ENVIRONMENTAL FACTORS AND COMMERCIAL BURGLARY

JACK L. NASAR
Department of City and Regional Planning
The Ohio State University

ABSTRACT

Burglary in commercial settings is an important target for crime prevention through environmental design. This study investigated the relationship of several environmental variables to reported commercial burglaries in Knoxville, Tennessee, in 1979. For each X^2 analysis, a random sample of burglarized facilities was cast into appropriate cells for actual values, and an equal number of randomly selected facilities was cast into appropriate cells for expected values. The analysis indicated negative relationships between commercial burglary and cleanliness, presence of vegetation, corner location, major thoroughfares, low density of stores on major thoroughfares, and closeness to major thoroughfares. In addition an interaction was found between distance to central business district and street type.

BACKGROUND

Predatory crime (such as burglary, robbery, and purse snatching between strangers) and the fear of such crime in commercial settings represents a significant factor threatening the livability and viability of urban areas [1]. Predatory crime between strangers can take the form of a crime against person (such as robbery) or a crime against property (such as burglary). In either case, the crime is frightening to the victim. In the former case, where there is a violation of the victim's body, the victim may feel their vulnerability to bodily harm. In the latter case, where there is a violation of property, the victim can feel both a loss of security in their own territory and the potential for a direct confrontation with the criminal.

Criminal victimization and fear of crime can produce various levels of avoidance in relation to a feared area: People might move away, not visit, or

only visit under certain conditions [2]. These limits on human choice and behavior surely effect people's quality of life and the economic vitality of the areas avoided.

The perceived safety of an area is likely to relate, in part, to the frequency, violence and public visibility of actual crimes. Frequently occurring violent crimes in highly visible areas would probably produce a more widespread fear than infrequently occurring crimes of less violent nature in less visible areas. Because commercial settings are public and because some are subject to high rates of predatory crime, commercial settings have been identified as an important target for crime control [3].

One strategy in crime prevention involves the use of physical design. Through the manipulation of physical attributes of the environment the designer can produce physical and symbolic barriers which constrain criminal behavior. Thus the appropriate manipulation of the physical environment can reduce crime and the fear of crime. The research on crime prevention through environmental design has centered on housing and neighborhood settings (see [4] for an annotated bibliography). There has only been limited work on non-residential settings, such as schools [5] and commercial areas [6]. Research is still far from achieving an understanding of those physical attributes of commercial settings which relate to predatory crime. It was the purpose of the research reported here to empirically investigate the relationship between several physical variables and commercial burglary.

The investigator identified a number of physical variables likely to relate to commercial burglary. The variables can be organized into the following categories:

1. *On site variables* — those related to particular attributes of a facility and its immediate surroundings.
2. *Locational variables* — those related to the broader area in which the facility is located.

The list of variables selected did not encompass all of the environmental variables which might relate to commercial burglary. Rather it represented a starting point for further investigations. The environmental variables selected for study were those that the author believed most likely to relate to commercial burglaries. These variables include the following:

- On-site variables
  Cleanliness
  Vegetation
  Lot Location (corner, or non corner)
  Adjacent lot (vacant, or not vacant)

- Locational variables
  Density of stores on road
  Street type
  Traffic level
  Distance to major thoroughfare
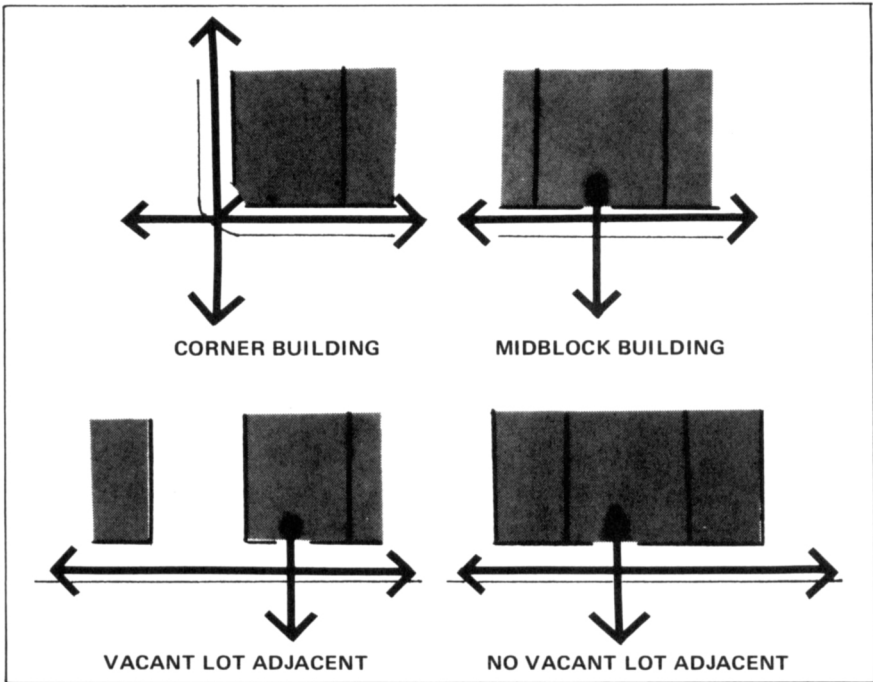 Distance to downtown.

Figure 1. Escape routes.

In the following discussion, the author explains why he believed the variables selected would relate to burglary. The research reported here centered only on testing the relationships between the variables and burglary, not on explaining the reasons behind these relationships. Further, research would be needed to explain the relationships found. Thus, the following explanations of why the relationships would occur only represent hypotheses untested by this research.

It seemed likely that cleanliness and presence of vegetation in an area would serve as symbolic cues to potential burglars that the area was cared for and that surveillance was substantial. As a result, facilities in clean areas and facilities in areas having vegetation were expected to have lower rates of burglary.

The investigator believed that corner facilities and facilities adjacent to vacant lots provided better opportunities and lower risks to potential offenders than midblock facilities and those with buildings adjacent to them. As shown in Figure 1, corner facilities and those adjacent to vacant lots provide more approach and escape routes than others. Thus, it was expected that midblock facilities and those with buildings adjacent to them would have less crime.

With regard to location, it was expected that major arteries would have higher rates of burglary per facility than minor roads, because on minor roads the meager traffic would make it more difficult for the criminal to achieve anonymity, and the slower speed of the traffic would strengthen the sense of

surveillance. On major thoroughfares it was also expected that fewer facilities per mile would result in a higher probability of a facility being victimized, as there would be fewer people and shopkeepers to provide surveillance. Finally, it was expected that streets with moderate traffic would have higher rates of crime than those with heavy traffic, because the moderate traffic would be enough to provide anonymity to the burglar, but not so much that the burglar would get caught in traffic trying to escape.

METHODOLOGY

The Planning Section of the Knoxville, Tennessee Police Department provided the investigator with the crime sheets for reported commercial burglaries in Knoxville for January through June of 1979. For each statistical test, random samples of these reported crimes were selected and an equal size sample of commercial facilities was selected at random from the phone book yellow pages. For purposes of analysis, each variable studied was conceptualized as having two discrete categories. The variables and categories included cleanliness (clean or dirty), vegetation (vegetation or no vegetation present), lot location (corner or other), adjacent lot (vacant or built-up), street type (major or minor), number of stores on major arteries (over 300 or under 300), distance to major thoroughfare (less than one-half mile or greater than one-half mile) and distance to central business district (less than two miles or greater than two miles). Each reported burglary in a sample under study was cast into its appropriate category. Thus, if in a sample of forty burglarized facilities, seventeen were on corners, and twenty-three in midblock, the cells for the analysis would be seventeen and twenty-three. Each facility selected at random from the yellow pages was also cast into its appropriate category.

X^2 analyses were used to analyze the data. In these analyses, the number of reported burglaries in each cell represented actual values, and the number of randomly selected facilities in each cell represented expected values. While this was a somewhat unconventional approach to calculating the expected values, it was believed that the number of burglaries would, in part, be a function of the number of facilities available. As a result, a higher frequency of burglaries than expected in a cell could have been related to the number of facilities available in that category rather than to the experimental variable. In order to control for biases relating to differences in the number of actual facilities in each cell, the random sample of facilities selected from the yellow pages was used to establish expected values.

RESULTS

In regard to on-site factors, there were significant effects related to cleanliness (X^2 = 6.6, df = 1, $p < .01$), vegetation (X^2 = 6.6, df = 1, $p < .01$) and corner

Table 1. On-Site Factors

| | Cleanliness[a] | |
	Clean	Dirty
Burglaries	8	7
Expected Values[b]	12	3

| | Vegetation[a] | |
	Vegetation	No or Little Vegetation
Burglaries	2	13
Expected Values[b]	7	8

| | Lot Location | |
	Corner	Other
Burglaries	17	23
Expected Values[b]	10	30

| | Adjacent Lots | |
	Vacant	Built-Up
Burglaries	7	33
Expected Values[b]	6	34

[a] Rated by investigator.
[b] Expected values are counts of facilities selected at random from the telephone book yellow pages, and cast into the appropriate cell.

location (X^2 = 6.53, df = 1, $p < .01$). There were higher rates of burglaries in facilities in dirty surroundings, in surroundings lacking vegetation and in facilities on corner lots. On the other hand, the analysis indicated no significant effects related to vacant adjacent lots (X^2 = .196, df = 1, $p < .05$). The frequency tables for these data are displayed in Table 1.

In regard to locational factors, there were significant effects related to street size (X^2 = 8.5, df = 1, $p < .01$), the number of stores on major arteries (X^2 = 8.7, df = 1, $p < .01$) and distance to major thoroughfares (X^2 = 20.5, df = 1, $p < .001$). While there was no effect of distance from the central business district (X^2 = .97, df = 1, $p < .05$), there was an interaction between distance from the central business district and type of traffic artery (X^2 = 12.4, df = 3, $p < .01$). These analyses indicated higher rates of commercial burglary associated with:

- Major thoroughfares;
- Major thoroughfares with fewer facilities;

Table 2. Locational Factors

| | Street Type | |
	Major Arteries	Minor Streets
Burglaries	44	24
Expected Values[b]	32	36
	Number of Commercial Facilities on Major Arteries	
	Arteries With Over 370 Facilities	Arteries With Less Than 250 Facilities
Burglaries	97	127
Expected Values[a]	119	105
	Distance to Major Thoroughfare	
	Less Than One-Half Mile	Greater Than One-Half Mile
Burglaries	55	17
Expected Values[b]	36	36
	Distance to Central Business District	
	Less Than Two Miles	Greater Than Two Miles
Burglaries	44	24
Expected Values[b]	40	28

[a] Expected values are based on counts of total stores on seven major arteries (1872), divided by 8.36 to make the sample size equivalent to the 224 burglaries, and grouped as streets with many stores (over 300) and fewer stores (less than 300).
[b] Expected values are counts of facilities selected at random from the telephone yellow pages, and cast into the appropriate cells.

- Major arteries distant from the cental business district, or minor arteries closer to the central business district; and
- Closeness to major thoroughfares.

The frequency data for these analyses are displayed in Tables 2 and 3.

DISCUSSION

The analysis of the results indicates that there are relationships between certain environmental attributes and commercial burglary. While as indicated in the introduction, this research did not attempt to explore the explanations behind the relationships, there are certain factors which might well mediate these relationships. In particular, I believe that the different rates of burglary might have been produced by aesthetics factors, possibilities for surveillance, criminal opportunities, and approach/escape possibilities.

Table 3. Interaction of Distance To
Central Business District and Street Type

| Street Type | Distance | |
	Less Than Two Miles	Greater Than Two Miles
Major	23[a]	21
Minor	21	3

[a] The expected values based on counts of randomly selected facilities are:

17   15
3   13.

The relationship of cleanliness and vegetation to commercial burglary, could, in part, be explained as a function of aesthetic factors. A pleasant environment might in itself lessen crime or it might provide cues to the potential criminal that people care and watch over it. If, in fact, aesthetic factors were to prove related to the rate of commercial burglary, it would be useful to determine whether the aesthetic qualities per se or related factors affected the rate of burglary. Furthermore, if burglary were found to be influenced by aesthetics, it would be valuable to determine what other aesthetic attributes relate to commercial burglary.

With regard to surveillance, the variation in burglaries on different major arteries might have been a function of differences in the amount of surveillance. Major thoroughfares having fewer facilities (and thus, probably less surveillance) had higher rates of burglary than major thoroughfares having more facilities. As this research did not explain the relationships found, further work is needed to determine the accuracy of this explanation. In particular that research might explore other differences related to sparse versus dense commercial arteries, such as possible differences in the kinds of facilities, classes of facilities or kinds of neighborhoods and uses nearby the two kinds of arteries studied.

The higher rates of burglaries at corner locations, at settings closer to major thoroughfares, at major arteries distant from the central business district and at minor arteries near the central business district might well be explained by the ease of approach and escape these settings afford the potential criminal. In addition, the latter three settings also have enough facilities (opportunities for crime) to attract the potential criminal to them. Given the convergence of results for the above factors related to increased opportunities and ease of approach/escape, I believe that the ease of approach/escape contributed to the results found. However, there may have been some other variables particular to each type of setting which influenced the rates of burglary. For example, stores at each of these settings might be of a particular kind attractive to burglars.

For all of the site and locational factor related to increased burglary, there is a need for a more detailed and controlled investigation to determine what other variables might influence or covary with them. At this point, based on limited evidence, one might conclude that commercial burglary as it relates to the environment is, in part, a function of aesthetics, surveillance, criminal opportunities and approach/escape possibilities. However, while I believe these are plausible hypotheses, they cannot be accepted as valid without additional evidence.

REFERENCES

1. J. W. McKay, CPTED in a Commercial Setting, *Nations Cities,* pp. 17-19, December 1977.
2. Westinghouse National Issues Center, *CPTED Technical Guideline 3 Assessing the Fear of Crime,* Prepared for the U. S. Department of Justice, Law Enforcement Assistance Administration, National Institute of Law Enforcement and Criminal Justice, Washington, D. C., 1976.
3. J. M. Tien, T. A. Repetto, and L. Hanes, *Elements of CPTED,* Prepared for U. S. Department of Justice, Law Enforcement Assistance Administration, National Institute of Law Enforcement and Criminal Justice, Washington, D. C., 1976.
4. V. Rouse and H. Rubenstein, Section C Annotated Bibliography, *Crime in Public Housing: A Review of Major Issues and Selected Crime Reduction Strategies,* Vol. II, Prepared for Department of Housing and Urban Development, Office of Policy Development and Research, Washington, D. C., 1978.
5. P. Pablant and J. Baxter, Environmental Correlates of School Vandalism, *Journal of the American Institute of Planners, 41,* pp. 270-279, 1975.
6. D. C. Duffalo, Convenience Stores, Armed Robbery and Physical Environment Features, *American Behavioral Scientist, 20:2,* pp. 227-247, 1976.

Direct reprint requests to:

Jack L. Nasar
Department of City and Regional Planning
The Ohio State University
289 Brown Hall
190 West 17th Avenue
Columbus, Ohio, 43210