CROWDING IN THE RESIDENTIAL ENVIRONMENT

by

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ABSTRACT

High density -- in the form of overcrowding of dwelling units, or the number of people or dwelling units per acre -- has traditionally been regarded as a leading factor in the environment which brings about pathology and social disorganization of all kinds. The purpose of this study is to promote a clearer understanding of the response of the individual to high density in the residential environment in terms of behavior and health.

The study is based on a review and critical examination of the literature concerning (a) previous investigations of the effects of high residential densities (correlational and epidemiological studies, extent and kind of social interaction, satisfaction, and family life), as well as (b) related research (animal studies, experimental investigations of the human effects of high densities, and the human use of space). The integration of these findings indicates an overall lack of rigorous scientific evidence concerning the adverse effects of high density on human behavior and health. Conceptual analysis of this evidence, however, indicates that the human effects of high densities appear to depend mainly on:

(a) social aspects of the situation or environment,
(b) personal attributes or characteristics of the individual,
(c) cultural norms,
(d) the type of activity involved,
(e) temporal duration (i.e., length of exposure), and
(f) physical factors in addition to density variables.

The study also includes a review of recent theoretical perspectives concerning the relationship between high densities, pathology and social disorganization. The bulk of these perspectives rely on the concept of
stress as a link between high densities and potentially adverse consequences for the individual. A functional discussion of present stress knowledge is followed by the description of a Conceptual Model of Crowding in the Residential Environment, which is suggested as a theoretical framework for future research on the effects of high residential densities. The conceptual model is based on Stokols' Equilibrium Model of Human Response to Crowding (Stokols, 1972), which has been modified somewhat and applied to the residential environment.

The concluding chapter suggests that performance standards, based on the behavior-contingent approach to the designed environment, are necessary criteria for the evaluation of high density residential development in order to avoid undue stress on the part of the individual.
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Chapter 1

INTRODUCTION

This study is concerned with human response to high density in the residential environment. Social factors, personal attributes of the individual, cultural norms, the type of activity involved, temporal factors, and certain characteristics of the physical environment in addition to density are emphasized as important variables which influence or mediate the individual's response to limited space or high population densities.

1.1 Background

Canadian housing statistics for the period 1960-1969 revealed an important change in the production of new dwelling units, indicating that increasing numbers of Canadian urban residents are now living at higher densities. Apartment starts increased from 27% of total dwelling starts in 1960, to 53% in 1969, with an accompanying decrease in the percentage of single-detached dwelling starts. While data for the period 1970-72 reflected a moderation in the trend to build at higher densities, the decline in the total number of multiple family starts in Canada in 1972 appears mainly to have been a response to relatively high vacancy rates in only a few cities (Central Mortgage & Housing Corporation, 1973).

The need to build at higher densities in the foreseeable future will tend to be reinforced, rather than mitigated, by recent rapid increases in residential land values, as well as increasing rates of population.
growth in many large urban centres in Canada. The existence of natural barriers to urban growth, and/or legislative mechanisms preserving fringe agricultural land will further influence housing densities in some urban areas.

High density, however, has traditionally been regarded as a leading factor in the environment which brings about pathology and social disorganization of all kinds. Research on the human effects of high densities, especially that concerned with high residential densities, is abundant both in volume and type of methodological approach; neither is it lacking in terms of cross-cultural findings. The common interpretation of many of these studies, however, is that high density almost inevitably leads to dissatisfaction, physical or mental disorders, or various forms of social disorganization, despite the lack of unequivocal and replicable scientific evidence that this is so.

Several recent studies pertaining to high residential densities, as well as high density in other contexts, have contributed greater insight into this problem. These include experimental (laboratory) investigations of the human effects of high densities, as well as several Canadian studies on family life in the high rise. There are, in fact, recent indications that Canadian research on this problem is increasing. A number of studies on various aspects of high rise living are now in progress in Toronto, or have been recently completed (Social Planning Council of Metropolitan Toronto, 1973).

A recent report of a medical consultant to the Province of British Columbia on Health, Housing and the Social Environment aptly reflects the continuing concern about the effects of high density upon behavior and health. The report cites evidence that crowding and high density high rise living are associated with stress, infectious diseases and psychoneurotic disorders, and suggests that the population category of the West End in Vancouver

"...is of such nature as to be at exceptionally high risk to various forms of social and personal disorganization and physical disorder."

(Foulkes, 1973: IV-C-8-5)
The understanding of how the individual experiences and responds to high density in the residential environment is fundamental to the formulation of adequate Canadian housing policies, standards, and housing design at high density. The achievement of this understanding requires not only a careful examination and analysis of previous findings on the effects of high density housing, but an inquiry into related research which may contribute greater insight into the complexity of this issue.

1.2 The Problem

Scientific investigations of the effects of high density in the residential environment have followed four basic lines of research: (1) correlational studies, usually based on census data; (2) epidemiological studies; (3) studies on the extent of social interaction; and (4) descriptive studies of satisfaction and family life in high density housing accommodation.

The findings of a series of correlational studies based on census tract data have generally resulted in an unresolved debate over whether overcrowding (the number of persons per room or dwelling unit), or high density (the number of persons or dwelling units per acre) is the more significant variable in relation to pathology and social disorganization (Loring, 1956; Schmitt: 1957, 1963, 1966; Winsborough, 1965; Marsella et al, 1970; Mitchell, 1971; Galle et al, 1972). Findings of studies which have partially controlled for intervening variables (e.g., social class, income, education, ethnicity), however, indicate that social structure and other variables have an important influence on the relationship between high density and various pathologies. In addition, correlational studies of Hong Kong (Schmitt, 1963; Mitchell, 1971) suggest that culture mediates the relationship between high density and pathology. However, the usefulness of correlational studies is yet at best indicative of the association between high density and pathologies, since relations that appear at the areal level may not appear at the level of the individual; neither is a high degree of correlation in itself proof of a causative relationship.
Epidemiological studies, i.e., investigations of the incidence of physical disease and mental disorders associated with apartment living, indicate that respiratory infections among children and women, and psycho-neurotic symptoms among women are more common among apartment dwellers than among those living in houses (Hird, 1967; Fanning, 1967). Yet the need for more careful control for other factors which may influence such disorders, as well as greater replication of such studies, limit the conclusions that can be drawn from these findings as well.

Research on the kind and extent of social interaction in the high rise and high density walk-up buildings indicates that spatial factors are likely to play an important role in initiating social contacts, but social factors largely determine whether these contacts develop into friendships (Darke, 1970). Physical design and building type (Cooney, 1962) as well as length of residence (Pfeil, 1968) have been noted to influence sociability and neighbor relations in high density settings, while informal situation-specific social norms seem to have considerable influence on patterns of social interaction in the high rise (Michelson, 1972).

Descriptive studies of the behavior, attitudes and experiences of residents of high density housing have largely focused on family life in the high rise. Findings suggest that physical characteristics influenced by high density -- but not a necessary accompaniment to it -- have an effect on satisfaction (e.g., living off the ground versus ground contact, access to outdoor space). They do not, however, categorically cause dissatisfaction.

Two recent Toronto studies of families (both with and without children) living in high rise apartments indicate the need to consider more than physical characteristics of the environment in determining the success or failure of high density housing in terms of residents' attitudes, satisfactions, and behavior (Social Planning Council of Metro. Toronto, 1973; Michelson, 1972). Life style and family mobility act as important determinants in the choice of the downtown high rise; awareness of compromises inherent with such housing type and location, as well as immediate satisfaction of expectations (Michelson, 1973:a & b) may facilitate adaptation to this housing form.
The above basic lines of research on high residential densities have yet to establish unequivocal evidence that density, as a physical condition involving the limitation of space, or a measure of the population of an area, leads to pathology, social disorganization, or even consistent dissatisfaction. Much of the evidence does suggest, however, that other variables (e.g., social factors, personal attributes of the individual, culture) have an important bearing on the nature of the effects of high residential densities for the individual.

1.3 Design & Purpose of the Study

The purpose of this study is to:

(a) undertake a critical review and examination of previous research concerning the effects of high residential densities on behavior and health; and to

(b) investigate related empirical research on crowding and density (i.e., animal studies, experimental investigations, and studies of the human use of space) in order to determine the potential usefulness of other findings, concepts, or theories in promoting a clearer understanding of the response of the individual to high density in the residential environment.

To accomplish this purpose, the research design will be both exploratory and formulative, incorporating the following procedures:

(1) a critical examination of previous empirical studies concerning the effects of high residential densities on behavior and health: correlational and epidemiological studies, extent and kind of social interaction, and descriptive studies of satisfaction and family life;

(2) an inspection of related empirical research on the effects of crowding and density: animal studies; and to a greater extent, experimental studies directly concerned with the effects of limited space or high population densities on human behavior, as well as investigations of the human use of space;
the determination of whether the results of related research (see 2. above) on crowding or density have potential value in promoting a clearer understanding of human response to high density in the residential environment, and if so, the application of such knowledge to the problem;

the specification of independent variables which have direct bearing on the response of the individual to the limitation of space or high population densities in the residential environment; and

the description of a Conceptual Model of Crowding in the Residential Environment, based on Stokols' Equilibrium Model of Human Response to Crowding (Stokols, 1972) as a theoretical framework for future research on the problem.

1.4 Scope of the Study

Most of this work is based on empirical studies of high densities in the residential environment and the effects of overcrowding within dwelling units or high outside residential densities upon behavior, health and family life. The search of the literature was confined to studies undertaken since 1950, mainly in Canada, the U.S.A., and Great Britain. The documentation of the literature is not meant to be exhaustive, but rather attempts to highlight major findings which are assumed to structure to a considerable degree the understanding of the density issue. Both quantitative (statistical) and qualitative (descriptive) findings are included on the assumption that observation and quantification are necessary partners in the scientific method.

Much has been written concerning the extent to which extremely poor housing conditions (e.g., multiple use of toilet and water facilities, inadequate heating or ventilation) are associated with respiratory and other infectious diseases, and other forms of physical illness. Specific inquiry into such evidence is beyond the scope of this study, although the potential influence of extremely poor housing conditions upon health has been included as a factor in the Conceptual Model of Crowding in the Residential Environment.
Related research on the effects of spatial limitation or high population density in contexts other than the residential environment, however, is considered not only important, but necessary to the understanding of how density influences human behavior and health. Thus, findings on the human use of space, and experimental studies of the effects of crowding and high density on human behavior are included along with a selective discussion of the results of animal studies. While studies of the effects of density by animal ecologists are even more numerous than those extant on the effects for man, the extrapolation of the results of animal findings to man is controversial, and yet to be accepted by many human behavioral scientists. Certain implications of these findings, however, are important to the understanding of how density affects social organization and constrains activities; further, the scientific approach used by ethologists for the study of crowding and density may be suggestive for future research on the effects for man.¹

The major literature sources have largely been generated by behavioral scientists, including the related disciplines of sociology, psychology, social ecology, social psychology and environmental psychology.

1.5 Definition of Terms

The terms "crowding" and "density" have frequently been used interchangeably in the literature, contributing not only to a general confusion in the interpretation of findings, but the lack of development of a broad theoretical perspective with which to approach the effects of limited space or high population densities (Stokols, 1972). In addition, both "crowding" and "overcrowding" have often been used to refer to the occupancy of persons per room or dwelling unit. Chapter 8 of this study includes suggested definitions of both "crowding" and "density" for future research purposes. "Crowding" has not been defined here in order to avoid confusion, although a precise meaning has been suggested in Chapter 8. The definitions of "density" and "overcrowding" shown below reflect those used in both North American and British current planning practice.
Density is defined as a physical measurement denoting the limitation of space (Stokols, 1972). In common planning practice, density may be measured by one or both of the following methods:
- number of persons or dwelling units/gross residential acre
- number of persons or dwelling units/net residential acre

Gross residential acreage refers to land used for residential purposes, including street allowances, lanes, and other public land uses (e.g., parks, elementary schools, shopping centres, health, recreational centres). This term is frequently interchanged in the literature with density per "gross neighborhood acre".

High density. No attempt has been made to define high density in terms of dwelling units or persons per acre, since human effects of high density have been attributed to not only high rise development, which by North American and British standards achieves a maximum of between 200-300 persons per net residential acre, but to "apartment" accommodation (largely synonymous with multiple dwelling unit). High density, then, is defined broadly in this study, generally referring to multiple dwelling units.

Abrams defined a "multiple dwelling" as
"...a building composed of three or more dwelling units, usually having common access, service system, and use of land." (Abrams, 1971: 95)

Overcrowding is a measure of the number of persons per room or dwelling unit. Abrams defined overcrowding as
"Too many persons living in too few rooms or too small an area. In the United States an occupancy ratio in excess of one person per room is considered overcrowding, but standards vary considerably across the world depending on cultural factors and housing resources." (Abrams, 1971: 216)

Net residential acreage is the most common measurement of density utilized in present planning practice in North American and Great Britain. It refers to a measurement of the land area used for residential purposes, excluding street allowances and land used for public and other nonresidential purposes. This term is frequently interchanged in the literature with density per "net lot acre".
Residential environment is used almost exclusively as part of the phrase "high density in the residential environment". Generally, this phrase serves to emphasize that this study is concerned only with high density living, as opposed to crowded offices, crowded cities, etc.

High density in the residential environment refers to: overcrowded dwelling units, inadequate associated indoor or outdoor space (public, private or semi-private), and/or crowded community facilities.

Stress "...is the rate of all the wear and tear caused by life ..." and does not necessarily imply adverse effects. Stress may be produced by many or all agents; yet it is manifested by a specific syndrome. The same stress that has negative effects for one individual may be invigorating for another (Selye, 1956).
Chapter 2

DENSITY, PATHOLOGY & SOCIAL DISORGANIZATION

2.1 Correlational Studies

Many, if not most empirically based conclusions concerning the effect of limited residential space or high residential population densities on human behavior and health have been drawn from studies demonstrating significant statistical associations between measures of density and various indicators of social disorganization and pathology. These studies include those pertaining more strictly to various measures of housing or population density based on census data, as well as areal correlations, i.e., data based on some other measure of land area than census tracts.

Both "overcrowding" of dwelling units (usually defined as 1.01 persons or more per room) and "high density" (a measure of the number of persons per net or gross residential acre) have produced positive correlations with statistical indicators of juvenile delinquency, adult crime, mental illness, tuberculosis, infant and adult mortality, etc. These findings warrant close investigation not only because of their frequent contradictory nature, but since the more carefully controlled studies have provided further insight into the complexity of this association.

Authors of popular literature on this subject frequently imply a causal relationship between overcrowding or high density, and social (group) and individual pathologies. Most authors of high density correlational studies, however, not only emphasize the difficulties inherent in interpretation of correlational analysis to the level of the individual,
but frequently stress that positive correlations do not necessarily prove cause-effect relationships. The general acceptance of a causal relationship is nevertheless evident in much of the popular literature on the dangerous effects of crowding and high density, as well as in community response to increased housing densities in many urban areas.

The concern that overcrowding of rooms within dwelling units is associated with poor health has a long history in Canada. The 1930's and '40's were particularly marked by an awareness of an association between communicable disease and overcrowding, poor housing conditions and/or blighted central urban areas, as reflected in the Bruce Report¹ (1934), the Curtis Report² (1944) and the formation of the Citizen's Housing and Planning Association in Toronto in 1944 (Rose, 1958). Present day concern over the effects of both overcrowding of dwelling units and high density housing in Canada has been noted earlier, in the Foulkes Report to the Province of British Columbia (Foulkes, 1973).

Correlational analyses demonstrating statistical associations between both overcrowding and high density and rates of pathology and social disorganization have been carried out largely in the United States and Asian countries since the early 1950's. Studies of the effects of overcrowding occurred in Great Britain in the 1930's as well, but the survey of the literature between the early 1950's and 1974 revealed no correlational studies of this type in Canada.

Two of the earliest investigations provided evidence that both overcrowding and high density are associated with forms of pathology or social disorganization. Schmitt's Honolulu study, which utilized five separate measures of population density based on census data, demonstrated that only two of these -- population per net acre, and per cent of units with 1.51 or more persons per room -- showed consistent and strongly positive correlation with juvenile delinquency and adult crime (Schmitt, 1957).

Loring (1956) found similar results in his Boston study of social disorganization. Most of the density items which were positively
associated with social disorganization in Loring's study were related to a space component (e.g., average private and common space), but two related to the number of interacting individuals and uses (i.e., an environmental index including distance from recreation and other community facilities, and mixed residential and business use). Loring hypothesized, however, on the basis of his findings that the

"...over-density presented by usage of housing and neighborhood space may aggravate or accelerate, not cause or motivate, any tendency to disorganization in a personality or group."

(Loring, 1956: 167)

Other studies have provided contradictory evidence on whether overcrowding or high density is the more significant variable in relation to social disorganization or pathology. The implications of these findings may be best understood by a separate examination of these issues.

2.11 Overcrowding of Dwelling Units

Martin's review of a considerable number of British studies between the early 1930's and 1961 led him to conclude that there is a clear association between overcrowding and both high mortality rates and incidence of physical disease (Martin, 1967). Poverty was highly correlated with overcrowding in one study, however, and Martin also noted that correlations in other studies were appreciably reduced when social class was held constant. Martin cautioned that studies using multivariate correlation techniques can give only a very general indication of the individual importance of the more prominent factors, and that apart from overcrowding in housing, the complex interrelationships of all the personal, social, economic, environmental, and housing factors must be considered (Martin, 1967).

Again, Lander's massive study of juvenile delinquency demonstrated a close correspondence between overcrowding and rates of juvenile delinquency, although substandard housing conditions were equally important
at the surface level of correlation. Both overcrowding and substandard housing showed no association with juvenile delinquency, however, when other variables were held constant. Lander finally explained differential delinquency rates in terms of the concept of anomie; i.e., when group norms are no longer binding or valid in an area or for a population subgroup, individual behavior may lead to deviant behavior (Lander, 1954).

Marsella et al (1970) recently explored the relationship between overcrowding and mental disorders in Manila, an extremely overcrowded Asian city. Overcrowding was investigated only for its effects on urban male married Filipinos. Both overcrowding and low social class status were associated with psychosomatic disorders and anxiety, as well as feelings of anger, frustration and withdrawal. The third pattern, expression of anxiety and violence, was independent of social class, i.e., was found among subjects with both low and high income and education. Rather than concluding that overcrowding leads to mental disorders, the authors suggested that it operates only as one of a wide number of variables:

"That is to say, lower-class individuals typically face many stresses such as housing, financial and status difficulties, and these obviously contribute to the patterns that emerge just as much as the overcrowding variable."

(Marsella et al, 1970: 292)

The authors suggested that future studies should explore the effect of personality, among other characteristics of the individual, and also pointed out the need to identify cultural differences in the use of space. There is an indication that overcrowding in the Philippines may to some extent be a function of choice or social norms, as evidenced by Marsella's remark that even high income Filipinos live in large houses that are frequently overcrowded (Marsella et al, 1970).

It is well recognized that Hong Kong has extremely high residential densities in comparison with North American or western European standards. Thirteen census tracts in Hong Kong exceed 2,000 persons per gross acre, while the average household size is 4.5 persons (Schmitt, 1963). The median size of dwelling units in the colony is 400 square feet, with a median of only 43 square feet of living space per person (Mitchell, 1971).
Average American cities seldom exceed 150 persons per gross acre, although the highest residential density in the U.S. has been recorded as 1,300 persons per acre of ground space in several blocks in Manhattan (Schmitt, 1963). Maximum densities for apartment development in Canada are approximately 200-300 persons per net lot acre.3

Despite the high degree of over-crowding of dwelling units in Hong Kong, however, Mitchell's investigation of the effects of internal crowding in that city led him to conclude that this form of high density has very little effect, or only a very limited range of effects, on individuals and families,

"...although there is a suggestion that congestion is a potentially significant stress." (Mitchell, 1971: 18)

Mitchell found that overcrowding within dwelling units does not affect deeper and more basic levels of emotional strain and hostility, contrary to the findings of Marsella (1970) above. Superficial manifestations, i.e., worry and unhappiness, did appear to be affected by overcrowding, but when statistical controls were applied for both low-income and low-education, overcrowding affected worry and unhappiness only among low-income families. Most of the limited effects of overcrowding pertained to the fabric of social life and social control in neighborhoods, or to congestion (simultaneous demands for the use of very limited resources). Doubling-up of nonrelated households in one dwelling unit tended to create stressful situations, and overcrowding also facilitated low parental control over children, in the sense that parents had less knowledge of and control over their children's activities (Mitchell, 1971).

Galle, Gove and McPherson (1972) have added the most recent controversial evidence in the growing number of findings generated by correlational analysis on the effects of overcrowding. They have suggested that overcrowding may have a serious impact on human behavior, although at the same time these authors emphasized that their study does not prove there is a causal relation between density and social pathology. Galle et al. used four different measures of population density to ascertain the
association between these and five indices of social pathology in Chicago. The number of persons per room was the most important component of density for rates of mortality, fertility, public assistance, and juvenile delinquency (Galle et al, 1972).

The effects of social class and ethnicity in Galle's study will be dealt with in a later section, along with an examination of a theoretical contribution by these authors to the study of the relation of density to pathology. Galle et al made some important observations, however, which assist in the understanding of how overcrowding itself may relate to pathology:

"...as the number of persons in a dwelling increases, so will the number of social obligations, as well as the need to inhibit individual desires... It would seem reasonable to expect that people would react to the incessant demands, stimulation, and lack of privacy resulting from overcrowding with irritability, weariness and withdrawal. Furthermore, people are likely to be so completely involved in reacting to their environment that it becomes extremely difficult for them to step back, look for themselves, and plan ahead... We might expect the behavior of human beings in an overcrowded environment to be primarily a response to their immediate situation and to reflect relatively little regard for the long-range consequences of their acts."

(Galle, Gove & McPherson, 1972: 28)

These studies have indeed demonstrated that overcrowding has been statistically related to some forms of social pathology on the surface level of correlation. The influence of poverty, substandard housing, low social class status and other variables cannot be ignored, however, to the extent that these factors change original statistical relationships. The remarks of Galle et al further suggest that the effects of a relatively high number of interacting individuals within a given living space tends to produce increased social obligations, as well as greater demands on the individual to respond to his social environment. An examination of the effects of high population density per given unit of residential land provides further insight into the influence of these and other variables on the relation between density, pathology and social disorganization.
2.12 High Population Density

Approaches to the study of the effects of high population density fall into two general categories: (a) urban ecological, i.e., areal investigations (based on "natural areas of a city"), and (b) correlation analyses based on population per residential acre.

Urban Ecological Studies. The first of these approaches involves the identification of the incidence of certain pathologies in a city, as they correspond to particular subcommunities or "natural" areas within its boundaries. Ecological or areal studies have formed a major part of the research interests of the Chicago (or Park) school of sociology. The social pathology of the city was a central although not exclusive interest of these urban sociologists, drawing them into the study of behavioral disorders, especially in the slums, transient room-house districts, and the deteriorating areas adjoining the expanding central business district.

McHarg, for example, studied the specific environments of physical, mental and social health in Philadelphia by mapping data for these categories on transparencies, along with other information on density, ethnicity, economic parameters, etc. Summary maps indicated that the heart of the city was the heart of pathology; in the absence of statistical correlations, McHarg concluded that the "obvious", most important correlation was density (McHarg, 1971). Poverty, unemployment, overcrowding and illiteracy data also coincided with the central city of Philadelphia to a considerable extent.

Winsborough used a somewhat similar approach to investigate the relationship between gross population density and indices of social disorganization as they occurred in some seventy-five Community Areas in Chicago, although correlation analysis was applied to detect the degree of association between density and these variables. All but one of the variables showed a positive correlation with population density; i.e., the higher density, the higher the rates of social disorganization. After
controlling for socioeconomic status, quality of housing and migration, however, three rates of disorganization changed to a strong negative association, one remained positive, and the final showed no association with density (Winsborough, 1965).

Schmitt (1963) also used an urban ecological approach to the study of the effects of high population density in Hong Kong; his conclusions were largely similar to those of Mitchell (1971) for that city. Overall rates of morbidity, mortality and social disorganization for Hong Kong were found to be well below similar figures for the United States as a whole, despite the exceptionally higher densities in Hong Kong. Schmitt suggested that much of the successful tolerance of high density and overcrowding in Hong Kong may stem from traditional Chinese living patterns which are ascribed partly to family cohesiveness; however, the inability of most Hong Kong residents to pay high commuter costs of transportation, improvement from previous living conditions, and Chinese maintenance of overall community health by efficient administration must also be taken into consideration (Schmitt, 1963).

The apparently successful tolerance of Hong Kong residents to extremely high internal and external residential densities may be a function of both culture and a readiness to adapt to circumstances which are not necessarily a matter of choice. Hugo-Brunt's description of the living patterns and the use of urban space by Hong Kong residents provides insight into this suggestion:

"The resident Chinese are seemingly by nature, adaptable, gregarious and capable of utilizing the most meagre resources to enrich their environment. Their needs are few and simple: food, shelter and a livelihood. . . . Short of open space, provided with the simplest shelter and enjoying but the barest of necessities, the endurance, humour and sensitivity of the inhabitants has produced an environment which is mobile, exhilarating and rich in experience.

"The Chinese are city dwellers, not from choice but through circumstance, yet they have turned the street, the shop, the eating house and the tenement into theatre, market and community. All have blended together in an intricate and unusual social pattern."

(Hugo-Brunt, 1967: 488)
The connotation of the remainder of Hugo-Brunt's remarks is that the Hong Kong resident not only spends a great deal of time out of his dwelling unit, but does so in an atmosphere characterized by a high degree of interest, liveliness, and sense of community and well-being.

Although Schmitt (1963) suggested that planners in the United States should reexamine their own density standards in the light of his findings, further investigation of cultural and other forces indicated above appears necessary for a better understanding of factors which may contribute to the successful tolerance of such densities.

Population Per Residential Acre. Only a few authors have asserted that high density expressed in population per residential acre has no deleterious effects. Jacobs, for example, suggested that overcrowding within dwellings or rooms is almost always a symptom of poverty, and that few people ever overcrowd by choice. Jacobs implied that high population densities per residential acre are, in fact, beneficial; i.e., dense concentrations of people are necessary to help generate diversity in a city neighborhood, as well as depth in urban services (Jacobs, 1961).

Alexander (1966) also claimed there is little doubt that overcrowding causes damage, but that this should not imply that density of population per square mile should be reduced. After a review of several correlational studies, Alexander has offered the following hypothesis to fully explain all the observed correlations:

"Those social disorders apparently caused by density, are in fact caused by low income - education, and by social isolation. It is known that people who are poor, and badly educated, tend to live in high density areas. It is also known that people who are socially isolated tend to live in high density areas. Both variables are associated with high indices of social disorder."

(Alexander, 1966: 47)

Investigations of the effects of high population density per residential acre of land present somewhat contradictory results. The first of these studies (Schmitt, 1966) indicated that the density of
persons per acre was the most important determinant of pathology when overcrowding was held constant; Galle et al (1972), however, found that an equivalent measure of persons per acre appeared to be relatively unimportant. Results of a third study (Newman, 1972) indicated that building height and type were necessary correlates of high crime rates, but density was only coincidental to this effect.

Schmitt's second study of Honolulu investigated whether overcrowding of dwelling units, versus high population density, was more closely identified with poor health and social disorganization. Population per net residential acre was most closely associated with these rates, but the strength of this association was further verified by controlling the specific level of internal crowding at 1.01 or more persons per room. The result of this control was that external (outside) densities "explained", or were still positively associated with, rates of pathology. Controls for income and education had no effect on the association between density per net acre and pathology (Schmitt, 1966). The effectiveness of Schmitt's controls for education and income, however, may be questioned since both were set at relatively high limits. That is, the controls may have had no effect since education and income were not tested at their lower levels (cf., Freedman, 1971).

Galle, Gove and McPherson (1972), as recalled, found that for mortality, fertility, public assistance and juvenile delinquency, the most important component of density was persons per room, a measure of overcrowding which the authors referred to as "interpersonal press". The second, but considerably less important determinant of the effects of density was housing units per structure, a "structural factor" of density, roughly corresponding to the number of high rise apartment buildings in an area. The other two components of density -- rooms per housing unit and structures per acre -- appeared to be relatively unimportant, although rooms per housing unit was strongly related to mental hospital admissions (Galle et al, 1972).
Newman's recent investigation of the effects of the physical layout of residential environments on the criminal vulnerability of inhabitants indicated that crime rate does not necessarily correlate specifically with density of units or population per acre, but instead with building height and type. He found that high rise, elevator-serviced, double-loaded corridor apartment buildings (seven stories or greater) were associated with appreciably higher crime rates than their walk-up counterparts. Newman's analysis was based on crime records for 100 public housing projects in New York City, including a wide variation of housing types and project site plans. Social characteristics of the population were held constant so that only the physical form of buildings was allowed to vary. The results indicated that while social variables played a key role in accounting for overall variations in crime, physical variables had a compounding influence and a relatively strong influence upon crimes in particular locations. The precise nature of the interrelationship of physical features, social variables and crime was not investigated, since Newman was concerned primarily with the influence of physical design features (Newman, 1972).

Correlations between density and crime rates revealed there was no evident pattern up to a density of 50 units per acre; above this, however, crime rate increased proportionately with density. Newman explained this phenomenon by the fact that in New York City, public housing projects above 50 units per acre are confined to high rise, double-loaded corridor buildings, the option that strongly correlated with crime rate (Newman, 1972).

However, other evidence demonstrates that poverty is unmistakeably correlated with both the criminal and the victim of crime. The Report of the National Commission on the Causes & Prevention of Violence (1970) indicated that violent crimes in cities in the United States are committed primarily by individuals at the lower end of the income and occupational scale (an important minority of whom are unemployed), while victimization rates for such crimes are also much higher in lower-income groups. Violent
crime was found most often in urban areas characterized by low-income, low-education, high unemployment, racial and ethnic concentrations, and a combination of other factors including overcrowding and high population density. The Commission noted, however, that crime and delinquency were strongly associated with neighborhoods disrupted by population movements and social change (Final Report of the National Commission on the Causes & Prevention of Violence, 1970).

Correlational studies on overcrowding of dwelling units and high population density cited above demonstrate that both these density factors have been positively correlated with pathology and social disorganization. An equally important observation, however, is that social structure variables have frequently coincided with both density and pathology. The important question that must be posed is whether density has a direct cause-effect relationship with pathology, or do social structure variables account for both population density and pathology? This problem also suggests another possibility, in which both density and social structure variables may be related to the incidence of pathology. These alternatives have not only been considered, but illustrated in the form of three conceptual models by Galle et al (1972) in the course of their research.

The first of these (Figure 1) is based on the assumption that density has a simple cause-effect relationship with pathology; that is, the higher the density, the higher the pathology. The \( \mu \) in the model indicates unmeasured variables not taken into account that affect pathological behavior.

\[
\text{Density} \rightarrow \text{Pathology}
\]

**FIGURE 1.**
Density as a Cause-Effect Relationship

(Galle et al, 1972: 25)
The second model takes into consideration the fact that the lower one's social class and ethnic status, the more likely a person is to live in areas with a high population density. Figure 2. assumes that class and ethnicity, or social structure variables, may account for the variations in both population density and pathology, with no causal relation between density and pathology; i.e., density is only spuriously (not genuinely) related to pathology.

![Diagram](image)

**FIGURE 2.**

Density as a Spurious Relation

(Galle et al, 1972: 25)

Figure 3. demonstrates the possibility of density acting as an intervening variable between social structure variables and pathology. The third model assumes that class and ethnicity may affect density, and density may, in turn, affect the pathologies; but it also assumes that the social structure variables may affect pathology in a manner unrelated to density. Galle et al accepted the third model (density as an intervening variable) on the basis of a careful analysis of the contributions made by class, ethnicity, and the four density components. Working from either effect to cause (from pathology to density), or from earliest cause to effect (from social structure variables to pathology), the independent effect of increments added by either the social structure variables or by the components of density was fairly small. The results, then, were
compatible with the assumption in Figure 3., where class and ethnicity affect density, or affect pathology in ways unrelated to density, while density may also affect the pathologies. The authors stressed they assumed, however, that social structure variables "cause" density, which ignores the possibility that density "causes" the social structure variables through selective migration (Galle et al, 1972).

Related research does provide evidence that selective mobility, or a certain kind of "drift", may account to a considerable extent for the over-representation of certain pathologies in congested, deteriorating subareas of the city. Faris and Dunham, for example, found a higher concentration of patients with schizophrenia in certain congested, socially disorganized areas of Chicago (Faris & Dunham, 1939), but upon subsequent re-investigation of these findings, Dunham rejected the idea that schizophrenia is indigenous either to a particular community or social class. Instead, Dunham concluded that certain forces within the social system, i.e., selective mobility, influence the concentration of schizophrenia-prone families in certain parts of the city. Changes in treatment of psychiatric disorders resulting in schizophrenic patients spending most of their lives in the community, as well as changes in mental hospital administrative procedures, have transferred yesterday's hospital problem for the disabled patient to the community (Roman & Wilder, 1967).
Timms provided further evidence that selective population mobility helps bring about definite residential patterns for mental patients and criminals. Timms found an association between the incidence of social deviancy, low occupational status, family instability, areas of low residential status and apartment districts, and high population turnover. He hypothesized, then, that low status background and low residential status in areas characterized by a breakdown in social interaction and normative controls leads to the over-representation of various types of social deviance (Timms, 1965).

Galle's model (Figure 3.) appears to synthesize much of the complexity of the relation between density and pathology, in that social structure variables seem to have as much effect on the observable pathologies as do components of density. This model depends to a considerable extent, however, on the spatial coincidence of low social class and ethnic status in high density residential areas. McHarg's study of Chicago verifies this assumption to some extent (McHarg, 1971). Canadian evidence also indicates that urban poverty (a reasonable equivalent of low social class status) is typically located in the downtown of many Canadian cities (especially Montreal and Toronto). Urban poverty in Canada is characterized by slum or poor housing conditions near the core, endemic unemployment, high crime rates, disadvantaged children, etc. (Lithwick, 1970). While residential density in the downtown may not necessarily be high, it may be assumed that the greater intensity of land use and mixed activities in a downtown creates a higher density of interacting individuals.

Galle's ethnicity index included both foreign-born residents and major ethnic groups in the United States. While less is known concerning the urban situation of immigrants in Canada than that of poverty, in Montreal

"...the densest area of immigrant residence is the central city, that part of the city where the lowest levels of income are found."

(Lithwick, 1970: 90)
In Toronto, postwar immigrants characteristically live in apartment dwellings, with the bulk of low-quality housing occupied by this group. Both ethnicity and income influence the housing choice of immigrants, and crowding within dwelling units is not uncommon. This does not necessarily suggest a housing shortage for new immigrants, however. Overcrowding of dwelling units in this sense may be a function of both income and choice:

"Sharing of facilities is an economical way for newly arrived immigrant households to minimize their expenditure on housing, thereby enabling them to accumulate savings for later acquisition of their own homes. This transition-easing pattern of behavior is highly rational, and the all-too-easy inference is that those behaving in this way are bearing a heavy toll in terms of the 'social effects and human implications' may lead to inappropriate policies."

(Lithwick, 1970: 92)

Immigrants may, in fact, be less susceptible to the effects of higher densities than internal or rural migrants. The Canadian immigrant is required to meet certain skill requirements, which frequently implies a relatively high level of education or specialized training, enabling the immigrant to command the facilities of the city more capably than his counterpart, the rural migrant (cf., Lithwick, 1970).

Keyfitz, for example, suggested that first migrant generations to the city may be particularly ill-adapted to the environmental conditions encountered in high density areas, while second- or third-generation city dwellers have learned to protect themselves against the great stimulation of the city, are typically more suitably educated, and are productive enough in terms of income to utilize a greater variety of city services. Keyfitz contrasted two types of urban agglomerations: (a) high density cities in industrialized affluent countries, and (b) cities which are growing without access to resources or industrialization. He suggested that rural migrants to the second type of city have little to buffer them from the stress of high density living (Keyfitz, 1972).
Correlational studies of the effects of high densities per given residential area of land and those of the effects of overcrowding within dwelling units have demonstrated a general similarity. Both high "outside" and high "inside" densities have produced significant statistical associations with various indices of poor health and social disorganization. In both cases, however, a number of other variables -- e.g., low-income, low-education, low social class status, migration -- appeared to be as important as the density variables in their relationship to pathology and/or social disorganization. Perhaps the best conclusion that can be drawn from the above evidence is that social structure or other variables may affect pathologies (as well as density), while density may also affect pathologies in a manner unrelated to other variables. That is, a functional interdependence of these variables may "explain" the higher rates of social disorganization and pathology. The obvious inference, however, is not that either of these necessarily "cause" such phenomenon, since the use of correlational analysis in identifying true cause-effect relations involves some important limitations. These difficulties are described in the following section.

2.13 Summary: Correlational Studies

Despite the potential usefulness of correlational analysis in identifying previously unconsidered associations with pathology and social disorganization, the results of such studies must be recognized as far from conclusive, on the basis of a number of limitations of this type of analysis. Problems associated with correlational analysis in identifying a simple causative relation between density and pathologies have been noted by most authors of studies cited above (Lander, 1954; Schmitt, 1967, 1966; Winsborough, 1965; Martin, 1967; Marsella et al, 1970; Galle et al, 1972), as well as other writers on this subject.
(Wallace, 1952; Timms, 1965; Zlutnick and Altman, 1972). Galle and associates have aptly noted that

"At the moment, we may speculate about how overcrowding relates to various pathologies, but specific knowledge about causal links, if there are any, is lacking."

(Galle, Gove & McPherson, 1972: 29)

The first important difficulty in the use of census or areal data relates to the system of spatial sub-units by which the data is organized. That is, the individual units should be strictly comparable with one another, with a maximum of external variation and a minimum of internal variation (Timms, 1965). The importance of using comparable spatial sub-areas in such analysis can be seen by comparing aggregate crime rates for the West End of Vancouver with those of the City as a whole. On a square mile basis, aggregate crime rates are far higher for the West End than for the rest of Vancouver. When the effect of density on crime frequencies is accounted for, however, the reverse appears to be the case. For an average of 10,000 persons per square mile, the total amount of crime in the West End is considerably lower than for Vancouver City as a whole (West End Plan, 1973).

A second difficulty in the use of correlational analysis is attributable to the ambiguity of the pathologies and forms of social disorganization. Thus the question of the relative definition of such concepts as "normal" and "abnormal" behavior must be raised, especially as these may reflect social class values or cultural differences in definition. Similarly, the issue becomes even more cloudy in consideration of the adequacy of many of the indices used to assess pathological behavior; e.g., is the number of juveniles brought before a family court an appropriate index for the amount of "asocial, aggressive behavior" which occurs in a given area? (Gad, 1973).

Rosenberg (1968) pointed out the tendency of many American studies to select the most disadvantaged minority groups for investigation of the effects of overcrowding, "...whereas in Hong Kong they are a normal cross section of the general population." (Rosenberg, 1968: 426)
A further difficulty in the interpretation of such studies arises when the results of a study of one urban area are implied to be true for another.

Perhaps the most important problem associated with correlational analysis, however, is that of inference from the areal level to the level of the individual. In the general case, results of areal analysis are strictly applicable only to the areal case (Timms, 1965); i.e., relations that appear at the group level may not appear at the individual level.

The limitations of correlational analysis in identifying true causal relations between density and pathology or social disorganization, as well as the need for discrete use of this statistical tool, are illustrated by Kaplan:

"It must be remembered. . . that significant correlations may be the result, not of any real relation among the correlated values but only a similarity in the pattern of forces operative in the two cases. . . . And even where there is a causal connection, it may be quite indirect: both sets of values may be the effects of the same cause rather than one being the same of the other. And the correlation itself gives us no way of distinguishing, in the case of direct causal relation, which variable is cause and which is effect. In short, statistical tools are like any other: the more powerful they are, the greater the demands which they make on the care and the intelligence of the user."

(Kaplan, 1964: 249-250)
2.2 Epidemiological Studies

Apart from correlational analysis, relatively little other evidence is available on the effects of high density housing upon health (Darke, 1970). Two particular studies, however, have frequently been used to demonstrate greater illness among apartment dwellers than among those living in single-family or semi-detached housing.

Hird's investigation of medical consultations among residents living in flats (the British equivalent of the North American apartment) and single-detached houses indicated that emotional disturbance and respiratory infections were more common among flat dwellers than those living in houses. Twice as many people living in flats as in houses consulted a physician for reasons of emotional disturbance; and upper respiratory infections among children were also more common in flat dwellers (Hird, 1967).

One of the important difficulties of this study is that Hird did not have access to the previous medical histories of these tenants. The need to assess such records for adequate comparisons was in fact recognized by Hird. In addition, life in a block of flats must be related to the effects of the larger housing environment, previous experiences and norms of the residents, and the tendency of many persons to project their "shortcomings" onto their housing circumstances (Hird, 1967).

Fanning's study of the health of women and children of armed forces families living in three- and four-storey flats and houses in Germany supported Hird's findings to some extent. Fanning noted that the relative incidence of disease in the families who lived in flats was some 57% greater than those in houses, with the increase most pronounced in children under the age of ten (who had more respiratory diseases), in women between twenty and twenty-nine years of age (who had more respiratory and psychoneurotic disorders), as well as women over forty, who also had more psychoneurotic disorders (Fanning, 1967). Residents of single-detached houses, however, had higher rates of blood disorders and home-associated accidents. Fanning also noted that the difference in rates of neuroses
between flat and single-home residents disappeared if the women were working or over thirty years of age (Fanning, 1967).

Fanning's study is well documented, indicating a similarity in social class and income, equal availability of social and medical services, etc. among the study sample. The health problems noted above were also based on significant statistical differences in ill health. Of particular note, however, is the finding that although the amount of illness in flats was greater than that in houses, the degree of seriousness measured by hospital admissions for these disorders was not. In fact, the rate of hospital admissions among house dwellers was higher than that of flat dwellers (Fanning, 1967).

A final problem in connection with Fanning's study is the presence of a social disturbance among these families, attributable to their removal from their place of origin and severance of family ties. In Fanning's words,

"With women of all ages it may have been that this increase in morbidity and intolerance of flat life would not have occurred but for the fact that their basic cultural pattern had already been disturbed, and that living in flats in a community which had a more acceptable social pattern would have been better tolerated."

(Fanning, 1967: 385)

In contrast to the focus of such studies on the effects of apartment living on health, comparisons of urban and rural populations have frequently been used to support the argument that high densities are associated with adverse effects on health and behavior. As noted above, Chicago urban sociologists have contributed considerably to the idea that the city itself, by virtue of its higher density relative to rural centres, is pathology-ridden, particularly with respect to mental disturbance. In a recent challenge to this hypothesis, Srole (1972) cited recent statistical evidence which suggests that differences in respiratory infections and incidence of mental disorders between urban and rural settlements are now disappearing. Srole argues that the city, by and large, may even be a more therapeutic
milieu for adults seeking a change in environment than is the small
community, especially for those who are discontent with the social
control of the rural community. While this somewhat contradicts Keyfitz'
supposition above, Srole qualified his hypothesis to the extent that
metropolitan and rural slums may under certain complex conditions be more
psychopathogenic for children (Srole, 1972).

Cassel (1972) argued in a similar manner that the evidence that
overcrowding or high population density is bad for health is not substantial.
The ratio for death rates in the United States prior to 1950 was in fact
higher in urban than in rural areas, but by 1960 the ratio had become
reversed; since 1960 the ratio of urban to rural deaths has been steadily
decreasing. Data from Great Britain tends to confirm this paradox; and
even Hong Kong and Holland, among the most crowded areas in the world,
enjoy one of the highest levels of physical and mental health in the world
(Cassel, 1972).

Cassel's fundamental thesis is that to the degree population
density is associated with poor health, the negative association comes
about because density increases the importance of the social environment
as a determinant of reactions to potentially infectious stimuli:

"The effects of the physical environment on health, therefore, cannot be predicted without knowledge of
the social experiences and characteristics of people living at different density levels."
(Cassel, 1972: 250)

Cassel gave special weight to two social factors: (a) the hierarchical
status structure of the urban community and social group, and the
individual's location within the hierarchy; and (b) the degree of social
integration and social cohesion within the group or community. His
application of this model led Cassel to conclude that many of the negative
effects of health associated with urban densities are not caused by
densities themselves, but instead by the rapidity of urban change and the
relatively limited experience of many recent urban migrants in learning
how to adapt to urban stresses (Cassel, 1972).
Finally, participants in a workshop on space and privacy in housing at the 1970 Conference on Health Research in Housing and Its Environment (H.E.W., 1970) concluded that according to present evidence, 
"...space and privacy have only dubious and perhaps undiscovered causal relationships to health or illness . . . . For people who are high health risks, space and privacy do appear to have some relationship to illness and health. Crowding also appears to have a causal relationship to illness in societies having high incidences of infectious diseases. . . . Lack of space and privacy results in . . . discomfort, displeasure, disappointment, and dissatisfaction, which we had to distinguish from mental illness." (H.E.W., 1970: 10)

The common belief that high density housing necessarily leads to greater incidence of ill health is difficult to substantiate in view of the yet unconfirmed nature of the relationship between housing per se and health. Cause-and-effect relationships between these factors are not clear, although it appears that social and/or economic factors have an important relation to the well-being or state of health of the individual (Colburn, 1969; H.E.W., 1970). Those involved in research on health and the housing environment have cited social and economic factors as priority items for future investigation. Colburn noted that total community planning, recognizing the need for a wide range of social and health facilities, also seems particularly necessary if apartment living is to be satisfactory in the fullest sense (Colburn, 1969).
Chapter 3

SOCIAL INTERACTION, SATISFACTION, & FAMILY LIFE

This chapter is an attempt to condense a broad but rich literature generally pertaining to social interaction, satisfaction, and family life as these relate to high density residential environments. The studies reported here are largely based on the collection of information through interviews, questionnaires, systematic direct observation or participant observation, which have frequently been referred to as "descriptive studies". The research questions posed in these studies generally require and assume considerable prior knowledge of the problem to be investigated, as contrasted with the preceding correlational studies. For example, in collecting evidence on satisfaction with high density housing, the investigator must clearly define what components of satisfaction he wants to measure, and delineate a series of questions which attempt to identify relatively precise independent variables which lead to variations in satisfaction; e.g., previous housing experience, intended length of stay, household type, etc. The findings of studies documented below reflect considerable variation in the techniques used to analyze accumulated data, including relatively elementary methods (e.g., purely descriptive reporting, the use of simple percentages) as well as more complex statistical procedures (e.g., factor analysis).
3.1 Social Interaction in High Density Housing

A common notion associated with social interaction in high density housing is that residents are isolated from meaningful social contact, especially in the high rise. Another, less common idea, holds that close proximity to a great number of people results in excessive social contact to a degree that privacy is difficult to maintain. Both these views share a basic assumption that the physical environment strongly influences, if not determines, both the kind and extent of social interaction.

The idea that physical factors in housing largely determine social interaction has been supported by a number of studies which investigated the effects of spatial determinism upon social relations. Festinger, Schacter and Back (1950) and Caplow & Forman (1950), for example, both studied friendship patterns in married student university communities and concluded that physical distance (between the front doors of dwelling units) and functional distance (the patterning of people's movements, determined by stairways, paths, etc.) largely determine friendship patterns in a residential setting. The notion of strict spatial determinism has since been challenged, however, to the effect that spatial proximity often based on the position and outlook of doors may determine interaction patterns, but normally only under conditions of real or perceived homogeneity among residents, and where there is a need for mutual aid (Michelson, 1970:a).

With this qualification in mind, we may examine specific findings on social relations in high density housing. The studies described in this section reflect the importance of physical and situational variables upon the accessibility of persons for interaction; they also point out the added, if not equally strong influence of social and even personal variables upon neighbor relations in high density residential areas.
3.11 Building Type & Design: Effects on Social Relations

A comparison of four different types of multi-storey apartment buildings in the Bethnal Green area of London suggested that layout or design is conducive to both sociability and privacy. The four building types investigated by Cooney (1962) were:

(a) a four-storey block of maisonnettes (row housing) with a walk-up access balcony;
(b) an eleven-storey tower (or point) block with an elevator to partly enclosed landings serving three to four dwellings;
(c) an eleven-storey slab block with an elevator and access staircase to external balconies with six to eight families per floor; and
(d) a fifteen-storey cluster block with access from a central core elevator across individual bridges to the apartments (four to a floor).

Tenants were asked whether the layout of these buildings was conducive to neighbor sociability, whether privacy from other tenants was possible, and whether housewives felt too isolated. The cluster block scored highest on enough privacy (100%), lowest on having a sociable layout (ease in getting to know other tenants), and highest on isolation (or feeling too cut-off because of the layout). The four-storey row housing, however, scored highest on sociability (95%), lowest on isolation, and lowest on privacy, but still with a 79% score on the latter.¹ Both the access balcony buildings were considered better in terms of sociability (Cooney, 1962).

Another study which compared a twenty-storey high rise with four-storey walk-ups, however, found that residents of both these building types were predominantly satisfied with the amount of contact with neighbors in the blocks. The observable characteristic common to all those satisfied with the amount of contact they had was their perceived ability to control the situation ² (Stevenson, Martin & O'Neill, 1967).

A number of other small studies have also generally come to the conclusion that balcony access arrangements provide greater opportunities
for contact with neighbors simply because the probability of chance contact is increased the greater the number of families living on one floor; yet another separate investigation found that tenants preferred common interior hall access to balcony access because of the lack of privacy and exposure to weather (Darke, 1970).

On the basis of these studies, one might be tempted to conclude that balcony-access arrangements, and especially the four-storey walk-up, are "good" housing forms at high density, while the cluster block is "bad" (using Cooney's study alone). It is important to remember, however, that in doing so, we are considering only two aspects of the adequacy of a building: sociability and privacy. Further, a particularly relevant question which has not been answered by these studies concerns the trade-off between privacy and sociability. That is, what is the relative value that residents put upon privacy on the one hand, and opportunities for sociability on the other; and what are the reasons for people's feelings about the differences in terms of sociability, privacy and isolation from one building type to another? Cooney (1962) was particularly cautious about making strong conclusions on the results of his study for these very reasons.

Privacy is a concept which few have attempted to define except in reference to a number of complex, interrelated factors. It is agreed to some extent that the variables which affect an individual's definition of privacy largely relate to cultural, social and personal factors, including the individual's past experience (cf., Ittelson et al, 1970; Kira, 1970). In a broader sense, however, the individual's definition of what constitutes privacy takes into consideration what behaviors are allowable in a particular situation.

In the psychological context, privacy is fundamental to the development of a strong sense of personal identity, and in its simplest form involves aloneness or freedom from the presence of others (Kira, 1970). The paradoxical fact about privacy, however, is that it must be seen essentially as a social phenomenon, including the freedom to communicate
differently with different individuals and groups (Proshansky, Ittelson & Rivlin, 1970:a). Proshansky et al asserted that the principal function of privacy is to increase

". . .the individual's freedom of choice in a particular situation by giving him control over what, how and to whom he communicates information about himself. . . ."

(Proshansky et al, 1970:a: 178)

As recalled, Stevenson found that perceived ability to control the amount of social contact was the most important factor contributing to satisfaction with extent of social contact. The importance of building type and layout for both privacy and sociability is considerably lessened when perception of control, largely a subjective but also social factor, is taken into consideration.

The purport of this discussion is to suggest that the importance of opportunities for social contact in high density residential settings can not be considered apart from the necessity of privacy. As implied above, privacy and sociability are both essentially social phenomenon, but each is related to a host of other variables which makes the prediction of satisfaction with either highly complex, and particularly difficult on the basis of physical characteristics of housing alone. This is not to assert that certain physical arrangements in housing may not be potentially more conducive to both sociability and privacy; rather, the evidence on the effect of different housing forms is thus far not entirely clear.

3.12 Social & Personal Factors in Neighbor Relations

Social variables which bear on neighbor relations in high density residential settings include such factors as stage in the life cycle, length of residence, homogeneity versus heterogeneity of social characteristics, work and family status, need for mutual aid, etc. Personal variables include background and previous housing experience, values, attitudes, aspirations or personality. As mentioned earlier, it appears
relatively certain that homogeneity (or perceived homogeneity) and a need for mutual aid among residents tends to favor more cohesive neighbor relations, but the important dimensions of homogeneity have not yet been fully identified.

Social homogeneity was found to be a strong explanatory factor in neighbor relations in a high density residential area in a German industrial city, although length of residence and size of the apartment block were also associated with more intensive social relationships. The group with the widest circle of friends within an apartment block were the most elderly and longest-resident group; second were the very young families, and middle-aged families were least friendly. It seemed that primary social relationships developed quickest in blocks where there was less tenant mobility, and in smaller apartment blocks (Pfeil, 1968).

Harrington's study of a group of housewives living on one storey of a block of apartments with balcony access demonstrated the role of homogeneity of social characteristics and mutual aid in social relations; but of equal importance, the part that pressure to conform to group norms, and personality factors may play in promoting cohesive neighbor relations. This Scottish study is particularly interesting for the comparison it made of two identical blocks of flats on the same estate. The layout of the flats or apartments was identical, and the residents in each block were similar on age, family size, social class, and other characteristics. Residents in the friendlier block of flats shared a gregarious group norm, while the second group was more reserved and desired a good deal of privacy. Harrington observed that the main difference in the amount and kind of interaction appeared to be attributable to the social skills and strong desire of one housewife in promoting an intense neighborhood life (Harrington, 1964). In this example, personal variables apparently had considerable influence not only on the frequency of social interaction, but on the norms which guide the kind of social relations which may occur.

Michelson's recent study comparing four combinations of housing type and location (high rise downtown, high rise suburban, single houses
downtown, and single houses (suburban) did not support any notion of high rise residents being isolated or suffering from any real lack of social contact. The absolute frequency of social contact for apartment dwellers was every bit as high as for those living in single-family homes; and where people entertained their friends varied even less, although the origin of first contact with friends most frequently seen did vary by intended housing type and location (Michelson, 1972).

Probably the most important single difference in social relations between these housing type-locations, however, was that high rise residents had more contact with non-local friends than with co-residents in the high rise or the immediate local environment. That is, for residents of the downtown high rise, social contact is different in kind, but not in amount. A summary of most of the single identifiable differences in social interaction patterns of high rise residents and resident characteristics follows:

1. There was a complex of variables centering on choice of downtown high rise apartments which were statistically interrelated, including

   "...no children, a working wife, being out of the dwelling unit, basing friendships on non-locality factors, seeing noncolleagues on weekends only, T.V., and housework done to a lesser extent but mainly on weekends."

   (Michelson, 1972: 274)

2. Persons living in a high rise downtown location first met their most frequently seen friends on a non-local, community of interest basis, even though these friends may live nearby. Those in downtown apartments were particularly more likely to have first met these associates at work.

3. People in high rise apartments were not isolated from social contacts, but were more in contact with non-proximate friends than with neighbors. Husbands moving to a high rise see somewhat more of their friends than do those moving to single houses.
(4) People in downtown locations and high rise currently saw their contacts a few percentage points more at work and slightly less in the neighborhood, but there was virtually no variation whatever in the four housing types and locations as to the amount of visiting in the home.

(5) Those moving to high rise apartments were far less knowledgeable of either the socio-economic or the personal characteristics of their future neighbors; i.e., residents of high rise apartments feel more personal heterogeneity vis-a-vis their neighbors, and expect to encounter an incongruence in these characteristics, but apparently make the move on other grounds (Michelson, 1972).

These findings strongly challenge both the common notion that high rise residents are isolated from social contact and the popular myth of high rise "swinging" living (i.e., the idea that most social interaction in a high rise results from contacts made within an individual's own apartment block or adjacent blocks).

The above statistical interpretation of social interaction in Michelson's study was verified and augmented by a three-year participant-observation study of the basis of interaction in a suburban high rise (Reed, 1972). This study emphasized the properties, operation and consequences of informal, situation-specific norms upon patterns of social interaction in the high rise. These were compared with the results of a similar study in a single-family neighborhood. Social and environmental factors had an important influence on when and where interaction took place in the high rise, and with whom. Five factors were suggested to account for the consistent difference in specific interaction patterns between these two residential settings. The order of discussion below suggests no particular priority among these factors:

(a) **Physical structure or layout.** These factors related largely to functional or structural properties of the high rise building: common transit (movement, passage) areas and function-specific facilities were the typical areas of chance encounter. The frequency of interaction in
the high rise, however, tended to fall below the frequency of encounter; i.e., not every encounter in the high rise led to face-to-face spoken interaction. In the single-family neighborhood the frequency of interaction was higher than that of encounter, due to a greater amount of intended interaction. This difference in the ratio of encounter-to-interaction was considered the key point in the study since it demonstrated the different effects of both social (normative) and physical (non-normative) factors in situated interaction. The four remaining factors clarify the different effects of both social and physical variables.

(b) **Symbolic aspect of the residential unit.** There was a clear-cut difference in the symbolic information content of the single-family residence and the high rise apartment dwelling, resulting in a general inability of high rise residents to evaluate the socioeconomic status, household composition, and living patterns of their neighbors -- essentially a reflection of the fact that everyone lives behind identical doors with no material or physical manifestations which provide clues as to the personal or social characteristics of those who live behind them.

(c) **Socio-economic heterogeneity of residents.** The lack of symbolic information content of the high rise residential unit is compounded by the usual greater heterogeneity of high rise residents along socio-economic, stage in the life cycle, ethnic or other lines, compared with the characteristically more homogeneous clustering of residents in single-family neighborhoods.

(d) **Sensory boundedness and information control of residential units.** The absence of open areas (other than balconies) surrounding or attached to individual apartments means that high rise residents have a relative absence of visual information concerning the "life routines" of their neighbors. This may be aggravated in a like manner by uncontrolled, possibly undesired information which is transmitted aurally, i.e., by noise from domestic or children's activities.

(e) **Mobility of residential population and length of residence.** The relatively higher mobility rate of high rise residents suggests an
addition, the difficulty in establishing normative interaction patterns, as well as the maintenance and transmission of a normative structure over time (Reed, 1972).

Existence of the last four factors has an additive effect which tends to diminish the amount of information available about fellow high rise residents and deprives them of a fundamental basis for formulating informal, but especially more formalized appropriate patterns of interaction. Reed's position was not, however, that high rise apartment buildings are basically normless social situations, while social relations in a community of single-family homes is more cohesive:

"Some HR buildings have stable populations, a considerable feeling of solidarity among tenants, as well as other norm-facilitating conditions. Conversely, some SF areas have a high population turnover and other conditions weighing against the development of cohesion-generating norms. Rather than asserting that each of these observed patterns is characteristic of a specific housing type, the paper has argued that the patterns are a result of a combination of basic physical and physically-related social characteristics which may be found in any kind of residential setting."

(Reed, 1972: 352)

Thus, in the absence of relatively clearly understood and shared conventions pertaining to the interaction situation in a high rise, certain physical environmental features, combined with social variables, tend to take on special importance in partially structuring an informal, situation-specific social order in the high rise (Reed, 1972).

3.13 Summary: Social Interaction in High Density Housing

This discussion began with a statement of the degree to which physical factors based on spatial proximity are modified by the social characteristics of residents and the need for mutual aid in their effects on social relations. Michelson's tentative conclusion (1970:a) was based on a review of previous literature on the residential environment in general.
The review of similar and subsequent studies above modifies Michelson's conclusion only minimally.

Findings on the effect of physical factors in housing (building type, design) suggested that physical structure and layout appear to influence sociability and privacy; that they determine or cause these effects was not entirely substantiated, however. In addition, the lack of a measure of individual variations in the trade-off between sociability and privacy renders the assessment of "good" versus "bad" housing forms in this sense tenuous. Reed's observation of the effect of physical or environmental factors of the high rise does suggest that interaction occurs in this setting may be highly environment contingent; but the matter of who interacts with whom, and the extent of such interaction was seen to be dependent to a considerable degree on perceived homogeneity in both social and personal characteristics. The degree of interrelatedness of both social and physical factors suggested by Reed's study of interaction in the high rise implies that the cause-effect nature of one of these variables on interaction cannot be determined without considering that of the other.⁶

Real or perceived homogeneity among residents does appear to be a major social variable which tends to increase the probability of social interaction in high density settings. The need for mutual aid, another social variable, is often a function of length of residence; the operational effects of these two variables are somewhat contradictory, however. High mobility tends to inhibit the establishment and maintenance of more formalized, consistent patterns of social interaction, while greater length of residence has an inverse effect. The need for mutual aid, however, is highest for a short time after the initial move. In addition to these social factors, personal variables (e.g., social skills, aspirations) have additional potential effect on both the extent and kind of interaction which may occur.

Finally, as noted above, opportunities for social interaction in high density residential settings have a counterpart in the need for
privacy. The residential environment seen as a social structure depends on the existence of avenues of communication between people with a minimum of effort. The balance between excessive communication or social stimuli, on the one hand, and privacy (or the individual's freedom to control what, how, and to whom he communicates information about himself) on the other, is a fine distinction since both these are relative to the individual. The determination of how much and what kind of social interaction is desirable in high density settings can perhaps best be approached by a simultaneous investigation of the privacy desired and obtainable in such environments.

3.2 Satisfaction & Family Life

Apartment living, and especially the high rise, has been the object of a great deal of concern with respect to its suitability for families with children. It is generally held that such accommodation may be appropriate for certain groups or at particular stages of the life cycle (e.g., young single persons, married couples without children, mature single adults, and the elderly) but that it is not an adequate housing environment for families with dependent children.

Descriptive studies, in general, verify that families with children are more dissatisfied with apartment or high rise living than people at other stages in the life cycle, primarily due to problems associated with parents' supervision of children's activities, children's play and their safety. Some investigators have emphasized the importance of ensuring that families with young children living in high rise buildings are housed on the lower floors, or recommended the use of only three- to four-storey walk-ups for such families at higher densities.

Much of the literature on satisfaction in high density housing or the residential environment in general does, in fact, focus on families with young children, especially those with low incomes or those living in
publicly-provided housing. Until recently findings on satisfaction of persons in other stages of the life cycle and in private rental housing have been less frequent.

"Satisfaction", however, is a concept which may be easily abused, especially when it is used to imply the fulfillment of all expectations or aspirations with respect to the housing environment. In its most reliable sense, satisfaction is defined entirely by the current situation (Schorr, 1970), and promotes the understanding of how families or individuals may be reasonably satisfied with their current housing situation while still aspiring to the ideal choice of a single-family home in the suburbs. Recent Canadian evidence suggests that the family mobility cycle not only "explains" satisfaction with the high rise (especially in a downtown location) but that many, if not most family households in their child-bearing years consider this type of accommodation as a temporary residence. In this sense, a move to the high rise is one in a series facilitating the attainment of the ideal, or the single-family home (Michelson, 1973: a).

Along with family mobility and stage in the life cycle, other variables which influence satisfaction with high density housing include life style, identity with local physical and social space, and personal values. The discussion below describes common difficulties of families with children who live in the high rise in some detail, in order to emphasize the need for careful design of high density housing for this household type.

3.21 Families with Children: The High Rise

Anthony Wallace, an American anthropologist/sociologist, was one of the first to undertake a major study of the suitability of the high rise for families with children. Like many others, Wallace was particularly interested in the adequacy of this housing form for low-income families with children, and after a comparison of both high rise and row-housing
units, recommended that the elevator-apartment be avoided for the use of this group. Although numerous arguments entered into this conclusion, his main concerns related to (a) the lack of privately controlled space, "...a fact which limits family activities, diminishes the role of the father, and separates child from parent. . . ." (Wallace, 1952: 100) and (b) the usability of the dwelling unit itself for various family functions. In this sense, Wallace proposed that family solidarity would be weakened by both a lack of sufficient space for entertaining and the necessity to carry on extra-family relationships outside of the home (Wallace, 1952).

Wallace also hypothesized that high rise residents in general are less likely to be satisfied with their accommodation than are those living in other types of ground-contact housing, basing much of his argument on the overwhelming preference for the single-family house. The choice of the single-family home as the ideal housing type, especially by family households, has not changed since the time of Wallace's work and was demonstrated in most of the survey studies reported in this section (cf., Willis, 1955; Stevenson et al, 1967; Ministry of Housing & Local Government, 1970; Social Planning Council of Metropolitan Toronto, 1973; Michelson, 1973:b). Aspirations toward an ideal, however, do not necessarily indicate dissatisfaction with the present situation; recent evidence suggests that families "...do seek downtown high rise apartments for valid reasons, despite the fact that they themselves as well as others may find this form of living an abomination for child-raising." (Michelson, 1973:a: 23)

Subsequent studies have reinforced Wallace's concern over a lack of privately controlled space, particularly with respect to appropriate play space and the loss of control over children's activities outside the dwelling unit. The lack of, or inadequate outdoor/indoor play space, as well as the design and usability of existing play space are important
concerns of more recent investigations. The Social Planning Council of Metropolitan Toronto, for example, reported that the availability of a play area was an especially important factor in satisfaction with the building for families with children (Social Planning Council of Metropolitan Toronto, 1973).

The enforced passivity of men in apartments (i.e., the loss of an opportunity for home maintenance or "do-it-yourself" jobs) was verified to some extent in subsequent studies (Stevenson et al., 1967; Kumove, 1966), although one recent study indicated that the majority of husbands were either glad to be free of home maintenance tasks or missed them very little (Social Planning Council of Metropolitan Toronto, 1973). With respect to Wallace's concern that high rise residents are unable to entertain visitors in their dwelling units, Michelson reported virtually no variation in the amount of in-home entertaining between apartment or high rise residents and residents of single-family homes (Michelson, 1972).

Two recent Canadian studies tend to contradict the assumption that high rise living is not suitable for the needs of family households. Michelson (1973a), for example, found that families moving to downtown high rises do so for positive reasons, even though they may be expected to eventually seek another housing type or location. Similarly, the Social Planning Council of Metropolitan Toronto (1973) reported that most respondents expressed some degree of satisfaction with their units, and the majority (51%) indicated their building created no problems for their children. On closer examination, however, the Social Planning Council found that parents' negative attitudes toward raising children in apartments, concern about children's safety and restrictions on their noisy activities, and suggestions by parents that children's facilities and programs would facilitate better family living, all pointed to a dissatisfaction with the high rise as a setting for raising children. In addition, approximately 75% of all high rise respondents agreed that families living in this type of accommodation were under more stress than families in other types of
housing. The largest proportion of respondents felt that problems related to children brought about stress in high rise apartments (Social Planning Council of Metropolitan Toronto, 1973).

Michelson's findings (1973:a) were based on a sample of families moving to downtown high rises in Toronto, 77% of whom had no children, and the overwhelming majority of whom expected to be moving again within five years. The implications of Michelson's study are discussed in greater detail below (Section 3.22 Deficit Compensation) since this evidence suggests that the family mobility cycle has important influence on satisfaction with the high rise. It is important to note, however, that families living in downtown high rises seem to experience dissatisfaction with the size of their dwelling units, since they

". . .were uniquely likely to complain that their dwelling unit was too small, that they had too few bedrooms, that they had too little storage space, that the size of the existing rooms was too small, and that the layout of the rooms was not optimal."

(Michelson, 1973:b: 57-58)

Play, Supervision & Safety of Children in the High Rise. Problems of children's play, supervision of their activities, and the general safety of young children in the high rise are the most frequent difficulties which emerge from an investigation of the high rise literature on families. The Social Planning Council of Metropolitan Toronto (1973) reported that 49% of their respondents reported their building created a variety of problems for their children, the most important of which was inadequate play space, while an important majority (57%) said they prevented their children from engaging in some activities for a number of reasons.

Play, supervision and safety problems related to living high off the ground (i.e., generally above the fifth floor) seem to be greatest for families with very young children -- especially those seven years of age or less (Ministry of Housing & Local Govt., 1970; Willis, 1955; Berry,
Comments of mothers indicated that children of this age group are not allowed to go out to play without the accompaniment of a parent or other adult. The Ministry of Housing & Local Government (1970), however, indicated that mothers equally experienced problems about children's play whether they lived in houses or multistorey dwellings, on the upper or lower floors of blocks, or off the ground or on it: more than half indicated simply that there were no suitable play spaces outside the home. Specific problems associated with living on upper floors included being too high up to see children at play, that of children getting down safely, and fears about children falling from balconies in efforts to see over the top of railings. Difficulties associated with play spaces in particular included traffic danger, noise, interference by older children, and management policies which prevented children from using spaces near their homes (Ministry of Housing & Local Govt., 1970).

Supervision of children's activities, i.e., being too high up to observe children's play, is perhaps the greatest difficulty experienced by high rise families, especially mothers. As Michelson noted,

"When a child leaves his home to play many storeys below, his actions cannot be followed from the apartment. . . . This differs . . . from the low rise situation where children's play areas can be seen from kitchen windows. When necessary, mothers can call their children and children can be heard, and the mothers are at most a few flights of steps from the ground."

(Michelson, 1970:a: 96-97)

The need for observable and accessible play space from family dwelling units at high density has been emphasized frequently (cf., Willis, 1955; Wood, 1961; Berry, 1967; Ministry of Housing & Local Govt., 1970). Several investigators have recommended that families with small children should never be housed far off the ground, preferring instead that they live at the ground level or not above the fourth floor (Willis, 1955; Tyrwhitt, 1968; Ministry of Housing & Local Govt.). Newman (1972) specifically recommended that the high rise should be strictly avoided for low-income families with children, and echoed the preference for walk-up buildings (no higher than three stories).
Some have suggested that units on lower levels of high rises be specifically designed for family living, etc. with an attached garden or play facilities (Ministry of Housing & Local Govt., 1970; Willis, 1955). Play areas, however, do not have to be put on ground level (Berry, 1967), and

"In a large high density scheme where not all families with young children could be housed on the ground, a wide access deck would give children a better outlook than a playroom and would also have adults passing by. Children could be supervised by their mothers if a window of their home overlooked the deck. . . ."

(Ministry of Housing & Local Govt., 1970: 8) (although care should be taken to preserve privacy).

Others have noted that a lack of explicit rules (not merely the existence of restrictive rules) on the use of public space around apartment buildings for play may be highly detrimental to a child's sense of security in his play activities (White, 1953).

Finally, tenant participation in working out appropriate facilities for children's play in existing multistorey dwellings has been deemed an important factor which may contribute to satisfaction of family needs (Levin, 1966; White, 1953). Levin's description of the play activities and recreation facilities of children living in Russian flats underlines the potential success of tenants' committees in organizing, planning and supervising their own children's recreation. In Moscow, several blocks of flats are built around a fairly large piece of land which is at the disposal of the residents. Each block has a tenants' committee which has the right to allocate certain sums of money, as well as some indoor or outdoor space for children's activities. Making-do with available space either on the site or nearby, often facilitates recreation that would otherwise be unavailable. The organization of play programs, as well as supervision of children's activities, is frequently carried out by a retired or other interested person (Levin, 1966).
3.22 Deficit Compensation: The Downtown High Rise

As suggested earlier, satisfaction with one's present housing situation does not preclude a concurrent aspiration for an altogether different housing environment in the future. A recent investigation of family life in apartments, especially the high rise, by the Social Planning Council of Metropolitan Toronto indicated that although most respondents expressed some degree of satisfaction with their units, nearly 58% nevertheless intended to move for a variety of reasons within two years or when their lease was up (SPCMT, 1973). Michelson, whose study also took place in Toronto at approximately the same time, found similar intentions to move among 57% of respondents moving to downtown high rises. These intentions were expressed before these families even occupied their new residences. These expectations

"...hardly indicate dissatisfaction with high-rise apartments in which the respondents have yet to live, but indicate rather intentions and aspirations which lead elsewhere."

(Michelson, 1973:a: 14)

Although the Social Planning Council was unable, on the basis of their data, to answer the question of what leads to satisfaction with apartment living or with the specific unit or building, the data did suggest

"...that the concept of 'relative deprivation' or 'trade off' may be operative in these situations."

(Social Planning Council of Metropolitan Toronto, 1973: 37)

Michelson specifically tested the degree to which relative deprivation may act as an important element in residential mobility, especially with respect to married couples in their child-bearing years. In fact, a decided "deficit compensation" process was evidenced among certain families who moved, or were moving to, high rises in downtown locations. "Deficit compensation" is a concept referring to a general action taken to overcome relative deprivation or disadvantage in some aspect of one's situation, in comparison with others; in this context, however, such
behavior would constitute a move to another housing type or location where the disadvantage may be somewhat easily remedied (Michelson, 1973:a).

People change residence for a number of reasons; not all of these reasons are clear, nor are the implications and patterns of this movement. Several somewhat recent explanations of intra-urban mobility in North America demonstrate quite different thinking on this matter, and also tend to reflect societal changes (cf., Michelson, 1973:a). Most have focused on the move as the main factor to be explained; a recent perspective, however, suggests that a focus on the family as a unit and its patterns of movement may do much to bring together many previous explanations of residential mobility.

Michelson (1973:a) defined family mobility in three general stages: I. Baseline Stage, II. Incremental Change, and III. Approximation of the Ideal. Deficit compensation (a move to remedy relative deprivation) was seen as one of the processes by which people make housing choices in Stage II, or the stage of incremental change. Changes in housing type or location in Stage II of the family mobility cycle are generally those made with the goal of satisfying practical problems which have arisen, and can be seen to include a number of successive strains and resolutions between the baseline stage and the approximation of the ideal (i.e., the single-family home). Michelson's study indicated that families in Stage II of the mobility cycle chose the downtown high rise for two important reasons:

1. the presence of on-site recreational facilities, and
2. the proximity of downtown and work-place.

These major "pull" factors corresponded with deficits, or relative deprivation on the part of these families prior to their move to the downtown high rise (Michelson, 1973:a).

The necessary evidence that a move to the downtown high rise truly reflected deficit compensation or an ability to overcome relative deprivation was demonstrated by time-budget data of both pre- and post-move activity of these families. The time-budgets indicated a regular deficit
of time spent in sports participation before moving to a high rise
(relative to other respondents in the sample) and a uniquely high increase
in sports activity immediately following their move. Despite the lack of
a continued high level of sports participation after one year, this
pattern, according to Michelson, is not inconsistent with the concept of

Similarly, the uniquely large amount of time saved on the trip
to work by people moving to downtown high rise apartments demonstrated
additional evidence of a decided deficit compensation process. In
summary,

"...it appears that despite long run aspirations for
very different types of accommodation, people find
positive reasons for moving to downtown high rise
apartments which correspond with aspects of their lives
in which they previously suffered some degree of rela-
tive deprivation. The consequence of their move is not
to put them in any long run position of superiority
with regard to these aspects, but nonetheless their new
environment has compensated, as long as desired, for
the deficit previously experienced. That they may
become dissatisfied with their residences on other
grounds and move again is by no means precluded, and
in fact it should be expected given the model of family
mobility."

(Michelson, 1973:a: 21-22)

3.23 Value Orientations & High Densities

Social status, stage in the life cycle, life style, and value
orientations are among the more important social variables thought by
many social scientists to be related to the urban environment (Michelson,
1966). Of these, life style and value orientations have been shown to be
closely related to housing choice and the preferred form of the residential
environment. The concept of values or value orientations is difficult
to define in any precise manner, since few social scientists agree on
their nature, their level of generality, their amount of variation, their
susceptibility to change, and the most basic unit for their study (Michelson, 1970:a). Yet most would agree that values are (a) basic rules or principles which guide human behavior, and (b) tend to be highly enduring over time.

Beyer (1959) was one of the first to investigate the relationship of values to housing, and suggested that nine value orientations (family centrism, equality, physical health, economy, freedom, aesthetics, prestige, mental health, and leisure) influence housing preferences and may lead to solutions which better fit people's shelter requirements.

The nomenclature of specific value orientations which have relevance for the housing environment varies greatly; among these, however, (a) convenience or instrumentalism, (b) expression, (c) class-consciousness and (d) person-orientation have been shown to be especially important values coinciding with the preference for high residential density, or the experience of living in such environments. Michelson's study on ideal environment indicated that preferences for ideal housing types are supported by distinct combinations of value orientations. High rise apartments were chosen on the asserted basis of expression (beauty or aesthetic appeal), instrumentalism (convenience) and class consciousness (high social class) (Michelson, 1965).

Instrumentalism, or an orientation toward convenience, was also related to preferences for lot sizes, i.e., the distances people chose between themselves and their neighbors:

"The more instrumental a person's values turned out to be, the smaller he wanted his lot to be. . . . It is therefore to be expected that people with strong instrumental values would prefer smaller spaces surrounding them."

(Michelson, 1970: 142)

Likewise, the more people could be characterized as high on instrumental values, the closer they ideally wanted to be to various kinds of activities and community facilities (Michelson, 1970).

Preference for single-family homes, on the other hand, was most frequently backed by individualism, or the ability of this housing to
provide privacy for a family, as well as a "doing" orientation (a desire for freedom of activity) (Michelson, 1965).

Whether people wanted a great deal of land or very little, however, they claimed they wanted it for what they could do in or with their private space:

"The doing value orientation is cited frequently whether a person chooses great or small separation from his neighbors."

(Michelson, 1965: 239)

Densely settled urban communities have also been associated with person-orientation, or a high value placed on interaction with relatives. Young and Willmott's study of a working class community in Bethnal Green, a high density area in London's East End, indicated that kinship relations were highly valued by these residents -- to an extent that newly married couples remained in their district to retain close association with their families or origin. Upon moving to a low-density suburban area, many of these people began to value things and objects above their previous valuation of other people as a basis of behavior (Young & Willmott, 1967).

3.24 Life Style & The Self-Selection Process

As noted earlier, life style has also been found to be closely associated with both the preferred form of the residential environment and satisfaction with that setting. Value orientations have in fact been placed at the very basis of life style patterns by some social scientists; most definitions of life style, however, include values as only one of several components which contribute to patterns of behavior that vary considerably one from another.

Greer, for example, used life style to refer to a mode of life of populations of various urban areas, or locality groups:
"At the high urbanism pole we find neighborhoods where single persons, childless couples and one-child families predominate. At the opposite end we find the single family dwelling units inhabited by families with several children, where the woman's role is that of wife and mother instead of participant in the labor force."

(Greer, 1962: 110)

Definitions and applications of the life style concept are so diverse as to eliminate the practicality of enumerating their variety in this discussion. The definition offered by Michelson to integrate the varied meanings of this concept is a configuration of roles and accompanying predispositions to behavior which people choose to emphasize from a larger number of possibilities available to those individuals having similar basic characteristics. "Self-selection" is inherent to the concept of life style, since the individual selects, and finds certain activities, objects, etc. more appropriate to, or congruent with, his self than others. The selection of these things in maximum congruence is directed by the individual's preferences and orientations, or his hierarchy of values (Michelson, 1970:b).

The process of self-selection in housing, however, does not consider housing only as a symbol or product, but as an opportunity structure for specific types of behavior. Michelson's recent Toronto study, for example, indicated that behavioral rationales enter into the choice of particular housing environments. Downtown and suburban high rises were chosen on the asserted basis of opportunities for increased physical exercise, while the choice of a downtown high rise was also expected to decrease commuting time to work. These expectations were in fact realized by these families immediately after the move, and verified the realism and importance of behavioral expectations in connection with housing (Michelson, 1973:c).

A life style characterized by intense, frequent contact with a large number of relatives was representative of both the West End in Boston and the East End in London. Both communities were largely working class, although the characteristics of this life style have also been
associated with ethnicity. The important point, however, is that this particular behavioral pattern

"...seems to require...some arrangement of buildings, streets, and open spaces (or lack of them) that promotes the easy availability of person to person."
(Michelson, 1970:a: 66)

These people were living in sufficiently high densities to allow related families to live close to each other; the combination and arrangement of building types, land uses, and pattern of streets all strongly supported this style of life. Further, the concept of personal living space was extended to include outdoor as well as indoor space (Michelson, 1970:a).

In short, a pattern of more intimate and frequent interpersonal contact requires a very different spatial setting than one which highly values privacy. On the basis of his study of the social values and housing orientations of the West-Enders in Boston, Hartman asserted that the quantity of individual space can properly be evaluated only within an entire living pattern and larger set of social and personal values, not merely the objective quality of the housing form (Hartman, 1963).

3.25 Interaction of Social & Physical Space

The idea that certain ethnic communities and working class groups derive certain satisfaction from patterns of local social interaction which are supported by a combination of land use and density factors is not new. Fried and Gleicher (1961), for example, found that for the great majority of West-Enders in Boston, the local area was the focus of strongly positive sentiments; the sense of local spatial identity, however, included both local social relationships and local places.

The concept of territorial space, a term suggested by Fried and Gleicher to denote subjective spatial organization (or a way of structuring physical space around the actual residential unit), however, is less frequently accepted by behavioral scientists. Fried and Gleicher suggested
that the orientation of residents toward physical space in the West End, a densely settled working class area in Boston, was territorial

"...in the sense that physical space is largely defined in terms of relatively bounded regions to which one has freedom or access. . . ."

(Fried & Gleicher, 1961: 312)

Further, it was clear that the area was differently bounded for different people; for some the territorial zone was very small, and for others, included a sense of access to the entire area. The authors suggested that the relatively bounded space perception of the working class may be distinguished from the more highly selective and individual use of space which seems to characterize urban middle- or higher-status groups (Fried and Gleicher, 1961).

Buttimer's more recent study of the evaluations of different groups of residents of Glasgow housing estates supported the idea that persons in the lowest socio-economic category identify with a home ground, but also indicated that the sense of identity with particular urban places interacts with social reference systems, norms and values. Satisfaction with an area, and with daily life in a particular residential setting, are the result of congruence between at least three components of spatial experience. In the Glasgow study, these included an

"...ability to identify with a home ground, accessibility to aspired social and service destinations, and a perception of the architectural environment corresponding to an image of the ideal environment."

(Buttimer, 1972: 290)

3.26 Summary: Satisfaction & Family Life

Satisfaction, as noted earlier, is a meaningful concept only in its reference to the current situation. Much of the evidence in this chapter has indicated that satisfaction, as an attitude, encompasses a good deal more than purely physical characteristics of a housing environment. While certain design features, amount of outdoor usable space, and the arrangement
of space appear to operate as important components of satisfaction, social reference systems, along with personal norms, values or behavioral patterns frequently (if not usually) cannot be separated from physical factors which promote a sense of fulfillment with present needs or wants. In a very real sense, then, there is not one housing satisfaction, but several (Schorr, 1970).

Further, satisfaction with a current housing situation does not preclude aspirations for an altogether different housing situation in the future. It has already been noted that many families choose, for apparently valid reasons, to live in downtown high rises, even though this type of accommodation seems to present important difficulties for child-raising. While this is not to suggest that families with young children are totally satisfied with present high rise form or design,

"The point is to take these units for what they are worth, and not to pretend they fill some other function even for the person selecting them for an interim period for indisputable purposes."

(Michelson, 1973:a: 23)

Family households who have satisfied their expectations for the "moment" but who see no valid opportunity for achieving an approximation of their ideal, however, may eventually experience great dissatisfaction with their present accommodation. The chance of achieving some approximation of an ideal is something which certainly permits relative satisfaction with several incremental residential changes in the family mobility cycle. Nevertheless for certain portions of the population whose characteristics are such that they recognize the futility of ever attaining their ideal, initial satisfaction may be replaced by a more permanent frustration (Michelson, 1973:a). This group could certainly include many residents of public housing who may be unable to put aside enough financial resources for the achievement of their ideal; with rapidly increasing housing costs, however, and a general lack of availability of alternative housing types, one might expect this frustration to affect a greater proportion of urban populations.
An important, if not singularly crucial conclusion of this section is that no single type of residence or location is suitable for all urban residents -- nor should one housing type be provided in the absence of suitable numbers of alternative types. High density residential settings may in fact be a satisfactory or preferred living environment for many households, although not a few will consider such situations satisfactory during relatively temporary periods in their complete mobility cycle. Satisfaction of the needs of families with young children who either choose or find it necessary to live in high rise apartments has particular priority, however, whether sufficient numbers of other housing alternatives are -- or are not -- available.
Chapter 4

RELATED RESEARCH

The foregoing evidence has not confirmed simple cause-effect relationships between high density housing and social disorganization, greater incidence of physical and mental illness, dissatisfaction, or social interaction. Rather, there is sufficient reason to suggest, on the basis of these findings, that the response of the individual to high density in the residential environment is a function of a set of highly interrelated factors, varying primarily according to social aspects of the situation, personal characteristics of the individual, and physical features of the environment, many of which are not necessarily related to density.

Inasmuch as considerable research has been undertaken on the human effects of spatial limitation and high population densities in other contexts, investigation of these findings may produce greater insight into the effects of high density in the residential environment. Growing concern for the quality of the physical environment, and for an understanding of the relationship between organisms and their environment, has prompted behavioral scientists to investigate not only the effects of crowding on animal populations, but also upon man -- in a variety of natural and experimental settings, and under a number of physical and social environmental conditions.

Related research on crowding and high density falls into three general categories: (1) animal studies, (2) experimental studies directly concerned with the effects of limited space and high population...
density on human behavior, and (3) experiments on the human use of space. Discussion of these findings has been undertaken with the express purpose of determining the potential usefulness of related research in promoting a clearer understanding of human response to high density in the residential environment.

4.1 Animal Studies

Another, but by no means insignificant body of empirical studies pertains to the effects of crowding and density on animals. Christian's work on sika deer and Calhoun's study of Norway rats, for example, are representative of a great number of carefully conducted ethological studies undertaken in either field or laboratory settings to assess both physiological and behavioral effects of crowding. Findings of these studies as they are applicable to particular animal species remain largely unchallenged; extrapolation of these results to man, however, has become the object of considerable controversy among social scientists.

The purpose of this section is to briefly summarize the known effects of crowding and density on animal populations, while at the same time pointing out the weaknesses of popularized writings which have attempted to directly apply these findings to the human situation.

Christian's longitudinal study of the effects of a build-up in a heard of sika deer demonstrated that physical crowding among such animals brings about prolonged overactivity of the adrenals, an effect which lowers defense mechanisms and produces severe metabolic disturbance. The gradual population increase of the herd over a forty year period resulted in a massive die-off over a two-year period. Physiological changes held to effect the die-off of the deer were concluded to be a result of stress reactions to excessive population density and its resultant social pressures (Christian, 1960).
Calhoun's study of Norway rats is important for its findings concerning the effects of crowding on social organization. In short, Calhoun demonstrated that crowding among this species disrupts important social functions and thereby leads to social disorganization, and ultimately to population decline or collapse. The "behavioral sink" is a term coined by Calhoun to describe the outcome of any behavioral process that collects animals together in unusually great numbers. Calhoun asserted that the "unhealthy" connotations of the term were not accidental:

"...a behavioral sink does act to aggravate all forms of pathology that can be found within a group." 
(Calhoun, 1962: 144)

Calhoun did not specifically apply these findings to human behavior, although he did suggest that refinement of such experimental procedures and the interpretation of such studies might eventually contribute to an understanding of the effects of crowding on man (Calhoun, 1962).

Generally, the researchers who have carried out experiments with animals have been careful not to extrapolate their findings to human beings (Gad, 1973). A sizable collection of recent popularized writings on the evils of crowding for man, however, have frequently based their conclusions on animal research (Zlutnick and Altman, 1972).

Hall (1966) and Sommer (1969) have been particularly instrumental in spreading the results of ethological studies, and imply that animal studies may provide clues to the sources of urban pathologies. It has also been argued that territoriality and aggression, behavioral phenomenon held to be innate to animal species, are no less "natural" for man (Lorenz, 1963; Ardrey, 1966). Modifications of these views assert that the tendency of man to render a particular area distinctive and defend it are not innate, but learned (Sommer, 1966).

Lorenz' and Ardrey's works have been questioned at some length by many writers, however, on the assertion that animal and human behavior are two different levels of reality; similarly, the development of language and culture in man makes him incomparable with other animals, while learning and experience influence both the development and expression of aggression (cf., Sandhu, 1969).
Tinbergen, an ethologist, lends a different perspective to the applicability of animal findings to the human effects of high densities. In short, he suggests that the methods of ethology, not necessarily the results, are potentially useful for other behavioral sciences. In his view, most writers who have tried to apply ethology to man have done this in the wrong way, i.e., by using facts that are valid only of some of the animals studied; and as ethologists keep stressing, no two species behave alike:

"...instead of taking the easy way out, we ought to study man in his own right... The message of the ethologists is that the methods, rather than the results, of ethology should be used for such study."

(Tinbergen, 1968: 1414)

4.2 Experimental Investigations

The most recent approach to the study of the crowding and density phenomenon is experimental investigation of the effects of differing population and spatial densities on human behavior. While these are still relatively few in number in comparison with correlational analyses and experimental animal studies, the variety of conditions and subjects tested contribute both a greater flexibility and precision to the empirical investigation of high density and crowding.

These experimental or laboratory studies have generally been of two types:

(a) those defining crowding in terms of group size or population density, i.e., "social density", and

(b) those testing the effects of different-sized spatial areas upon same-sized groups, i.e., "spatial density".

In addition such investigations have looked for evidence of the effects of crowding in both subjective/affective and behavioral human responses. For example, investigators have measured the effects of crowding as expressed in subjective reports of liking or disliking of another person (Griffit and Veitch, 1971), as well as subjective measures of stress,
anxiety, hostility and annoyance (Smith & Haythorn, 1972). Behavioral measures have included aggressive/destructive behavior, non-aggressive social encounters, and territorial behavior (Hutt & McGrew, 1967), along with the size of interaction group (Tucker & Friedman, 1972).

The results of these studies vary considerably. As a whole, however, the findings suggest that in humans, density effects appear to depend on many factors, not merely the lack of space. In the main, experimental investigations demonstrate the importance of characteristics or attributes of the individual, the nature of the physical environment, and social aspects of the situation.

4.21 Social Density

Several experimental studies have investigated the outcome of placing different numbers of people within the same size of spatial area, or the effects of "social densities". Hutt and Vaizey (1966), for example, attempted to assess the effects of different group densities on the behavior of autistic, brain-damaged, and "normal" children between the ages of three and eight years. Autistic children were regarded as withdrawn or introverted in comparison with normal children, while brain-damaged children were regarded as more outgoing and active (i.e., extroverted). Reactions to crowded conditions were expected to reflect the normal and extreme reactions of the general population (Hutt & Vaizey, 1966).

In brief, the effects of group densities were seen to be a function of both the type of subject and the nature of the physical environment. During free-play activities, the normal children showed an appreciable increase in aggression only when the room was very crowded, and for a relatively small proportion of the time tested. Autistic children demonstrated almost no aggression, while those brain-damaged showed more aggressive behavior as the size of the group increased (but still only for a portion of the time they were observed). With respect to non-aggressive social
interaction, normal children reduced their interaction with increasing group size. Territorial behavior, or attempts to preserve a physical area against intruders, was more dependent on the characteristics of the physical environment than on the number of children in the room (Hutt & Vaizey, 1966).

A second investigation tested the effects of group size or population density in combination with temperature, and concluded that dislike for another person was greater during exposure to high population density and high temperature, than under conditions of comfortable temperatures and low population density. The significant temperature effect replicated a previous finding by Griffit. While the findings concerning crowding supported the hypothesis that extremely crowded conditions do influence social behavior in a negative manner, the authors stated that their investigation did not substantiate any clear statement concerning at what point crowding is either first unpleasant, or next intolerable (Griffit & Veitch, 1971).

Desor's study demonstrated that the feeling of being "crowded" is related to receiving excessive stimulation from social sources, and not merely the result of a lack of space. Further individual differences were large in what constituted the feeling of being crowded. The results also indicated that a person's criterion of crowding varies with ongoing activity. Desor's research design was especially interesting in that it tested an architectural design hypothesis: any architectural feature of a space that reduces interpersonal perception within that space was assumed to reduce human judgment of the level of crowding there (Desor, 1972).

Subjects were presented with scaled-down rooms and human figures, and asked to place as many people as possible in the rooms without overcrowding them. The findings indicated that room partitioning reduces the degree to which people judge a given space to be crowded, i.e., room partitions permit greater numbers of people to be accommodated without increasing the individual's feeling of being crowded. Further, it seemed
that "other things", principally the activity involved, were at least as important as the level of social stimulation. Desor's findings that different activities produced different assessments of "crowded" suggests that

"Unraveling the variables relevant to crowding that differentiate activities poses a rather formidable challenge for further research."

(Desor, 1972: 83)

The complex nature of the effects of crowding and group size was further supported by Smith and Hayward's study of small groups of persons who were subjected to laboratory-induced isolation and confinement. Their findings were generally indicative of the way in which subtle changes in environmental conditions may influence subjective reactions (e.g., anxiety, stress, hostility, and annoyance) to isolation and confinement. The subjective reactions of individuals in groups interacted highly with both social and physical aspects of the group setting (Smith & Haythorn, 1972).

Tucker and Friedman (1972) found support for the theory that social interaction between persons decreases as population density increases, i.e., under conditions of high population density, people gather for interaction in smaller groups. This result was explained as a psychological means of reducing the effects which result from increased population density (Tucker & Friedman, 1972).

4.22 Spatial Density

Very few investigators have observed the effects of placing same-sized groups in different sized spatial areas. The findings which are available apply to different behavioral measures, different activities, and different types of subjects, so that comparison of the effects of spatial density are difficult.

Hutt and McGrew investigated the social behavior of eight children under free-play conditions in different-sized spaces, and found that
aggressive and territorial behavior increased with increasing spatial density. Somewhat contrary to Hutt's earlier findings, the frequency of non-aggressive social interaction increased as density increased. The latter result was in general agreement with animal density studies, but not with Hutt and Vaizey's previous finding in which normal children reduced their interactions with increased density. Hutt and McGrew suggested that environmental characteristics may best explain this discrepancy (Hutt & McGrew, 1967).

In Hutt and Vaizey's earlier reported social density study, a child reacting negatively to increased density conditions could lessen his discomfort by purposely reducing his interaction of social contacts. In Hutt and McGrew's spatial density study, however, any child experiencing discomfort in a crowded playroom was always free to "escape" to a less-populated space adjacent to the playroom (Hutt & McGrew, 1967).

A second experimental investigation of spatial density (Freedman, 1971) tested the effects of different-sized rooms upon same-sized groups engaged in (a) performance tasks of varying degrees of complexity, (b) competitive versus cooperative interaction, and (c) jury deliberation. In the first of these no effects of any kind were found to be attributable to the degrees of density in the rooms:

"Regardless of the task, when or how it was performed, or by whom, we found no effects of density."
(Freedman, 1971: 61)

The second experiment (competitive versus cooperative interaction) indicated that boys competed more in the crowded room, while girls were affected less, i.e., competed somewhat less in the crowded room. The results of Freedman's third experiment (jury deliberation) were consistent with those of the second. That is, in one-sex groups, men responded negatively to crowded conditions and became more suspicious and combative. Women responded positively, becoming more friendly in high density situations. There were no effects of density when men and women were mixed (Freedman, 1971).
Freedman, in summarizing his work and the results of relevant previous studies, asserted that available evidence does not support the idea that density has generally negative effects on human beings:

"On the basis of my own research and the other available data, I would guess (and it is only a guess) that density per se is not particularly detrimental to human beings."

(Freedman, 1971: 86)

4.23 Summary: Experimental Investigations

The variety of conditions under which these experimental studies were conducted, as well as their yet small number, renders conclusive statements about the effects of density and crowding upon human beings based on this evidence tenuous at best. The results, as demonstrated by the above review, have been varied, although there is some reason to believe that extreme overcrowding does influence social behavior in a negative manner (Hutt & Vaizey, 1966; Griffit & Veitch, 1971). On the basis of these findings, however, the parameters of overcrowding in humans are only vaguely defined, if at all. As Griffit and Veitch stated,

"The question of at what points on the density dimension do humans experience feelings of crowding which are initially unpleasant, then intolerable, is not answered by the present factorial investigation."

(Griffit & Veitch, 1972: 97)

The approach of many of these experiments is necessarily limited in some aspects, as pointed out by Freedman (1971). Perhaps one of the most critical limitations of experimental studies is that the time span in which the effects of social or spatial densities have been tested is relatively brief compared to some situations in real life. Another weakness is that the subjects knew they would eventually get out of the crowded environment (Freedman, 1971).

It is not yet evident from the above studies whether the type of activity involved is an important determinant of the effects of density, since Desor's finding that different activities produced different assessments of 'crowded' was somewhat contradicted by Freedman's conclusion that
performance of tasks of differing complexity produces no differences in the effects of spatial density. Further investigation of the influence of the type of activity involved upon the effects of density will be reported in Section 4.3, The Human Use of Space.

Despite the variations in the evidence of this part, however, experimental investigation directly concerned with either social or spatial density do demonstrate some quite distinct similarities. The above studies summarily indicate that human response to high densities is not predictable simply on the basis of either the number of interacting individuals, or a lack of space; rather, the effects of densities are interactive with not only the type of subject (i.e., attributes or characteristics of the individual), but the nature of the physical environment, and social aspects of the situation.

4.3 The Human Use of Space

A third category of related research generally deals with human space perception and man's use of space in everyday behavior. Although many of the studies reported below do not focus directly on the human effects of crowding or density, they are particularly relevant to problems arising from spatial limitation.

Hall (1966) used the term "proxemics" to refer to the interrelated observations and theories of man's use of space as a specialized elaboration of culture. The work of Hall (1959, 1966) and Sommer (1969) on proxemics suggests that people differ in their values, attitudes and habits concerning the use of space and the distances they maintain from others, but these differences are largely held to be related to cultural norms or traditions. Language, as a major element in the formation of thought, is believed to have an important influence on man's perception of the world; language not only reflects, but influences man's use of space (Hall: 1959, 1966).
Much of the work on the human use of space revolves around the concepts of personal space, privacy and territoriality. Central to each of these is the notion that people establish boundaries around themselves to maintain their psychological integrity, manage their interactions with others, and protect their environment. While the distances that an individual maintains between himself and others are generally seen as a function of such factors as familiarity, status, situation, sex, and age, the overall pattern of such spatial behavior is culturally determined (cf., Becker & Mayo, 1971; Sommer, 1969; Hall: 1959, 1966).

Sommer has used the term "personal space" to refer to a portable territory that an individual carries around with him which is functional in the distance he maintains with other people -- somewhat like a "bubble" or invisible shell which others may not intrude upon. Sommer asserts that this portable territory disappears under certain conditions, such as crowding, with the result that social norms largely replace personal space as a mechanism for maintaining privacy (Sommer, 1969).

Personal space is only one of four types of territories applied by Sommer to human societies, however. Public territories (e.g., courtyards and parks) provide the individual freedom of access, but not necessarily of action. Home territories (e.g., clubhouses) are public areas taken over by groups or individuals who have a sense of control over the area. Interactional territories include those areas where social gatherings may occur; and personal space, the territory encompassing the human body (Sommer, 1969).

While some have restricted the use of the term "territoriality" to situations involving demarcation of boundaries and defense of a particular spatial area; and personal space or distance, to interpersonal relationships which define the use of space (Becker & Mayo, 1971), others have suggested that the two concepts are at times virtually inseparable:

"In many situations defense of personal space is so entangled with defense of an immediate territory that one sees them as part of a single process -- the defense of privacy -- that involves fundamental questions of space usage and property rights."

(Sommer, 1969: 45)
The term territoriality finds its origin in the field of animal ecology. Many who have researched the human use of space are not reluctant to apply the term to human behavior, although the tendency in man is generally held to be a learned, rather than innate capacity (Sommer, 1969), and the analogy is usually limited to achieving and exerting control over private property. A view that is gaining considerable acceptance among behavioral scientists holds that territoriality in man is not only tied to his direct socializing and broader cultural experiences, but serves the function of preserving minimum space to provide freedom of choice in satisfying biological and complex social motives:

"Territoriality in humans, defined as achieving and exerting control over a particular segment of space, seems always to be instrumental to the achievement of a more primary goal. We have suggested that the inner determinant of territorial behavior in the individual is his desire to maintain and achieve privacy. Territoriality thus becomes one mechanism whereby he can increase the range of options open to him and maximize his freedom of choice in a given situation."

(Proshansky, Ittelson & Rivlin, 1970:a: 180)

Discussion of the human use of space below mainly emphasizes differences in interaction distance and the everyday use of space among and within cultures. For purpose of clarity, these have been categorized as (a) national or cultural, and (b) subcultural or group differences in the use of space. The observations and experiments indicate that differences within cultures vary mainly according to ethnic, age, and sex groups.

4.31 National or Cultural Differences in the Use of Space

Hall (1959, 1966) has been particularly instrumental in reporting evidence that the organization of space and spatial cues differ considerably among cultures, and in suggesting that subjective responses to certain spatial arrangements also vary among members of different cultures. The
Inference of Hall's observations is that spatial and architectural needs are not the same, but vary considerably among different cultural groups. In the United States, for example, space is highly personalized, and relationships between places are visualized on the basis of personal experience. Hall observed that for Americans, the points where things begin and end are important, and the areas in between are largely ignored or considered "empty". Americans use the edges of rooms and leave the centre open for other activities. The Trukese, on the other hand, have not developed as an elaborate nomenclature for edges of places or objects. Each open area is identified with a name, however, and treated as completely distinct (Hall, 1959).

The Japanese custom emphasizes centres in a variety of spatial arrangements. Their house walls are semi-fixed and movable, in a result that rooms are multi-purpose according to the time of day or purpose (Hall, 1966). Michelson suggested that the Japanese exemplify successful adjustment to very high densities:

"Faced with high urban masses in a country with no room in which to expand, and without the precedents for high rise construction, the Japanese have made their dwellings small, and private open space is minimal."

(Michelson, 1970:a: 155)

The reaction of the Japanese people to this pressure is a "turning inward", with a strong differentiation between what is public and private in both physical and social terms. Lack of size in personal dwelling units is compensated for by intensive use of personal living space. Exterior space, however, is largely ignored and unkempt since it is public and therefore does not reflect the individual's domain and responsibility (Michelson, 1970:a).

Hall maintains there are important differences between American and English proxemics as well. In the United States, space is used as a way of classifying people and activities; in England it is the social system that determines who you are. Whereas Americans depend on architectural features for privacy, the English use subtle behavioral clues to indicate they do not want to be bothered (Hall, 1966).
In a manner similar to the English, when an Arab wants to be alone, he stops talking. In fact, the Arabs do not have a word for privacy, and according to Hall's observation, do not like to be alone. The Arabs show a greater overt sensitivity to forms of architectural crowding than the Americans, avoiding partitions and having a great deal more open space in their middle-class private dwellings. Hall implied that the lack of any sense of "private" rights in public areas and the orientation of being deeply involved with each other in an active way, promotes cultural adaptation to the very high population densities in several Arabian cities (Hall, 1966).

Draper's recent description of the use of space and daily interaction patterns of the Kung Bushmen (hunter-gatherers who live on the edges of the Kalahari Desert in Botswana and South-West Africa) suggested that the Kung live in very crowded conditions by choice, not by an economic or ecological constraint. The Kung live in kin-based groups whose size and mobility are determined to a great extent by the availability of food and water resources. The average density of their camps is very high, but the organization of interior space in each settlement increases the exposure of each individual to another:

"The human press in !Kung camps is clearly extreme. The campsites themselves are tightly packed and the absence of physical barriers combined with the circular arrangement of inward-facing huts means, effectively, that approximately thirty people are living in a single room. The Kung apparently like to be close together, even touching."

(Draper, 1973: 303)

Draper suggested two important conditions which may facilitate the accommodation of the Kung to crowded living conditions, although there may in fact be other ameliorating conditions. The first of these relates to the Kung's cultural acceptance of moving from one camp to another while retaining a socially cohesive group of individuals who have known each other through years of co-residence. Another condition relates to the relatively great separation between camp settlements, which minimizes chance encounter
Draper observed that clearly the Kung are crowded; "...yet the absence of presumably stress-related diseases suggests that residential crowding is not necessarily related to social pathology." (Draper, 1973: 303)

4.32 Subcultural or Group Differences in the Use of Space

Relatively little information is available regarding variations in interaction distance and the use of space between subcultural ethnic groups, or grouping along other lines (e.g., age, sex). While evidence in this section is not necessarily definitive, to the extent that subcultural groups do demonstrate similar differences in space usage, they may prefer different interaction conditions, and therefore may require certain architectural patterns of design for optimal interpersonal functioning (Baxter, 1970).

Baxter's investigation of the distances at which people interacted with each other in several natural settings revealed important differences among ethnic, age and sex groups in interpersonal spacing. The most striking result of the analysis was a significant difference in spacing attributable to ethnic groupings: Mexican groups interacted most proximally (stood closest); Anglos were intermediate, and Blacks interacted at the greatest distance (Baxter, 1970).

Age groupings also showed significant differences in interpersonal spacing, with children interacting most proximally. Adolescents were intermediate, and adults interacted at the greatest distances. Sex groupings also demonstrated significant differences in interaction distances, although this effect was quite modest in comparison with the strength of differences for both ethnicity and age. Baxter found that male-female groups interacted most proximally, female-female groups were intermediate, and male-male groups were most distant. The order of sex groupings did not remain constant within the ethnic and age combinations, however (Baxter, 1970).
The modest level of the effect of sex differences in Baxter's study and its inconsistency across groupings is interesting, in view of other findings cited in this chapter. Freedman (1971) reported significant differences between men and women in response to crowded situations in two different observations, but Desor (1972) observed no replicable sex differences in his study of human judgement of crowding. Further investigation of sex differences in space perception is apparently needed before conclusive statements can be made on the effect of this variable.

Hall (1971) also reported that behavior of blacks and whites varied in the way in which residential space was handled. Territoriality, or social control of physical space, was much more evident in the black neighborhoods, and territorial boundaries were closely related to group boundaries. "Trespassing" was virtually meaningless among these blacks, whose territory was a group concern rather than a personal or private matter. Hall observed that the block club, an important part of black community life in Chicago, serves a wide variety of purposes, but one of its more important functions is social control of the young. In contrast to white "suburban" culture where only the immediate family as a rule corrects children's behavior, black adults (and principally the block club) are expected to not only discipline others' children, but encourage their good behavior. The extent of social control by block clubs normally included an area two blocks long on a single side of the street. Hall suggested that this form of informal control has managed to remain viable on blocks with single houses, as well as row-houses and low-rise apartments centered on courts, but that the high rise, when combined with restrictive management policy, contributes to the loss of block club organization. The main difficulties were attributed to distance from the ground, which discourages group supervision of children, as well as the lack of opportunity for residents to exercise initiative over the care and maintenance of grounds and property. While Hall stressed there is nothing inherently good or bad about high rise apartments, he did suggest that successful adaptation to
crowded living seems to be correlated with discipline or homogeneity. He explained the apparent successful adaptation to Hong Kong densities by the high discipline of the Chinese in the family context, along with family stability (Hall, 1971).

4.33 Summary: The Human Use of Space

Research on the human use of space has indicated that the distances people maintain from others, and man's everyday use of space are not constant behavioral patterns, but vary both between and within cultural groupings. In another manner of speaking, experiments and observations on the human use of space provide evidence that cultural norms mediate (i.e., influence) man's perception of, and adjustment to interpersonal space (Stokols, 1972).

To the extent that different cultural groupings demonstrate similar differences in interaction distance and the use of space, it is not at all unlikely that members of different cultures respond differently to high density or crowded situations. While values and attitudes are an important component of the individual's response to crowded situations, physical manifestations of culture, i.e., design and the physical arrangement of space for particular activities, also influence the individual's perception of space. Hall, for example, applied the term "sociofugal spaces" to denote spatial arrangements which tend to keep people apart, and "sociopetal spaces" to those which tend to bring people together. What is sociofugal in one culture, however, may be sociopetal in another since members of different cultures apparently interpret different physical arrangements of space as having different opportunities for behavior (Hall, 1966).

Sommer's observation of the spacing of individuals in small groups indicated that in addition to the nature of the physical setting, personality and cultural factors, the type of activity performed in a given area influences whether the amount of available space is too limited or adequate (Sommer, 1969). These findings support Desor's evidence, cited previously, that a
person's criterion of crowding varies according to ongoing activity (Desor, 1972). Other works on the human use of space have emphasized that particular physical environments are especially conducive to certain behavioral patterns (Barker, 1955; Goffman, 1959).
Chapter 5

CRITIQUE OF PREVIOUS RESEARCH ON
THE EFFECTS OF HIGH DENSITIES

As stated in the introductory remarks of this study, the purpose of this work is to promote a clearer understanding of human response to high density in the residential environment. More specifically, this research is an attempt to clarify the effects for the individual of:

(a) overcrowding within dwelling units;
(b) high density of population or dwelling units per residential acre;
(c) congestion of private or public space contiguous to high density dwelling units; and/or
(d) congestion of community facilities which support the residential population of a given area.

The exploration of previous studies -- correlational, epidemiological, social interaction, satisfaction, and family life -- was undertaken to provide a representative statement of existing knowledge on the effects of high density in the residential environment. The intent of this chapter is to summarize these findings, while supplementing this knowledge with the results of related research. The integration of this evidence contains an implicit assumption that investigations of the human use of space, experimental studies directly concerned with the effects of high densities on human behavior, and certain evidence from animal studies are not only useful, but necessary for an understanding of the variables which affect the individual's response to high densities in the residential environment.
The summary of these findings is preceded by a discussion of the overall lack of rigorous scientific evidence on the human effects of crowding and high density, as well as statements concerning general weaknesses of much previous research.

5.1 Lack of Rigorous Scientific Evidence on the Human Effects of Crowding & High Density

Despite the existence of extensive literature on the effects of high density and crowding -- both in the residential environment and in other contexts -- relatively little rigorous empirical evidence can be cited on the human effects of these phenomena on behavior and health. The foregoing examination of these studies was not exhaustive, but rather representative of previous research on this problem. Yet those who have conducted intensive reviews of the literature are either highly sceptical of the present state of this knowledge (Zlutnick & Altman, 1972; Gad, 1973) or have designated only a preliminary picture of the effects of crowding and density on the basis of existing evidence (Stokols, 1972). Following his recent critique of this literature, Gad stated that

". . .the postulated link between high population densities in cities and the physical and mental health of urban man lacks a solid basis. Empirical evidence of these adverse effects is not only sparse and in places contradictory, but it suffers also from problems of definition and the lack of awareness that a priori value judgments are being made."

(Gad, 1973: 385)

In a similar manner, Zlutnick and Altman (1972) concluded that one just cannot be confident about the effects of crowding on social and psychological behavior in humans, in view of the lack of adequate scientific evidence which is unequivocal, replicable, or carefully designed.

Previous research efforts on the human effects of crowding and density have been generally hindered by three major problems: the
ambiguity of the terms "density" and "crowding", the lack of precise
definition of dependent variables (i.e., pathologies or effects), and
a frequent failure to consider the importance of intervening variables
(Michelson, 1970a; Gad, 1973; Stokols, 1972). Much research has also
lacked a theoretical perspective (Stokols, 1972); while qualitative
dimensions of space and the duration of exposure to high densities in
different settings have largely been ignored (Gad, 1973). Aside from
these, many popular speculations and hypotheses have either been based
on extrapolation from animal research, correlational data, or opinion
(Zlutnick & Altman, 1972).

A comprehensive understanding of the effects of crowding and
density in the residential environment is more broadly impeded by the high
degree of complexity of these phenomena and their interrelatedness to
other urban or societal problems. Further, density and crowding may be
analyzed at a variety of levels -- one can speak of a crowded city, neigh­
borhood, home or dwelling unit, office, classroom, community facilities,
etc. Specific variables which interact with spatial limitation undoubtedly
vary from one level to the next, and the effects on human behavior or
health are probably different at each level (Stokols, 1972).

5.2 Summary: Effects of High Density or
Crowding in the Residential Environment

Examination of the findings generated by the four categories of
research directly concerned with housing and the residential environment
(correlational studies, epidemiological studies, social interaction in high
density housing, and satisfaction and family life) does not permit a precise
statement of the conclusive effects of high density and crowding for the
individual. Summation of these findings will necessarily be general since
results of correlational studies are largely contradictory, and other
findings require further replication.
Correlational studies have demonstrated a statistical relationship between overcrowding of dwelling units as well as high population densities per residential acre, and various measures of social disorganization and pathology. This evidence does not necessarily indicate a cause-effect relationship between density and pathology, however. Indeed, the frequent coincidence of low-income, low-education, substandard housing, and several other social structure variables suggests to this author that the relationship between density and pathology is a highly complex one. In short, available correlational evidence at best indicates that density either (a) acts as an intervening variable between social structure variables and pathology (i.e., social structure variables may affect density, and density may in turn affect pathologies; social structure variables may also affect pathology in a manner unrelated to density); or (b) is only spuriously or not genuinely related to pathology (i.e., social structure variables may account for virtually all variations in the relation of population density and pathology). (See Figures 2 and 3, Chapter 2.)

As noted earlier, correlational analysis is hindered by a number of limitations, the most important being the difficulty of identifying true causal relations between density and pathology, and that of inference from the areal level to the level of the individual.

Epidemiological studies, i.e., investigations of the effects of apartment living or high density housing on physical and mental health, have suffered a similar lack of control for other variables which may contribute to poor health (e.g., personal characteristics of the individual, his state of health, aspects of the social environment, etc.) As previously noted, a lack of certainty on the part of many health researchers on the relationships of space and privacy to health or illness renders conclusions that apartment dwellers suffer greater poor health than do those of lower density housing quite tenuous.

Findings on the extent and kind of social interaction in high density residential environments suggest that physical factors in housing (e.g., building type and lay-out) influence where interaction occurs in a high rise or other high density accommodation; likewise, physical
features of high rise dwelling units seem to contribute to a general lack of information which might contribute to frequent interaction between neighbors. The usual socio-economic heterogeneity of high rise residents or apartment dwellers, as well as the relatively high residential mobility which characterizes this population, however, contribute as much (if not more) to a lack of information which tends to discourage intensive neighbor interaction. Recent Toronto evidence, nevertheless, contradicts the notion that high rise residents are isolated from social contact: Michelson found that the extent of social contact for apartment dwellers was every bit as high as for those living in single-family homes, although high rise residents interacted more with non-local friends than with their neighbors (Michelson, 1972).

Descriptive studies on satisfaction and family life indicate that families with young children are generally more dissatisfied with apartment or high rise living, especially those with very young children and those who live above the fifth floor. Dissatisfaction, for these households, is generally attributed to problems associated with parents' supervision of children's activities, children's play, and their safety. Other evidence suggests that preference for high density residential environments is associated with distinct value orientations (e.g., convenience), while both the choice and experience of living in such settings is associated with certain life styles. Physical features of housing, social aspects of the environment, norms, values, and life styles were all seen as interactive components of satisfaction with any housing environment. Finally, these findings suggest that choice of high rise living by family households is a function of the family mobility cycle during a period of frequent changes in housing type or location, but with the intention of satisfying relative deprivation, not necessarily the ideal (Michelson, 1973a).
5.3 Summary: Results of Related Research

Despite an overall lack of rigorous empirical evidence on the human effects of high density and crowding in areas of related research, it is possible to outline a preliminary picture of the density and crowding phenomena on the basis of existing evidence (Stokols, 1972).

Animal studies indicate that (a) negative responses to crowding develop over time, while (b) the limitation of space is a necessary condition for adverse responses. In addition, animal studies pointed out the constraints that spatial limitation places on social activities. It should be noted that application of animal findings to this study does not suggest that specific effects found for certain animal species have reference for human response to crowding and density. Rather, the inference is that animal findings provide evidence on conditions associated with crowding not generally produced by other research efforts.

Experimental investigations suggest that in humans, response to high population or spatial densities depends on many factors -- not merely the number of interacting individuals or a lack of space. Studies investigating group (or social) densities indicated that (a) the type of subject and nature of the physical environment, (b) excessive stimulation from social sources, and (c) the nature of ongoing activity all play an important role in human response to crowding. Results of spatial density studies indicated that when group size is held constant and physical conditions associated with spatial limitations are controlled (e.g., restriction of movement, physical discomfort), high density has virtually no effects on task performance. The specific nature of subjective responses and social effects of both high population density and spatial limitation varied considerably among the studies. Although results of two experimental investigations (Griffitt & Veitch, 1971; Hutt & McGrew, 1967) suggest there is reason to believe that extreme overcrowding influences social behavior in a negative manner, the precise parameters of overcrowding have not been identified. That is, the point at which feelings of crowding are initially unpleasant, then intolerable, was not answered by these studies (Griffitt & Veitch, 1971).
Observations and experiments on the human use of space support other findings that the type of activity performed in a given area influences whether the amount of available space is perceived by the individual as inadequate. By and large, however, this research provides evidence that cultural norms influence habits, values, and attitudes concerning the use of space and interpersonal distance. In another manner of speaking,

"...the relationship between space and pathology is mediated by variables such as culture... Disruption to the individual and his psyche is very much dependent on the definitions and rules specified by the cultural system, at the top of the hierarchy of control between cultural, social and personality systems, and by his relations within the social system."

(Michelson, 1970a: 157)

5.4 Integration of Findings

The integration of the results of related research with the reported findings on the response of the individual to high densities in the residential environment cannot be undertaken in a strict or literal manner. As noted earlier, specific variables which interact with spatial limitation or high population densities undoubtedly vary according to the situation or context analyzed. That is, human effects are probably quite different depending upon whether one is interested in how the individual responds to spatial limitation or overcrowding (a) in the dwelling unit or home, (b) with respect to contiguous private or public space, and (c) crowded community facilities -- versus some of the situations which have been studied under laboratory conditions (e.g., how men and women react differently to crowding when engaged in jury sentencing: Freedman, 1971; or what the minimum space and appropriate group size is for long-term confinement: Smith and Haythorn, 1972).

However, conceptual analysis of the findings directly concerned with high density in the residential environment, as well as evidence cited in
related research, indicates a consistency in certain general or system variables which interact with each other to produce different responses to high densities. Human effects of limited space or high population densities appear to depend mainly on:

(a) social aspects of the situation,
(b) personal attributes or characteristics of the individual,
(c) cultural norms,
(d) the type of activity involved,
(e) temporal duration (i.e., length of exposure), and
(f) physical factors in addition to density variables.

The evidence has indicated that these variables may, on the one hand, interact with limited space or high population density in such a manner as to offset adverse human response to high densities; that is, interaction of any of these variables may mediate and potentially preclude adverse reaction to high densities. The overall findings of this study have also demonstrated, however, that these variables may interact with high density so as to provoke, or induce potentially detrimental reactions to limited space or high population densities. Understanding of the response of the individual to any of the above named forms of high density in the residential environment thus requires consideration of the interaction of this multi-dimensional set of properties, not simple "prediction" on the basis of purely spatial variables or number of persons.

More precise specification of the independent variables which influence or mediate the effects of high density in the residential environment will be discussed in great detail in Chapter 8, as they are incorporated in a conceptual model which theoretically explains differential individual responses to "crowding" in the residential environment. In order to promote still further a clearer understanding of the individual's response to high residential densities, however, it is advantageous to examine several theoretical explanations from the literature which link high densities to pathology or social disorganization by the concept of
"stress". Recent social-psychological theoretical perspectives of this relation are emphasized since these explanations take into particular consideration the influence of the above variables in influencing or mediating the effects of high densities.
Chapter 6

"CROWDING" AS A SUBJECTIVE EXPERIENCE

As Gad (1973) recently noted, some investigators have accepted documentation of fairly consistent coincidence of exposure to high densities and the occurrence of adverse effects as sufficient proof of a cause-effect relationship; several, however, have been more curious about explaining the link between high densities and adverse consequences for the individual. Quite a range of explanations have been offered, but the main differences are between biological (or biochemical) and subjective (or psychological) causal mechanisms.

Both biological and subjective explanations nevertheless rely on the concept of stress as the link between high densities and potentially adverse effects. In short, either subjective or biochemical stress is seen as a response of the individual to spatial inadequacy or excessive social stimulation, which may potentially lead to adverse effects in the form of physiological or emotional imbalance. As will be seen, however, cognitive or perceptual factors are especially important determinants of whether stress leads to potentially adaptive responses to high densities, or alternatively, adverse consequences for the individual.
6.1 Biological Versus Subjective Links Between High Densities and Pathology

The concept of stress is central to Hall's biochemical explanation of the relationship between crowding and pathology. Excessive demands are reflected in higher activity levels in the endocrine (or hormone) system, which in turn can lead to pathologic psychic or physiological consequences. Hall's argument is partly based on Christian, who found that for some animals, high densities could lead to stress and subsequent organic and behavioral changes (Hall, 1966).

Desor (1972) has also been influenced by Christian's theory which holds that animal pathology occurring in response to crowded situations is attributable to psychological stress from high levels of social strife and competition between members of the same species. Desor's psychological theory of crowding asserts that the feeling of "being crowded" (among humans) results from perception or awareness of "excessive stimulation from social sources" -- a term serving as a psychological correlate of population size. Desor made no specific reference to possible adverse human physiological, behavioral or psychological consequences of high densities, since his objective was to provide an experimental link between this theory and the everyday dictionary meaning of "crowded" (Desor, 1972).

Esser's biosocial perspective on crowding (cited by Gad, 1973) contains both a subjective and biological explanation of the relationship between high densities and pathologies. Physiological changes may result from the feeling of crowding, which is a result of an arousal state in the brain. Esser relies rather heavily on Ardrey in his assumption that man retains images from his animal past, and that disharmony between such images and perception of the environment may result in stress or overload. He also emphasizes that stimulus overload may result from a wide variety of personal and social sources, however, which are unrelated to spatial factors in general and density in particular (Gad, 1973).
Recent theoretical discussions by environmental psychologists more strongly emphasize a subjective link between high densities and potentially adverse human effects (Proshansky, Ittelson & Rivlin, 1970:a; Stokols, 1972), while noting that other aspects of the physical environment, social conditions, personal attributes and other factors have an important influence on human response to high densities (Ibid.; Zlutnick & Altman, 1972). Stokols made a clear and useful distinction between crowding as a psychological or subjective experience, and density as a physical condition involving the limitation of space. Each of these theoretical discussions deserves expansion for a comparison of the merits they contain in promoting a clearer understanding of the response of the individual to high densities, especially in the residential environment.

Proshansky, Ittelson and Rivlin (1970:a) assume that man is a cognizing and goal-oriented organism who attempts to organize his physical environment so that it maximizes his freedom of choice. The absence of crowded conditions is seen as instrumental in the achievement of freedom of choice, or behavioral freedom. "Crowding", according to these authors, is both a psychological and social phenomena, and is only indirectly related to mere numbers or densities of people:

"The significant element appears to be frustration in the achievement of some purpose because of the presence of others... Crowding occurs when the number of people an individual is in contact with is sufficient to prevent him from carrying out some specific behavior and thereby restricts his freedom of choice."

(Proshansky, Ittelson & Rivlin, 1970:a: 182)

Crowding also has an objective aspect in the capacity of a particular setting for a desired behavior. That is, how a space is organized, for what purposes it is designated, and what kinds of activities are involved, all contribute to the phenomenology of crowding (Proshansky et al, 1970:a).

Proshansky and associates also pointed that crowding can be pleasurable as well as painful; crowding is an inherent quality of an urban setting that may lend excitement and a sense of participation for those within it. Depending upon cultural and subcultural differences,
and an individual's past experiences, he may expect, and find desirable, greater numbers of people. On the other hand, one may "accept" crowding, but this does not necessarily imply an absence of discomfort or pain. Acceptance is seen as a form of adaptation to negative situations in which willingness to change a situation is neutralized. The individual's ability to experience the discomfort is not neutralized, although his intensity of feelings may be reduced over long periods of time (Proshansky et al., 1970a).

Stokols' theoretical perspective of the relationship between high densities and pathology is somewhat similar to that of Proshansky and associates, although considerably greater emphasis is placed on "crowding" as a subjective or psychological experience involving stress. Stokols has also developed a more thorough theoretical link between the state of stress and potential (but not necessarily) adverse physiological or psychological consequences for the individual. The concept of "crowding", according to Stokols' definition,

"... refers to a situation in which the restrictive aspects of limited space are perceived by the individuals exposed to them. The recognition of spatial inadequacy arouses the experience of psychological and physiological stress. ... Density is a univariate condition of limited space, without motivational overtones, whereas crowding is a multivariate phenomenon, resulting from the interaction of spatial, social and personal factors. ..."

(Emphasis supplied) (Stokols, 1972: 75)

It has been noted that most previous research has been hindered to a considerable extent by the ambiguous use of both "crowding" and "density"; these concepts have not only been frequently used interchangeably, but have both served as referents for physical conditions. Stokols' distinction has an advantage in that it reserves "density" for purely spatial considerations, and "crowding" for the potential response of the individual to the limitation of physical space. It is extremely important to point out that the experience of crowding (a recognition of spatial inadequacy) does not always occur under conditions of high density, according to Stokols'
perspective. Rather, the experience of crowding may be offset by physical or social environmental factors, or personal attributes of the individual. Provided these variables do not mediate the effects of high density, however, the individual may experience crowding. All situations of crowding involve stress,

"...but the occurrence of this stress cannot be predicted on the basis of spatial considerations alone. Rather, the experience of crowding must be understood as a phenomenon which develops over time and whose developmental pattern and intensity are determined through a combination of environmental and personal factors."

(Emphasis supplied) (Stokols, 1972: 77)

Spatial restriction thus serves as a necessary antecedent of, but not always a sufficient condition for, the arousal of crowding stress (Stokols, 1972).

By example, if several people share an apartment in which there is a relatively small amount of living space per person, but feel quite comfortable and unrestricted, then a situation of crowding may be said not to exist. Fewer persons in a larger apartment, however, may feel restricted and infringed upon by each other; in this case a state of crowding may be said to exist. The determinant of what constitutes "crowding", then, is a subjective experience on the part of the individual which may be mediated by social aspects of the situation, personal factors, activity, culture, time, and/or other aspects of the physical environment not directly attributable to density.

It should be noted that Proshansky and associates are concerned primarily with social sources of crowding stress (that is, with the individual's frustration because of the presence of other persons); Stokols' perspective, however, permits consideration of both physical and social sources of crowding stress. Physical sources take into consideration subjective awareness of the limitation of space due to physical variables only, while social sources of crowding stress involve the presence of other persons, and the individual's relationship to them (Stokols, 1972).
Zlutnick and Altman (1972) have proposed that the concept of crowding be dealt with at several levels: physical, interpersonal and psychological. More specifically, they state that the concept of crowding involves a multi-dimensional set of interlocked properties, as follows:

(a) situational or environmental characteristics of high density of people per unit of space over long time periods in environments where resources are limited;

(b) certain interpersonal events where persons are not able to sufficiently control their interactions with others, and/or where the psychological and physiological costs of controlling interactions are high; and

(c) personal/subjective events where there is a network of subjective and personal feelings reflecting an inability to control interpersonal exchange, incongruities with past experience, and discrepancies in expectations (Zlutnick and Altman, 1972).

Zlutnick and Altman consider these properties as important variables which must be taken into consideration when determining the effects of high densities, but do not assume that all these conditions need apply in "crowded" situations. Their conceptualization of the crowding phenomenon is quite similar to that of Stokols (1972), although "crowding" is not necessarily defined as a psychological or subjective experience involving potentially adverse consequences. Subjective events are deemed an important determinant of the effects of crowding, however; and these authors express the personal view that overpopulation and crowding have serious effects on social and psychological behavior in humans (Zlutnick & Altman, 1972).

The work of Zlutnick and Altman is particularly important for its discussion of high densities in the residential environment. The specific problem of crowding or high densities in the residential setting was in fact significantly omitted from other theoretical discussions of the crowding phenomenon, although Stokols treated this issue minimally.
Zlutnick and Altman constructed a classification of a variety of living conditions, based on factor definitions of "inside" and "outside" densities (see Figure 4, below). "Inside" density, in this classification, was defined as the number of people per unit of living space within an apartment or residence; whereas "outside" density refers to the number of people per unit of space in a larger environmental unit within which the inside density is imbedded (e.g., neighborhood, census tract, net residential acre, etc.) (Zlutnick & Altman, 1972).

**"Inside" Density**
(Within Residential Units)

<table>
<thead>
<tr>
<th>&quot;Outside&quot; Density (Neighborhood or Community)</th>
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<td>low high</td>
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<td>low high</td>
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**FIGURE 4.**

**Density of People**
As a Determinant of Crowding
(Zlutnick & Altman, 1972)

The extreme of this classification, IV (referred to by Zlutnick and Altman as an "urban ghetto"), may have quite high concentrations of people inside, as well as high outside densities. It is quite conceivable, if not likely, that persons living in such situations may additionally experience conditions characteristic of the poverty cycle (e.g., unemployment, low education, low or fixed incomes, chronic illness, parent-child or marital
relationships of poor quality, deserted mothers with dependent children: Rose, 1973), and thus are susceptible to stress owing from several sources which are unrelated to density in particular.

Category 111 ("urban luxury area") is analogous to the high outside, but relatively low inside densities characteristic of the West End in Vancouver. Such areas usually contain a wider mix of income levels, attract persons who value the convenience which such densities frequently provide to the amenities of downtown areas, and often have a low ratio of family to non-family households. Further, the tendency of persons living in areas with high outside densities to be quite mobile suggests that such persons are not exposed to high densities for extended time periods.

Considering only the environmental variables of the crowding phenomena, Zlutnick and Altman suggested that extreme crowding might exist when (a) inside and outside densities are high, (b) when people are in such situations for a long period of time, and (c) when the environment is limited in resources (i.e., consideration of the quality of facilities in general, and the arrangement of space inside or outside a dwelling unit) (Zlutnick & Altman, 1972).

Each of the preceding theoretical perspectives (with the exception of Zlutnick and Altman) rely on the concept of stress as a link between high densities and potentially adverse effects for the individual. Acceptance of this perspective requires not only an operational definition of stress, but calls for a clarification of the relationship between stress and adverse physiological, psychological, or behavioral consequences. These will be discussed in subsequent sections of the study. A more immediate consideration, however, is an assessment of whether any or several of the above theoretical perspectives and concepts have potential value in promoting a clearer understanding of the response of the individual
to high density in the residential environment. A crucial part of this assessment is whether the theoretical perspectives incorporate the findings outlined in the preceding chapter on the general or system variables which interact with each other to affect human response to high densities.

6.2 A Social-Psychological Perspective of Crowding

It has been noted that related research (in particular, experimental investigations) indicated that human response to high population or spatial densities depends on many factors, not merely the lack of space. Findings on the response to high density in the residential environment, together with results of related research, indicated that the human effects of high densities appear to depend mainly on: (a) social aspects of the situation, (b) personal attributes or characteristics of the individual, (c) cultural norms, (d) the type of activity involved, (e) temporal duration, and (f) physical factors in addition to density variables. The theoretical works of Proshansky et al (1970:a) and Stokols (1972) recognize that each of these variables has an important influence on the nature of human response to high densities. Zlutnick and Altman (1972) emphasized the influence of all but the culture and activity variables.

The bulk of the theoretical perspectives described in the preceding section emphasized that the initial response of the individual to high densities is subjective in nature (Desor, 1972; Esser: Gad, 1973; Proshansky et al, 1970:a; Stokols, 1973). Stokols (1972) suggested that recognition (perception, awareness) of the restrictive aspects of limited space be identified as "crowding", to avoid further ambiguity of vocabulary. Stokols' concept of crowding is analogous to Proshansky and associates' view that an individual may experience frustration in crowded settings while interacting with his environment in pursuit of freedom of choice.
Whether the individual is frustrated or recognizes a limitation of space, however, depends on the interaction of all the independent variables which influence or mediate the effects of high densities, described above.

The crucial link between high densities and adverse consequences for the individual, according to the preceding theoretical perspectives, is psychological or physiological stress. As will be discussed at greater length in the section which follows, "stress is the rate of all the wear and tear caused by life" and does not necessarily imply adverse effects; stress has beneficial as well as negative consequences (Selye, 1956). Recognition of spatial limitation, according to Stokols (1972), involves stress, but the experience of stress provokes behavioral, perceptual, or cognitive potentially tension-reducing responses designed to alleviate psychological strain or physical discomfort:

"The particular form of one's response to crowding stress will be a function of the relative intensity of environmental and personal factors and of the degree to which they can be modified."

(Stokols, 1972: 77)

Stokols suggested that tension-reducing responses to crowding stress may be adaptive to the extent they relieve or reduce the effects of perceived spatial limitation; these responses are "maladaptive", however, if they fail to alleviate the experience of crowding stress (Stokols, 1972).

On the basis of the subsequent critical examination of the literature on the effects of high density and crowding, it is this writer's view that Stokols' social-psychological model of the human crowding phenomena (together with the works of Proshansky, Ittelson & Rivlin (1970:a) and Zlutnick and Altman (1972)), contributes to a clearer understanding of how the individual responds to high densities and other potential sources of stress. These works are additionally important in the sense that each of these theoretical frameworks promotes the idea that different individuals may respond differently to high densities depending upon characteristics of the social environment, personal attributes of the individual, temporal duration, and other factors. In addition, Stokols' model seems particularly
suitable for application to the problem of the response of the individual to high densities in the residential environment. Before his model can be modified somewhat and applied to the residential environment, however, a functional but necessarily limited discussion of stress is required.
Wallace (1952) was one of the few investigators to discuss the effects of stress as they directly apply to high residential densities. His comments covered the effects of stress resulting from excessive social stimulation associated with high densities, as well as the effects of stimulus deprivation. The expenditure of energy, in response to increasing social stimuli (or a lack of stimuli) is central to his argument. He asserted that other things being equal, density increases the frequency of interaction among individuals:

"This increase in frequency of stimulation by people implies the expenditure of more energy in making adjustments to new interpersonal situations; otherwise the organism will be overwhelmed by stimuli. The only alternative to an increased expenditure of energy in interpersonal adjustments must be physical withdrawal from contact, which can only be achieved by 'privacy' arrangements. These, however, can hardly be satisfactory, since physical withdrawal (into an apartment, for instance) subjects the individual to an increased frequency of invariant physical stimuli."

(Wallace, 1952: 28)

Wallace's documentation of the general effects of stress is appropriate; the assertion, however, that the individual has no choice but to withdraw physically in order to reduce or alleviate stress must be modified on the basis of subsequent stress research. The ensuing discussion points out that a variety of cognitive, perceptual, or behavioral responses potentially reduce adverse effects of stress stimuli.
As a preface to the present discussion of stress, it is important to note that many investigators presently involved in human stress research consider its study to be still in a formative, or preliminary state. The limitations of present knowledge on the stress phenomena will be discussed later in more detail. For the present, however, the evidence presented in this section should be considered somewhat tentatively, in the sense that considerable scientific replication of the evidence must be carried out.

7.1 The Meaning of "Stress"

The stress literature reflects a variety of definitions of the stress concept. Some meanings focus on physiological or psychological manifestations of adverse stimuli, while others describe the conditions under which stress may be said to occur.

Probably the best known of these meanings is that of Selye (1956). Selye's definition of stress is basically oriented toward an analysis of stress in physiological or biochemical terms, and has been widely adopted in biological circles (Howard & Scott, 1965). His operational definition states that

"Stress is the state manifested by a specific syndrome which consists of all the nonspecifically induced changes within a biologic system."

(Selye, 1956: 54)

That is, stress has its own characteristic form and composition (i.e., shows itself through visible changes), but no particular cause. Selye emphasized that a nonspecifically caused change is one that can be produced by many or all agents, in contrast to specifically caused changes that are produced by only one or a few agents. A "stressor", on the other hand, is that which produces stress, but any one agent is more or less defined as a stressor to the degree it is capable of producing nonspecific changes (Selye, 1956).
Selye's term, the "general adaptation syndrome" (G.A.S.), describes the manifestations of stress in the whole body as they develop over time. The G.A.S. evolves in three distinct stages: (1) the alarm reaction, (2) the stage of resistance, and (3) the stage of exhaustion. Most changes in the biological system occur in response to the first two of these:

"At first they may upset or alarm us, but then we get used to them. In the course of a normal human life, everybody goes through these first two stages many, many times. Otherwise we could never become adapted to perform all the activities and resist all the injuries which are man's lot."

(Emphasis supplied) (Selye, 1956: 64)

According to Selye, then, no one can live without experiencing some degree of stress all the time. The G.A.S. assists in adjustment to these changes, but "adaptation energy" must be available for these adjustments. In a manner of speaking, the same stress that has negative effects for one individual may be invigorating for another. Selye also theorized that there is a relationship between the available level of adaptation energy and the aging process (Selye, 1956).

Howard and Scott's formulation of the stress concept is directed at reducing the barriers between those stress definitions which deal with physiological processes (such as Selye's), and those which emphasize cognitive and perceptual processes of the stress condition. Theirs is not inconsistent with Selye's concept of adaptation energy or the general adaptation syndrome, but is more similar to McGrath's assumption that stress is related to a disequilibrium, i.e., to an imbalance between environmental demand and the response capability of the organism (McGrath, 1970). Howard and Scott suggested that disequilibrium implies a problem situation, to which the individual responds in a manner to reduce threats. Energy must be expended in problem-solving activity, while appropriate resources (e.g., intelligence, special skills or knowledge) must be available to master the problem. Failure to master the problem requires the excess use
of energy, as well as maintenance activity. To the extent that excess maintenance activity exists, the individual may be said to be experiencing stress (Howard and Scott, 1965).

McGrath (1970) attempted to specify one conceptual meaning of stress as a useful paradigm for stress research, suggesting that stress occurs when there is a substantial imbalance between environmental demand and the capability of the organism to respond. He noted, however, that this definition requires at least two important qualifications:

(a) An environmental demand can produce psychological or perceived stress only if the individual anticipates that he will not be able to cope with it, cope with it adequately, or cope with it without endangering other goals. That is, one is not threatened by demands he does not "receive" or believes himself capable of handling; but is threatened when he anticipates he cannot handle these demands adequately;

(b) Stress or threat occurs only when the consequences of failure to meet the demand are perceived by the individual to be important, or to have serious consequences for himself (McGrath, 1970).

7.2 Sources of Stress

High density is of course the principal potential source of stress with which this study is concerned. The manner in which high density may act as a stressor is discussed briefly here, since this matter will be treated in greater detail in a later section. The emphasis here, however, is that a variety of other factors (e.g., sensory deprivation, poverty, noise) also serve as potential sources of stress. The discussion of other sources of stress should not be interpreted as exhaustive, but merely representative of other stress-producing events.
Density as a Source of Stress. It is important to differentiate between physical and social sources of stress associated with high density. Stokols (1972) theorized that when the individual's demand or need for physical space exceeds the available supply of space, he responds by experiencing crowding stress. On the other hand, stress may occur when the social environment places excessive demand on the individual simply because of the number of persons present. The latter, however, also takes into consideration the relationship to the individual of other persons present (Stokols, 1972). High social densities, then, may produce stress when there is a considerable imbalance between the demand of the environment and the capability of the individual to respond.

Other Sources of Stress. Most discussions of the stress problem imply that stress consists of an overload, i.e., too much demand on the individual. Milgram (1970), for example, recently suggested that large numbers of people, high population density, and heterogeneity of population are not only major factors which condition all aspects of our experience of the urban setting, but factors which constitute a continuous set of encounters with "overload". Milgram's perspective of the experience of living in cities is somewhat similar to Wirth's description of urbanism as a way of life (Wirth, 1951), although Milgram placed considerable emphasis on the adaptations which occur when such overload is present (Milgram, 1970).

Others (e.g., McGrath, 1970; Dubos, 1968; Rosenberg, 1968; Wallace, 1952) however have noted that there is a substantial body of literature on sensory deprivation and social isolation which suggests that stress-like effects may result from environments which place too little demand on the individual. Dubos, in fact, emphasized that much more seems to be known about the harm done by isolation and social deprivation than the effects of crowding and excessive social stimulation (Dubos, 1968).

Far more research and theory has been devoted to physical or "environmental" sources of stress than to the effects of what may be generally referred to as social and psychological factors in stress (McGrath, 1970). In recent years, for example, an increasing number of investigators
have become interested in the physiological, psychological and behavioral effects of noise. Glass and Singer (1969, 1972) recently found that adersive behavioral effects of loud unpredictable noise are substantially reduced if the individual believes he has control over the termination of the noise. Other important sources of stress which have been investigated include the potentially stressful effects of sociocultural impoverishment, status and role conflict, interpersonal disagreements, etc. McGrath (1970) provides a useful bibliography of recent articles on social and psychological factors in stress. These include a number of studies in real life (as opposed to experimental or laboratory) settings of stress resulting from poverty, slum background, cultural deprivation, occupational situations, and personal and community disasters (McGrath, 1970).

7.3 Initial Responses to Stress

Irrespective of its source, the experience of stress evokes any one (or several) of a variety of potentially tension-reducing responses on the part of the individual. According to Stokols (1972) the purpose of such responses is to reduce or alleviate psychological strain or physical discomfort which accompanies the experience of stress. It is important to note that the initial response of the individual to stress is distinct from (or different than) what may be eventual adverse consequences of stress. In brief, the type of response -- or the manner in which the individual initially responds -- to a stressful event may to a large extent determine whether he later experiences adverse manifestations or consequences of stress.

Responses to stress may occur in cognitive, perceptual, or behavioral forms. The type of response which the individual adopts to alleviate his experience of stress depends upon (a) the relative intensity of physical
and social variables which accompany a stressful event, as well as the individual's own personal characteristics; and (b) the degree to which they can be modified (Stokols, 1972).

**Cognitive and Perceptual Responses.** The stress literature consulted in this study consistently emphasized that cognitive and perceptual factors play an especially important role in human response to stressful events. McGrath, for example, asserted that cognitive or subjective responses potentially mediate the effects of stress, although there is substantial inter- and intra-individual variability in the perception of stress and responses to it (McGrath, 1970). Learning, or experience with situations or conditions giving rise to stress, produces differential responses to stress (McGrath, 1970), and tends to be adaptive for the individual (Howard & Scott, 1965).

Glass and Singer (1972) found that perception of potential control over noise termination appreciably reduced the adverse after-effects of unpredictable noise. Their experiments with physical stressors other than noise, along with their investigation of previous studies on social stressors, led them to conclude that:

"...the influence of unpredictability and uncontrollability is applicable to any stressor. ... Deleterious aftereffects of stress are a function of the unpredictability of aversive stimulation and the belief that one has little control over stimulus occurrence and nonoccurrence."

(Glass & Singer, 1972: 158)

Other cognitive or perceptual responses which may reduce or alleviate stress include:

- cognitive appraisal of the relative importance of the situation (McGrath, 1970);
- increasing the desirability of the given situation (Stokols, 1972);
- screening or selectivity of stressful stimuli (Milgram, 1970).
Behavioral Responses. Stokols suggested that cognitive and perceptual attempts to alleviate stress will occur when it is not possible for the individual to easily alter physical or social variables which accompany the stress situation. When physical or social conditions are amenable to alteration, however, a person will likely adopt a behavioral response (Stokols, 1972).

Potentially stress-reducing behavioral responses include: activity-oriented diversion techniques (Selye, 1956; Howard and Scott, 1965); temporarily withdrawing from a stressful situation; actively avoiding stressful conditions (Stokols, 1972); and changing or altering the physical or social environment (Festinger, 1957).

When the situation giving rise to stress threatens or actually eliminates a behavior a person believes himself free to engage in, the individual may experience "psychological reactance" — a term developed by Brehm to describe a motivational state directed at the re-establishment of the threatened or eliminated behavior. This psychological reactance, Brehm maintains, will result in actual attempts to engage in the threatened behavior (Brehm, 1966). Stokols (1972), as well as Proshansky et al (1970:a) reached similar conclusions concerning behavioral responses to high density or crowded situations.

7.4 Adverse Consequences/Manifestations of Stress

The preceding discussion emphasized that certain initial responses of the individual may be especially effective in reducing or alleviating psychological strain or physical discomfort which accompany the experience of stress. Should the form of response fail to produce this effect, however, stress literature maintains that observable manifestations or consequences of stress may result — in observable physiological, psychological, or behavioral manifestations of stress.
There is a vast literature on the adverse consequences of stress. The purpose of this discussion is to point out the different ways in which stress may adversely affect the individual, rather than documenting the precise forms of these effects. It is important to note, however, that considerably greater research has been devoted to physiological, as opposed to psychological and behavioral manifestations of stress.

Rene Dubos (1968) noted that physiological tests have shown that crowding as a form of stress commonly results in increased secretion of various hormones which affect the whole human physiology. Although a certain level of hormonal activity is necessary for well-being, any excess has a variety of harmful effects (Dubos, 1968). Selye (1956) provided a thorough discussion of potential physiological manifestations of stress, while Howard and Scott (1965) documented numerous studies concerning the effects of stress on biological functions. These include studies of the effects of stress on the physiological process, the influence of stress on the onset and outcome of various diseases, and its influence on illness. Howard and Scott suggested that one way an individual may respond to stress or a high tension level is to attempt to "live with" the tension. If the tension is great and persists for long periods of time, however, it tends to reduce energy and resources, which may result in biochemical changes (Howard and Scott, 1965).

As indicated above, psychological and behavioral adverse manifestations of stress are less frequently documented, although research on these consequences has increased in recent years. Howard and Scott, for example, maintained that excess tension may be manifested in psychological and behavioral forms, as well as physiological. Excess tension may be discharged through socially approved behavior, but when the individual believes such behavior not to be available to him (or desirable), he may resort to "deviant" behavior -- or behavior which falls outside normative patterns. Socially disapproved behavior may in fact actually increase tension, thus creating a spiral involving greater stress (Howard and Scott, 1965). McGrath (1970) cited a number of studies which have measured both
behavioral and psychological manifestations of stress. The latter include 
emotional and motivational indications (McGrath, 1970).

7.5 Adaptation to Stress

The preceding discussion of stress has been sequential in the sense 
that it has moved from a consideration of different sources of stress, 
and the initial response of the individual to the experience of stress, to 
an explanation of how stress may result in adverse consequences for the 
individual (given that his initial responses are not effective in reducing 
psychological strain or physical discomfort). This section departs from 
the sequential order, in that it considers the possibility that initial 
responses (discussed in Section 7.3) which were heretofore assumed to be 
adaptive for the individual, may in fact have long-range detrimental 
consequences for man.

There is a considerable body of literature which suggests that 
adaptation may be costly to man; i.e., adaptive responses may eventually 
"take their toll" in the sense that important after-effects of adaptation 
may occur in the form of physical/mental diseases, psychosomatic disorders, 
or behavior which is not seen as beneficial to man in the short or long 
range of effects. In brief,

". . . it would thus seem important to question the validity 
of the simplistic idea that adaptation is unqualifyingly 
beneficial to man."

(Glass & Singer, 1972: 11)

The Meaning of Adaptation. The word "adaptation" has been given a 
variety of meanings, not all of which properly apply to the adjustments 
that human beings make to conditions of modern life (Dubos, 1968). 
Generally, however, there are two classical definitions which apply to 
this term: (a) the Darwinian definition (concerned with a state of fitness 
to a given environment which enables a species to survive and multiply) and
(b) a broader definition which is concerned with responses of the individual which enable him to survive and function in his particular environment (cf., Dubos, 1968; Glass & Singer, 1972).

Both these definitions are relevant to high density. The emphasis of this study, however, is on the response of the individual to high densities in the residential environment, and since the ultimate interest is in whether a person is able to "function" in such an environment without unduly compromising his goals or endangering his physical or mental health, it is appropriate to explore the implications of the second of these definitions. "Function" in this sense implies the fulfillment of desired activities and other behavioral and personal goals or values.

Adaptation may be thought of as largely synonymous with the term "habituation", which involves a learning process and a gradual simplification of the individual's responses to repeated similar problems of everyday life (Selye, 1956; Glass and Singer, 1972). Adaptation also implies the notion of homeostasis, generally referring to a state of equilibrium between the individual and his environment. Any external element which disturbs this state will motivate the individual to respond in a cognitive, behavioral or physiological manner (Glass and Singer, 1972) in order to correct the disturbing effects of environmental sources. As Dubos suggested, a response is adaptive when it promotes homeostasis (Dubos, 1968). The latter is only a concept of the ideal, however; organisms and individuals do not always return exactly to their original state after responding to a stimulus (Dubos, 1965).

The Cost of Adaptation. The argument that adaptation is potentially costly to the individual maintains that "adaptive" responses may very well alleviate or lessen psychological strain or physical discomfort from stress temporarily, but that the process of adaptation itself may result in long-term consequences which are potentially deleterious or not necessarily beneficial to man or society.
Glass and Singer's recent investigation of noise as a stressor, for example, led them to conclude that adaptation
"...is certainly one way of coping with environmental stress, but it is by no means an unequivocably effective strategy. For we have shown that stress exposure leaves adverse behavioral residues in spite of adaptation. It is also important to remember that these after effects are determined by the cognitive and social setting in which the stressor occurs. Mere intensity and similar physical parameters of the stimulus are not sufficient to produce psychological deficits in humans."
(Glass & Singer, 1972: 166)

Milgram suggested that the observed behavior of urban residents is determined largely by a variety of adaptations to overload, one source of which he attributed to high population density. He maintained that adaptation to city life deforms daily life on several levels; that is, such adaptation reduces social responsibility on the part of the individual, impinges on role performance, etc. In short, Milgram held that adaptation to city life is manifested in a gradual evolution of behavioral norms, involving a lessening of moral and social involvement (Milgram, 1970).

Dubos noted that the long term, or even short term after-effects of adaptation to high population density are not yet well understood. Yet he suggested that there is little doubt that the consequences of high densities and/or crowding will in most cases have an insidious course; that is,
"...the worst effects will not be the initial ones, but the complex secondary responses called forth later in individual persons and society as a whole."
(Dubos, 1968: 154)

7.6 Limitations of Stress Knowledge

As noted previously, the need for considerable scientific replication of (a) what conditions or events act as potential sources of stress, (b) how the individual initially responds to the experience of stress, and
(c) the nature of the adverse consequences which stress may have for the individual, renders the preceding discussion tentative. Perhaps even less is known about (d) the long-term consequences of adaptation to stress.

McGrath has summarized the present limitations of stress knowledge by pointing out that we have no solid basis to suppose that, among a range of situations which have been cited as relevant to stress research, we are dealing with the same or even related phenomena. That is, there may be many kinds of stress, not one. In addition, the techniques for measuring stress and its effects are yet somewhat crude (McGrath, 1970).

These limitations on present knowledge of stress in general also apply to high density as an agent of stress. Dubos pointed out that much less seems to be known of the harmful human effects of crowding and excessive social stimulation than those of isolation and social deprivation (Dubos, 1968).

These comments are not meant to suggest that little or no substantial evidence exists on the nature of stress, nor on some of the adverse consequences of the stress phenomena. Voluminous research has been devoted to human stress in recent years, providing important direction toward the identification of some agents of stress and the nature of its effects. At the moment, however, its study may be said to be still in its formative stage (cf., McGrath, 1970; Glass and Singer, 1972).
Chapter 8

A CONCEPTUAL MODEL OF CROWDING
IN THE RESIDENTIAL ENVIRONMENT

8.1 Introductory Remarks

As noted earlier, it is this writer's view that recent social-psychological theoretical perspectives concerning human response to high densities contribute significantly to a clearer understanding of the implications of high density residential environments for behavior and health. The most important contributions of the works of Stokols (1972), Proshansky, Ittelson and Rivlin (1970:a), and Zlutnick and Altman (1972) is that they recognize that the effects of high densities can not be predicted on the basis of purely spatial variables or population density. Instead, these authors emphasized that the manner in which the individual responds to high densities depends upon a number of variables analogous to those described in the conclusions of Chapter 5 of this discussion.

Stokols' social-psychological model of the human crowding phenomena (Stokols, 1972), however, offers particular advantages in promoting a better understanding of the effects of high densities.1 His conceptual framework achieves this purpose by:

(a) drawing a crucial distinction between the terms "density" and "crowding";

(b) identifying specific independent variables which influence, i.e., appear to determine, the nature of the individual's response to high densities; and
(c) providing a theoretical explanation of the relationship between high densities and physiological or psychological disorders.

One of the important weaknesses of previous research has been the ambiguous utilization of the terms "density" and "crowding". Most previous investigators have used these terms interchangeably as referents for a physical condition, involving either limited space or high population densities. A few authors have used "crowding" to refer to the individual's response to high densities, but have rarely offered a clear definition of the meaning of this term. As Gad (1973) and Stokols (1972) pointed out, this has not only hindered the investigation of the problem, but has impaired the identification of independent and dependent variables and obstructed the development of theoretical perspectives.

Perhaps the most important weakness of previous discussions and investigations of the effects of high densities, however, has been the failure to carefully consider (and emphasize) variables other than density which have important influence upon the individual's response to, and the effects of, limited space or high population densities. The need for a broader conceptualization of this problem has been noted by several recent writers (cf., Michelson, 1970a; Zlutnick & Altman, 1972; Stokols, 1972). Yet Stokols' model specifically recognizes social environmental qualities, personal attributes of the individual, and physical environmental qualities (including exposure time, arrangement of space) -- in addition to spatial considerations -- as independent variables which directly affect the individual's response to high densities (Stokols, 1972). It should be noted that Stokols also recognized the importance of culture and activity variables as they potentially influence the effects of high densities, although he did not specify them directly in his model. Inasmuch as the critical examination of the literature (discussed in Chapters 2-5) bore out the singular importance of both culture and activity, however, these are included in the Conceptual Model of Crowding in the Residential Environment as a modification of Stokols' framework.
Finally, Stokols' work offers a theoretical explanation — to serve as a guide for future research — of the relationship between high densities and observable adverse physiological or psychological consequences on the part of the individual. Stokols first assumes that an individual will usually be able to cope with high densities through the use of either behavioral, perceptual, or cognitive responses which alleviate or lessen the experience of crowding stress. He also assumes, however, that under certain conditions the person will not be able to cope successfully with stress resulting from prolonged exposure to high densities. In this event, Stokols assumes the individual's "inadequate" responses to crowding stress will be manifested in physiological disorders or psychological manifestations of stress. The theoretical link in Stokols' conceptual model, then, between high densities and adverse consequences is the concept of stress.

As previously noted, the bulk of theoretical perspectives consulted in this study relied on stress as a link between high densities and potentially adverse consequences for the individual. It was also noted that several of these perspectives (described in Chapter 6) assumed that the initial response of the individual to high densities is subjective in nature. Despite the support which other theoretical works lend to Stokols' model, however, the limitations of present knowledge on stress and its consequences implies that the validity and usefulness of this explanation must be borne out by further replication of stress knowledge, as well as further verification of the extent to which high residential density acts as a stressor.

The idea that stress is a useful concept in understanding how housing affects individuals is not new, however. Schorr (1970) earlier noted that any housing quality that affects individuals may be interpreted as potentially stressful (e.g., social isolation, inadequate space, physically dilapidated dwelling units, overcrowding within dwelling units, how space is arranged to promote or interfere with privacy). Perhaps more appropriate to the focus of this study, however, is Schorr's point that the stress concept takes into consideration individual differences in
response to housing qualities:

"The use of such an intervening concept has at least two advantages over attempts to relate housing inadequacies (noise, for example) directly to behavioural consequences. It accounts for differences in reaction between individuals of the same general background. In other words, it introduces the idea that some people have more effective adjustive mechanisms than others -- patently a factor which would not otherwise appear to be relevant. . . ."

(Schorr, 1970: 322)

8.11 Modification of Stokols' Model

As a final introductory comment, it is emphasized that the Conceptual Model of Crowding in the Residential Environment is a modification of Stokols' Equilibrium Model of Human Response to Crowding (Stokols, 1972) in the following manner:

(a) Two additional independent variables, culture and activity, have been added to Stokols' identification of those factors which influence and potentially mediate the experience of crowding stress;  

(b) Three of the independent variables (physical/temporal factors, personal factors, and social environmental qualities) have been applied directly to the residential environment by a description of their components;

(c) The present model introduces the possibility that "other sources of stress" (e.g., social isolation, factors comprising the poverty cycle) may result in the experience of stress and potentially result in observable manifestations of stress -- in the form of physiological disorders, emotional imbalance, or 'deviant' behavior.
(d) Stokols' model provides a theoretical explanation of how stress may be transformed into physiological or psychological disorders, but not social disorganization. The present model provides this additional link, based on this writer's examination of the stress literature. Other minor modifications have been made to Stokols' conceptual model, and where these contribute an important difference, they will be noted.

8.2 Purpose of the Model & Usefulness of Models in General

8.21 Purpose of the Model

Stokols' conceptual model of the human crowding phenomena was primarily intended as a suggestion for future research, especially direct experimental investigation of the effects of high densities. He also emphasized that his model permitted an integration of various theoretical perspectives or approaches to this problem, as well as the derivation of experimental hypotheses (Stokols, 1972).

The advantages of Stokols' model for further experimental or other scientific investigation of the effects of limited space or high population densities in general, and high residential densities in particular, are recognized by this writer. Suggestions for further research of this problem in the form of hypotheses are described in a later section. The description of Stokols' model in this chapter and its application to the specific problem of high residential densities, however, serves one important purpose with respect to this study. The conceptual model serves as a vehicle for emphasizing that human response to high residential densities -- however such densities occur -- depends upon the interaction of a number of independent variables, not merely the physical parameter of density. Previous research has demonstrated that personal characteristics and previous experience of the individual, aspects of the social
environment, exposure time (e.g., length of residency), activities which an individual or family may wish to pursue, the culture involved, and physical variables other than density (e.g., arrangement of space) all influence and potentially mediate the effects of high densities. In a word, the model suggests that different individuals or families respond differently to high density, depending upon the nature of each of these variables.

As a hypothetical explanation of the relationship between high density, pathology and social disorganization, the conceptual model clearly serves as a framework for future research. The assumptions of this relationship rely primarily on present stress knowledge, the limitations of which already have been noted. Recent attempts, however, to investigate, theorize and hypothesize about the nature of urban stress reflect a growing attitude that the stress concept holds promise for integrating the fields of physiology, psychology, sociology, medicine, etc. (Glass & Singer, 1972). The presentation of Stokols' conceptual model in this thesis contains an inherent assumption on the part of this writer that the study of stress is also relevant to the planning discipline, in order that those engaged in planning both physical developments and social programmes may avoid creating, either directly or indirectly, conditions or situations which produce adverse consequences for the individual.

8.22 Shortcomings & Advantages of Models in General

Kaplan (1964) has aptly noted both the shortcomings and advantages of several styles and kinds of models used in the field of behavioral science. This writer is in sympathy with his objection to both the blanket condemnation and indiscriminate enthusiasm of models. Kaplan pointed out several shortcomings of models in general, two of which are (a) oversimplification and (b) overemphasis on form.
A model which is oversimplified may neglect something important for the purposes of that very model. Such models need not, however, necessarily be criticized on the basis of oversimplification alone since "Some of the greatest achievements on the level of theory are remarkable precisely for their simplicity. The failing in question is rather that we have simplified in the wrong way, in the wrong places...

(Kaplan, 1964: 281)

The Conceptual Model of Crowding in the Residential Environment may, for example, be oversimplified in the sense that future research will identify additional independent variables which affect the experience of crowding. In addition, the identification of elements comprising these variables is not meant to be exhaustive, but rather representative, as noted by Stokols (1972).

On the other hand, models which overemphasize form are not always useful in a given state of knowledge. What limits their usefulness may be an inadequacy in knowledge of the subject matter. In this sense the requirements of the model impose a premature closure on ideas, while on the contrary "...we may be using the model precisely in order to find out how much or how little of what we suspect is indeed true."

(Kaplan, 1964: 279)

Kaplan's words above actually state an important advantage of conceptual or semantical models. That is, conceptual frameworks are particularly useful in that they allow the "systematic exploitation of failure"; they need not be used in the expectation of immediate success, but in the hope of successive identification of particular causes of failure (Kaplan, 1964).

The Conceptual Model of Crowding in the Residential Environment is presented in this study with an underlying goal of potentially developing an acceptable theory concerning the response of the individual to high residential densities, in terms of behavior and health. Its usefulness will depend not merely on how much or little is true with respect to its assumptions, but also on whether it assists in the eventual formulation of an adequate theoretical explanation of the effects of high residential densities.
8.3 Definition of Terminology

Since one of the purposes of this theoretical framework is to avoid further ambiguity of vocabulary in discussion of the effects of high densities, the following sets out operational definitions of terms most important to the model.

The term density refers only to a physical condition implying the limitation of space, and is one component of several factors classified as the "physical environment" (Stokols, 1972). The model expresses not one, but three definitions of density (see Section 8.5, Physical Features of the Environment). Each of these density measures generally refers to the amount of space available in a particular residential context.

Crowding refers to a subjective experience in which the individual perceives or recognizes that his demand for space exceeds the available supply of space; that is,

". . .the restrictive aspects of space are perceived by the individuals exposed to them."

(Stokols, 1972: 75)

The significant element appears to be frustration in the achievement of some purpose or activity, i.e., a restriction of the individual's freedom of choice((Proshansky, Ittelson & Rivlin, 1970:a). The experience of crowding is a phenomenon which develops over time and results from the interaction of physical, social, personal, cultural, and activity variables, and is accompanied by a state of stress. 4

The term nonsocial crowding refers to a recognition of the restrictive aspects of space due to physical variables alone (Stokols, 1972). These include density factors, the arrangement of space, temporal duration, intensification of stimuli (e.g., noise, movement, lights, etc.), residential building type and height, capacity and accessibility of community facilities, etc.

Social crowding is directly related to an awareness of limited space because of the presence of other persons, and takes into consideration the individual's relationship to them. Conditions of social crowding
include such factors as social constraints on available space, status conflicts, competition for scarce resources (Stokols, 1972), role conflict, interpersonal disagreements, and lack of privacy.

Stress is defined as "the rate of all the wear and tear caused by life" and does not necessarily involve adverse effects. Stress is manifested by a specific syndrome, yet it is nonspecifically caused, i.e., is a state that can be produced by many or all agents (Selye, 1956). By way of a basic definition, stress arising from nonsocial (physical) sources may be said to exist when there is a substantial imbalance between a person's demand for space and the capacity of a particular residential space to fulfill this expectation. Similarly, stress arising from social sources (i.e., excessive social stimulation) may be said to occur when there is a substantial imbalance between environmental demand and the response capability of the organism (cf., McGrath, 1970). All situations of crowding involve stress, but its occurrence cannot be predicted on the basis of purely spatial factors or the number of persons present (Stokols, 1972). The adverse consequences of inadequate behavioral, perceptual, or cognitive responses to stress may be manifested in the form of feelings of frustration, alienation or impatience (subjective of psychological manifestations), physiological changes or disorders, or social behavior which falls outside the range of normative patterns.

Residential Environment. Preliminary to a discussion of the interactive processes of the conceptual model, a further explanatory comment is necessary on the meaning of this term. The scope of the model, so far as physical parameters are concerned, includes more than the dwelling unit and contiguous residential space. The recommended use of "neighborhood" or "gross density" measurements by the American Public Health Association (1960) in the planning of residential communities reflects the need to prevent overcrowding of available schools, parks, playgrounds, streets, as well as community, social and health facilities. While such standards do not lessen the importance of density standards designed to avoid
overcrowding of people in dwelling units, or people or structures on strictly residential land, the broader goal of achieving amenity and livability must also be extended to community services and facilities which support a given population. In a recent discussion of the density/overcrowding issue in the Canadian context, Kumove and Cappon (1972) expressed the concern that as densities are increased, we frequently fail to make adequate provision for community facilities (e.g., recreational facilities, social services, mental health services) which not only enable people to live more comfortably, but which may in fact assist them in coping with problems related or unrelated to higher densities. The parameters of the conceptual model reflect these concerns.

8.4 Description of Major Features of the Model

The dependent variable of the conceptual model, 'crowding', is the central focus of this thesis, i.e., a potential response of the individual to high densities in the residential environment. As determined previously, the major independent variables which affect a person's response to high densities (i.e., which affect a subjective recognition of the restrictive aspects of space) encompass more than merely the lack of space or purely density factors. Social aspects of the situation, personal attributes of the individual, cultural norms, the type of activity involved, temporal duration, and features of the physical environment interact in such a manner as to potentially intervene or mediate perception of, and frustration from, a lack of adequate space.

The theoretical framework of the model assumes that the effect of interaction of the independent variables may be to prevent or mediate the individual's recognition of the restrictive aspects of space; conversely, the model also assumes that the interaction of these variables may act to aggravate or accelerate the experience of crowding. As Stokols noted,
"...spatial limitation appears to be a variable whose latent unpleasant properties are activated only through its interaction with other aspects of the specific situation."
(Emphasis supplied) (Stokols, 1972: 78)

The above basic dimensions are identified in Figure 5. A Conceptual Model of Crowding in the Residential Environment. (The independent variables enclosed in the circle on the left of the model are comprised of a number of factors which are summarized in Table 1 and discussed at greater length in Section 8.5.) The interaction between each of the independent variables determines their importance and immediacy to the individual (Stokols, 1972). No attempt will be made to portray this interaction, since any of these may achieve lesser or greater importance according to the situation and the individual involved. The broken arrow in Figure 5 between the independent variables and crowding, the dependent variable, indicates that the individual's subjective recognition of the restrictive aspects of space may be mediated by the interaction of the independent variables. That is, the experience of crowding does not necessarily result from the interaction of the independent variables.

As indicated in the preceding definitions, nonsocial crowding refers to recognition of the restrictive aspects of space due to physical variables alone; while social crowding occurs as a result of the recognition of limited space because of the presence of other persons, including the person's relationship to them. By example, the amount and arrangement of public space contiguous to an apartment building may restrict the behavioral (activity) alternatives open to the individual. Should he be unable to carry out these desired activities elsewhere, or either fail to or be incapable of adopting cognitive or perceptual adaptive responses to this problem, he may become frustrated by (or dissatisfied with) his present residence on this basis; i.e., in a manner of speaking the individual may experience nonsocial crowding. With respect to social crowding, "doubling up" of unrelated persons in a single dwelling unit may heighten the individual's sense of limited space, and/or produce interpersonal disagreements, role conflicts, or other potentially tension-producing situations.
A CONCEPTUAL MODEL OF CROWDING IN THE RESIDENTIAL ENVIRONMENT

FigurE 5.
### TABLE 1

**SUMMARY DESCRIPTION OF INDEPENDENT VARIABLES**

**OF THE CONCEPTUAL MODEL OF CROWDING IN THE RESIDENTIAL ENVIRONMENT**

**Physical & Temporal Factors**
- Density
- Arrangement of Space
- Temporal Duration
- Intensification of Stimuli
- Community Facilities
- Building Height & Type
- Quality of Environmental Resources

**Social Environmental Factors**
- Competition for Scarce Resources
- Extent & Kind of Social Interaction
- Formal vs. Formal Regulations Concerning Use of Space
- Role or Status Conflict, Interpersonal Disagreements, Relationship to Other Persons

**Personal Attributes**
- of the Individual
  - Past Experience
  - Perception of Control
  - Expectations
  - Social Skills
  - Values, Life Style, Interests, Preferences
  - State of Health
  - Socioeconomic Characteristics

**Culture**
- Cultural and subcultural differences in the use and perception of space.

**Activity**
- Activities desired or actually pursued in a high density residential setting.
As Stokols noted, social crowding contains an element of nonsocial crowding since the number of people in a given area frequently determines the amount of space available to each person. Situations of social crowding involve a far greater number of component variables than nonsocial crowding, however, and allow for a more complete application of the model (Stokols, 1972).

The Conceptual Model of Crowding in the Residential Environment assumes that the experience of crowding involves stress, but that stress cannot be predicted on the basis of purely spatial factors. In the same manner that the experience of crowding depends on the interaction of all the independent variables, the intensity and pattern of stress is determined by the combination of physical, social, personal, cultural and activity factors and is a phenomenon which develops over time (Stokols, 1972).

An emphasis of the present model, not apparent in Stokols' framework, is that stress may also result from sources which are only indirectly associated with spatial variables, i.e., occur only in coincidence with high densities. For example, a resident of a high density residential setting may experience stress arising from (a) any factors comprising the poverty cycle (e.g., low income or unemployment, low education, disrupted family relationships); (b) occupational sources; (c) personal or community "disasters", etc. An additional, well-documented condition that may produce stress-like effects is an environment that places too little demand on the individual, i.e., sensory deprivation, monotonous stimuli, social isolation. The factor identified as "other sources of stress" in Figure 5 represents any or several of these sources.

While there will be a necessary interaction between any of the events or situations defined as "other sources of stress" and the independent variables which influence the individual's experience of crowding, the effect of this interaction may be such that the experience of crowding as a response to high density is mediated or does not occur. For example, a resident of the West End in Vancouver may suffer a personal loss (e.g.,
loss of his job or the death of a relative); however, if the high density of the area is not unpleasant to this person, or even corresponds with his present goals and values, his personal loss may in a real sense have "nothing to do" with the fact that he lives in a high density area. In this event, any observable manifestations of stress on the part of the individual would be attributable not to high density, but to the actual conditions or events which gave rise to stress. The Conceptual Model of Crowding in the Residential Environment also takes into consideration, however, the possibility that stress resulting from other sources may be aggravated or accelerated by the experience of living in a high density residential setting. That is, persons having any characteristics of the poverty cycle may experience stress from any of these particular conditions, while this experience of stress may be intensified by overcrowding, a lack of appropriate space for family activities, etc.

Irrespective of its source, the experience of stress evokes a variety of possible behavioral, perceptual, or cognitive potentially tension-reducing responses, the purpose of which are to reduce or alleviate psychological strain or physical discomfort (Stokols, 1972). Cognitive or perceptual responses which may reduce or alleviate stress include:

(a) predictability and perception of control over the situation (Glass & Singer, 1972; Stokols, 1972) (e.g., awareness of compromises inherent to high density living; awareness of a capability to pursue leisure-oriented activities elsewhere if necessary, or eventually relocate in a lower density setting);

(b) cognitive appraisal of the relative importance of the situation (McGrath, 1970);

(c) increasing the desirability of the given situation (assessing the advantages, versus disadvantages of high density living);

(d) screening or selectivity of stimuli (Milgram, 1970). ("ignoring" certain unpleasant social or physical environmental stimuli).
Potentially stress-alleviating behavioral responses may include:

(a) actively avoiding crowded situations where possible;
(b) activity-oriented diversion techniques (Selye, 1956; Howard & Scott, 1965) (e.g., engaging in sports or other socially approved activities or behavior);
(c) temporarily withdrawing from social interaction;
(d) rearranging a given space.

Whatever the response to crowding stress, its particular form will depend on the relative intensity of any or all of the independent variables and the degree to which they can be altered. That is, when spatial, physical, activity, or social variables can be easily altered, a person will likely adopt a behavioral response. Where any of these are not possible, cognitive or perceptual responses are likely to occur (Stokols, 1972).

Thus far it has been assumed that an individual may alleviate crowding stress (or stress arising from other sources) by utilizing behavioral, perceptual, or cognitive responses which involve modifying physical, temporal, social, personal, or activity variables. What has not yet been considered is whether a particular response may, in effect, intensify psychological strain or physical discomfort; or as Stokols expressed this possibility, whether a particular response perpetuates the cycle of crowding stress (Stokols, 1972). Most tension-reducing responses are, by their nature, divergent. Some of these may offer temporary relief, but may not actually eliminate crowding stress, or stress emanating from other sources. For example, where socially sanctioned tension-reducing responses are unavailable to, or inadequate for a given individual, socially disapproved techniques may be resorted to. In short, failure to alleviate stress through other responses may be manifested in observable forms of social disorganization. It is important to note that the use of socially disapproved diversion techniques may result in further stress by inducing social sanctions on the individual (Howard and Scott, 1965).
Long-term withdrawal, as opposed to temporary withdrawal from social interaction, is another type of behavioral response which may act to increase the cycle of stress. As Wallace aptly noted,

"If withdrawal plunges the organism into a restricted, invariant environment, the slight physical stimuli required by their monotonous repetition requires a great expenditure of energy. 'The same four walls' can literally drive a man crazy; their effect is analogous to that of any sort of prolonged stimulation which progressively requires more and more energy to master."

(Wallace, 1952: 29)

Thus, it would be expected that prolonged withdrawal within an apartment dwelling involving an excessive lack of social or other stimuli may have as serious consequences as prolonged and involuntary exposure to an overcrowded dwelling unit.

Finally, the Conceptual Model of Crowding in the Residential Environment assumes that the consequences of inadequate or inappropriate responses to crowding or other sources of stress may also, however, be manifested as feelings of frustration, alienation and impatience, i.e., as psychological manifestations of stress. Since general stress theory also maintains that stress reactions may affect physiological changes and affects certain organs in very specific patterns (cf., Selye, 1956), it may be expected that the maladaptive consequences of inadequate responses to stress may be noticeable as physiological disorders (Stokols, 1972).

It is important to note that both Stokols' theoretical framework and that of Proshansky, Ittelson and Rivlin (1970:a) have been criticized for their failure to explain how stress may be transformed into social pathologies, such as juvenile delinquency, adult crime, etc. (Cassel, 1973). That is, while Stokols' Equilibrium Model of Human Response to Crowding provided a theoretical link between high densities and both physiological and psychological adverse manifestations of stress, it did not attempt to explain potential occurrence of observable forms of social disorganization. The Conceptual Model of Crowding in the Residential Environment has been modified to provide this additional theoretical link, based on this writer's examination of the stress literature.
8.5 Description of Independent Variables

The independent variables which influence the individual's response to the effects of high densities (summarized in Table 1) are discussed below in greater detail. The model assumes that physical and temporal factors, personal attributes of the individual, features of the social environment, culture, and activity variables interact in a manner to either mediate the individual's recognition of the restrictive aspects of limited space, or potentially aggravate or accelerate the experience of crowding stress. Each of the independent variables are comprised of a variety of factors or elements which are assumed to contribute to the occurrence, or lack of occurrence of, the experience of crowding. While those factors discussed below are based to a considerable extent on Stokols' Equilibrium Model of Human Response to Crowding, the works of Zlutnick and Altman (1972) and Proshansky et al (1970:a) have also contributed to this formulation. Other additions, and especially the interpretation of all these factors to the residential environment, reflect this writer's contribution, based on evidence reported earlier in this study and/or other knowledge. The qualification placed by Stokols on his enumeration of factor variables applies to the present model as well. That is, the variables and factors listed are not seen to be the only ones which influence the experience of crowding; future research may identify additional variables and hopefully will determine

"...the relative salience and importance of each factor..."

(Stokols, 1972: 78)

Features of the Physical Environment and Temporal Factors

While density (the amount of space) and the arrangement of space are two of the more important physical factors of crowded situations, temporal duration is an equally, if not more salient dimension of the crowding phenomena.
Density may denote any of the following:

(a) the number of persons per room or dwelling unit (i.e., what is frequently referred to as "overcrowding");

(b) the number of persons or dwelling units per net lot/residential acre of land (land area used for strictly residential purposes, excluding street allowances and other public uses);

(c) the number of persons or dwelling units per gross lot/residential acre of land (net residential land plus streets, lanes, and other land used for schools, recreation, health and other community facilities or services).

Arrangement of Space. The arrangement of a given space may support or encourage certain activities, or alternatively constrain or implicitly discourage activities. Even when some activities are supported they are usually done so for only a certain range and specific number of people (Eastman and Harper, 1971). The arrangement of space, then, implies its usability for a person's desired activities. In the present model, this includes the arrangement of space (a) inside the dwelling unit; (b) public space within apartment buildings; (c) outdoor private and public space contiguous to the dwelling unit or housing structure; (d) space devoted to parks, playgrounds or other recreational or public community facilities.

Temporal duration is a necessary consideration in the developmental pattern of the crowding experience. In Zlutnick and Altman's view, one component of extreme crowding may be when people are in such situations for a long period of time (Zlutnick & Altman, 1972). Temporal duration may refer to length of residency in a high density residential area or length of exposure to an overcrowded dwelling unit, for example.

Intensification of Stimuli. The intensification of certain stimuli, e.g., noise, excessive movement, lights, environmental pollution, may heighten a person's perception of limited space, or may in fact act as separate sources of stress. Noise itself is capable of affecting physiological changes (cf., Forshaw, 1971) and when accompanied by a crowded setting, may produce additive stress. Griffith and Veitch (1971) indicated
that dislike for another person was greater during exposure to high
temperature and high population density, than under conditions of com-
fortable temperatures and low population density.

Community Facilities. The number, capacity and accessibility of
recreational, health and other services facilities in the community
should also be considered with respect to their available use to the
individual. Building height and type have been associated with crime
rates (Newman, 1972) as well as the potential ability of these factors
to influence sociability and privacy (Cooney, 1962).

The quality of environmental resources also seems important to
the crowding phenomenon (Zlutnick and Altman, 1972). This may include
not only the physical condition of a dwelling unit or housing structure,
but the quality of residential and community facilities in a given area.

Features of the Social Environment

The presence of other persons introduces a number of factors which
may heighten an individual's sense of spatial restriction.

Competition for Scarce Resources. The extent to which a person
perceives himself as competing with others for scarce resources heightens
the importance of limited space (Stokols, 1972). A person may also feel
crowded to the extent he is frustrated in the pursuit of his goals in a
particular setting simply by the presence of others (Proshansky et al,
1970).

Extent and Kind of Social Interaction. A person's sense of crowding
is also relative to the extent and kind of social interaction which occurs
within a given physical setting. High mobility versus relative stability
of a residential population, and homogeneity versus the heterogeneity of
residents (e.g., socioeconomic characteristics, stage in the life cycle,
household composition) influence the extent of social interaction which
may occur in an apartment building. In addition, social norms of interaction
(formal versus informal) influence who interacts with whom in a (highrise)
apartment building (Reed, 1972).
The extent to which a person experiences a sense of crowding may also be influenced by formal or informal regulations concerning the use of space. These are especially important as they are administered by apartment managers and as they influence the use of public space within an apartment block, or semi-private/public space contiguous to an apartment building.

Other social conditions which may heighten a sense of crowding or potentially act as separate sources of stress include role or status conflict, a person's relationship to others, interpersonal disagreements, etc. These may be particularly important under conditions of overcrowding within dwelling units.

**Personal Attributes of the Individual**

As Stokols observed, it is quite conceivable that certain personal attributes or characteristics serve to protect the individual from the negative effects of crowding, while others tend to predispose him to the dissatisfactions and the adverse consequences of crowded situations (Stokols, 1972).

*Past experience* with respect to residential densities may influence a person's response to crowded situations. This factor contains similarity to the notion that conditioning or learning are important to the successful solution of problems, especially under stressful situations (cf., Howard and Scott, 1965).

*Perception of Control.* The extent to which a person perceives he has control over his environment (physical or social) has been shown to reduce or alleviate the effects of stressful stimuli (Glass and Singer, 1972).

*Expectations* with respect to (a) what densities will exist in a given situation; (b) length of residence or stay; (c) characteristics of neighbors; and other anticipations which tend to reflect the "reality", or lack of reality, of a high density environment may also influence a person's experience of crowding.
Whether a person has the social skills necessary to successfully adapt to high density situations may also contribute to his perception of a crowded situation. As Zlutnick and Altman observed, an "introvert" might feel easily crowded in a situation that an "extrovert" finds socially enjoyable (Zlutnick & Altman, 1972).

The extent to which an individual's values, life style, interests and preferences are congruent with a physical environment may determine to a considerable degree his satisfaction or dissatisfaction. In a word, Michelson's experiential and mental congruence model for successfully planned physical environments is applicable to the crowding phenomenon (Michelson, 1970:a).

Two additional factors may contribute to an individual's response to high densities or other stressors:
(a) the individual's pre-existing state of health (physical and/or mental) as well as previous tendencies toward social disorganization; and
(b) his general socio-economic characteristics (e.g., income, education, occupational skills). Low or fixed incomes, for example, may deprive a family or individual of access to health services or limit their ability to seek recreational facilities elsewhere in an urban area. Occupational skills and education may largely determine income and thus contribute to an inability to locate elsewhere.

Culture

Culture contributes a further independent effect upon a person's subjective recognition of limited space. Investigations and observations of the human use of space suggest the existence of both cultural ("national") and subcultural (group) differences in the use and perception of space. Cultural norms and values, social norms and roles specified by a cultural system, and man-made artifacts of culture (design) influence the nature of physical, social, and personal independent variables.
Activity

The type of activity, or activities an individual or family wishes to pursue, or is actually engaged in, will directly affect both the perception of limited space and its importance to the individual. Features of the physical environment, personal attributes of the individual, and social aspects of the situation all affect the kind of activity involved in a high density setting.

8.6 Use of the Model & Formulation of Hypotheses

As noted earlier, Stokols primarily intended that his model serve as a vehicle for further experimental investigation of the effects of high densities. As he observed, this would require careful specification of dependent measures of the experience of stress in order to assess the experience of crowding (e.g., subjective reports of discomfort, observational indices of stress) (Stokols, 1972). Since the Conceptual Model of Crowding in the Residential Environment is based largely on Stokols' work, and its modifications have not changed its adequacy for this use, the present model is also suited for direct experimental investigation of the effects of high densities. Experimental investigation may not easily lend itself, however, to the day-to-day experience of living in overcrowded dwelling units or in areas having high outside densities of persons or units per acre. Thus it is necessary to consider additional approaches for utilizing this theoretical framework in future research.

The description of the Conceptual Model of Crowding in the Residential Environment has been presented here as an inherent suggestion that future investigation of the effects of high residential densities, whatever form such study may take, should consider the role that social environmental factors, personal attributes of the individual, cultural norms, activity, temporal duration, and physical factors in addition to density variables play in mediating the effects of high residential densities.
As demonstrated in the critical examination of the literature, the interaction of these variables largely determines the effect of high densities in terms of the individual's behavior and health.

For example, these variables should be considered especially in further studies of the suitability of the high rise for families with children, as well as the use of this building form for lower-income persons. Michelson's findings have already indicated that temporal duration and personal goals or values (as they relate to the family mobility cycle) are significant factors which contribute to satisfaction with the high rise for families recently formed or in the very early stages of child-rearing (Michelson, 1973a).

The limitations of correlational analysis have already been noted (Section 2.13), the most important of which is the difficulty such methodology presents in ascertaining causal links between high density and pathology or social disorganization. Further use of such analysis, however, may be useful to the extent it demonstrates the importance (or lack of importance) of such factors as low income, low education, unemployment, disrupted family relationships, etc. as these may correlate positively with higher incidence of poor health or behavior which deviates from societal norms in areas with high residential densities.

The Conceptual Model of Crowding in the Residential Environment assumes the possibility that conditions characteristic of the poverty cycle are capable of producing stress-like effects and may in fact produce many of the observable manifestations which many investigators attribute to high density. The model also assumes that high residential densities may aggravate such stress, and/or that high density itself may act as a stressor. Inasmuch as present stress knowledge is presently in its formative stages, the use of the model in this sense must rest on the verification of much of the present evidence, as well as advancement of this knowledge.
The Conceptual Model of Crowding in the Residential Environment suggests the following hypotheses for future research concerning the effects of high residential densities, in terms of behavior and health:

(a) Social environmental factors, personal attributes of the individual, cultural norms, the type of activity involved, temporal duration, and/or physical factors of the environment other than purely density variables potentially mediate negative effects of high residential densities for the individual in terms of behavior and health.

(b) Should the individual experience crowding stress (i.e., recognize the restrictive aspects of limited space or excessive stimuli from social sources), certain cognitive, perceptual, and/or behavioral responses potentially alleviate or lessen the experience of stress.

(c) Other sources of stress (e.g., characteristics of the poverty cycle, sensory deprivation, social isolation) which may be only indirectly associated with high residential densities may result in observable physiological or psychological disorders, and/or social disorganization.

(d) High residential densities potentially aggravate or accelerate the negative effects of other stressors.
Chapter 9

CONCLUSIONS:
IMPLICATIONS FOR PLANNING

The focus of this study has been the response of the individual to high residential densities, in terms of behavior and health. A critical examination of the literature demonstrated that the effects of high densities appear to depend mainly on the interaction of a number of independent variables, none of which was given any particular weight or priority with respect to its importance. However, one of these variables -- physical factors of the environment -- has received considerable attention in the literature. It has already been emphasized that many investigators concerned with the effects of high density have restricted their study almost exclusively to spatial variables, expressed either as a measure of the amount of residential space or as an indicator of the population of an area. These authors frequently expressed an implicit or explicit assumption that restricting or reducing residential densities is necessary to ensure protection for the individual. As will be suggested in the following discussion, similar assumptions are reflected in both the formal approval, and formal or informal planning of residential development as carried out by municipal agencies.

More recently, however, investigators of the effects of high densities who largely represent the field of behavioral science have become more interested in the importance of design at high density, including
not only the design of building form, but the arrangement and quality of contiguous outdoor residential space and associated facilities. Several recent studies, for example, have addressed the problem of "satisfaction" by exploring what design features of high density housing lead to satisfaction with apartment living on the part of families with children (cf., Social Planning Council of Metropolitan Toronto, 1973; Michelson, 1973: a & b; Ministry of Housing and Local Government, 1970). Others have demonstrated the feasibility of combining the preferred physical characteristics of the single family dwelling with medium density housing forms for families with children (Diamond, 1970).

The underlying concern of most of these investigators is the manner in which design at higher densities can effectively meet the needs of people, both as individuals and groups. The concluding chapter of this study suggests that recent attempts to come to terms with the problem of design at high density reflect a conscious effort to design or control environments to achieve specific behavioral, social, and even biological outcomes. Studer (1970) has called this the "behavior-contingent approach to environmental design". This approach to the design of residential or other environments rests on the argument that

"...we must decide what it is we want to do as individual and collective humans, and then, arrange our environment to maximize the probability that we will consummate these intentions."

(Studer, 1970: 327)

The conclusions also suggest that design at high density should be guided by a number of "performance standards" or general criteria for design which reflect the behavior-contingent approach to environmental design. While such criteria could, and ideally should serve as effective guidelines for the architect (who retains the final responsibility for residential design), it is asserted that performance standards are equally essential to the planner as a means of evaluating high density residential development, along with the use of zoning by-law density standards. In order to clarify this assumption, the discussion which follows points out
some difficulties inherent in the use of traditional zoning and development by-laws, but especially maximum density standards, as a means of evaluating the suitability of residential development with respect to the needs of those who will live there. By and large, these tools are presently the only enforceable criteria by which the planner endeavors to ensure satisfactory living conditions at high density.

9.1 The Use of Maximum Density Standards

The design of residential accommodation, contiguous outdoor space, and associated facilities is largely the responsibility of the architect. The influence of the planner on the design of residential development is less direct, involving the enforcement, amendment and/or formulation of zoning and development by-laws (except where he has the opportunity to directly affect the design of public or private housing developments). The resulting form of residential development, nevertheless, is structured to a considerable degree by the content of municipal zoning and development by-laws.

Traditional zoning by-laws have as their fundamental purpose the regulation of

"...the development of land ... with respect to the use of the same, and the location, design, construction, and use of buildings and structures for residence ... and other purposes." (City of Vancouver, 1973: 1)

Zoning by-laws reflect numerous additional objectives, however, which include the regulation and limitation of population density, the provision of adequate open spaces for light and air, the protection and improvement of amenity, and the promotion of health, safety and the general welfare (Ibid.). In order to accomplish these objectives, zoning by-laws commonly employ a number of standards and restrictions which must be achieved in the design of residential development.
Maximum density standards, however, are often relied on by municipal planning agencies as the most important factor affecting the amenity of high density residential areas and satisfactory living conditions. Density standards are particularly useful in estimating space needs for both developed and partially developed residential areas, and are usually an adaptation of generally recognized regulations considered to be consistent with the principles of healthful housing (Goodman, 1968). Density standards are also useful as preliminary design schemes and provide a uniform and objective approach to comparing site plans for general openness, amenity, and livability. It must be recognized, however, that

"...density figures, no matter how accurately computed, are but a crude index of the design quality of a site plan. Being rigid mathematical ratios for relatively large areas, they cannot properly reflect all factors of design. ... The amount of open space established by density standards has limited meaning unless that space is properly distributed and designed for usability."

(Emphasis supplied)

(American Public Health Association, 1960: 36)

In order to encourage appropriate distribution of open space at either high or relatively low densities, residential development must also comply with zoning by-law standards regulating site coverage, uniform setbacks, and other features of site layout. Experience has demonstrated, however, that the use of such regulations all too frequently results in open areas surrounding buildings which are of little use to apartment dwellers except as visual relief and the provision of landscaping. In brief, density standards and other zoning by-law regulations have generally proven to be less than effective in insuring the usability and proper distribution of open space, according to the needs of those who occupy a particular apartment block.³

Density standards, however, are frequently relied on as yet another means of insuring satisfactory living conditions. Maximum densities often purport to protect families and individuals against social and other ills which have been associated with high population densities.
While the formulation of maximum density standards which effectively avoid undue stress on the part of individuals or families is both highly desirable and hopefully achievable, present evidence on appropriate density limits which do not impair people's well-being is far from conclusive (cf., False Creek Proposals Working Papers, 1971). In the absence of such criteria, attempts to derive maximum densities which insure "healthful" residential development are largely subjective or involve the substitution of commonly accepted land use intensity measurements. When used on this basis, however, maximum density standards tend to perpetuate the

"...sociological myth -- raised, not by the sociologists in this case but by the standard makers: that there is a uniform pathological response to high density... which is not necessarily true."  
(Michelson, 1971: 10)

Further investigation of high density as a stressor will hopefully demonstrate the usefulness of maximum density standards as a protection for the health and well-being of the individual, as opposed to useful estimates of the space needs of particular household types. In any event, it appears that the planner ought well to be guided by Gideon's conclusion that

"...codes of density are no cure-all... We have seen that correct density is a variable dependent on habits of living, the geographic situation and the demands of a particular project: it can never be something absolutely fixed."  
(Gideon, 1965: 208)

Gideon's remarks do not merely suggest that maximum density standards do not necessarily guarantee "good living conditions"; they imply that greater flexibility and different, or more appropriate criteria should supplement the planner's evaluation of residential development.
9.2 **Performance Standards**

The essential concern of many recent investigators of the effects of high density is whether existing or planned high density development satisfies the needs of the "user". That is, many have approached the basic question of whether the design of a particular project is relevant to the behavioral and social needs and goals of those who live there. As Michelson suggested, whether a particular land use

"... is portrayed statistically, or allowed or prohibited by current by-laws is less important than what it actually means to the particular segment of the population interested in its use. Regardless of whether it is currently legal or illegal, the important thing to ask is: 'will it work?'"

(Michelson, 1971: 10)

To ensure that planning is not only socially sensitive, but relevant to the needs and goals of the individuals who live in a community, Michelson asserted that performance standards, as opposed to absolute standards, are unquestionably more appropriate if they are consistently, accurately, and honestly applied (Michelson, 1971).

The use of performance standards as an additional criteria on which high density residential development is evaluated implies that the planner (and others involved in the processing of development permit applications) must exercise greater discretion in his judgement. At the same time, however, these criteria must be applied steadfastly to each development if they are to be ultimately resultant in more suitable design. The purpose of this discussion is not to suggest an appropriate administrative process for the application and use of performance standards by planners, technical planning boards, or other municipal agents involved in the evaluation of residential development. Rather, the discussion which follows focuses on the nature of such standards, and emphasizes several considerations which, in the view of this writer, are important to the evaluation of effective design at high density.
9.3 Behavioral Design at High Density

In recent years members of the field of behavioral science, as well as urban planning and architecture, have demonstrated increasing interest in the influence of the designed environment on human behavior at the individual, group, and institutional levels. Although behavioral research relating to environmental quality is still in its early stages of development, in a number of cases it has already made useful contributions to public policy. As a field, however, it still lacks both a broad conceptual framework and the development of more refined methodology (Sewell, 1971).

Yet it is possible to portray theoretical agreement among several investigators as to the prominent concerns of behavioral planning, as it relates to the designed environment in general. The fundamental concern of these writers is how to create physical environments which meet both behavioral and social requirements of those who will use them. Although somewhat different emphases are distinguishable, as a whole their interests reflect Studer's behavior-contingent approach to environmental design, which is based on the assumption that we should arrange the physical environment in such a manner as to maximize the opportunity to achieve our intentions both as individuals and as groups (Studer, 1970). A similar view is expressed by Eastman and Harper (1971), Proshansky et al (1970:b), Wood (1961), and Porteus (1971).

Eastman and Harper (1961) pointed out that in general, particular physical environments may -- or may not -- provide support for certain activities. That is, activities which are supported are encouraged to the extent they are the propensities of those who use the space. Those activities not supported are implicitly discouraged or directly constrained. The designer thus takes partial responsibility for the behavior that does or does not occur in a particular space. Eastman and Harper maintained that this responsibility should be based on well-defined goals, and
suggested that two different objectives or general goals are open in behavioral planning. These are:

"(a) to encourage the existing propensities of users by providing support for the anticipated activities of all people. This objective maximizes behavioral freedom. In working toward this end, the designer is trying to make the physical environment as unconstraining as possible. . . .

(b) to encourage some activities while discouraging others through the support or nonsupport of various activities. In this way, the designer channels behavior. . . . While no environment equally supports all activities and influences behavior in some minimal way, these two objectives are distinct in that, in the second case, the designer takes the responsibility for attempting to redirect existing propensities."


Proshansky et al (1970:b), however, implied that freedom of choice in behavior is a criteria that should be applied to the design of any physical setting. These authors were primarily interested in high density environments, and especially the social and psychological phenomenon of crowding. They asserted that a lack of freedom of choice in behavior may contribute to the experience of crowding, thus rendering this criteria particularly important in design at high density. The basic requirements involved in designing physical settings which maximize freedom of choice are described as follows:

"Whatever the primary purpose that brings the individual to a given physical setting, the setting must not only have the capacity to satisfy the primary need and other relevant subsidiary needs, but it must allow for goal satisfactions that are only remotely related to the major purpose. . . . Any physical setting that provides many alternatives for the satisfaction of related and unrelated subsidiary purposes obviously provides considerable freedom of choice."

(Proshansky et al, 1970:b: 175)

The goal of designing high density residential space so as to maximize freedom of choice in behavior has significant merits, when taken
in the sense that adequate opportunity should exist for individuals and
groups to satisfy their primary needs and relevant subsidiary needs.
Experience has shown, however, that in some cases the provisions of
"free space" for whatever purpose has resulted in competition between
groups or individuals for the use of the space, as well as resulting
behavior which may serve at cross-purposes with the best interest of
those living nearby. In the case of the Pruitt-Igoe public housing pro­
ject, for example, unusually wide (gallery) corridors, flexibly designed
and originally intended to be free for play and recreation, eventually
became the "territory" of gangs of teenagers. Herrenkohl (1972) pointed
out that by leaving such spaces wide open and failing to consider the
variety of groups seeking to create their own territory, the intended
purpose of the space was subverted. Other studies have pointed out
potential problems which may result when boundaries and uses of space are
not sufficiently clear, and have indicated the need to create real or
symbolic boundaries when integrating various uses of space (particularly
between public and semi-private or private residential space) in order to
avoid social problems arising from misunderstandings about which space is
available to various users (cf., Cooper, 1970; Newman, 1972).

A suitable modification of the principle "maximize freedom of
choice", in this writer's view, would be to ensure that sufficient and
appropriate overall opportunity exists for the fulfillment of activities
and goals which are the propensities of those who live in high density
residential accommodation. However, where public and private (or semi-
private) residential uses are integrated or intermingle, real or symbolic
boundaries should be created to avoid confusion over, and competition for,
a given area. Given these criteria, behavior is unconstrained with respect
to overall opportunity to engage in desired activities, but behavior is
channeled with respect to the groups or individuals who may use a given
space.
Wood's social theory of housing design is an explicit effort to come to terms with the problem of design of all high density, urban residential areas whether they come into being as projects, public or private, or through the redesign and conservation of older areas." (Wood, 1961: 383)

Wood is ultimately concerned with the kind of social structure which is desirable in a project and how to use design to achieve it, asserting that the fulfillment of needs of people is itself a suitable design objective. She suggested that this theory should be expressed almost exclusively in the design of public space outside the dwelling unit. Following the identification of five general categories of needs that must be served outside the dwelling, Wood suggested four principles to guide the architect in design for social structure. As presented here, they are viewed as equally useful in guiding the planner in evaluating proposed or existing high density residential development:

(a) Design for visible identification of a family and its dwelling (a characteristic not found in high rise buildings with interior corridors);

(b) Design so as to make association and loitering easy not only on the building floor, but in lobbies and on the grounds;

(c) Design so as to make the formulation of informal groups easy (e.g., purposeful arrangements of benches and ground equipment);

(d) Locate the facilities and equipment so that they provide and are provided with social controls. (Wood, 1961)

Wood's social theory of housing design gave particular attention to the design of high density housing for families with children, especially those design features important to appropriate play spaces (Wood, 1961).
The preceding discussion has suggested some criteria which may be useful for the formulation of performance standards for high density residential design. The derivation of such standards for use by both the planner and architect is deemed necessary to the creation of high density housing, associated space, and facilities which avoid undue stress on the part of the individual. In formulating such standards, however,

"The question always has to be raised: 'whom do we have in mind, and what are the goals as they perceive them? If you are interested in performance standards (as I think we ought to be), you always have to ask the question: 'performance for whom?'

(Michelson, 1971: 10)"
Chapter 1

1 For a more intensive investigation of the results of animal or ethological studies concerning the effects of density, see Jorgensen (1973).

Chapter 2

1 Report of the Lieutenant-Governor's Committee on Housing Conditions in Toronto (1934).

2 Advisory Committee on Reconstruction (1944).

3 Present day planning authorities in Great Britain, the United States, and Canada have generally adopted maximum densities of approximately 200-300 persons per net residential acre, and 100 persons per gross neighborhood acre for apartment development (Technical Planning Board, 1965).

4 Schmitt's education control was population 25 years of age or more, with twelve years or more of schooling as a per cent of persons 25 years old or more, 1950; and income, families and unrelated individuals with 1949 incomes of $3,000 or more as a per cent of all families and unrelated individuals, 1950 (Schmitt, 1966).

5 "Interpersonal press" as a form of overcrowding was measured by two density components: the number of persons per room, and the number of rooms per housing unit (Galle et al, 1972).

6 "Structural" factors of population density were measured by two other density components: the number of housing units per structure, and the number of structures per acre (Galle et al, 1972).
Newman recently warned that Canada will face similar increases in crime and vandalism if it continues to house families in high rise buildings. A reply to this warning, however, treated Newman's argument with scepticism on the basis that it has very little relevance to the Canadian experience. Rose (1973) noted that U.S. cities comparable in population to Metropolitan Toronto have an incidence of major crimes 20 to 50 times that of the Toronto area. Further, statistics on juvenile "incidents" occurring in three major public housing projects in Toronto indicated that the project with high rise accommodation and the highest density of units per acre had as few incidents as the project with lower density and no high rise accommodation. Of particular interest, however, was the fact that one-half of all juvenile incidents in one high rise building emanated from one family (Rose, 1973).

Galle et al chose three measures as an index of social class: the percentage of employed males in the area with white-collar occupations; the median number of years of education completed by all persons 25 years and older in the area; and the median family income for all families residing in that community area. Ethnicity was based on the percentage of Negroes, Puerto Ricans, and foreign-born living in the community area (Galle et al, 1972).

Roman and Wilder suggested that housing and community tolerance are important factors composing forces in the social system which lead to the over-representation of patients with schizophrenia in decaying urban areas. In attempting to locate housing for some 100 persons per month referred by New York State Psychiatric hospitals, the New York City Welfare Department can usually only find quarters in blighted rooming houses. Many patients are in need of employment or financial support as well (Roman and Wilder, 1967).

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Chapter 3

Influence of layout or building type on sociability, privacy, and isolation: (Per cent saying yes) (Cooney, 1962)

<table>
<thead>
<tr>
<th>Type of Block</th>
<th>Sociability</th>
<th>Privacy</th>
<th>Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-storey blocks of row housing</td>
<td>95</td>
<td>79</td>
<td>5</td>
</tr>
<tr>
<td>11-storey slab block</td>
<td>71</td>
<td>81</td>
<td>13</td>
</tr>
<tr>
<td>11-storey tower (point) block</td>
<td>30</td>
<td>95</td>
<td>30</td>
</tr>
<tr>
<td>15-storey cluster block</td>
<td>24</td>
<td>100</td>
<td>42</td>
</tr>
</tbody>
</table>
The kind of social contact in both building types included exchanges of visits, not just casual greetings between residents, although the number of neighbors contacted was somewhat higher in the walk-ups than in the high rise (Stevenson, Martin & O'Neill, 1967).

One may hypothesize that the elderly, being relatively less mobile in their environment, would tend to look for social contact in their neighbors when other opportunities are lacking; and as Michelson noted, the aged find greatest satisfaction in a concentration of like-aged people particularly when they have local life styles and previously lived in non-cohesive communities (Michelson, 1970:a). Likewise, young mothers are also more restricted in their mobility (assuming they do not work), and children frequently bring such persons into mutual contact.

Michelson's findings represent an investigation of the decision-making processes and expectations among 761 families intending to move within or to Toronto. This study is longitudinal, based on information received both before the move, and at fixed periods up to and including four years after the move. The report of his findings here (1972) is based on a first analysis, which was followed by additional, more complete analysis, documented in this study as Michelson (1973: a, b, & c).

The notion of "situated interaction" used by Reed was a modified version of an idea first suggested by Erving Goffman to refer to interaction which is especially dependent on its setting, and which is relatively clearly bounded socially, spatially, and to some extent temporally. Goffman devoted much of his attention to "focused" or spoken face-to-face interaction between people who are in each other's immediate physical presence, while Reed concerned himself with both "focused" and "unfocused" interaction (unspoken communication), and the effects of the symbolic aspects of residence along with other personal or situational factors (Reed, 1972). The present report of Reed's observation is largely confined to "focused" interaction in the high rise.

Reed suggested that the relationships between physical and social variables indicated by his findings call for more extensive and intensive testing; e.g., in other types of residential settings, and controlled for such factors as density, total project size, ratio of public to private space, social composition, etc. (Reed, 1972).

Other studies which have focused on low-income families, or families living in publicly-provided housing include Stevenson et al (1967), Newman (1972), Ministry of Housing and Local Government (1970).
Wallace (1952) investigated the effects of the high rise upon individual health and community structure, in addition to its effects on the family structure of low-income families. His conclusion concerning the ineffectiveness of the elevator-apartment in achieving many of the aims of public housing, insofar as they were related to families with children, rested on some hypotheses concerning the problems of high rise buildings. His discussion included a rather detailed analysis of density itself and its relationship to building type and non-residential land use. Although some of Wallace's original hypotheses have since been challenged by subsequent studies, others have stood the test of time. Until very recently, few other studies have attempted as comprehensive an analysis of the high rise as did Wallace.

Determining a specific age cut-off for upper floors is admittedly a difficult matter. Both Willis and the Ministry of Housing and Local Government found, however, that until children were seven years of age, mothers preferred to be able to keep an eye on their activities, and in Willis' words,

"...it is usually only when a child is beyond this age that he is considered responsible enough to go down and play in the grounds on his own." (Willis, 1955: 5)

The Ministry of Housing's sample of mothers of children aged three to six living on the upper floors of blocks was

"...too small to allow conclusions to be drawn with confidence, but those of this group who felt unable to let these children out to play unaccompanied do show a strong tendency to be generally dissatisfied." (Ministry of Housing & Local Government, 1970: 35)

Perhaps the best warranted conclusion is that children of preschool age are best housed on the ground-floor levels; or as Willis suggested, if people choose their own floors as far as possible, they are more likely to be satisfied (Willis, 1955).

The Ministry of Housing and Local Government (1970) did not recommend the use of special playrooms on each floor in high rises, as they would not provide the variety of scene and movement which attracts children to play outside:

"Children would not be considered safe unless they are locked in, and sufficient numbers for a play group are unlikely to be available on each floor of a block." (Ministry of Housing & Local Government, 1970: 8)
11 An additional 33% said a move was "possible" within the next five years (Michelson, 1973:a).

12 Michelson's analysis of the family mobility cycle is limited to the conjugal family from marriage to approximately retirement age. His model is not intended as a pattern which all people could be thought to follow, but rather as a useful way of conceptualizing the general stages of residential family mobility.

Stage I, the baseline stage, briefly represents the formation of a family or its arrival within a given metropolitan area. Effective factors of residential choice largely depend on economics, pre-existing social contacts, and place utility (e.g., the trip to work).

Stage II, incremental change, reflects intermediate changes in residence made with serious intent over either short or in fact extremely long periods of time, but not necessarily having direct bearing on those things these families hold most important in housing. That is, changes in housing type or location in Stage II may or may not be steps toward the attainment of the ideal in Stage III.

Stage III, approximation of the ideal, may never be experienced by some families, but its possibility is very important:

"The chance of achieving some approximation of one's ideal is something which permits relative satisfaction within the various iterations of Stage II even at the same time the latter may not be satisfied in an absolute sense." (Michelson, 1973:a: 8)

Chapter 4

1 Interpersonal attraction responses and subjective evaluations of affective feelings were more negative under conditions of high population density than in low-density conditions (Griffit and Veitch, 1971).

2 Four activities were considered by the subjects to accommodate differing degrees of density. From highest to lowest density, the four activities were ordered cocktail party (standing), waiting in an airport (standing), sitting and talking, and sitting and reading. In other words,
the subjects judged that the first ongoing activity would accommodate the highest population density, and the last (sitting and reading) required the lowest population density (Desor, 1972).

In jury deliberation, men gave somewhat more severe sentences in the smaller room than they did in the larger. Women, however, were more lenient in the smaller room. Higher densities had an even stronger effect on the individuals' subjective reactions. Women in a small room found the experience more pleasant, the other members more likeable and more friendly; men, however, reacted in an opposite manner. All of the interactions of sex and room size were significant statistically (Freedman, 1971).

Individuals living in crowded urban settings probably lack this mobility option for economic reasons, as well as the social networks linking relatives and friends who can lend economic support. Draper also suggested that "stranger density" may be an important component of modern urban stress (Draper, 1973).

Chapter 6

The present "outside" density of the West End in Vancouver is estimated at 175 persons per net residential acre, while "inside" densities averaged 1.6 persons per dwelling unit, according to 1971 census data (West End Planning Centre, 1974).

Census data indicate that average West End family incomes for the year 1970 ranged between approximately $7,300 and $12,150 (West End Planning Centre, 1974). The proportion of family households (those with children) was approximately only 9% in 1972, although many of these were single-parent families (West End Policy Guidelines, 1972). Convenience to work and the downtown, as well as nearby recreational opportunities ranked highest in features liked best in the West End, according to the Marathon Report (1970).

The average length of residence in the West End is somewhat lower than that of the City of Vancouver as a whole. The apparently high degree of mobility is the result of a fairly small number (approximately 15%) who move frequently. Approximately 38% of the West End population has resided there over five years (West End Policy Guidelines, 1972). Michelson (1973:a), however, reported that the overwhelming majority of families moving to downtown apartments expected to move again within five years, a finding supported by the Social Planning Council of Metro. Toronto (1973).
Chapter 7

Selye observed that there seems to be a close relationship between the general adaptation syndrome and aging, in the sense that each individual inherits a certain amount of adaptation energy, determined by his genetic background. Selye suggested the individual may draw on this energy for a long but "monotonously uneventful existence" or spend it more rapidly in a stressful, intense, but perhaps more exciting life (Selye, 1956). Selye touched only on the fundamentals of aging; investigation of subsequent research on this theory may prove insightful.

\footnote{See, for example, Forshaw (1971).}

The Darwinian definition of adaptation is more frequently subscribed to by biologists concerned about the survival and mortality rates of species (Dubos, 1968). Christian, for example, found that the increasing population density of a herd of sika deer over a number of years resulted in an ultimate "population crash" or die-off due to overactivity of the adrenals owing from physical crowding (Christian, 1960). Calhoun demonstrated that crowding among Norway rats can result in high infant mortality rates (Calhoun, 1962).

\footnote{This definition is somewhat broader than the strict physiological definition of homeostasis, used by Selye to describe the body's tendency to maintain a steady state despite external changes (Selye, 1956).}

Chapter 8

\footnote{Stokols' social-psychological model of the human crowding phenomenon is more formally referred to as an Equilibrium Model of Human Response to Crowding (Stokols, 1972).}

\footnote{See, for example, Gad (1973) and Stokols (1972) for a discussion of this problem.}

\footnote{Stokols' Equilibrium Model of Human Response to Crowding (Stokols, 1972) does not identify culture or activity factors as specific independent variables. His discussion of previous research on crowding (and density), however, gives recognition that cultural norms mediate the perception and adjustment of interpersonal space, while the type of activity performed in a given area largely determines whether the amount of available space is perceived as adequate or too limited. Stokols does not give any particular}
importance to the effect of cultural norms since his investigation apparently only focused on cultural differences in personal space, which, in his view,

"...do not relate specifically to the experience of crowding."

(Stokols, 1972: 74)

The evidence reported in Chapter 4 of this study, however, suggested that both cultural and subcultural differences in the use of space appear to have an important influence on spatial perception.

Stokols included activity as a component of the social independent variable, on the assumption that the type of activity a person engages in with others will directly affect the salience of immediate space (Stokols, 1972). "Activity", however, is not something that always is engaged in with other people; an activity can be pursued by one person, but may be prevented or inhibited by merely a lack of space and/or the presence of other persons. Hence activity has been included as a separate independent variable in the Conceptual Model of Crowding in the Residential Environment as a factor which affects the experience of crowding.

Stokols referred to crowding as a psychological experience, referring to an awareness, perception or recognition by the individual of the restrictive aspects of limited space (Stokols, 1972). Inasmuch as the term "psychological experience" commonly carries a strongly negative connotation, the word "psychological" has been deleted from the present model, although Stokols' essential meaning has not been modified. As the description of the model illustrates, "crowding" may be unpleasant, but is potentially alleviated depending upon the type and adequacy of particular responses the individual adopts.

Hypotheses (c) and (d) are somewhat analogous to a conclusion reached by Marsella (1970) as follows:

"...poverty itself, without the overcrowding, could well encourage alienation, especially since one is faced with an inevitable future of physical and psychological want; but in combination with overcrowding its influence may be increased."

(Emphasis supplied) (Marsella et al, 1970: 293)

Hypothesis (d) is additionally supported by Loring's suggestion that further studies investigate the possibility that:
"...density affects action otherwise stimulated and motivated. That is, the over-density... may aggravate or accelerate, not cause or motivate, any tendency to disorganization in a personality or group."

(Emphasis supplied) (Loring, 1956: 167)

Chapter 9

1 The Technical Board of Vancouver, for example, noted that

"Probably the most important factor affecting the amenity of high density residential areas is the maximum density which should be allowed, consistent with good day present day living standards."

(Technical Planning Board, 1965: 16)

2 The "land use intensity" approach to deriving maximum density standards is considered one of the most reliable and comprehensive means of determining how many people should live on a unit area of land. The land use intensity concept is particularly advantageous since it deals with qualitative planning factors on a small scale, and considers all the small space requirements which should be left around the type of household designated (False Creek Study Group, 1971).

3 The implementation of more flexible zoning and development by-laws will hopefully result in not only the provision of usable outdoor space, suitable to the needs of occupants, but in far better quality and variation in design at high density. For example, the New York Zoning Reform Program "Housing Quality", requires "recreation space" appropriate in size and type to the occupancy characteristics of the development, to be located either indoors or outdoors (Urban Design Council of the City of New York, n.d.). In addition, the proposed zoning zoning schedule for the West End in Vancouver combines a highly discretionary zoning by-law (based on urban design guidelines prescribed for the West End) with required "amenity areas" appropriate to the size and occupancy of the dwelling unit. The purpose of the amenity area regulations is to create adequate, efficient, and usable open space appropriate to the needs of residents (West End Planning Team, 1974).
Somewhat reliable evidence is available on appropriate densities for families with children, although these findings are not necessarily related to the promotion of health or well-being of the individual. The Ministry of Housing and Local Government, for example, concluded that high density development of up to 130 persons per acre "...could be compatible with satisfactory family life, given the right design and management policies" (Ministry of Housing & Local Govt., 1970: 4).

The problems of higher densities, however, were not investigated by their survey.

These findings are generally consistent with Diamond's work at the University of Toronto, who found that the preferred characteristics of the single family dwelling (a private entrance to the dwelling unit, access to outdoor personal space, and accommodation of the automobile in association with the dwelling) could be incorporated into housing forms of up to 40 dwelling units per acre (Diamond, 1970). Using an average family occupancy of 2.9 persons per dwelling unit (West End Planning Centre, 1974), this is equivalent to 116 persons per acre.

Wood's five categories of the needs of people which must be served outside the dwelling unit are: (a) active exercise, (b) sunshine and fresh air, (c) the need to get "out", (d) the need to go somewhere, and (e) the need to some household chores which cannot be done indoors or are better done outdoors (Wood, 1961).
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