d:f.=2	d.f.=2
	p=0.000 (n=185)	p=0.000 (n=158)

The results of the analysis of variance indicate that a relationship between a classification of buildings by height and their associated residential burglary rate is strong. Rates go up as height goes down. But, in order to further examine this relationship, additional analysis is performed to find if the other variables described in the previous chapter help define the relationship between building type and residential burglary.

In the previous chapter, research was described that included speculation that the amount of residential burglary may be influenced by variables measuring "defensible

space". Physical building features such as landscape-coverage and the position of the building entrance may help define "semi-private" spaces. This may result in increased informal social controls among residents and would result in reduced crime. As was noted earlier, studies involving interviews with burglars (Cromwell *et al*, 1991; Bennett and Wright, 1984; Hope and Clarke, 1984) indicate the opposite. These same features may provide "cover", as burglars are effectively protected from the prying eyes of neighbours and/or police. Consequently, there could be increased residential burglaries for apartment buildings. Defensible space variables are included in the analysis.

In addition, security measures are used in this analysis. Past research has been inconsistent regarding the importance of security. Bennett and Wright (1984), Walsh (1980) and Reppetto (1974) did find locks to be a significant factor in target selection by offenders. Rengert and Wasilchick (1985) and Scarr (1973) found burglars did consider the type of lock. Waller and Okihiro (1978) have argued that the use of extra locks result in a "security illusion". They suggest that apartment buildings with doormen have lower burglary rates and suggest that approximations to this, such as an intercom system might also reduce the risk of a residential burglary.

Past research has shown no strong reason for expecting these variables to be important, but they are included because the idea of defensible space, security and the value of goods influencing crime is still attractive to some. Due to these previous ambiguous research results, it is not expected that there will be significance in the relationship between residential burglary and the independent "security" variables.

The results of the multiple regression are displayed in Table 6. Multiple regression on the data is useful in order to isolate the independent effects of the variables that the literature on residential burglary and "defensible space" suggest.[27] Of the variables entered into the equation, the independent variables related to defensible space, target attractiveness and security show no importance in describing the variation in burglary rates. The only independent variable that does show significance is the building height.[28]

Over-all only a small amount of the variation in burglary rates for buildings is explained in the regression analysis (R = .15). This is not surprising. The burglary rates vary greatly. Over-all the burglary rates are not that high. It is most likely that, if one examines a group of similar apartment buildings, the burglary rate would vary. It is analogous to choosing an apple from a pile. Even if there is a preference for a size, shape and colour, only one gets picked. When many of similar size, shape and colour exist, some "good" target apples get ignored.

27 In some cases when examining the variables, the correlations are obvious. For example, it is not surprising that building height and the average cost of an apartment suite are positively related ($r = .74$ $p. = .000$ $n = 172$). The more recent buildings constructed in the study area at the time of the collection of the data tend to be high rise apartment buildings. Consequently, they would have a higher dollar value for apartment suites. Generally speaking, as the age of the building increases, then the cost, the landscape-coverage, the security of the building and building height (FLOOR) are negatively correlated. (Table 6).

28 While the results show no statistical significance, it cannot be ruled out that this may be in part due to the weak nature of the measurements of the independent variables.

Table 6

MULTIPLE REGRESSION

BUILDING BURGLARY RATE WITH DEFENSIBLE SPACE VARIABLES

SECURITY AND TARGET ATTRACTIVENESS

VARIABLE	CORRELATION	PARTIAL CORRELATION	BETA	T-VALUE	SIG. T.
AGE	0.168	-0.041	-0.054	-0.550	0.583
BALC	-0.013	-0.040	-0.049	-0.540	0.590
LOCK	-0.177	-0.105	-0.113	-1.430	0.120
COVER	-0.083	-0.053	-0.056	-0.712	0.480
ENTRE	0.079	-0.073	-0.090	-0.990	0.320
T COST	-0.268	0.000	0.041	0.007	0.990
FLOORS	-0.348	-0.242	-0.393	-3.290	0.0012*

(* denotes statistical significance)

ANALYSIS OF VARIANCE	SUMS OF SQUARES	D.F.	MEAN SQUARE	F	SIGNIF OF F
REGRESSION	4277.35087	7	611.05012	3.827	0.0007
RESIDUAL	25063.13973	157	159.63783		

MULTIPLE R	0.381
R SQUARED	0.150

While the over-all R is small, the only variable that is important is building height (see Table 6). The baseline correlation between building height and burglary rate is -.347. As the height goes up, the rate comes down. The other variables measuring defensible space, security are minimal. The measure of attractiveness (average cost per suite) has a correlation of -.26, but when controlling for height and the other variables, the partial correlation between dollar value and burglary rate drops to .0005. Of the variables entered into the equation, what does show significance is the building height (FLOORS). In examining the correlation, the partial correlation and the significance of T., building height records -.347 and -.242 with a significance of T at .0012 (See Table 6). It should be noted, however, that while the results show no statistical significance for security and defensible space measures, it cannot be ruled out that this may in part be due to the weak nature of the measurements of the independent variables.

An analysis of covariance was done to follow up on the regression analysis to explore two additional variables.[29] The regression analysis found that building height was an important factor in predicting burglary rates. The analysis of covariance was used to combine the one-way analysis of variance shown in Table 3 with the results of the regression analysis, basically to explore how building crime rates vary by type of building (walk-up, middle-size apartment, high-rise) controlling for other variables. As well, the analysis was used to explore how rates vary as the proportion of ground floor units

29 While analysis of covariance and multiple regression under certain assumptions are statistically equivalent, analysis of covariance was chosen to focus attention on building height categories.

varies. Measures of "defensible space" features and security were used as covariates. Though based on the regression analysis, the number of covariates were limited.

In Table 7, the multiple classification analysis (M.C.A.) table shows how the mean for each type of building category (walk-up, middle-size apartment, high-rise) was effected when the covariates were used as statistical controls. This table is useful in showing the relation between the main effect (HIGH) and the covariates in a descriptive fashion. The mean of each category is expressed as deviations from the grand mean (13.94 reported residential burglaries per building). By examining the first column of unadjusted means, a pattern can be seen. As the height of the building increases, reported residential burglary decreases. The building height measure (HIGH) shows that apartment buildings with 3 floors or less (walk-ups) average 17.96 reported residential burglaries (13.94 + 4.02) while middle apartments (4-6 storeys) average 16.20 (13.94 + 2.36) and high-rise apartment buildings report and average of 8.16 (13.94 - 5.68). Although, as noted earlier in Table 3, the variation between walk-ups and middle apartments is not significant.[30]

Third column in the M.C.A. table controls for the effects of the three covariates. The variable building height still maintains the same pattern although each building type from the grand-mean is reduced. The building measure (HIGH) ranges from 16.82 recorded residential burglary for walk-ups, 16.38 recorded residential burglaries for

30 It should be noted that the "n" here is different from that shown in Table 3. Cases were dropped if the necessary data were lacking; this resulted in modified means.

middle apartments, and 9.4 recorded residential burglaries for high-rise apartments. This third column indicates that once the confounding influence of the covariates is controlled, that the difference between the different building types is smaller. Overall, however, the only covariate that had a significant impact was the proportion of building suites on the ground floor. The higher the proportion, the higher the burglary rate (F ratio = 3.5; p. = .03). This relationship is not surprising, since the proportion of ground floor apartments is greater in the low-rise apartment buildings.

In summary, the results of these statistical tests suggest that residential burglary does vary by building height. A closer look at the covariates and multiple regression results lends support to the hypothesis that as building height increases, and the proportion of total building units on the ground floor decreases, residential burglaries decrease. The analysis in this study lends no support to the view that "defensible space", security measures or "attractiveness" of targets affect the rate of burglary for buildings. But, as was previously described, the measures of these concepts have limitations and better measures might support the idea that "defensible space", "security" or "attractiveness" is related to burglary rates.

In the next section, residential burglaries by floor level will be examined.

Table 7

ANALYSIS OF COVARIANCE

BUILDING TYPE WITH ENTRANCE, BALCONIES,

APARTMENTS ON GROUND FLOOR

SOURCE OF VARIATION	SUMS OF SQUARES	D.F.	MEAN SQUARE	F	SIGNIF OF F
COVARIATES	2587.154	3	862.385	4.75	0.003
ENTER	86.712	1	86.712	0.47	0.490
BALC	41.728	1	41.728	0.23	0.632
APT	1573.341	1	1573.341	8.67	0.004

MAIN EFFECTS	SUM OF SQUARES	D.F.	MEAN SQUARE	F	SIGNIF OF F
HIGH	1270.428	2	635.214	3.50	0.032
EXPLAINED	3857.582	5	771.5116	4.25	0.001
RESIDUAL	32468.095	179	181.386		
TOTAL	36325.677	184	197.422		

Residential Burglaries by Floor Level

The general hypothesis in this study is that residential apartment suites located on the ground floor are "closer" to the street and are more at risk for a residential burglary than apartment suites located on the upper floors of the apartment building. As one moves away from the ground floor, and up through the apartment building, accessibility decreases. Consequently, reported residential burglaries should decrease. However, as one approaches the top floor, where accessibility may be perceived to be increased by its proximity to the top floor, reported residential burglaries for apartment suites on the top floor may increase. The rate may also increase on the top floor because of the location of penthouses. This section reports the statistical findings for this hypothesis.

In order to test this hypothesis, the mean rate for apartment floor levels were calculated. The tabulations are displayed in Table 8, Table 9 and Table 10. Each table displays the mean burglary residential rate, standard deviation and the number of buildings with the floors from the ground level to the twenty-third storey. Table 8 displays mean burglary rates for all floors in the apartment buildings. Chart 1 graphs these means (see pages 95 and 96). Table 9 displays the mean burglary rate by floor location, but it excludes those burglaries occurring on the top floors of the buildings. Chart 2 graphs the mean burglary rate for Table 9 (see pages 96 and 97). Table 10 displays the mean burglary rates occurring on top floors only. Chart 3 graphs the mean burglary rate by floor for Table 10 (see pages 98 and 99).

Charts 1 through 3 and Tables 8, 9, and 10 suggest burglary rates vary by floor. The mean residential burglary rate is highest on the ground floor and decreases as the floor level increases. In Table 8, residential mean burglary rates including all floors within the apartment building, range from a high of 2.569 burglaries per 10 units per floor on the ground floor (standard deviation = 4.14; n = 184) to a low of .194 burglaries for every 10 suites per floor on the fifteenth floor (standard deviation = .534; n = 21). As can be seen in Table 8, the mean burglary rate by floor level begins to increase again as one approaches the upper floors of high-rise apartment buildings. As hypothesized, the mean burglary rates do vary by floor level.

Looking at the variation in crime rate by floor level does require some careful considerations. The mean rate, as mentioned before, for the ground floor is 2.56, but the standard deviation is 4.14. The minimum value is zero. The maximum is 30 burglaries per 10 units. There are 184 buildings included in the analysis. As the floor height increases, the number of buildings included in the analysis drops. More buildings are short than tall. There are only eight with twenty floors; six with twenty-one floors; four with twenty two floors; and three with twenty-three floors. Differences between ground floor rates and the rates for top floors of the tallest buildings have little meaning given the limited number of extremely tall buildings , the variance of rates at all levels is substantial. As a conservative test, floor burglary rates were compared using a pair T-test with other floors in buildings of the same height. The T-test results are given in Appendix B. Over-all, the rates decrease as the height increases in the lower floors and are fairly equivalent in the upper floors. The low population size limits the power of this

analysis, however the over-all tendency, despite the high variance does lend support to the idea that rates decrease as accessibility decreases.

Tables 9 and 10, and Charts 2 and 3 show a similar pattern to what is seen in Table 8 and Chart 1. Rates decrease, but vary greatly, as height increases. However, the rate for top floors is frequently high. As seen in Chart 3, the top floor rates appear to be zero for several levels. The zero rates are most frequently associated with the rarity of some heights for top floors. For example, the top floor rate for a building of two or twenty-two stories is zero, but there are only two twenty-one storey buildings and one twenty storey building. But, it does appear that top floors which may be penthouse floors, are more accessible and generally have higher rates than other floors except floor one.

Table 8

MEAN BURGLARY RATES BY FLOOR

ALL FLOORS INCLUDED

	MEAN	N	STD. DEV.	MIN.	MAX.
GROUND FLOOR	2.569	184	4.141	0	30
FLOOR 2	1.148	185	1.747	0	10
FLOOR 3	1.064	175	2.094	0	11.43
FLOOR 4	1.629	118	3.381	0	20
FLOOR 5	0.613	74	1.486	0	10
FLOOR 6	0.592	71	1.186	0	6
FLOOR 7	0.665	68	1.391	0	7.5
FLOOR 8	0.482	66	0.847	0	3.3
FLOOR 9	0.513	64	1.805	0	10
FLOOR 10	0.439	55	1.238	0	5
FLOOR 11	0.472	47	1.535	0	10
FLOOR 12	0.406	38	1.176	0	5
FLOOR 13	0.478	29	1.104	0	4.29
FLOOR 14	0.266	23	0.639	0	2.5
FLOOR 15	0.194	21	0.534	0	2
FLOOR 16	0.367	19	0.683	0	2.2
FLOOR 17	0.219	19	0.539	0	1.67
FLOOR 18	0.394	18	0.737	0	2.5
FLOOR 19	0.788	14	1.809	0	6.67
FLOOR 20	0.573	8	1.316	0	3.75
FLOOR 21	0.556	6	1.361	0	3.33
FLOOR 22	0.278	4	0.556	0	1.11
FLOOR 23	0.505	3	0.592	0	1.11

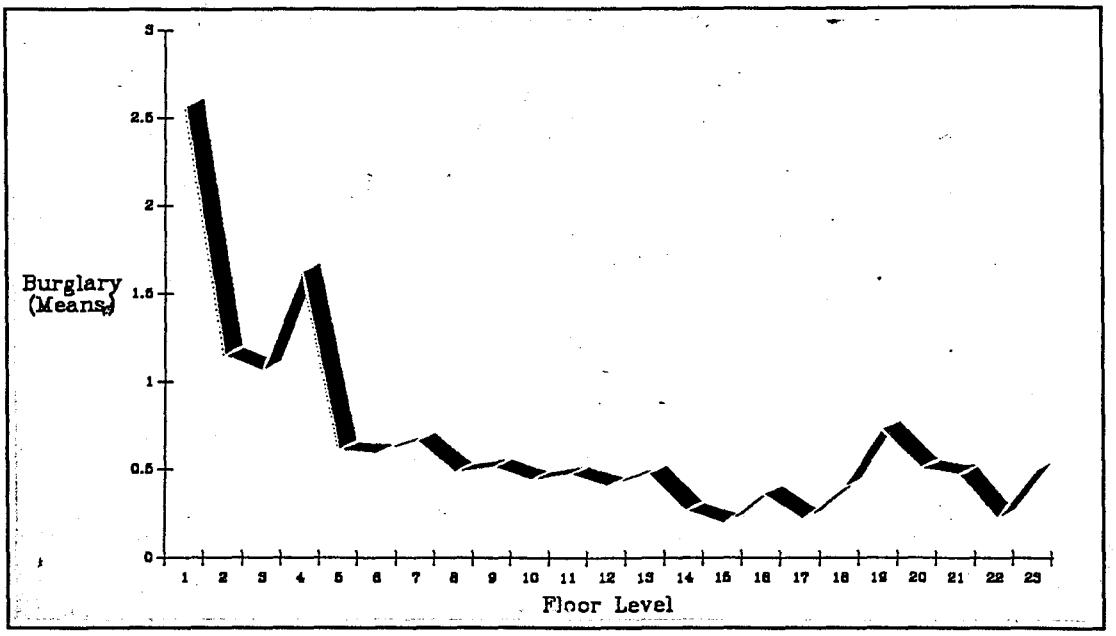

Chart 1 Burglary Rate by Floor Level (Including Top Floor)

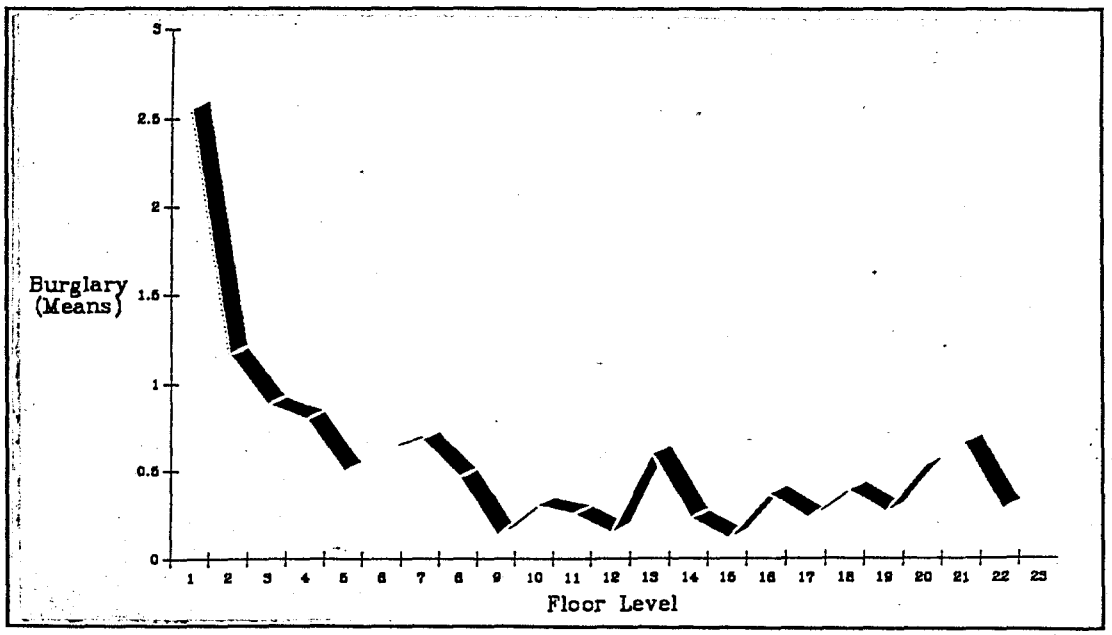

Chart 2 Burglary Rates by Floor Level (Excluding Top Floor)

Table 9

MEAN BURGLARY RATES BY FLOOR

EXCLUDING TOP FLOOR

	EXCLUDING TOP	N	STD. DEV.	MIN.	MAX.
GROUND FLOOR	2.781	170	4.141	0	30
FLOOR 2	1.160	175	1.76	0	10
FLOOR 3	0.886	118	1.60	0	11.43
FLOOR 4	0.801	74	1.53	0	10
FLOOR 5	0.498	71	1.01	0	4
FLOOR 6	0.618	68	1.21	0	6
FLOOR 7	0.685	66	1.41	0	7.5
FLOOR 8	0.465	64	0.84	0	3.3
FLOOR 9	0.129	55	0.42	0	1.67
FLOOR 10	0.301	47	0.92	0	5
FLOOR 11	0.254	38	0.52	0	2
FLOOR 12	0.144	29	0.44	0	1.67
FLOOR 13	0.603	23	1.22	0	4.29
FLOOR 14	0.231	21	0.64	0	2.5
FLOOR 15	0.110	19	0.34	0	1.25
FLOOR 16	0.367	19	0.68	0	2.22
FLOOR 17	0.231	18	0.55	0	1.67
FLOOR 18	0.389	15	0.77	0	2.5
FLOOR 19	0.262	9	0.55	0	1.25
FLOOR 20	0.536	7	1.53	0	3.75
FLOOR 21	0.667	5	1.67	0	3.33
FLOOR 22	0.278	4	0.64	0	1.11
FLOOR 23	0.370	3	0.79	0	1.11

Table 10

MEAN BURGLARY RATES BY FLOOR

TOP FLOOR ONLY

	TOP FLOOR ONLY	N	STD. DEV.	MIN.	MAX.
GROUND FLOOR					
FLOOR 2	0.829	10	1.585	0	5
FLOOR 3	1.430	57	2.844	0	10
FLOOR 4	3.020	44	4.898	0	20
FLOOR 5	3.300	3	5.774	0	10
FLOOR 6	0.000	3	0	0	0
FLOOR 7	0.000	2	0	0	0
FLOOR 8	1.000	2	1.41	0	2
FLOOR 9	2.860	9	4.15	0	10
FLOOR 10	1.250	8	2.32	0	5
FLOOR 11	1.380	9	3.3	0	10
FLOOR 12	1.250	9	2.165	0	5
FLOOR 13	0.000	6	0	0	0
FLOOR 14	0.417	3	0.722	0	1.25
FLOOR 15	1.000	2	1.414	0	2
FLOOR 16					
FLOOR 17	0.000	1	0	0	0
FLOOR 18	0.417	3	0.722	0	1.25
FLOOR 19	1.444	6	2.681	0	6.67
FLOOR 20	0.417	2	0.589	0	0.83
FLOOR 21	0.000	2	0	0	0
FLOOR 22	0.000	1	0	0	0
FLOOR 23	0.909	1	0	0	0.91

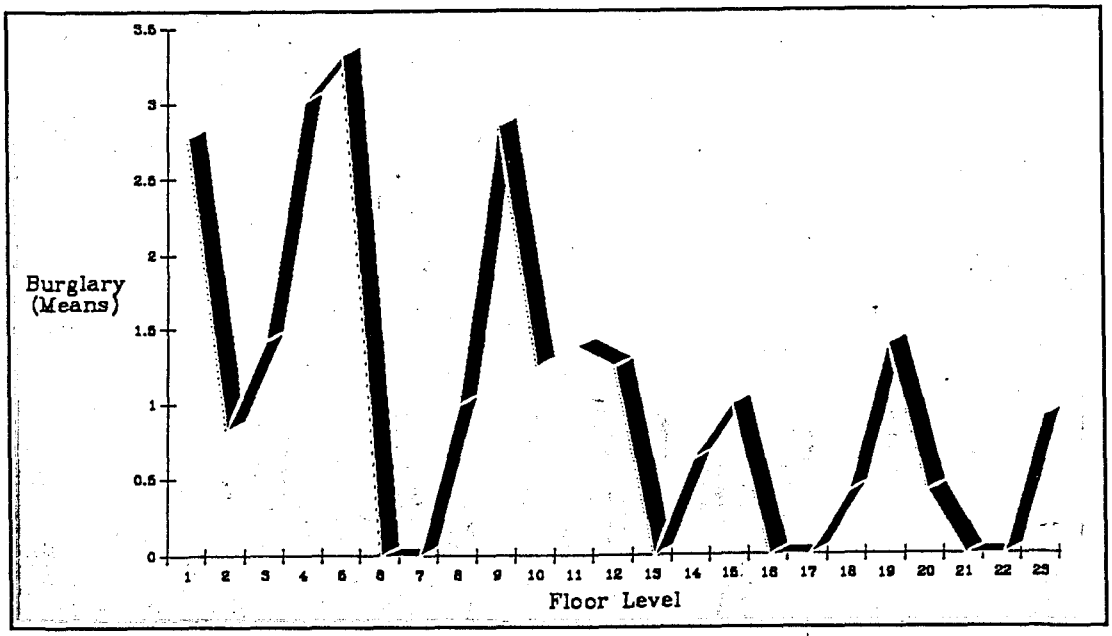

Chart 3 Burglary Rate by Floor Level (Top Floor Only)

The results of the statistical analysis of the previous two sections indicate that despite the high variability within the study area, apartment suites on the ground floor appear to be more at risk for a residential burglary than residential apartment suites located on other floors in the apartment building.

In summary, 95 percent of multiple-storey residential buildings with recorded residential burglaries experience at least one residential burglary on the ground floor. An alternative way to saying this, is that while only 9.65 percent of all apartment suites are located on the ground floor, 23.6 percent of residential burglaries occur in apartment suites located on the ground floor. With such findings, it is not surprising to see that it is the location of apartment units on the ground floor that influences the burglary rates for buildings.

The Influence of Ground Floor Apartment Suites on Residential Burglary Rates of Buildings

The final hypothesis to be examined is related to the proportion of apartment suites on the ground floor. This hypotheses is not independent of the previous two, but is a slightly different way of viewing burglary risk and apartment accessibility. As residential apartment buildings increase in height, the proportion of their total number of apartment suites on the ground floor decreases. Consequently, it should follow that apartment buildings with a smaller proportion of apartment units on the ground floor (as in high-rises) will have a lower residential burglary rates than apartment buildings with higher proportion of apartment suites on the ground floor (as in walk-ups). Essentially, the over-all burglary rate of apartment buildings will decrease as the proportion of suites located on the ground floor decreases.

Generally, the over-all findings of the previous two sections support this statement. Table 5 shows a decrease in burglary rates as building height increases. It shows no significant difference between residential burglaries for walk-ups and middle apartments, but a major reduction (approximately 50 percent) in the residential burglary rate for high-rise apartments.

In summary, the results of the statistical tests suggest that residential burglaries do vary by height. There is support for the hypothesis that as building height increases, and the proportion of total building units on the ground floor decreases, residential burglaries decrease.

Chapter VIII

DISCUSSION AND CONCLUSION

The findings of this study indicate that within the West End study area, even at micro levels of analysis, burglary does not occur haphazardly. Micro levels of analysis show that accessibility to ground floor apartments is a key to identifying patterns of burglary within the study area.

The general hypothesis in this study is that residential apartment suites on the ground floor are closer to the street and are more at risk for a burglary than apartment suites located on upper floors. As one moves away from the ground floor, and up through the apartment building, accessibility decreases. Overall, burglary rates by floor decrease as the height of the building increases. However, the low population size of high-rises limits the power of the analysis, but the overall tendency, despite the high variance, does lend support to the idea that rates decrease as accessibility decreases. The results of the statistical analysis indicate that, despite the high variability within the study area, apartment suites on the ground floor appear to be more at risk for residential burglary than those located on other floors. Also, the results of the statistical tests suggest that residential burglaries do vary by building height.

Before discussing the importance of these findings, some of the concerns mentioned at the outset of this study will be presented. They essentially related to missing data counts, simple measures of the concepts used and limitations in the design of the study area.

One of the shortcomings of this study is that only partial data about measurements of "awareness space" and the "activity space" of the West End was available under the scope of the study. Examples of data not collected are: interval level measurements of traffic flow and pedestrian flows within the study area, detailed interval level data on the actual movement of people, including potential offenders in the West End, and data that would provide indication of traces of surveillance or neighbourhood "watchers".

Another concern at the outset of this study is the conceptualization of some of the independent variables. Some of the variables used to measure the concept of accessibility, security and target attractiveness are of a simple nature. Stronger relationships might have been found had better measurements been used. Nonetheless, it is encouraging that these simple measures of accessibility show significant relationships, despite their limitations.

A third concern is that the findings of the study, statistically, cannot be generalized beyond the boundaries of the study in space and time, but, as noted in Chapter V, the study area within the West End is similar in several ways to high density residential areas located in downtown sections of other major Canadian cities, and what happened in the West End in the early 1980's may represent what is happening today.

Also, due to the design of the study, one cannot determine the extent of outside forces influencing burglary rates within the study area. There was no consideration of the complexities of variables outside the study area. For example, the influence of potential crime generators such as high schools, bars and taverns on the recorded

residential burglary for buildings located within the study area was not considered. Such an analysis is beyond the scope of this study.

In the criminological literature, less than a handful of studies have examined burglary in a multiple storey apartment building, and, to this writer's knowledge, no studies have examined residential burglary within the apartment building, that is, the relation of the location of the apartment suite within the apartment building to the ground floor has not been examined until now. Past studies that have considered multiple residential structures include Waller and Okihiro (1978), Molumby, (1976), Brantingham and Brantingham (1975), Reppetto, (1974). The small numbers of studies at this micro level of analysis may be in part due to a lack of conceptual modes which might lead researchers to examine burglary at these small levels. Or, as noted in Chapter III, it may be in part due to the unavailability of officially recorded data to researchers at such small levels of aggregation.

In the studies that do consider multiple storey apartment buildings, (such as Molumby 1976; Brantingham and Brantingham, 1975; and Reppetto, 1974), burglary rates for multiple storey apartment buildings are examined not in relation to the height of the building or the location of the apartment suite within the building, but by the total number of apartment units within the building. Small multiple storey buildings contain two to nine units, while multiple storey apartment buildings with more than ten units are classified as "large" (Brantingham and Brantingham, 1975; Reppetto, 1974). In these studies there is no differentiation made by floor level or by the height of the building. Reppetto found that the differences in burglary rates between the various

kinds of multiple residential buildings are not statistically significant (1974:124). In this respect, this thesis is the first study to examine detailed building height considerations.

What the findings of this study suggest is that it is not necessarily the total number of units within the building that is the important consideration, rather, it is the location of the apartment suite within the building that is a significant factor in predicting burglary rates. In particular, the proportion of a building's apartment suites located on the ground floor plays a significant role in the overall burglary rate of the building.

Additional factors such as the amount of privacy and/or green space provided by landscaping were also considered. In this thesis, research was described that included speculation that the amount of residential burglary may be influenced by variables measuring "defensible space". Physical building features such as landscaping, coverage and the position of the building entrance may help define semi-private spaces. This may result in increased informal social controls among residents and so might well contribute to a reduction in crime. As noted in Chapter III, studies with interviews of burglars (Cromwell *et al*, 1991; Nee and Taylor, 1988; Bennett and Wright, 1984) indicate the opposite; they suggest that these same features may provide "cover", so that burglars are effectively protected from the prying eyes of neighbours and/or police. The findings in this thesis, however, generally support the findings in the criminological literature: there appears to be little relationship between the amount of landscape coverage and the burglary rates within the apartment building.

In addition, data on security measures were used in this analysis. Evidence in the criminological literature is inconsistent regarding the importance of security. Bennett

and Wright (1984), Walsh (1980) and Reppetto (1974) did find locks to be a significant factor in target selection by offenders. Rengert and Wasilchick (1985) and Scarr (1973) found burglars did consider the type of lock. Nee and Taylor (1988) found that burglars did consider the type of lock on the residence, but suggested they thought the type of lock might provide clues as to what would be the best way to break into a building. Waller and Okihiro (1978) have argued that the use of extra locks result in a "security illusion". The findings of this study suggest that the security of the building appears to have little relationship to the likelihood of the apartment suite being burglarized. Similarly, the variables related to target attractiveness - cost of building and age of building - show little relationship to the likelihood of the apartment suite being burglarized.

Within the confines of this study it is suggested that the proximity of the apartment suite to the ground floor best explains recorded residential burglaries in apartment buildings. Across building type, that is, walk-up, middle-rise apartment or high-rise, the general pattern in this study is clear; ground floor apartment units show higher rates of residential burglaries than do the other units. These findings for apartment buildings certainly suggest that the conclusions drawn from the "defensible space" literature might be questioned. In the early literature examining crime and the urban environment, the impression is strong that crime is most associated with high-rise housing schemes. The literature reports that impersonal high-rise buildings generally evidenced much higher crime rates than did the more "humane" low-rise building (Coleman, 1985; Newman, 1972; Jacobs, 1961). While these studies looked at all types of crimes, burglary was not excluded. The findings of this study, however, suggest that, contrary

to the conclusions drawn in the earlier literature, apartment buildings that have a larger proportion of apartment suites located on or near the ground floor (as in walk-ups) will have higher recorded residential burglary rates than high-rise apartment buildings.

The findings of this study further add to the criminological literature examining patterns of specific crime at micro levels of analysis. For the most part, burglars appear to choose their targets from within a spatially constrained range of potential targets. Accessibility is a key variable to be considered. Evidence in the criminological literature on patterns of burglary at other micro levels of analysis such as the block level and the street level support this. It would seem that these same propositions also apply to even smaller levels of analysis, including the apartment building.

Theoretical Considerations

In this century, theories of crime have focused on the criminality of the offender. (Barlow, 1990; Gottfredson and Hirschi, 1990). While research into patterns of crime has a well-established tradition in criminology (see Chapter III), only recently have there been new insights into the dimensions of the criminal act beyond the criminality of the individual. A sub-discipline of criminology, environmental criminology, focuses its research on one of these additional dimensions: the specifics of where and how the criminal act occurs. Researchers who examine the specifics of the crime site do not do so to the exclusion of the role of the offender. Rather, the motivation of the offender is assumed, and research is concentrated on the other elements of the criminal act (Brantingham and Brantingham, 1984, 1991). Actually, an important purpose in identifying criminal opportunities in the urban environment is to gain better insights into

the reasons people commit crimes where they do. If patterns of crime are understood, the processes that may account for an individual's involvement in criminality may be uncovered. But the absence of details about individuals committing burglaries is one of the weakness of this study. Future research should incorporate variables reflecting the motivation of the offender (or potential offender) and his interaction with the specifics of the crime site.

It is significant that recent developments in the theory of crime recognize and incorporate elements of the criminal "act" in addition to the criminality of the offender. Barlow (1990) and Gottfredson and Hirschi (1990) call for development of a theory that would also consider the circumstances of the criminal event, including the crime site and target choice.

Conclusions

Most burglaries involve decisions or choices based on the cues interpreted in the urban setting. Consequently, in examining the search patterns of potential burglars, it may prove useful to employ an opportunity-spatial model to explain where and how burglars may select their targets. Evidence from this study further adds to the literature. For the most part, burglars appear to choose their targets from within a spatially constrained range of potential targets. Evidence from this study would suggest that such a proposition applies to such micro levels of analysis as the apartment building.

The hypotheses under examination in this study of an area in the West End of Vancouver are generally supported by the data collected; that is, residential apartment

suites on the ground floor, because they are, from the burglar's point of view, closer to the street, are more at risk for a residential burglary than apartment suites located on the upper floors of the apartment building. As one moves away from the ground floor, and up through the apartment building, accessibility decreases. Overall, burglary rates by floor decrease as the height increases. However, the low population size of high-rises limits the power of the analysis; still, the overall tendency, despite the high variance, does lend support to the idea that rates decrease as accessibility decreases. The results of the statistical analysis indicate that despite the high variability within the study area, apartment suites on the ground floor appear to be more at risk for residential burglary than residential apartment suites located on other floors in the apartment building.

Also, the results of the statistical test suggest that residential burglaries do vary by building height. The analysis of covariance and multiple regression results lend support to the hypothesis that as building height increases, and the proportion of total building units on the ground floor decreases, residential burglaries decrease. The analysis lends no support to the view that "defensible space", security measures or "attractiveness" of targets as measured by dollar value and age of the building account for burglary rates. But, as was noted, the measures of these concepts have limitations, and better measures might be found to be more related to burglary rates.

Examining burglary patterns as they relate to the location of the apartment suite in the apartment building is previously unexplored at such micro levels of analysis. Consequently, the approach taken is exploratory in nature. The researcher did manage to

achieve approximate answers to the hypothesis under scrutiny. However, the writer believes that the research undertaken indicates that a more detailed study is both feasible and necessary.

Further research might consider closer examination of the selection of the apartment suite at the floor level, for example, the proximity of the residential suite to accessibility points on the floor. It is suggested that apartment suites closest to elevators and/or stair wells may be at higher risk for burglary than apartment suites located in the interior areas of the apartment floor.

In summary, the results of this study indicate that within the study area, even at micro levels of analysis, burglary does not occur haphazardly. Apartment suites are at different risks in the urban setting depending upon their spatial location within the apartment building. Within the limitations of this study, it is shown that substantive relationships are found between building height and burglary rates.

APPENDICES

APPENDIX A Apartment Information Sheet

BLOCK NUMBER_____

BUILDING TYPE	+6_____	Rooming House_____
	4-6_____	Single Family _____
	2 - 3_____	Condominium _____
	Townhouse_____	Duplex _____
		Other _____
BUILDING USE	Residential_____	Commercial _____

NUMBER OF FLOORS _____

NUMBER OF UNITS PER FLOOR

Basement _____	8th Floor_____	16th Floor_____
1st Floor _____	9th Floor_____	17th Floor_____
2nd Floor _____	10th Floor_____	18th Floor_____
3rd Floor _____	11th Floor_____	19th Floor_____
4th Floor_____	12th Floor_____	20th Floor_____
5th Floor_____	13th Floor_____	21th Floor_____
6th Floor_____	14th Floor_____	22th Floor_____
7th Floor_____	15th Floor_____	23rd Floor _____

ENTRANCE SECURE	Yes _____	No _____
	Set Back _____	On street_____
APARTMENTS ON MAIN FLOOR	No _____	Yes _____
BALCONIES ON MAIN FLOOR	Yes _____	No _____

APPENDIX B T-TEST SCORES FOR MEAN BURGLARY RATE BY FLOOR (* denotes statistical significance)

	1	2	3	4	5	6	7	8
1								
2 n=169	4.45* 0.00							
3 n=163	4.37* 0.00	0.57 0.56						
4 n=114	1.81* 0.74	-1.49 0.14	-2.23* 0.027					
5 n=72	2.39* 0.02	1.29 0.20	1.04 0.30	0.76 0.45				
6 n=69	2.41* 0.02	1.65 0.10	1.30 0.20	1.05 0.30	-0.61 0.55			
7 n=67	2.28* 0.03	1.22 0.23	1.00 0.32	0.64 0.53	-0.70 0.49	-0.22 0.83		
8 n=65	2.61* 0.01	2.07* 0.04	1.97* 0.05	1.60 0.115	0.18 0.85	0.76 0.45	1.03 0.307	
9 n=63	2.52* 0.01	1.91* 0.06	1.80* 0.07	1.22 0.23	0.06 0.95	0.40 0.69	0.67 0.50	-0.20 0.84
10 n=54	2.13* 0.04	1.69* 0.09	1.49 0.14	1.67 0.10	0.19 0.85	-0.02 0.99	0.91 0.37	-0.18 0.84
11 n=46	1.49 0.14	1.43 0.16	1.33 0.19	1.17 0.24	0.08 0.94	-0.02 0.99	0.50 0.62	-0.54 0.60
12 n=37	1.78 0.08	1.29 0.20	1.75* 0.08	1.12 0.27	0.19 0.85	0.52 0.60	1.07 0.29	-0.04 0.97
13 n=28	1.42 0.17	0.72 0.48	0.86 0.40	1.46 0.16	0.46 0.65	0.23 0.83	-0.24 0.81	0.01 0.99
14 n=22	1.96* 0.06	1.66 0.11	1.96* 0.06	1.78* 0.09	1.55 0.14	1.09 0.29	0.76 0.46	0.92 0.37
15 n=19	2.25* 0.03	2.13* 0.04	2.24* 0.04	1.87* 0.07	1.34 0.20	0.79 0.44	1.16 0.26	1.22 0.24
16 n=17	1.84* 0.08	1.53 0.15	1.71 0.11	1.54 0.14	1.05 0.31	-0.07 0.94	0.58 0.57	0.46 0.65
17 n=17	2.23* 0.04	2.19* 0.04	2.48* 0.02	1.84* 0.08	1.40 0.18	0.72 0.48	1.01 0.33	1.27 0.22
18 n=16	1.86 0.08	1.12 0.28	1.45 0.16	1.49 0.15	0.63 0.54	-0.07 0.94	0.29 0.78	0.43 0.67
19 n=13	0.32 0.75	-0.01 0.90	-0.05 0.96	0.76 0.46	-0.27 0.79	-0.90 0.36	-0.95 0.36	-0.25 0.80
20 n=7	0.21 0.84	-0.18 0.86	-1.23 0.26	0.83 0.43	0.07 0.90	-0.07 0.90	-0.43 0.68	-0.14 0.89
21 n=5	0.44 0.68	-0.05 0.96	-1.00 0.36	1.00 0.36	1.00 0.36	0.49 0.65	-1.00 0.36	0.05 0.96
22 n=3	0.45 0.68	1.00 0.39	-1.00 0.39	1.36 0.30	1.00 0.39	1.70 0.18	0.00 1.00	0.76 0.50
23 n=2	-1.97 0.18	-0.05 0.96	-1.97 0.18	0.87 0.47	0.47 0.68	0.90 0.46	-1.00 0.42	-0.22 0.84

APPENDIX B T-TEST SCORES FOR MEAN BURGLARY RATE BY FLOOR (* denotes statistical significance)

	9	10	11	12	13	14	15	16
1								
2								
3								
4								
5								
6								
7								
8								
9								
10 n=54	-1.71* 0.09							
11 n=46	-1.34 0.19	-0.66 0.52						
12 n=37	-1.25 0.30	-0.92 0.34	-0.68 0.50					
13 n=28	-1.56 0.129	-1.50 0.15	-0.94 0.354	-1.45 0.159				
14 n=22	-0.60 0.55	-0.47 0.64	0.31 0.76	-0.52 0.60	1.50 0.15			
15 n=19	0.09 0.98	0.04 0.97	0.89 0.39	-1.33 0.20	1.47 0.16	0.19 0.85		
16 n=17	-0.76 0.46	-1.19 0.25	-0.16 0.87	-2.07* 0.05	1.21 0.24	-0.61 0.55	-1.83* 0.09	
17 n=17	0.00 1.00	-0.38 0.70	0.63 0.54	-1.07 0.30	1.52 0.15	0.20 0.85	-0.72 0.48	0.87 0.40
18 n=16	-0.76 0.46	-1.34 0.20	-0.18 0.86	-1.99* 0.06	0.98 0.34	-0.52 0.61	-1.59 0.13	-0.03 0.97
19 n=13	-1.46 0.17	-1.13 0.28	-0.60 0.50	-1.44 0.17	0.13 0.90	-0.80 0.44	-1.29 0.22	-0.70 0.48
20 n=7	-1.23 0.26	-0.51 0.62	-0.69 0.51	-1.32 0.22	0.55 0.60	-0.85 0.42	-1.00 0.35	-0.03 0.97
21 n=5	-1.00 0.36	-0.10 0.93	-0.70 0.52	-0.50 0.60	1.22 0.27	-1.00 0.36	-0.50 0.60	0.08 0.90
22 n=3	-1.00 0.39	0.24 0.82	-0.17 0.87	-1.00 0.39	1.96 0.145	0.00 1.00	-1.00 0.39	1.00 0.39
23 n=2	-1.97 0.18	-0.22 0.84	-1.10 0.38	0.95 0.44	-1.00 0.42	-1.00 0.42	-1.97 0.18	0.12 0.91

APPENDIX B T-TEST SCORES FOR MEAN BURGLARY RATE BY FLOOR (* denotes statistical significance)

	17	18	19	20	21	22	23
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18 n=16	-0.86 0.40						
19 n=13	-1.10 0.29	-0.67 0.50					
20 n=7	-1.23 0.26	0.00 1.00	-0.76 0.47				
21 n=5	-1.00 0.36	-0.32 0.76	-0.35 0.73	0.08 0.94			
22 n=3	-1.00 0.39	-17 0.87	0.00 1.00	-1.00 0.39	1.00 0.39		
23 n=2	-1.97 0.18	-1.10 0.39	-1.00 0.42	-1.97 0.19	0.47 0.68	-1.00 0.04	

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