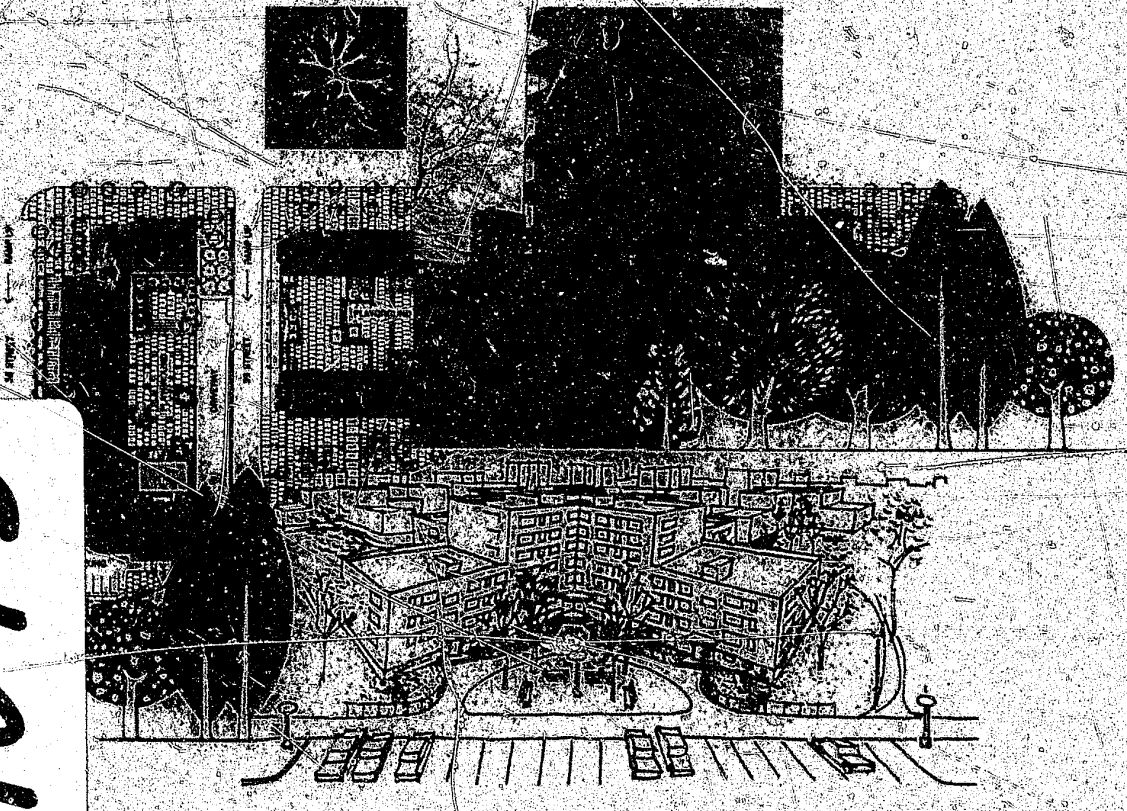
U.S. Department of Justice
National Institute of Justice

Factors Influencing Crime and Instability in Urban Housing Developments

Executive Summary



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Factors Influencing Crime and Instability in Urban Housing Developments

Executive Summary

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INTRODUCTION

In answering their legislative mandate federally-assisted housing projects are built with certain identifiable characteristics: they house a comparatively high percentage of low-income residents; they are constructed at comparatively high densities with little investment in site development; and, because their rental incomes and subsidies are low, the funds available for maintenance and security are minimal. All three factors -- the low socioeconomic status of the residents, the high density buildings and poorly defined sites, and the lack of funds for maintenance and security -- can, in themselves, be seen as precursors of high crime rates, fear, and project instability. It is the purpose of this study to determine whether these "built-in" characteristics of federally-assisted, moderate- and low-income housing developments are, in fact, contributors to crime, fear and instability and, if so, which of these characteristics are the most important contributors.

In this study emphasis is given to examination of the role played by physical factors in determining the levels of crime, fear and instability. This is because the study principals have, from their past work, become expert in analyzing the role of housing design factors in predicting crime rate and this study provides a further opportunity to develop and measure these factors.

The theory of how physical form acts to deter crime, fear and instability is grounded in two principles:

Principle 1: The theory postulates that the fewer the number of families required to share a common entry, internal circulation system, and adjacent outside grounds in a multi-family building, the more frequently will residents make use of these communal and outside areas and the more willing they will be to intervene to maintain and control them and to prevent anti-social behavior from occurring within them. As a consequence, there will be less crime in buildings which house fewer families per entry, residents will be less fearful, and, finally, for all these reasons, residents will be more pleased with their buildings and developments and less anxious to move out.

Principle 2: The theory postulates that the physical layout of a building and its grounds can restrict unauthorized access to a building and the apartments within it without the intervention of residents. Building and site design can restrict access through the use of real barriers (fencing

which surrounds the grounds of buildings and units, doors and locks, window guards, and intercoms) and through the design of a building and grounds entry and exit system that can be easily controlled by a doorman or guard. As a consequence of this restricted accessibility, both crime and fear of crime will be lower than in buildings where access is not limited. And, as a result of the lower crime and fear of crime, community instability will also be lower.

This study follows on an earlier research project conducted in New York City that was the basis for the book DEFENSIBLE SPACE (Newman, 1972). In the New York City study, a step-wise multiple regression was used to examine the relationships between physical and social characteristics of housing projects and various types of crime. Table 1 below presents the results for one type of crime, robbery. The source of the robbery data was New York City Housing Authority Police reports, and the robbery rate of a project was figured

Table 1

Robbery Rate as Predicted by Social and Physical Variables in 53 New York City Public Housing Projects[1]

Social and Physical Variables[2]	Simple R[3]	Regression Structure Coefficient	R^2	Change in R^2
% of population receiving welfare	.47	.71	.22	.22
Building height	.36	.55	.33	.10
Project size	.25	.38	.38	.05
Number of public housing projects in area	.33	.50	.40	.03
% of families with female head	.36	.55	.44	.03

[1] This table is adapted from Table III in Newman (1973), FINAL REPORT: PROJECT FOR THE SECURITY DESIGN OF URBAN RESIDENTIAL AREAS submitted to the National Institute of Law Enforcement and Criminal Justice. The source of the crime data is New York City Housing Authority Police Reports for 1969.

[2] These are the first five variables that were entered into the regression equation.

[3] $r \geq .35$, $p < .01$
$r \geq .27$, $p < .05$

as the total number of robberies in a project per 1,000 residents. The strongest predictor of robbery rate, as indicated by the magnitude of the regression structure coefficients, was the percent of the population receiving welfare (coefficient = .71). The second most important predictors were building height (.55) and the percent of families with a female head of household (.55). Thus, the physical design feature, building height, ranked among the three most important predictors of robbery rate. The importance of building height is further indicated by the percentage of variance in robbery rate that it explained, namely 10%.

Although the present study draws upon the theory and the findings of the earlier research, it is not intended that this be a replication of it, but rather an extension of the scope and detail of the earlier work. The primary objective of the present study is to determine how a number of characteristics of housing developments determine, not only the level of crime, but also the level of fear and community instability. In addition to the physical design and the social composition of developments, a number of other characteristics are included as possible determinants of crime (and of fear and instability). These are: management's rent collection ability; guard service; cooperative ownership; and police service.

To better understand the mechanisms by which the independent variables act on the dependent variables, intervening variables were introduced in a causal model linking the independent variables to the dependent variables. This use of intervening variables in a causal model represents the first real examination of the mechanics of the theory. The first defensible space study sought only to demonstrate that there was an important relationship between the physical form of low-income assisted housing and the occurrence of crime.

CAUSAL MODEL AND MEASUREMENT OF VARIABLES

The diagrams in Figures 1 and 2, below, illustrate the study's causal model. Two figures are employed to describe the model rather than one to enable us to examine the effects on, and of, two different types of crime: burglary and personal crime. Aside from this difference, the models in the two figures are identical. The independent, intervening, and dependent variables are grouped from left to right in these diagrams. The arrows running from the independent variables to the intervening variables and to the dependent variables indicate the causal effects anticipated. Each independent variable is expected to affect each intervening variable and each dependent variable. Each intervening variable is expected to affect each variable that follows it in the causal sequence.

The independent variables consist of seven characteristics of housing developments: (1) physical design variables (building size and accessibility); (2) social characteristics of residents (low-income/AFDC, teen-adult ratio, and cooperative ownership); and (3) security service (police service and guard service).

The four intervening variables measure different attitudes and actions on the part of management and residents. Rent collection is a measure of management's success in collecting rent and hence of management effectiveness. It is composed of items taken from interviews with housing managers concerning the total amount of rent owed by residents, management's willingness to accept late rent payments and similar information. Residents' use of space is a measure of how frequently residents use space outside their apartments and was compiled from the survey of residents. Social interaction reflects the frequency and intensity of social contacts between residents and is also composed of items from the survey of residents. Control of space consists of items from the survey of residents that measure their perception of the likelihood that residents would intervene in suspicious or criminal situations.

The four dependent variables are: personal crime rate; burglary rate; fear of crime; and rate of instability. Personal crime is made up of robberies and assaults; burglary of both burglaries and attempted burglaries. Both crime variables are compiled from residents' experiences of these crimes as they occurred within their developments during the twelve-

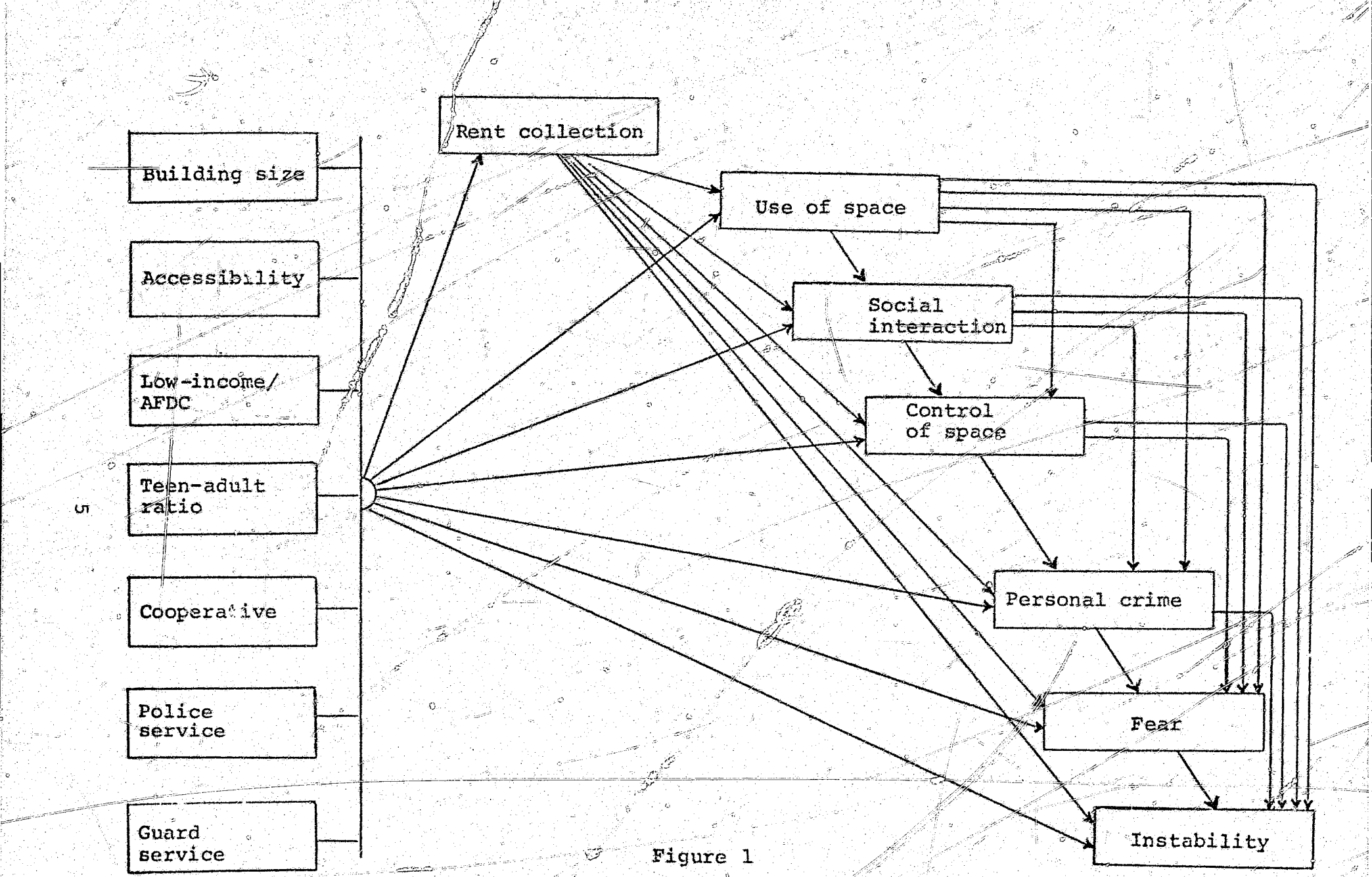

Figure 1

Theoretical Model of the Key Factors Affecting Personal Crime, Fear, and Instability

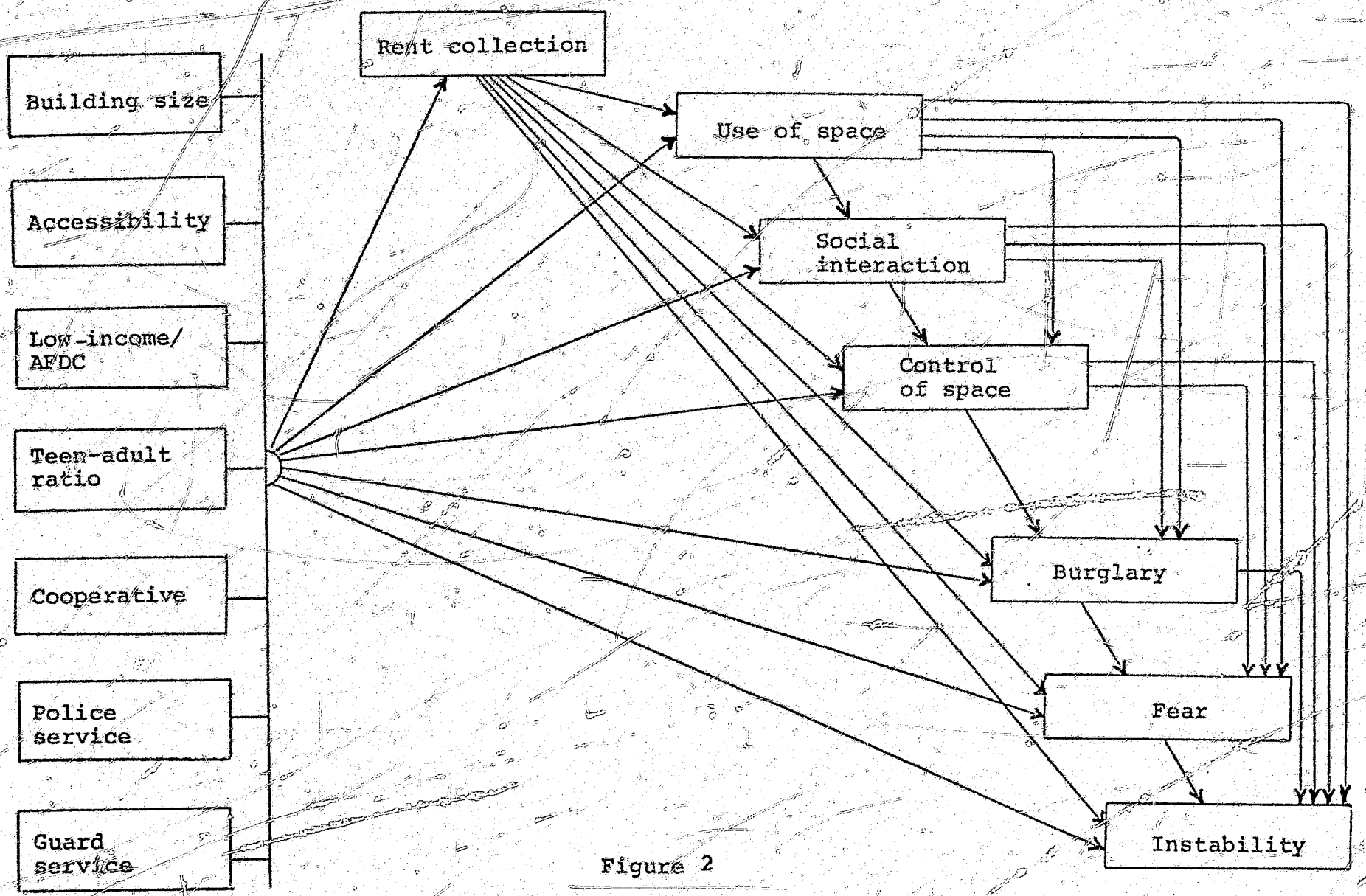

Figure 2

Theoretical Model of the Key Factors Affecting Burglary, Fear, and Instability

month period prior to the interview. Each crime variable is figured as a rate per 1,000 residents. Fear of crime is an index composed of several questions from the survey of residents concerning their perceptions of how unsafe different areas are and the likelihood that certain crimes will occur. Instability is also a composite variable that includes the actual rate of turnover of apartments, the rate of vacancy, the rate of abandonment, and residents' desire to move out of the development as expressed in the household survey. The data on turnover, vacancy, and abandonment were collected from the files of housing agencies.

Building Size

Building size is an index that combines two physical design characteristics of sites: (1) the number of apartment units that share a building entry or, in the case of outdoor stairways, the number of apartment units that share a stairway; and (2) the building type. Buildings are classified into four types: row houses; two types of walk-up buildings -- regular walk-up buildings and gallerias, which are walk-up buildings with an open, single-loaded corridor; and high-rise buildings.

The rationale for combinding number of units per entry with building type is that together these two variables best capture those characteristics of building design that are expected to determine crime, fear of crime, and community instability most strongly. Units per entry alone would not meet this objective as well since in some cases the number of units per entry in a galleria is larger than the number per entry in a high-rise. This would then give the high-rise a better rating on defensibility than the galleria, which is inaccurate since some of the qualities intrinsic to gallerias -- no elevators, no fire stairs, and all apartments fairly close to the ground -- make it by definition more defensible than a high-rise. On the other hand, using building type alone as a measure of building design could cause some distortions as well. The variation in the number of units per entry within each building type, except row houses, is quite large, and this variation is lost when building type alone is used as a measure of design.

Building size is expected to affect each dependent variable (personal crime, fear, and instability) directly and indirectly through the intervening variables. We expect that crime, fear of crime, and instability will increase with building size. We also expect that rent collection, use of space, social interaction, and control of space will decrease with building size.

Accessibility

The accessibility of apartments and buildings is a measure of the ease with which an outsider can gain access to the interior of a building or an apartment, either directly (through a window) or indirectly (via the common interior circulation areas of a multifamily building to the doors or windows of each unit). Accessibility is composed of a series of ratings of physical design characteristics including: the position and design of doors and windows and their locking hardware; the position and surveillability of circulation areas, stairs, corridors, and the doors to individual apartments; the presence of high fencing or other real barriers; and the presence of symbolic devices which demarcate areas as private. Because of the unique qualities of each of the three building types (row houses, high-rises, and the two types of walk-ups combined), apartments in each type are vulnerable to intrusion in decidedly different ways.

The accessibility to the interior of row house units is measured solely in terms of the accessibility of the ground floor windows, front and back, since it is the design of the windows which makes row house units more, or less, vulnerable to intrusion. The exterior doors, front and back, are not included in the accessibility rating system for row houses because these are the doors to individual units, not to public circulation areas as they are in walk-ups and high-rises. The doors to row house units, being the entrances to the dwellings of individual families, are always equipped with locks and are almost invariably kept shut. There is too little variability in the condition of the doors to row house units to warrant rating them. (This is true for the doors to individual units in walk-up and high-rise buildings as well.)

High-rise buildings present the opposite picture from row houses. The primary means of access by an intruder to the interior of most individual high-rise units is through the building's common ground floor entrances and then through the common circulation areas of the building rather than through the windows to units because the overwhelming majority of high-rise units have windows that are inaccessible from the ground. For these reasons the accessibility of high-rise units is rated solely in terms of the design and condition of the building's common ground floor entry and exit doors.

Walk-up and galleria type buildings share traits with both row houses and high-rises: that is they suffer the vulnerabilities of both. Walk-up buildings are similar to row houses in that the windows of ground floor units -- and the windows to second and third floor units in gallerias -- are vulnerable to access either from the ground or from the

circulation areas. They are similar to high-rises in that the doors to individual units are vulnerable to access via the common building entrances and the common circulation areas which are hidden from public view. In walk-up buildings designed with an outdoor stair usually no common entry door is provided. In such buildings the visibility of the individual apartment door from the interior of other units and from the street below usually helps to decrease the accessibility of the units. Because of these different design features walk-up sites were rated on all three characteristics: the design of windows; the design and condition of common entry and exit doors; and the visibility of individual apartment doors.

Accessibility is expected to have a strong and important positive effect on burglary because accessibility is primarily a measure of the vulnerability of apartments to intruders. The primary motive intruders have for breaking into apartments is to commit burglaries. The accessibility of buildings and apartments is expected to affect negatively residents' use and control of areas outside their apartments. Accessibility is also likely to have negative effects on fear and instability because residents are able to perceive that the areas outside their apartments are open to outsiders and, therefore, will feel fearful and will be dissatisfied with the development as a place to live.

Low-income/AFDC

Low-income/AFDC is an index composed of two items: the mean adjusted income of households in the site and the percent of one-parent, female-headed families on welfare (AFDC). The index ranges from a low proportion of AFDC families and a high estimated mean income to a high proportion of AFDC families and a low adjusted mean income. Previous defensible space research indicated that the percent of households receiving welfare and the percent of one-parent families were the two most important social characteristics in predicting robbery rate in New York City Public Housing (see Table 1). These two social characteristics were highly correlated, suggesting that most of the one-parent families in that study were receiving welfare under the program Aid to Families with Dependent Children and that it was primarily the proportion of this type of household that determined the rate of robbery. For some types of crime, per capita disposable income replaced percent of single-parent families and families on welfare as the social characteristic most predictive of crime rate (Newman, 1973).

Because both of these variables, percent AFDC and mean income, proved to be important in earlier research, it seemed

important to include them as independent variables in this study. However, entering them as separate independent variables would have resulted in exceedingly high standard errors since the two variables are highly correlated. Entering only one of the variables and excluding the other was considered. However, to use only the percent of AFDC families as the primary social characteristic of sites would have eliminated some of the variation in the level of income between moderate-income sites, where there is often a very low proportion of AFDC families. On the other hand, the use of mean income alone would not capture the particular problems and vulnerabilities of developments that house a high proportion of single-parent, welfare families. For these reasons mean adjusted income of households and percent AFDC were combined to form a single index.

The variable low-income/AFDC is expected to have direct effects on all the intervening and dependent variables. The percent of low-income and AFDC families living in a development will probably: produce rent collection problems for management; minimize residents' use of areas outside their apartments; reduce social interaction between residents; minimize residents' control over areas outside their apartments; and increase crime, fear, and instability both directly and indirectly through the four intervening variables.

Ratio of Teenagers to Adults

The ratio of teenagers to adults is the number of teenagers, aged 10 through 20, in a site, divided by the number of persons who are older than 20. Several recent studies have documented teenagers' involvement in crime, particularly in crimes committed within a short distance of their homes. Therefore, it was important to include a measure of the proportion of teenagers.

Teen-adult ratio is expected to have a direct positive effect on residents' experience of burglary and personal crime, on fear, and on instability. Teen-adult ratio is expected to affect negatively the following intervening variables: residents' use of space and residents' control of space. The effects of teen-adult ratio on these two intervening variables is expected to be reflected in an increase in residents' fear and in the developments' instability.

Cooperative Ownership

The independent social variable cooperative ownership is a simple dichotomous variable which measures whether or not the development was financed within a framework which allowed residents to take title to their apartments through a mortgage arrangement.

Cooperative ownership was introduced for two reasons. First, it is reasonable to assume that, all other social, physical, and managerial conditions being equal, residents' use of and control over areas of their development outside their apartments would be affected by whether or not they had legal title to it. Similarly, residents' desire to move might be affected by whether or not they shared in the ownership of the development. Second, critics of the original defensible space study made the point that residents' identification with an area and their sense of control over it were probably more the consequence of their involvement in the ownership of the development than of building design or the assignment of physical space.

Cooperative ownership is expected to influence directly and favorably residents' use of the areas outside their apartments; their control over these areas; their interaction with their neighbors; their fear of crime; and their desire to move. Cooperative ownership, through the three intervening variables (use of space, social interaction, and control of space), is also expected to have negative effects on all the dependent variables (crime, fear, and instability).

Police Service and Guard Service

The reason for including municipal police service and security guard service as independent variables in the causal model is to control for the possible effects they might have on crime, fear, and instability and thereby to estimate the effects of physical design features and social characteristics as accurately as possible. It should be kept in mind that the causal model and research design for this study were developed primarily to estimate the effects of physical design features and social characteristics of residents, not to estimate the effects of municipal police and guard service.

The quality of municipal police service is measured by an index of the frequency and nature of police patrolling, as reported by the police themselves. Given the findings of earlier studies, we do not expect that police service will affect either the rate of personal crime or the rate of burglary. The quality of police service is, however, expected to affect residents' fear, in that the visual presence of patrolling police and a quick police response to residents' requests for assistance can be expected to have an effect in reducing residents' fears. Through its effect on fear, the quality of police service is also likely to influence instability.

Security guard service is a measure of the presence and nature of the security guard services provided at each site. It is measured by items from the managers' interview and the

household survey. Security guard service is expected to have direct negative effects on both types of crime and on residents' fear of crime, and indirect negative effects on instability through crime and fear of crime.

STUDY SITES, SOURCES OF DATA, AND TECHNIQUE OF ANALYSIS

This is a study primarily of federally-assisted, moderate-income developments, but it also includes some public housing projects. The sites are moderate-income developments in Newark, St. Louis, and San Francisco, and public housing projects in San Francisco. In this study the terms "moderate-income developments" and "public housing projects" refer to the two major types of federal assistance programs which are used to build and operate these apartment complexes. The moderate-income developments are privately owned either by non-profit or limited dividend corporations, or by the tenants themselves. They were built under Title 221(d)(3) or Section 236 of the National Housing Act which provide a share of the equity and guarantee low-interest mortgage loans. The public housing projects were built with the federal government providing the total project costs and are then owned and maintained by the individual municipality. Maintenance costs are supposed to be covered by rental income, although the federal government has recently started providing subsidies to housing authorities who house a high proportion of low-income and welfare residents. For the most part moderate-income developments house a higher-income group than public housing. However, the term "moderate-income" is not always an accurate description of the relative economic composition of these sites since some moderate-income sites in this study house as many low-income families as a public housing project.

Several housing developments in this study contain buildings of two different types. Whenever a development contained buildings of two different types, such as row houses and walk-ups, each group of buildings of the same type within the development was treated as a separate site. In this example, the group of row house buildings would have been considered one site and the group of walk-up buildings, another site.

Altogether, 63 sites were analyzed; these consist of 11 high-rise, 34 walk-up, and 18 row house sites. All of the sites were at least two years old as of April 1976 and house primarily families with children. The majority of residents in almost all the sites are black: 49 sites house 70% or more black households; 12 sites range from 32% to 59% black; and only two sites have no black families. The mean adjusted income of families in these sites ranges from $68 to $7,094, with a mean of $2,366. The sites are relatively small: only 7 of the total of 63 are larger than 300 apartment units; the largest site consists of 772 units; and the average size is 169 units.

The primary source of data for this study is a survey of households conducted in a single stage in late 1976 and early 1977 in which interviews were obtained from residents living in the study sites. Housing managers and city police were also interviewed. Archival data collected from housing management and police files were used to supplement the interviews with residents, management, and police. Each site was visited at least once by Institute staff to document fully the physical design characteristics of the site and to ensure that the correct building type designation had been made.

The causal model for this study specifies both direct and indirect effects. A direct effect is the effect of one variable on another variable that is not transmitted through any intervening variables. For example, the direct effect of building size on personal crime is the effect that does not pass through rent collection, use of space, social interaction, or control of space. The indirect effect of one variable on another variable is the effect that is transmitted through variables that fall between these two variables in the causal model. If more than one variable falls between these two variables in the model, then there is more than one individual indirect effect to be estimated. The total indirect effect is the sum of all the individual effects. Thus the total indirect effect of building size on personal crime is the sum of the effects that are transmitted from building size to personal crime through rent collection, use of space, social interaction, and control of space.

The total effect that one variable has on another variable is equal to the sum of the direct effect and the total indirect effect. The total effect represents the total causal impact of one variable on another variable. It shows how much change in a dependent variable, say personal crime rate, is produced by a change in the independent variable, say building size, regardless of the mechanisms by which the change in crime rate is produced.

Direct effects, individual indirect effects, total indirect effects, and total effects were estimated by using ordinary least squares regression procedures. Both relative size and statistical significance were used to judge the importance of effects.

MAJOR FINDINGS

Primary Causes of Crime, Fear, and Instability

The primary objective of this study is to determine which characteristics of federally-assisted urban housing developments determine the level of crime, fear of crime, and community instability that such communities experience. The total effect of each of the independent variables on burglary, personal crime, fear, and instability, which are listed in Table 2, indicate which are the primary determinants of each of these four community problems. These results suggest that burglary is primarily determined by the accessibility of buildings and apartments and, to a lesser extent, by the ratio of teenagers to adults. The more accessible buildings and apartments are and the higher the ratio of teenagers to adults, the higher the burglary rate. The effect of accessibility (.43) is significant and, by the standards adopted in this study, also large.[1] The effect of teen-adult ratio (.16) is not significant but it is moderate in magnitude and it is the only other effect on burglary that is not virtually zero.

Table 2

Total Effects of Independent Variables on Burglary, Personal Crime, Fear, and Instability

	Burglary	Personal crime	Fear	Instability
Building size	-.05	.11	.41[a]	.39[a]
Accessibility	.43[b]	-.03	.06	.16
Low-income/AFDC	-.02	.29[d]	.57[a]	.40[a]
Teen-adult ratio	.16	.21	.18[d]	.07
Cooperative	-.04	.29[c]	.03	-.14
Police service	-.01	.42[b]	.05	.01
Guard service	-.04	.10	-.10	-.10

[a] $p < .01$ [b] $p < .05$ [c] $p < .10$ [d] $p < .15$

[1] Large effects are greater than or equal to .30; moderate effects are between .15 and .29; and small effects are from .06 through .14. Any effects that are equal to or smaller than .05 are considered to be virtually zero.

Personal crime is mostly determined by low-income/AFDC, cooperative ownership, police service, and, to a lesser extent, the ratio of teenagers to adults. Both low-income/AFDC and teen-adult ratio have the expected effects: the higher each one of these characteristics, the higher the rate of personal crime. Cooperative ownership and police service, however, have surprising effects: cooperatives tend to have higher rates of personal crime than noncooperatives; and the more frequently police patrol, the higher the personal crime rate. The effects of low-income/AFDC (.29) and cooperative ownership (.29) are both significant and moderate in size. The effect of police service (.42) is large and significant, and the effect of teen-adult ratio (.21) is moderate but not significant. It should be noted that building size does have a small effect on personal crime (.11) that is in the expected direction, that is, in the direction of larger buildings having higher rates of personal crime, but the effect is not large enough to allow us to consider building size a determinant of personal crime.

On the other hand, building size is a major determinant of both fear of crime and community instability. The determinants of fear of crime are building size, low-income/AFDC, and teen-adult ratio. All of these effects are in the expected direction. The larger the building, the greater the fear of crime. And the higher the level of low-income/AFDC and the higher the teen-adult ratio, the greater the fear of crime. All of these effects are significant, and the effects of building size (.41) and low-income/AFDC (.57) are both large. The effect of teen-adult ratio is moderate (.18).

Community instability is determined by building size, accessibility, and low-income/AFDC. All these effects are in the expected direction. The larger the building and the greater its accessibility, the greater the community instability. And the higher the level of low-income/AFDC, the greater the community instability. As with fear of crime, the effects of building size (.39) and low-income/AFDC (.40) are large and significant. The effect of accessibility (.16) is moderate.

Cooperative ownership has only one effect of any substance on any of the four types of community problems, and that is the unexpected positive effect on personal crime rate. It may be that cooperative developments become targets for personal crime, in particular for robberies, because outsiders may know they are cooperatives and may assume the residents are likely to be richer than residents of other housing developments. Such a strong relationship between cooperative ownership and wealth, as measured by low-income/AFDC, is not

borne out by the results of this study (r = -.30) but within any particular neighborhood, cooperative residents may indeed be wealthier than other residents of the surrounding area and, at the very least, may be perceived to be wealthier.

It should also be noted that unlike building size or low-income/AFDC, cooperative ownership has very little impact on the intervening variables in the causal model (see Figure 3). The reason for including cooperative ownership as an independent variable was precisely to see if actual ownership, rather than the physical design of multifamily housing, encourages people to express proprietary feelings over the space outside their homes by using and controlling these areas. The findings indicate no such relationship. However, the research was not expressly designed to compare the effects of building size with the effects of cooperative ownership. Moreover, there are only 6 cooperative sites in the study: such a skewed distribution makes it very difficult for cooperative ownership to have an effect on anything. Also, not one of the high-rise sites is cooperatively owned. For these reasons, the relatively weak impact of cooperative ownership should be viewed with caution. The question of whether the deleterious effects of building size, say for example in high-rise buildings, can be combatted by giving title to the apartments to the residents awaits further research, as does a more rigorous comparison between the impact of physical design and the impact of cooperative ownership.

The major reason for including police service and guard service as independent variables was to control for their expected effects and thereby to estimate more accurately the effects of the physical design variables and the social characteristics. Nonetheless, the findings concerning both these variables are somewhat surprising. Police service turns out to be an important determinant of personal crime but in the following way: the more frequently police patrol, the higher the rate of personal crime. The causal model for this study may be misspecifying the direction of the causal relationship between police service and personal crime rate: it is likely that the amount of personal crime is a determinant of police service rather than vice versa and that where the personal crime rate is high, police are likely to patrol more frequently. Neither the causal model nor the research design for this study was developed to analyze the relationship between police patrolling and crime. The purpose for including police service in the model was to partial out its effects: that was successfully done. The possibility that the model is misspecifying the relationship between police and crime does not affect the validity of the findings concerning the effects of physical design or social characteristics. While the model may not be adequate for assessing the effects of police service, it is

still valuable for demonstrating the effects of these other factors.

Guard service has virtually no effect on crime, fear, or instability. Its effects on fear (-.10) and instability (-.10) are in the predicted direction -- that is, sites without guard service have higher levels of fear and instability, but these effects are too small to suggest that the absence of guard service determines either of these problems. That guard service should have so little influence is only somewhat surprising. It is likely that the presence of guards is only effective where the guard is able to fully control all the entrances to a building. This can only happen in a high-rise site where a doorman is constantly present at the front door and all secondary exits are kept locked at all times. Of the 21 sites in the study that have any guards at all, there is only one site which meets these criteria. Moreover, the overwhelming majority of sites in the study are row houses and walk-up sites where security guards, if they are present at all, are unable to monitor who enters the many different buildings. What the findings from this study demonstrate then is that the mere presence of guards has little, if any, impact on crime, fear, or instability. It may still be true, however, that the degree to which guards actually control access to a building or to its grounds does effect crime or fear of crime. Confirmation of this hypothesis awaits further research since, for the most part, guards in this study did not control access to buildings or grounds properly.

Each of the characteristics of housing developments that has effects in the expected direction also affects more than one type of community problem. Building size affects fear and instability; low-income/AFDC affects personal crime, fear, and instability; accessibility affects burglary and instability; and teen-adult ratio affects burglary, personal crime, and fear. Both the number and the consistency of the effects that these four characteristics of housing developments exert suggest to us that overall they are the major causes of crime, fear of crime, and community instability in federally-assisted urban housing developments in this study.

Percentage of Variance Explained

Table 3 lists the cumulative percentages of variance in each of the four dependent variables explained at various stages of the burglary and the personal crime versions of the model. Beginning with the percentage of variance explained by the independent variables only, the percentage of variance is presented for each successive stage of the model.[2]

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[2]The variance explained by each one of the independent

Table 3

Cumulative Percentages of Variance in Burglary, Personal Crime, Fear, and Instability Explained at Various Stages of the Model

I Burglary Model

Independent and Intervening Variables	Percentage of Variance Explained		
	Burglary	Fear	Instability
Independent Variables	27%	63%	53%
Rent collection	27	63	56
Use of space	27	65	57
Social interaction	27	65	63
Control of space	30	69	64
Burglary		69[a]	66
Fear			67[a]

II Personal Crime Model

Independent and Intervening Variables	Percentage of Variance Explained		
	Personal crime	Fear	Instability
Independent variables	26%	63%	53%
Rent collection	37	63	56
Use of space	38	65	57
Social interaction	40	65	63
Control of space	45[a]	69	64
Personal crime		69[a]	65
Fear			65[a]

[a] $p < .01$

The last figure in each column tells us how much variance in total is explained by the model. The proportion of variance in fear (69%) that is explained is sizeable and significant. Similarly, the proportion of variance in instability

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variables separately is not listed in Table 3 because all the independent variables together constitute a single stage in the model. That is to say, there are no causal relationships posited among the independent variables.

is large and significant (67% in the burglary version; 65% in the personal crime version of the model). The proportion of variance in personal crime that is explained (45%) is not as large, but it is still a sizeable amount and is significant. On the other hand, the proportion of variance in burglary that is explained is considerably lower (30%) and is not statistically significant.

Overall, we can conclude that the causal model allows us to account for a large and significant proportion of the variance in fear of crime and community instability. It allows us to account for a smaller, but significant, proportion of the variance in personal crime. And finally, the model accounts for a relatively small portion of the variance in burglary.

Indirect Effects of Building Size and Accessibility

Building size, accessibility, low-income/AFDC, and teen-adult ratio each affect more than one type of community problem and their effects are all in the expected direction. Examining the indirect effects of these variables will allow us to clarify how these characteristics of housing developments produce problems of crime, fear of crime, and community instability. Figure 3 displays the major direct and indirect paths from each of these four independent variables to burglary, fear, and instability, and Figure 4 displays the major direct and indirect paths to personal crime, fear, and instability.

Control of space mediates effects from building size to burglary, personal crime, and fear of crime. Thus, although the overall (total) effect of building size on crime is not large, building size does show important indirect effects on both forms of crime and on fear of crime through control of space. These two indirect effects provide important empirical support for the theory of defensible space. The theory posits that residents' control of space is the link between the physical design of the housing environment and crime or fear of crime: the larger the building, the less control residents are able to exert, and, in turn, the greater the crime and the greater the fear of crime. Up until this time, however, this relationship has not been studied and therefore there has been no empirical support for this postulate prior to this study.

Another tenet of defensible space theory that has not previously been studied concerns the importance of residents' use of space outside their homes as an additional link between design and crime or fear of crime. The postulate is much the same as for control: the larger the building, the less frequently residents will use the space outside their homes, and

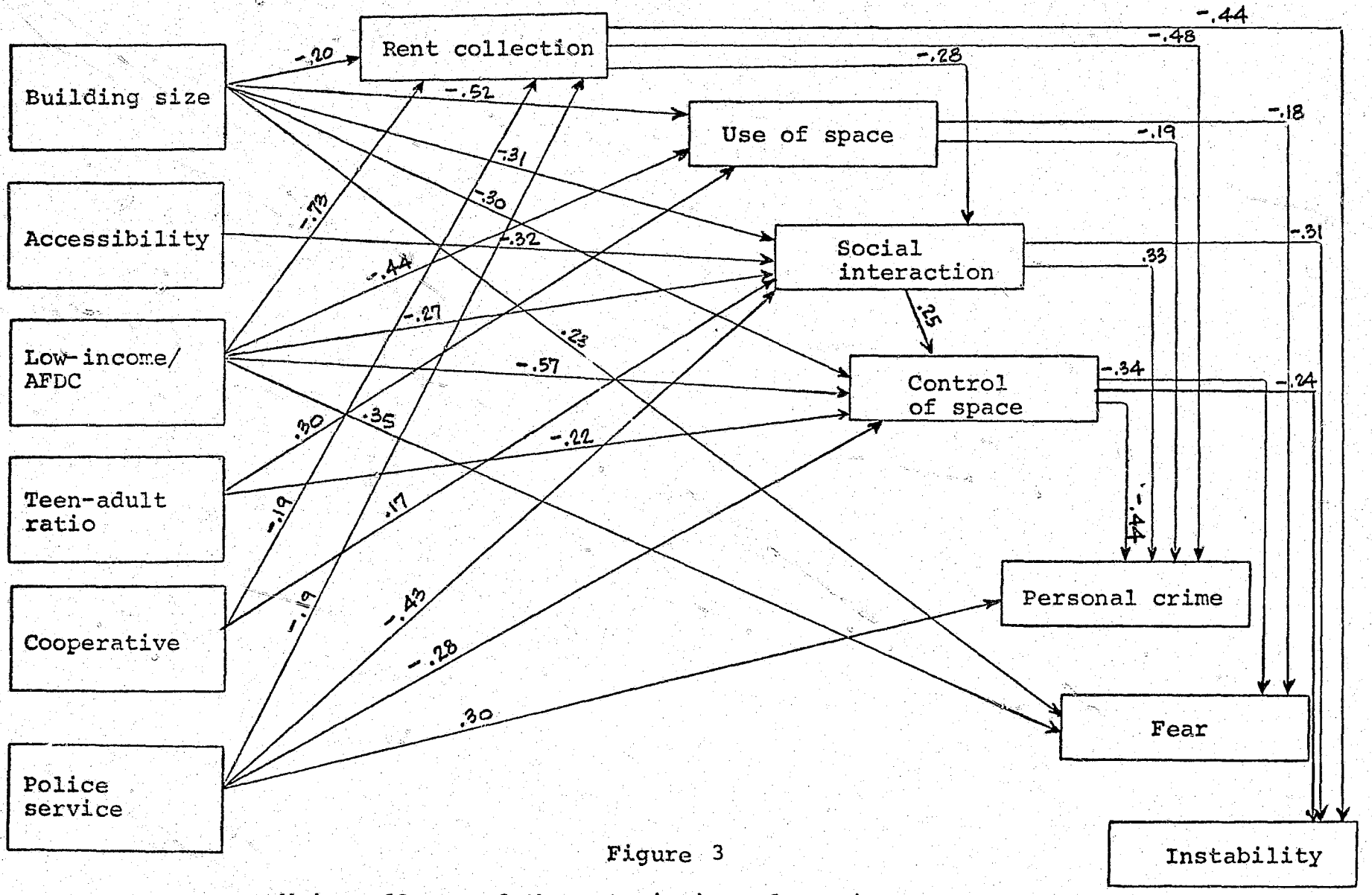

Figure 3

Major Effects of Characteristics of Housing Developments on Personal Crime, Fear, and Instability

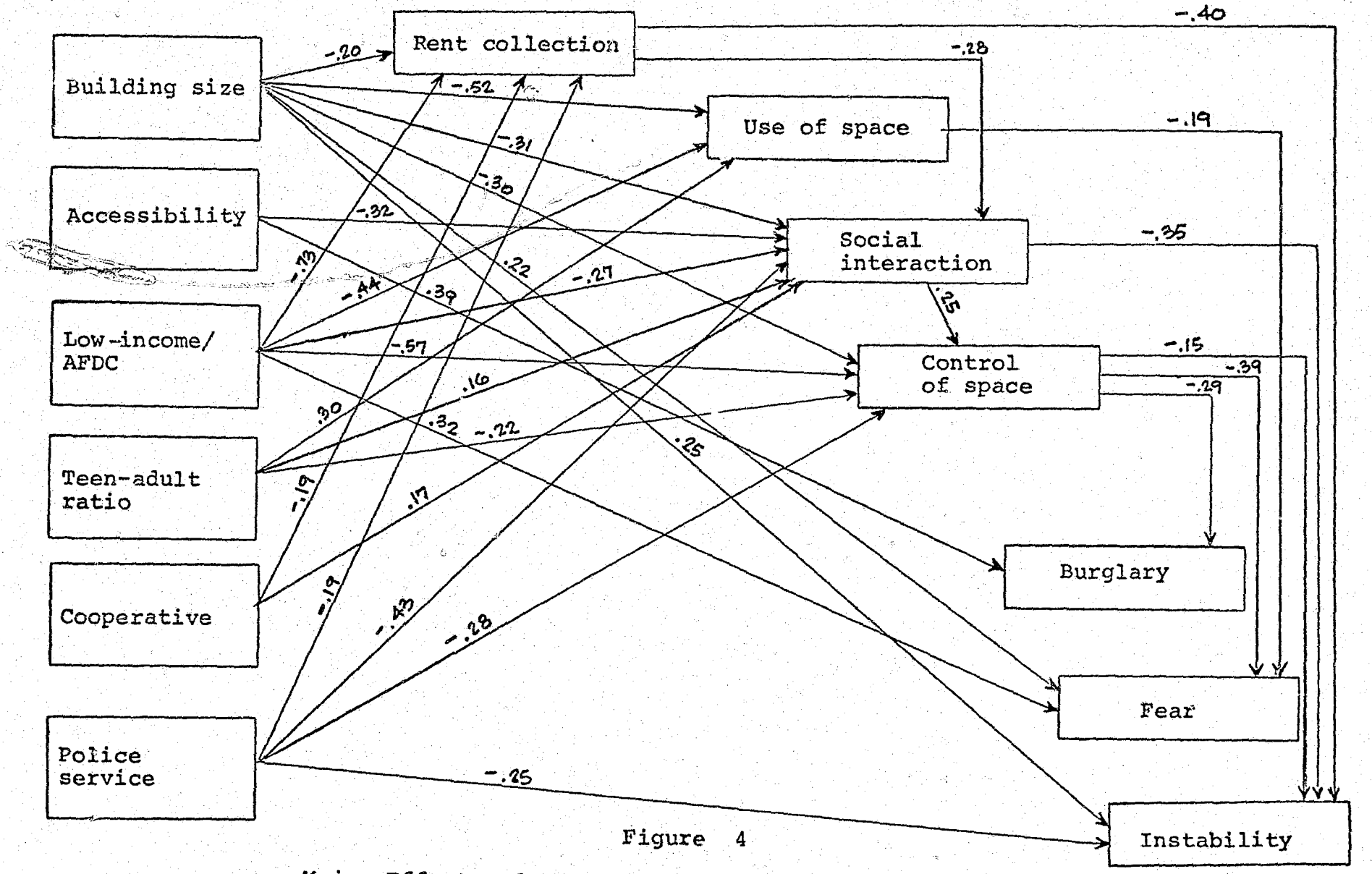

Figure 4

Major Effects of Characteristics of Housing Developments on Burglary, Fear, and Instability

in turn, the greater the crime and fear of crime.[3] This study provides empirical support for this postulate as well: residents' use of space transmits effects from building size both to personal crime and to fear of crime in the expected manner.

Both use of space and control of space reflect the degree to which residents have extended the realm of their own homes beyond the interior of their apartment units to encompass adjacent areas. Newman, as well as others such as Rainwater (1966), Yancy (1973), and Cooper (1972), have long suggested that the degree to which such an extension of the home environment occurs is a function of the design of that environment, particularly of the number of apartments that share the adjacent areas (which is measured by building size in this study). Prior to this study the evidence for such an effect was meager (McCarthy, 1978) or largely impressionistic (Yancy, 1973; Rainwater, 1966; Cooper, 1970). The findings from this study help to document this expected relationship between the design of the environment outside the apartment unit and the degree to which residents extend the realm of use and control beyond the confines of their own apartments. Moreover, this study indicates that such an extension of the home can work to inhibit both the occurrence of crime and the fear of crime.

As it turns out, the level of social interaction among residents also functions as a link between design and crime in this study, but not in the expected way. The larger the building, the less frequently residents interact, and in turn, the lower the rate of personal crime. Social interaction does, however, form the expected link between building size and community instability: the larger the building, the less residents interact and, in turn, the higher the level of instability. Social interaction among residents can also be viewed as a form of extension or enlargement of the home beyond the apartment itself. This study shows that this form of extension is also affected by the design of the environment and that it, in turn, helps to determine the level of instability in a community.

That social interaction among residents has a positive effect on personal crime rate is unexpected; a negative effect

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[3]We recognize the possibility that the relationship between use of space and crime, as well as between use of space and fear, or between control of space and crime, may be relationships of reciprocal causation whereby, for instance, low use of space causes high fear of crime and vice versa. We believe, however, that the predominant effect is from use to fear and, similarly, from use to crime and from control to crime.

was anticipated. There are at least two explanations. If we interpret the effect strictly in terms of this study's causal model, we would conclude that the more residents interact with each other in a housing environment, the more likely they are to victimize each other. Based on existing theories about community this seems unlikely. Another explanation is that incidents of person to person crime in a housing environment bring people together to solve the crime problems, and in this way they come to know each other better and to interact more frequently. In designing the causal model for the study, we assumed that the direction of causal influence was primarily from social interaction to personal crime rate and not vice versa. The positive effect that we found suggests that this may have been a mistaken assumption. The relationship could be one of reciprocal causation, where each affects the other but where the effect of personal crime on social interaction outweighs the reverse effect. A nonrecursive model would be required to simulate such a relationship. Moreover, a longitudinal study would be required to understand the process of how initially low social interaction may result in a high personal crime rate, and then how several incidents of personal crime may, in turn, result in a higher level of interaction.

The final intervening variable to be considered with respect to the indirect effects of building size is rent collection, which is used as a measure of management's ability to provide services. Rent collection mediates effects from building size to two dependent variables: personal crime and instability. The larger the building, the less able management is to provide services, as measured by rent collection, and, in turn, the higher the level of community instability. Similarly, the larger the building, the less able management is to provide services and, in turn, the higher the rate of personal crime. Thus building size not only affects actions and attitudes on the part of residents but it also affects management's ability to perform its duties and that affects both the occurrence of personal crime and residents' willingness to remain in that environment.

While building size affects all four of the study's intervening variables -- rent collection, use of space, social interaction, and control of space -- accessibility only affects social interaction. This effect is similar to the effect of building size: the greater the accessibility of buildings and apartments and thus the greater their vulnerability to intrusion by outsiders, the lower the social interaction among residents. Social interaction, in turn, affects community instability; thus, accessibility affects instability through social interaction. Accessibility also affects instability through burglary: the greater the accessibility,

the higher the burglary rate and, in turn, the higher the level of community instability. Apparently, high accessibility, like large building size, discourages residents from interacting with each other and, at least in this way, tends to limit the realm of the home to the apartment unit itself. The result of this limitation is higher community instability.

Indirect Effects of Low-Income/AFDC and Teen-Adult Ratio

Residents' control over space outside their apartments mediates the effects of low-income/AFDC and of teen-adult ratio on the various dependent variables. Indeed, control appears to be a highly important intervening variable in the causal model. It is the only intervening variable that has substantial effects on all four dependent variables. This means that residents' control over the environment outside their own apartments plays a role in determining the severity of each of the four types of community problems: the greater residents' control is, the less severe the problem, whether it be burglary, personal crime, fear, or instability.

Low-income/AFDC and teen-adult ratio both have negative effects on control. Through control, both social characteristics exert positive effects on burglary, personal crime, and fear of crime in much the same way that building size has indirect effects on these same three dependent variables. That is to say, the higher the proportion of low-income and AFDC families, the lower the sense of control, and as a result, the higher the rates of burglary and personal crime and also the higher the fear of crime.

Low-income/AFDC also has positive effects on personal crime and fear of crime through residents' use of space. The higher the level of low-income/AFDC, the lower the use of space, which results both in personal crime and fear of crime. Teen-adult ratio, however, has a negative effect on fear through residents' use of sapce: the higher the ratio of teenagers to adults, the more intensively outdoor space is used and the more intenvisely it is used, the lower the fear of crime.

A high proportion of low-income and AFDC families in a community, like large buildings, tends to discourage residents from extending the realm of their homes beyond the walls of their individual apartments. As with building size, the consequences are serious: burglaries and personal crimes are more likely to occur and residents are more likely to feel afraid. A high ratio of teenagers to adults also limits the extension of the home as it is measured by control. At the same time, however, a high teen-adult ratio facilitates the

extension of the home in that a high ratio results in more intensive use of outdoor space.

Low-income/AFDC and teen-adult ratio also have positive effects on instability through social interaction. The higher the proportion of low-income and AFDC families, the lower the social interaction among residents, and this in turn contributes to a high level of instability. A high ratio of teenagers to adults has the same effect on instability through social interaction. Low-income/AFDC also affects community instability through control: the higher the proportion of low-income and AFDC families, the lower the control, and in turn the higher the level of community instability.

Low-income/AFDC, like building size, has a negative effect on rent commection: the higher the level of low-income/AFDC, the lower the rent collection and, thereby, the less able management is to provide services. Rent collection, in turn, affects both personal crime and community instability. The lower the quality of services, as measured by rent collection, the higher the personal crime rate and the higher the level of community instability.

When we look over the set of intervening variables that mediate the effects of the characteristics of housing developments on each of the four types of community problems, an interesting pattern emerges. Those variables that best reflect the degree to which residents have extended their domain of concern beyond their individual apartments, namely use of space and control of space, are important links from building size, low-income/AFDC, and teen-adult ratio to each of the crime-oriented variables -- burglary, personal crime, and fear -- but not to community instability. The less residents have extended their domain of concern, the higher the crime and the fear of crime.

Social interaction, which perhaps reflects links to other residents rather than concern or interest in space, affects neither fear nor burglary and has the puzzling positive effect on personal crime. Social interaction, however, does affect community instability in the expected way. Links between residents, then, for the most part are not one of the primary causal mechanisms underlying the crime-oriented problems. And finally rent collection appears to be a major precipitating factor in the causation of personal crime and of instability but not of burglary or fear of crime.

Comparison Between This Study and Defensible Space

Although the present study and the study conducted in New York City that formed the basis of DEFENSIBLE SPACE differ in terms of objectives, research design, sites, and meas-

ures, they do share one very important hypothesis. The hypothesis that the two studies have in common is that crime rate is expected to increase with building size. Using the two most similar measures of crime rate from the two studies, robbery rate from the earlier research and personal crime rate from the present study, we find that the effect of building height on robbery rate in the earlier work was positive and large (beta weight = .47), whereas in the present study the effect of building size on personal crime rate is positive but small (total effect = .11).

There are many possible explanations for this discrepancy between the results of the two studies. The two studies were conducted in different cities; the earlier research was restricted to only one city whereas the present study included three cities. The sources of crime data are also different: the earlier research was based on police reports whereas the present study is based on a victimization survey of residents. There are, however, two additional differences between the two studies that are more plausible explanations for the contrast in results and that suggest possible refinements to defensible space theory. The first explanation concerns the distributions of building size in the two studies and the second explanation concerns the distributions of project size.

In the earlier work the overwhelming majority of the sites (50 of the total of 53 sites used in the regression analysis) were high-rises of different heights, whereas in the present study the majority of sites are row house and walk-up sites (52 of the total of 63 sites). Since the precision of the estimated mean crime rate for sites with a particular building size is a function of the number of sites with buildings of that size, the most accurate comparison in the earlier study was among high-rises whereas the most accurate comparison in the present study is between row houses and walk-ups. The building size effect on robbery rate that was demonstrated in the original defensible space study may have been primarily due to differences in crime rate among high-rises of different heights. The absence of any building size effect on personal crime rate in the present study may be due to a lack of any difference in crime rate between walk-ups and row houses.

The second possible explanation for the contrast in results lies in the difference between the distributions of the size of sites. (Size of building refers largely to the type of building -- row house, walk-up, and high-rises of different heights -- whereas size of site refers to the total number of dwelling units in all the buildings making up the site.) The average site size in the earlier research was 962 apartment units whereas the average size in the present study is only 169 apartment units. There is some evidence in the earlier work that building size has a stronger effect on

crime rate in large sites (more than 1,000 units) than in small sites. It may be that the building size effect found in the earlier work is peculiar to relatively large sites (50 of the 53 sites were larger than 300 units in size). Accordingly, the absence of a building size effect in the present study may be due to the fact that the sites studied are relatively small (55 of the 63 sites are 300 units or smaller and none is larger than 772 units).

Either one or a combination of both explanations may apply: the effect of building size on robbery or personal crime may pertain only to high-rise buildings of different heights, to all building types that form large sites, or to high-rise buildings that also form large sites. Of course all of these possibilities are in the realm of speculation. They are nonetheless plausible and indicate directions for future research regarding the main effects and the interaction effects of building size and size of site on crime rate.

Although in the present study building size does not have a large or significant total effect on personal crime rate, it does show a number of important indirect effects on personal crime rate. Building size has the predicted positive indirect effects on personal crime rate through residents' use of space and through residents' control of space. The role of these two intervening variables in the present study in accounting for the admittedly small relationship between building size and personal crime rate suggests that these same two variables, use and control of space, may also have accounted for the strong relationship between building height and robbery rate in the earlier study.

Moreover, the present study extends the earlier findings in several ways. Building size shows significant negative effects on rent collection, use of space, social interaction, and control of space, and significant positive effects on fear of crime and community instability. In other words, as building size increases, rent collection, use of space, social interaction, and control of space all decrease; and both fear of crime and community instability increase. Thus, regardless of the social characteristics of the residents or the nature of police or security guard service, building size affects the nature of life in federally-assisted housing developments in a variety of ways, and the character of this impact is consistent throughout: the larger the building, the more problematic life is.

DIRECTIONS FOR FUTURE RESEARCH

This study has produced a number of important findings on how physical design affects crime, fear of crime, and instability. At the same time, the absence of certain expected effects and the presence of some unexpected ones suggest a number of directions that future research might take to address some important, unanswered questions.

In selecting the cities and the sites for this research, we tried to give careful consideration to the ranges and distributions of, and the correlation between, the study's two major independent variables (building size and low-income/AFDC). As it turned out, however, this effort was not sufficient to ensure a good range and distribution of the physical design features. In the end, by arbitrarily limiting the study to three cities, the total number of study sites proved too small; the distribution of building size favored row houses and walk-ups over high-rises; and there was only one site that had, what we would categorize as, high quality defensible space characteristics. The distributions of two other variables were also poor: very few cooperatives were included and very few sites used guards effectively to control access to buildings and grounds. In all probability the sites we studied are a good representation of the distribution of these key variables throughout the United States, and in this respect the study is useful. However, the characteristics of our sample did not allow us to demonstrate the full capability of physical design for affecting crime, fear, and instability. Nor did it allow us to compare properly the effects of physical design with the effects of other variables, such as cooperative ownership or guard service.

Some of these weaknesses in the sample might have been avoided if we had pursued our original intention of studying developments in eight cities instead of only three. Certainly the sample of sites would have been larger. In future research far more attention (time, money, and effort) should be given to developing the study design than is typically given in research of this type, particularly with respect to determining the appropriate unit of analysis, the sample size of <u>those</u> units, and the ranges and distributions of variables that are properties of those units. The advantages and disadvantages of various study designs should be carefully spelled out and the selection made not only on the basis of the relative costs of conducting the field work (as was done in this study) but on the relative costs <u>and</u> the relative benefits of the various research designs. Granted some trade-offs have to be made, but these trade-offs should be fully understood by the

research team and the funding agency before the final selection of a study design is made.

Given the importance of more balanced study design than this study possessed and the strong findings generated by this study concerning the importance of certain characteristics of urban housing developments, it is now possible to locate a range of housing developments throughout the country that possess various combinations of the characteristics studied in this research in order to conduct a study with a larger sample and with more optimal ranges, distributions, and combinations of variables. This would allow one to compare more fully the effects of various characteristics, to examine the interaction effects between certain characteristics and, in the end, to attain a better measure of whether a heavy investment in defensible space design or in tenant selection is cost-effective and desirable.

Finally, pursuit of further defensible space investigations should consider the adoption of an entirely different research approach: one which involves the modification of existing housing environments and the construction of entirely new environments. This will entail the building of a number of housing environments that fully meet defensible space design criteria, housing within them various mixes of residents, and studying these environments closely over time. In fact, building environments with truly excellent defensible space characteristics and then studying these environments may be the only way to assess the full impact these characteristics can have since there are so few housing developments that currently possess the full complement of defensible space design features. Considerable funds are now being made available for the construction of traditional public housing and for Section 8 housing. Instead of building without guidelines or evaluation, this housing could be built in accord with defensible space principles and systematically evaluated and tested against other housing.

The systematic social and physical modification of existing housing developments could also provide a rich testing ground for defensible space theories. There are, of course, limits to the extent to which existing environments can be modified. It will never be possible to construct an ideal defensible space environment through modification. Nevertheless, a lot can be done and its utility in improving existing conditions tested.

With either the more balanced research design or the experimental approach, studies would benefit greatly from being longitudinal. By tracking police service, social interaction, and crime rate over time one might be able to explain some of the anomalous findings of the present study.

Moreover, one might be able to document how a high level of control over space outside the home works to prevent small crime problems from escalating into large and insurmountable ones. And monitoring possible changes in tenant composition in different sites would allow one to analyse whether and how such changes lead to increases or reductions in crime and fear of crime and how these effects may be stronger in large buildings than in small ones. Balanced study designs with good ranges and distributions of variables, experiments that are carefully evaluated, and longitudinal research are all important directions for future research. In fact, it is essential that future studies employ one or more of these approaches if research concerning crime and the design of the physical environment is to make any substantial progress in the future.

POLICY IMPLICATIONS

This research project set about to determine which factors are the strongest determinants of crime, fear, and instability in federally-assisted housing developments. The results show that two physical design features (building size and accessibility) and two social characteristics (low-income/AFDC and teen-adult ratio) are the major determinants. The policy implications of this research therefore hinge on our ability to manipulate these four factors.

A discussion of the policy implications of research findings, if they are to serve the policy maker, must address the political realities of the function of government-assisted programs and the social and economic feasibility of implementing changes. The discussion of policy implications which follows is therefore a pursuit of alternative forms of implementable compromise. The discussion of policy implications is organized as follows: it begins with an initial examination of the overall program that may be best employed to address the effects of the four key characteristics of housing developments and it concludes with a detailed discussion of the changes that can be implemented to reduce the impact of each of these characteristics separately.

Looking at the four key characteristics of housing developments (low-income/AFDC, teen-adult ratio, building size, and accessibility) we find that three lend themselves to manipulation and change: the two social characteristics and accessibility. Building size cannot be altered easily. The only hope for large buildings is that a drastic change be made to the social composition of the population living in them. However, the fact that it is physically easier to alter the social composition of a housing development than it is to alter the physical design does not mean that it will be politically or socially more acceptable to do so. In fact, the opposite is true. There is a paradox here. Physical alterations are politically most acceptable but are mechanically more costly -- if not outright impossible -- to implement. Social changes are less costly to undertake but are often politically unacceptable.

Everyone may accept the fact that a high concentration of teenagers or low-income/AFDC families in a subsidized development is causing crime, fear, high turnover and vacancy rates. And, given the large attrition resulting from a high turnover and vacancy rate, it may even be comparatively easy to change the composition of the development to smaller families, two-parent families, and to working-class rather than

welfare families. But the constituents of assisted housing who will be excluded in this manner, and the people who represent them, may find this politically unacceptable.

Currently the allocation of government subsidies to public housing developments takes into account some of the key factors identified in this study (subsidies to moderate-income housing are not, however, allocated on such a systematic basis). The Performance Funding System (PFS) used by HUD to provide monthly subsidies to public housing projects employs a formula which considers: the age of the development; the height of buildings; the size of apartments; the fair market rent; and other factors which are regional and national rather than project-based (i.e., rate of inflation, utility cost increases, etc.). During the past ten years building height has become an increasingly important factor in the PFS formula, accounting for 30% of current allocations where it previously accounted for only 20%. Apartment size is also a factor in the PFS formula and it does predict, roughly, the number of children likely to be present; large apartments are likely to house more children. But if the ratio of teenagers to adults is what governs, then apartment size alone is a poor surrogate.

The PFS formula is currently undergoing reassessment. Currently it does not now allow for any consideration of the socioeconomic make-up of the resident population. Nor does it in any way consider the accessibility of grounds, buildings, or apartment interiors. The socioeconomic composition of a housing project, as well as its accessibility, are considered elements which can be altered. As such they are not permanent and therefore cannot be considered in the PFS formula. This suggests that housing authorities should feel free to change the social composition of their projects should they find them troublesome. This, as we have seen before, is not always politically feasible. Many municipalities feel that they are committed to using their assisted housing projects to serve the poorest of the poor first. Why then should the municipality not be compensated for such a commitment if research findings bear out what is accepted wisdom: that the higher the percentage of low-income/AFDC families in a development, the higher the fear, crime, and instability?

The means by which additional funds should be allocated to projects with a high percentage of low-income/AFDC families is another problem. Outside of public housing the problem of providing good housing and services to welfare families is proving insolvable. H.E.W. has been putting billions of dollars into the hands of welfare residents and private landlords to provide residents with good housing. But survey after

survey shows that the welfare resident is not getting his or her money's worth -- regardless of whether the money goes directly to the landlord or via the resident to the landlord. Programs which provide additional rental monies directly to the landlord do not appear to be able to motivate the landlord into making long-term commitments to improve his housing stock. Similarly, programs that provide additional rental monies to residents do not seem to be getting to the landlord or to be buying improved housing for welfare families.

In public housing the channeling of additional monies from government to ensure better quality housing is more successful: thus the allocation of additional subsidy monies on a continuing basis through the PFS for developments with certain physical and social characteristics would appear to be worthwhile, given the argument that these characteristics are more immutable than the PFS program originally envisioned. If we cannot change their characteristics, then projects with large and accessible buildings and high percentages of AFDC families and high teen-adult ratios should be given larger monthly subsidies. Part of the difficulty of adopting such a course of action is that the management of most housing developments do not have the resources or training to apply these monies to address the problems created by each factor. For example housing management may reason, and probably correctly, that a high ratio of teenagers to adults will generate more vandalism and higher maintenance costs. The additional subsidy monies will thus be spent on physical repairs. But this will not address the source of the problem, nor is it likely to reduce the crime, fear, and instability which result from it.

It is also questionable whether other programs exist which will address the problems produced by these specific factors more efficaciously. Each one of the four identified characteristics contributing to crime, fear, and instability of a development can, however, be altered environmentally: that is to say, the social composition, physical characteristics, or both, can be altered to reduce the impact of each factor. Given some of the difficulties in introducing and adopting other panaceas, we should like now to explore the implementation, and implications, of environmental changes. The information on which this discussion is based is drawn from this study as well as from other research and the first author's long experience as a consultant to public housing authorities.

Accessibility

Of the four key causal factors we identified as affecting crime and instability, the one which can be altered with

least social and economic cost is accessibility. Where one cannot easily modify building size or find and implant a more suitable population, the accessibility of buildings is easily altered. Accessibility has a large and significant influence on burglary: the more accessible buildings and apartments are to intruders, the higher the rate of burglary. And through its effect on burglary, accessibility has a moderate effect on instability. The prevention of burglary and the reduction of instability through the simple mechanism of reducing the accessibility of apartments, buildings, and grounds seems a worthwhile, low-cost investment. Even those buildings which are rated as highly accessible can be rendered almost totally inaccessible at the cost of no more than 5% to 10% of the cost of a new unit. This cost will vary depending on the lay-out of the existing building and site plan. High-rises and walk-ups, in that order, have an advantage over row houses in that the higher the building, the less costly it will normally be to reduce its accessibility per unit. In addition, because row houses are considered much more desirable by families with children than high-rises, a high burglary rate in row houses is less likely to precipitate a large exodus of the population than a high burglary rate in high-rises. One can conclude, therefore, that an investment in reducing the accessibility of buildings is increasingly beneficial and less costly per unit with increased building size.

Although the reduction of access from the outside of a building or project is less costly in high-rises than in walk-ups or row houses, this caveat should be kept in mind: in large-sized buildings, a large number of families share a common entry and common internal circulation areas and these families themselves may be responsible for some of the burglaries. Therefore, securing the interior circulation area of a high-rise building from outside access is only effective if the criminals live outside the building. It is less costly per unit to reduce the accessibility of large-sized buildings but what is secured from access in the large-sized building is the common interior circulation areas. What is secured from access in row houses is access to the individual apartment unit. In a large-sized building the families living within the building continue to have access to the interior circulation areas and from those to the doors of individual apartments. In walk-up and row house buildings the cost per unit of preventing access is higher but the number of families sharing an internal area, and from it access to other units, is appreciably lower.

In a building shared by a small number of families the chances of finding one resident among the building's occupants who commits burglaries is proportionally lower than in a large-sized building. Also an in-house burglar in a small

building shared by a few families stands a much greater chance of being spotted and recognized. The deterrence is therefore higher. An investment in reducing accessibility in row houses and walk-ups is therefore likely to be far more effective than in high-rises.

In high-rise buildings, therefore, cost investments in reducing accessibility are justified only when there is little chance that the resident population within the building will commit burglaries against other, in-house residents. The social characteristic found to affect burglary rate most in this study is the teen-adult ratio of the resident population. Except in high-rise buildings with a high teen-adult ratio, it is highly recommended that housing agencies make funds available to developments to reduce the accessibility of buildings and grounds. Such investment is particularly cost-effective for large-sized buildings in which the ratio of teenagers to adults is not high. An investment in reducing the accessibility of row house and walk-up buildings, although proportionally more costly per unit, is less subject to failure resulting from a high teen-adult ratio among residents.

Low-Income/AFDC

In this study the percent of low-income/AFDC families in residence proves to be the strongest single determinant of personal crime, fear, and project instability. This factor has a total effect on personal crime rate of .29, a total effect on fear of .57, and a total effect on instability of .40. Another way of gauging the effect of the percent of AFDC families -- a way which is probably of more usefulness to project managers -- is to say that an increase of 10 percentage points in the proportion of AFDC families (say from 12% to 22%) will produce 12 more personal crimes and 6 more burglaries per thousand population. This is the effect of a 10% increase in AFDC families alone, when the effects of all the other characteristics of developments that influence personal crime and burglary have been partialled out.

Most housing managers have a sense of these relationships from their own experience. It will come as no surprise to those familiar with assisted housing to learn that many managers, who balance their commitment to housing low- and moderate-income families with an equal commitment to making their developments a sound long-term investment, go to great lengths to exclude AFDC families from their developments. Such an exclusionary policy can obviously be more easily adopted and maintained in moderate-income developments than it can in public housing and, not surprisingly, some of the moderate-income sites in this study have no AFDC families in them whatever.

Despite the fact that some housing managers and non-profit owners of moderate-income housing have been able to exclude AFDC families from their developments, it is fundamental to the purpose of federally-assisted housing programs to provide housing for low- as well as moderate-income families, and for welfare, single-parent, and large families as well as working-class, two-parent, and small families. It is a further policy of the federal housing act to encourage the integration of low-income families in moderate- and middle-income developments. Moderate-income housing developments that have a policy of excluding AFDC families are therefore evading some of their basic responsibilities.

The opposite side of this exclusionary policy is the all-inclusive policy adopted by some public housing authorities. Some authorities see public housing as "housing of last resort." For them needy families have first priority for admission to public housing -- just because they are able to exercise the least choice in the housing marketplace. For such housing authorities and those others who have allowed the percent of AFDC families to climb uncontrolled, the consequences have been devastating. Their projects have become occupied by a high percentage of residual, non-mobile, AFDC families -- sometimes in excess of 75%. Their projects suffer high crime rates, high turnover and vacancy rates. Some of these projects are more than 50% vacant. Projects with such high vacancy rates -- where new residents often choose not to reside more than a week -- are obviously not succeeding in their goal of providing housing for the poorest of the poor either.

Between these two extreme and equally unsuitable policies must lie a course of action which will allow federally-assisted housing programs to best serve all the groups intended -- from moderate-income, working-class to low-income/AFDC -- without intentionally excluding any one group. The only way this can be done is to avoid the concentration of one group in any form of assisted housing to the exclusion of the other group. The experience and policies of the New York City Housing Authority -- which is rapidly being accepted as a guiding wisdom by project managers and housing agency executives throughout the country -- is that the percentage of AFDC families should not exceed 15% in moderate-income developments and not exceed 30% in public housing.

The implication that follows from our findings is that housing managements who are still able to attract higher income, non-AFDC families to their developments should endeavor to do so before the low-income/AFDC families form too large a majority of residents. After that point it will become increasingly difficult to attract two-parent and working-class families to their developments.

If a housing project has a very high percentage of low-income/AFDC families (60% or more), it will also have a high vacancy and turnover rate. Although high vacancy and turnover rates will contribute to the insolvency of the development, they will also simplify the problem of finding vacant apartments to lease to higher-income families.

However, attracting the higher-income, two-parent families to projects with a high percentage of AFDC families is not easy. Housing management will have to make a concerted effort to direct their advertising to specific groups that are most likely to produce suitable candidates. The appearance of the project will be very important to these prospective applicants. But most critical to their decision to move in will be management's stated policy of, and commitment to, maintaining an acceptable mix of two-parent, working-class and one-parent, welfare families.

Teen-adult Ratio

The teen-adult ratio in projects affects burglary (a total effect of .16), personal crime (a total effect of .21), and fear (a total effect of .18). The effects of this variable are not nearly as strong as the effects of low-income/AFDC, accessibility, or building type. This finding is surprising but it is most likely due to the fact that sites with a high percent of low-income/AFDC families also have high teen-adult ratios ($r = .46$). The finding that the effects of teen-adult ratio are only moderate in size is therefore in part an artifact of the overlap between these two social characteristics of the population.

Control of the ratio of teenagers to adults in existing housing projects can be achieved two ways: by renting the large units in housing projects to as small a family as is permitted, and by giving preference to large families that have two adult heads of household. A third solution is provided by some housing managers who have taken to subdividing their very large units (four and five bedrooms) into smaller units.

The difficulty with the above policies is that, although they are effective in lowering the ratio of teenagers to adults, they also decrease available subsidized housing for large, one-parent families. A compromise policy is required if we are not to end up with a subsidized housing market which provides no housing whatever for large, one-parent families. The maintenance of some large units for leasing to one-parent families should be required in any conversion program. However, government should also provide housing managers with incentives, in the form of special subsidies,

to help management pay for the additional costs of maintaining, policing, and renovating these units -- costs which will result from the presence of these large families.

Building Size

Building size alone, that is separate from the effects of all the other independent variables, has a total effect on fear of .41 and a total effect on instability of .39. These are large and significant effects. The variable building size is made up of two highly correlated physical design characteristics: the number of units sharing a common entry and building type.

A cursory review of these findings may prove to be at variance with our personal experience: each of us knows of one or two moderate-income, high-rise buildings, lived in by friends, which appear to be comparatively stable and free of fear. How then does one reconcile this knowledge with the findings from this study? This difference is perhaps best explained by the fact that all the projects examined in this study were occupied predominantly by families with children. All projects with more than 60% elderly were intentionally excluded from the sample. High-rises occupied primarily by retired elderly families have a history both of high stability and of low fear. To a lesser degree the same can be said of high-rises occupied primarily by working-singles and couples, given that there are sufficient funds available to pay for round-the-clock doormen.

For high-rises occupied primarily by families with children the story is different. The level of fear found in the high-rise buildings in this study was significantly higher than that found in row houses or in walk-ups. The same is true for the level of instability.

The marked differences in instability that are attributable to building size alone are perhaps best explained by parents' dissatisfaction with raising children in large-sized buildings. Residents of the 63 sites in this study were shown illustrations of six different building types and asked to identify their building from among them (see Figure 5).

Residents were then asked the following: "Which type of building do you think is the best place to raise kids?" The response, broken down by the percentage of residents preferring each type, appears below:

Elevator buildings	1%
Walk-up (long interior corridor with many families sharing a common entry and circulation system)	1%

Galleria (outside corridor with many families sharing common circulation system)	3%
Walk-up (subdivided, few families sharing an entry.	7%
Garden apartments (piggy-back type row houses)	34%
Row Houses (individual houses in a row)	54%

The descending order of desirability, from row houses to elevator buildings, is consistent and unmistakable. Fully 88% of all respondents found the row house and garden apartment (piggy-back row houses) the most desriable housing types in which to raise children. Even the differences between the

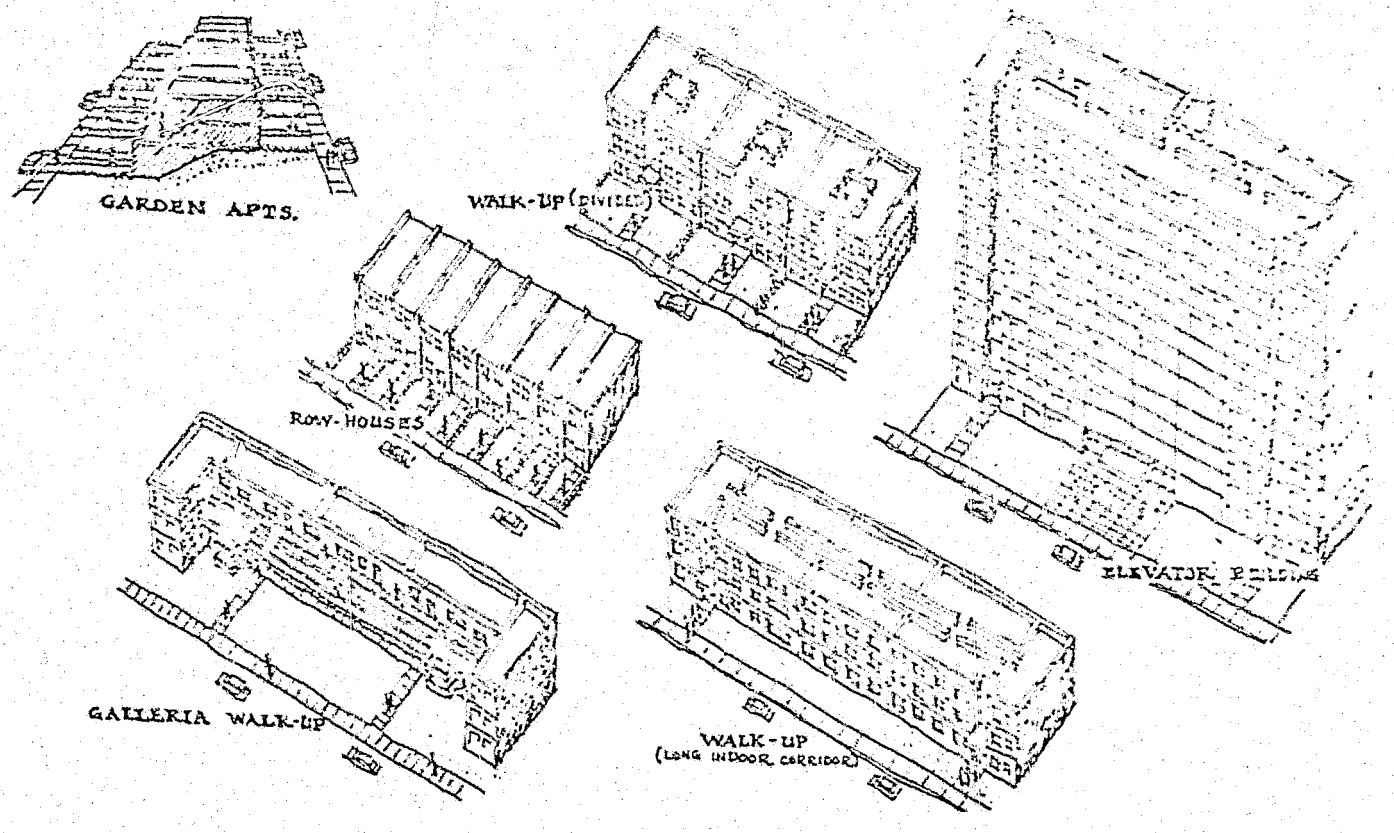

Figure 5 - The Six Building Types Typical of All the Developments in the Study

subdivided walk-up (in which a small number of families share an entry), the galleria walk-up, and the walk-up with the long interior corridor are apparent: preferred by 7% versus 3% versus 1%.

In order to determine how the building the respondents were currently occupying affected their choice, residents were asked: "How good or bad is the type of building you're living in now as a place to raise children?" The response, broken down by the three basic classifications of building types residents were living in, appears below:

	High-rises	Walk-ups	Row houses
Very bad	20%	9%	4%
Bad	29%	21%	14%
In between	45%	33%	29%
Good	5%	30%	38%
Very good	1%	7%	16%

What is remarkable is that even for residents living in high-rises 49% found it either "bad" or "very bad" while only 6% found it "good" or "very good." Preference studies normally show that people tend to favor the type of environment they are currently living in as justification for an earlier made decision. High-rise residents' evaluations of the inadequacies of their own environment for raising children therefore constitute an important rejection of a living environment they chose to live in with some expectation that it would prove suitable.

Implementing Policy on Building Size

The implementation of change in building size is complicated by many factors. If a housing developer or agency is starting a new project from scratch, he obviously has many more options open to him than a developer or agency who is managing completed and occupied units. For the developers of a low and moderate-income family project starting from scratch, the construction of a row house project is recommended over a walk-up, and a walk-up is recommended over a high-rise, if the developer desires to keep fear and instability to a minimum in his development. In studies undertaken of the comparative cost of different building types (independent of land costs) it was found that walk-ups, which can be built at densities up to 50 units per acre, cost less to build than either high-rises or row houses. They are also the least costly to maintain. A developer, therefore, should not select or pay more for a

piece of property than a density of more than 50 units per acre would justify. Fifty units per acre is the effective maximum density at which three-story walk-ups can be built.

However, the developer who has already purchased an expensive site is forced to consider how the cost of the land may be divided up between units. The land he purchased may have been so costly that he can now only afford to build on it as a density of over 50 units to the acre. In that case he has no option but to construct a high-rise building. However, if his site is an acre or larger in size he should consider a compromise: that is, the construction of a high-rise for exclusive occupancy by elderly at a very high density (150-250 units/acre) so that the remaining portion of the site can be built as walk-ups, or even row houses, for families with children at 50 units or less per acre. On smaller sites the high-rise for the elderly might well be built on top of three story walk-ups for families with children. Experience has shown that high-rises constructed for occupancy exclusively by the elderly are safe and desirable buildings even at very high densities.

We come now to the central policy question: what can a housing agency do that has high-rise buildings currently occupied by families with children? There is no simple, inexpensive, and effective solution to this problem. If the building has a high vacancy rate, the possibility of moving the remaining families out and into new, or existing, walk-ups and row houses may be explored. But the conversion of an existing high-rise designed for families with children to one designed for elderly is very costly. The large units (three to five bedrooms) are expensive to convert to small, one-bedroom units (60% to 85% of the cost of a new unit).

There are two other options available: securing the building by reducing its accessibility to outsiders; and changing the type of families with children who occupy the building. Both of the above should be adopted simultaneously for maximum effect. A high-rise building occupied by families with children which is experiencing high fear and instability may also be found to have a high percentage of low-income and AFDC families and a high ratio of teenagers to adults. The percentage of low-income/AFDC families and the ratio of teenagers to adults both affect fear significantly. Low-income/AFDC also affects the personal crime rate and the level of instability, and teen-adult ratio also affects the burglary and personal crime rates.

The overall fear and instability of a high-rise occupied by large, low-income families with children can therefore be

reduced by changing the occupancy to a higher percentage of smaller, higher-income, two-parent families. This may take a major policy change and commitment by the housing agency to achieve: if the high-rise building already has a reputation for fear and instability, it will be difficult to attract higher-income families with fewer children to it because they have more options available to them in the housing market. To accomplish such a change will necessitate a long-term commitment on the part of management to seek out a new tenant body. This will mean a period during which management will have to bear the burden of a large number of vacant units. Once the project is properly leased up, however, the rate of instability should decrease and the losses incurred during the changeover can be expected to be made up over time. In order to attract new tenants, management will have to publicize its new leasing policies, and it will need the backing and commitment of the government agency providing it with subsidies in order to achieve the changeover: management will need a period of grace on mortgage payments while some of the units go vacant during the search for new tenants. Management will also need understanding and support from the subsidizing agency in turning away some large, low-income, and AFDC families while trying to achieve a more stable mix of residents.

Earlier it was mentioned that an investment in reducing accessibility of high-rise buildings was more cost-effective than a similar investment in row houses and walk-ups. However, there was the cautionary note that this assumed that crimes were being committed by individuals who lived outside the development. However, the study's findings show that crime, fear, and instability are affected by the characteristics of the residents within the development: the percentage of low-income and AFDC families and the ratio of teenagers to adults. A substantial investment in reducing the accessibility of a high-rise building, therefore, should, for maximum effectiveness, be undertaken in tandem with a program to reduce the percentage of low-income and AFDC families and the ratio of teenagers to adults. In this way high-rises can remain occupied by families with children. They will, however, be of predominantly moderate rather than low-income; and they will be primarily two-parent rather than one-parent families.

It should be pointed out here, as a further caution, that the New York City Housing Authority's investment in reducing accessibility through the installation of intercoms in its high-rises has been without success except in buildings occupied predominantly by the elderly or by two-parent families with few children. Children have a history of disabling the intercoms and the automatic door closing and opening hardware. If they cannot have their way with the main entry doors, they will dismantle the emergency exit doors so as to gain undis-

rupted access to the interior of the building. The number of units sharing an entry and the teen-adult ratio are the two factors which most influence the failure of intercom installations in subsidized low-income housing.

In discussing the mechanisms and procedures required to implement a program for stabilizing high-rise developments, it was suggested that this would require a policy change along with a concerted and long-term commitment by both the manager/owner of the development and the government agency providing the subsidy. To date, there are few instances of this happening. The far more common solution adopted for the family-occupied high-rises suffering crime, fear, and instability is to provide them with additional rental subsidies to allow management to fill up the vacant units with a higher percentage of low-income residents. In management's and government's anxiety to keep the development from defaulting, a short-sighted short-term solution is adopted which, our findings suggest, can only have negative long-term consequences. It is true that in the short-term the increased subsidies will fill the vacant units and provide the mechanism by which government can assist a housing management firm in meeting its monthly mortgage payments. But such a policy will also increase the percentage of low-income and AFDC families and, most likely, the ratio of teenagers to adults. Such a change in the social characteristics will, with time, only increase the crime, fear, and instability in the development and nullify the effects of an investment in reducing the accessibility of buildings (assuming that such a program for physical modifications was also introduced when the development received an additional subsidy).

Developrent managers and the local area officers of HUD are not the only ones who must bear the blame for adopting such short-sighted policies; they are, after all, encouraged to do so by HUD Central. It is from the Central Offices of HUD that directives are issued to the region and local area offices to reduce vacancy rates, turnover rates, and defaults in government assisted housing -- quickly and by whatever means available. This inevitably leads to the adoption of short-term strategies which only provide temporary, patch-up relief. These policies are adopted and implemented even though the problems of crime and fear will only worsen with time -- producing higher instability and requiring still more subsidies. The managers of limited dividend developments will, at this juncture, begin to take profits out of their buildings as quickly as they can -- even though they might actually be receiving more subsidies and higher overall rents. The project, following the national trend, will then go into default and, if a private owner cannot be found for it, be sold to the local public housing authority, if they will accept it (which they are normally willing to do for still more subsidies). The

useful life of such projects then becomes very short, the cost to government is far in excess of what was ever anticipated. The total cost in government subsidies for such developments over a twenty to thirty year period (the length of the mortgage, assuring the project can survive that long) can be well over twice what legislators thought they were committing themselves to.

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