Crowding and Neighborhood Mediation of Urban Density

Andrew Baum, Glenn E. Davis, and John R. Aiello

Trinity College, Washington College, and George Peabody College

The mediating effects of local neighborhood variables in the experience of urban density were considered by surveying and interviewing residents of moderately dense urban areas. The presence of local markets and pharmacies seemed to increase use of the public sidewalk and street areas, and this appeared to interfere with residents' ability to regulate contact outside of their homes. Group development and conversion of public space to semi-private space were inhibited, and reported crowding increased. Residents of streets on which these stores were located were less likely to be observed interacting with others in exterior neighborhood space, and complained more frequently of excessive unwanted contact. The implications of these findings for understanding urban experience were considered.

The study of density and crowding has expanded rapidly, due in part to concern for the impact of high density on the quality of urban life. Density is a defining characteristic of urban areas, and many researchers had great expectations for understanding experience and behavior in cities by studying responses to crowding. The results of studies to date have been somewhat disappointing (cf., Fischer, in press). Most research has not directly addressed the condition of urban living, and

The authors would like to thank Lisa E. Calesnick, Susan Coyne, Richard Dubiel, Nancy Kasimer, Scott Lewis, Katherine Maye, and Sally Tarbell for their help in conducting this research, and Carlene S. Baum, Susan Saegert, and Gary Winkel for their helpful interpretations of some of our findings.

0146-1052/78/1500-0266 $00.95

studies of naturally-occurring urban density have yielded confusing results. Based upon the findings of animal research (e.g., Calhoun, 1962; Christian, 1963), some epidemiological studies (Cassel, 1972) and reports in the popular press (Zlutnick & Altman, 1972), most people assumed that high urban density was adversive and had deleterious effects on behavior. Early laboratory studies, however, did not support this notion, and reinterpretation suggested that main effects of density, independent of classification variables (e.g., income), were minimal (Freedman, 1975). While urban density seemed to affect people already stressed by other conditions it did not represent the overwhelmingly negative state of affairs that many had assumed.

It has become clear that one of the reasons for this failure to find evidence of effects of urban density has been a sometimes simplistic view of urban behavior (Fischer, in press). Our perspectives on these phenomena are becoming more complex, considering mediation of density by a number of variables. Following Stokols' (1972) distinctions between density and crowding, the focus of research has shifted to individual experience in high density settings. Environmental, social, and psychological variables that determine the degree to which high density is experienced as stressful have been identified. These efforts have begun to reveal the negative effects of density as it interacts with these variables, but the need to consider crowding in the context of larger, ongoing systems remains. This paper reports the findings of the first of a series of studies concerned with the intervening role of neighborhood variables in the experience of urban density.

The urban neighborhood. The neighborhood unit represents an ongoing system in which the experience of density may be embedded. Definitions of these units, however, have varied considerably, ranging from areas roughly analogous to census tracts and larger districts of cities to the spaces immediately adjacent to people's homes. Some conceptualizations of the urban neighborhood have focused on physical features. Perry (1966), for example, considered neighborhoods for 3,000-10,000 people, defining them as "that area which embraces all of the public facilities and conditions required by the average family for its comfort and proper development within the vicinity of its dwellings" (Mercer, 1975, p. 151). Other definitions imcorporate social criteria such as hospitality, intensive social interaction, "territorial" control of local spaces and social groupings sharing a common cultural, social, economic, or

political reality (e.g., Fried & Gleicher, 1961; Ittelson, Proshansky, Rivlin, & Winkel, 1974; Mercer, 1975).

Our definintion of neighborhood evolved out of a number of considerations. First, patterns of space use in urban areas, described in the next two sections, suggest that most social activity occurs relatively close to the home. While large districts may have distinctive identities and may provide labels for one's locale, it is unlikely that social activity within these areas is uniformly distributed across them. Rather, socializing and neighboring seem to be concentrated around people's residence, and we felt that the best way to study these activities was to examine them at the local level. Further, small street-based areas were readily available for study, and description of them could be completed without having to rely upon gross indices of behavior such as those used in correlational studies of urban density (e.g., Galle, Gove, & McPherson, 1972). Neighborhoods were defined as the physical space, architectural modifications, and people surrounding one's home. Specification of the size and shape of neighborhoods was seen as less important than understanding how the interaction of spatial arrangement and local social systems affected experience and behavior. As a result, we were concerned with studying units of urban residential districts that shared common, outdoor public space. Our intent was to identify variables operating at the neighborhood level to account for varying response to moderately high urban density.

The use of neighborhood space. Our definition of the neighborhood unit can be further specified by considering patterns of use of urban spaces. Residential areas generally contain four types of space: private, poorly-defined private, semi-private, and public. Private space refers, as one might expect, to spaces such as one's house or yard. Private spaces are clearly owned and used by identifiable people or groups. Poorly-defined private space refers to areas that are owned but whose ownership is not clear or symbolically reinforced. If a building is torn down in a neighborhood, the empty lot is still under someone's ownership; but when this ownership is ambiguous to residents, they may begin to use it as their own (Hester, 1975).

Semi-private space is that space, formerly public or ambiguously-owned private, which has been converted to group "territory" by residents. Residents frequently share the use of these spaces and, through casual interaction, gradually come to know one another and begin to exert some control over the spaces. Thus, parts of urban sidewalks may become the "prop-

erty" of a residential group, who collectively control who may use the space, when they may use it, or for what purposes they will use it. The development of this semi-private space in the hallways of college dormitories and urban apartment buildings has been interpreted in terms of developing residential groups (e.g., Baum & Valins, 1977; Newman, 1972) and has been associated with decreasing crowding stress and crime rate. Public neighborhood space refers to outdoor space not privately owned and not currently under the influence of residential groups. Together, these kinds of neighborhood space may be used to characterize certain aspects of neighborhood life.

Private outdoor spaces, including porch and yard areas, are typically used for a number of purposes. People often sit outside their homes to survey the area, to visit with neighbors, or just to relax. Home and yard maintenance is often required, and children may use this space for play. Public outdoor space may be used for work, leisure, or access in and out of the immediate home environment. Thus, parks may be used for relaxation and play while stores and offices in the neighborhood may provide employment. For our purposes, however, the access provided by public sidewalks and streets was most interesting. By facilitating movement from place to place and connecting the elements of the neighborhood, these spaces were likely to be used frequently by all residents. This frequent sharing of public space should increase the likelihood that neighbors will interact in these spaces and make them the most probable areas of group conversion to semi-private space. On the other hand, if the frequency of contact is too great, the use of these spaces may be accompanied by a reduction in ability to regulate social contact and an increase in crowding.

The significance of sidewalk and street spaces is underscored by a number of studies of space use in urban neighborhoods. Sanoff and Dickerson (1971), for example, found more activity in these areas than in public playground and open spaces. Similarly, a study conducted by the Department of Planning in Baltimore (cited in Hester, 1975) indicated that home-based activities accounted for considerably more of residents' leisure time than did activity in designated recreational areas. Bangs and Mahler (1970) found that regular use of space more than 400 feet from homes was unlikely; again, use of outdoor public space was confined primarily to the sidewalk and street areas near one's housing.

Housing and social behavior. Our investigation of neigh-

borhoods was based on studies of the arrangement of residential settings and consequent social experience. Festinger, Schachter, and Back (1950) noted the role of the design of student housing in determining the frequency of passive contact with neighbors and the number of friendships made. Baum and Valins (1977) have described an architectural manipulation of social density in college dormitories in which the size of residential groupings was related to loss of regulatory control over social experience. Dormitories that grouped students around shared areas in large groups were characterized by frequent and unwanted interaction in a relatively unpredictable social context while those housing students in smaller groups were not. The results of these and other studies (e.g., Newman, 1972; Yancey, 1972) suggested that the arrangement of space in residential settings interacts with ongoing social processes to determine many aspects of resident mood and behavior.

Studies of college dormitories are not important for their descriptions of neighborhood life; social systems that develop in college dormitories are clearly not comparable to urban neighborhoods. However, they do provide a basis for studying the mediation of density by neighborhood dynamics. Both kinds of studies suggest that the formation of friendships and local social groupings are important in determining residential satisfaction. Jacobs (1961) emphasized the positive aspects of naturally forming social networks, and Festinger et al. (1950) described the process by which proximity-based residential groupings often form. Baum and Valins (1977) noted the role of these groupings in ameliorating consequences of high social density. Density-related increases in unwanted contact and decreases in one's ability to regulate social interaction and selectivity attend to the environment were related to crowding and withdrawal in some dormitories. Membership in local residential groups, however, seemed to reinforce ability to control social experience and reduced feelings of crowding, social overload, and withdrawal.

Assuming that residents would desire space beyond the interior space provided by their housing, we focused on exterior spaces adjacent to and connecting buildings. Our unit of analysis was the residential street, approximating the 400-foot home range suggested by Bangs and Mahler (1970). A typical residential street was arranged in a more-or-less predictable fashion; the street was flanked on both sides by sidewalks, and varying mixtures of one to three family houses and a few 10 to 12 family

houses were located along these sidewalks. Most houses had small porches and very small patches of lawn. Apartment buildings were not as common as one, two, or three-family houses, and usually had neither lawns nor porches.

The space most immediately adjacent for many was provided by the porch and yard. However, the size of these areas was small and their close proximity to the sidewalks suggested that their use might be suppressed by frequent contact with passersby. Because of the large number of people living on the street, many of these passersby were probably unknown or unfamiliar, and it appeared that this could have made use of these exterior areas less positive. Further, individual ability to regulate contact with people using the sidewalk may not have been sufficient to adequately control these exterior spaces. Unless small groups of residents could exert control over yard and sidewalk spaces, it seemed likely that exterior spaces would not be adequate to ensure comfortable interaction with neighbors.

Our initial hypothesis concerned the effects of the presence of small markets or pharmacies at the ends of residential streets. At first, we reasoned that these stores would increase the number of places in which neighbors could meet, and that this would facilitate group formation and group control over exterior space (cf., Jacobs, 1961). While our interest in these stores was heuristic, our initial predictions proved to be wrong. Our findings, some of which will be considered in this paper, indicated that the presence of stores *inhibited* group formation. Apparently, these stores caused more people to be on the sidewalk at a given time and increased the probability of interaction outside the home. The use of the stores was not associated with increased familiarity with neighbors and, when compared with streets on which there were no stores, seemed to create problems similar to corridor-design arrangement of interior space.

Observation of Behavior in Outdoor Spaces

The first phase of our investigation involved nine residential streets that were comparable on most classification variables. All could be considered lower middle or middle class neighborhoods, with a mean income of just under $10,000 per year. The areas studied were primarily white (less than 5% of the population was non-white). Of those studied, more than half

(52%) reported that their parents had not completed high school and only 6% reported their parents' education beyond college. Additional background data were collected, but space does not permit a complete listing of them here. For our purposes, it is sufficient to note that socio-economic status, housing value, average rental cost, ethnic composition, education, and other social status variables were comparable among the streets studied. Those variables that were not comparable were entered into data analyses; density (assessed by street, persons per unit, and persons per room), age, years living on the street, prior place of residence, and family size variables did not affect what we observed. While we cannot be certain of the comparability of these residential areas, we are confident that our findings were not generated by psychological and social background variables. Rather, they appear to reflect response to different neighborhood dynamics.

Observation of these streets was conducted during the early evening hours (6:30 to 8:30 p.m.) on weekdays during July and August. Pairs of trained observers spent five minutes at one end of each street (in an automobile), drove slowly to the other end, and spent an additional five minutes observing behavior from this end. Each street was observed on nine separate occasions, and observation was not conducted during bad weather. Observed behaviors were summed across these observations, and a multivariate analysis of variance was conducted on these data. Overall, multivariate effects for the presence/absence of stores and for the location of observed behavior (e.g., sidewalk, yard) were obtained, $F\ (12,24) = 31.125$, $p<.001$, and $F\ (48,95) = 10.219$, $p<.001$. The effects of these variables were qualified by an interaction, $F\ (48,95) = 6.176$, $p<.001$. Generally, people on streets with stores were observed more frequently on sidewalk or street spaces, were less likely to be interacting with others, and were more likely to be walking than were people observed along streets without stores.

Examination of univariate effects yields a clearer picture of this pattern of results. As can be seen in Table 1, more people were observed walking along the sidewalks and streets when stores were present than when they were not, $F\ (1,35) = 10.363$, $p<.001$, but the use of yard areas was greater among residents of streets on which stores were not present, $F\ (4,35) = 11.57$, $p<.001$.

Observers' estimates of subjects' destinations suggest that the presence of stores may be directly responsible for these

TABLE 1

Mean number of people observed walking along sidewalk, yard, and street spaces (means reflect 9 observations).

Street Type	Sidewalk	Yard*	Street
Stores Present	42.2	0.6	8.4
Stores Not Present	9.5	12.5	1.8

*Yard space comparable across streets.

differences. While most people walking along streets without stores were seen walking to and entering a house, relatively few of those people observed on store streets were walking to and from houses. Rather, a major portion of those walking along store streets were observed entering the local busisness at the corner. Thus, it could be argued that the presence of stores generated more pedestrian traffic associated with shopping and increased the number of people using sidewalk spaces.

In order to examine residents' use of yard and sidewalk spaces for interaction with one another, observation of social and nonsocial activity in these areas was also conducted. If the presence of stores affects the use of private and semi-private outdoor space, one would expect differences in residents' social velocity, the amount of time spent in areas where interaction is likely. This expectation was confirmed; the data summarized in Table 2 indicate that residents of streets with stores present were less likely to be observed sitting in yard and porch spaces, $F(4,35) = 23.344$ and 26.993, p's$<.001$. They were also less likely to be seen standing and talking in these areas, $F(4,35) = 2.98$, $p<.05$. The strength of these findings is indicated by their discriminant function coefficients (.754, .657, .969, respectively), suggesting that they were relatively influential in the determination of overall significance levels.

These findings suggest that residents of streets with stores located at the corner were more likely to be walking along the sidewalk than standing or sitting in yards or on porches, and that

TABLE 2

Mean number of people observed standing or sitting, interacting or not interacting, in yard and porch spaces.

	Interacting		Not Interacting	
Street Type	Standing	Sitting	Standing	Sitting
Stores Present	2.40	2.50	3.50	2.00
Stores Not Present	7.70	14.60	3.40	10.60

they were less likely to have been observed interacting with others in these exterior neighborhood spaces. At least two explanations for these differences are plausible. It is possible that the presence of stores generates more frequent use of these spaces by more people and that this elevated "pedestrian density" interferes with residents' ability to predict and regulate contact in spaces adjacent to their homes. Alternately, the presence of stores may shift primary interaction areas from these exterior spaces to the stores themselves. As Jacobs (1961) has suggested, neighborhood shops may provide additional loci for neighbor contact, and the social networks on streets with these stores may center there. While observational data are suggestive, they cannot provide answers to these kinds of questions. In order to learn more about the reasons for the observed differences in use of neighborhood space, residents of store and no-store streets were asked to complete a survey assessing perceptions of neighborhood life.

Survey of Resident Experience

Survey data obtained from a sample of 117 residents of these streets provided additional evidence of differences between store and no-store conditions, suggesting that the number of people encountered outside the residence created problems for the maintenance of adequate regulatory control over social experience. Responses to questions about where residents encountered friends and how often they made contact with people strongly support our initial interpretation of the obser-

vational data, and indicate group-related problems among residents of store-present streets.

When asked to indicate where they encountered friends most often, residents of store streets were most likely to report contact in their homes (32% of respondents) or on the sidewalk outside (36%); only 7% reported frequent contact in local stores. Residents of no-store streets responded similarly, indicating more frequent within-the-home contact (49%) and less frequent encounter in sidewalk space (19%). Coupled with residents' reports that they do not spend very much time near the stores and shopkeepers' reports that their stores were generally *not* used as a place for casual neighboring, it appears that residents of store streets are not using commercial areas as foci for locally-based interaction networks. Rather, they appear to remain inside their homes when not walking to or from another place; when asked if they used their residence as a "retreat" from neighborhood activity, about half of the store-street respondents answered affirmatively while less than 30% of the residents of no-store streets so indicated, X^2 (1) = 6.108, $p<.05$.

Residents of streets on which stores were present also reported that they felt more crowded than did residents of streets without stores, F (1,113) = 14.987, $p<.001$, and that they more frequently encountered unfamiliar others outside of their residences, F (1,114) = 16.118, $p<.001$ (see Table 3). Residents of streets with stores also reported more unwanted contact with friends and strangers, F (1,110) = 3.114, $p<.05$, and F (1,113) = 9.294, $p<.01$. These residents expressed greater desire to avoid others on their street than did respondents from streets without stores, F (1,113) = 5.530, $p<.05$, and reported having less control over what happened on their street, F (1,114) = 2.489,

TABLE 3

Summary of survey findings regarding crowding, interaction frequency, and desires to avoid others (7-point scales).

Street Type	Crowding	Frequency of contact with unfamiliar others	Desire to avoid other people
Stores Present	4.80	4.86	3.50
Stores Not Present	2.50	3.07	2.60

$p<.09$. Control-relevant problems included regulation of contact with people in the spaces exterior and adjacent to their homes, with store-street residents indicating more difficulty regulating such contact ($\bar{X} = 3.5$, 7-point scale) than did residents of no-store streets ($\bar{X} = 2.2$), F (1,112) = 14.77, $p<.001$.

Survey data also provided evidence of differential development of local groups across the two types of streets. Residents of streets on which stores were located reported having fewer friends ($\bar{X} = 3.3$) in the neighborhood than did residents of streets that did not include stores ($\bar{X} = 7.8$), F (1,114) = 6.708, $p<.01$. No-store street respondents were more certain of how their neighbors felt about them than were residents of store streets, F (1,112) = 10.359, $p<.001$, and were more likely to deal with neighborhood problems as a group, F (1,114) = 12.228, $p<.001$. Finally, residents of streets without stores felt a greater sense of "belonging" in their neighborhood than did residents of streets with stores present, F (1,114) = 3.776, $p<.05$.

Crowding and the Urban Neighborhood

These data indicate that the presence of local markets and pharmacies on moderately-dense urban residential streets can increase the frequency of use of exterior access spaces and expose residents of these streets to more frequent encounter with unfamiliar others. The presence of stores was associated with infrequent use of yards, porches, and stoops, apparent withdrawal into residence, and with crowding and reports of control-related problems. It seems likely that the small size of porch and yard spaces coupled with the close proximity of the sidewalk and street were responsible for these difficulties. The large number of passersby, many of whom were not known, may have interfered with residents' ability to predict and regulate interaction outside the home. The development of control-reinforcing neighborhood groups was apparently inhibited by these conditions, and residents of streets on which stores were located did not appear to exert very much control over private or potentially semi-private exterior spaces. Instead, they seemed to withdraw, avoiding neighbors and outdoor areas where interaction was likely.

Residents of streets with no stores, on the other hand, did not have to cope with frequent contact in exterior neighborhood spaces. Since the kind of foot traffic generated on these streets was different and the rate of use considerably less than on

streets with stores, it is possible that residents were able to maintain control over yard, stoop, and porch areas. The relatively high rate of interaction in these spaces on no-store streets, as well as rather extensive use of yard areas for access between each others' houses, also suggest that control over these spaces is reinforced by group development and conversion of yard and sidewalk spaces to semi-private, group surveyed space.

While these findings are consistent with those of a number of investigations of density and crowding phenomena, they are not as harmonious with many descriptions of the role of stores in urban neighborhoods. Initially, we expected the presence of local shops to facilitate the development of social ties among neighbors. Jacobs (1961) describes instances of local markets and other shops forming a nucleus for community-based interaction, and Buttimer (1972) suggests that shops and pubs help foster and maintain social networks in urban neighborhoods. Yet, our findings indicate that these stores do not serve as a meeting place. Rather, they increased the frequency of use of exterior areas by people who are not necessarily known by residents. Instead of reinforcing residents' regulatory control over social contact by facilitating group development, the stores appeared to generate situations in which groups did not form and social control was inhibited.

It is possible that the positive influence of stores is dependent upon more general urban characteristics than are represented at the street level. The relative placement of stores (e.g., average distance between stores, concentrated vs. isolated areas) could affect the relationships between stores and neighborhood experience, as could other variables reflecting the distribution of resources across urban districts. It is also likely that the type of store affects this relationship; as Gans (1968) suggests, shopping areas should include cafes or other places in which neighboring can occur under casual and unhurried condititons. While pubs, luncheonettes, candy stores, cafes, and pharmacies with soda fountains provide places for people to sit and talk, markets and retail stores typically do not. None of the stores considered in this study could be classified as places for casual contact. Residents reported that they were a convenience rather than a meeting place, and storekeepers reported that customers came in, bought what they needed, and left. Furthermore, preliminary analysis of subsequent research has indicated that streets on which markets are located are characterized by more negative affect and withdrawal than are

streets on which bars, snack shops, and bakeries are located. It appears that the degree to which stores encourage customers to "stay awhile" or provide a relaxed, unhurried atmosphere for neighboring is important in dertermining the impact of local stores in residential neighborhoods.

These data also provide evidence of the complexity of urban social experience and behavior; studies using gross indices of density, such as persons per acre or square mile, to identify density-related pathology have not reported dramatic instances of behavioral dysfunction, but the use of increasingly more immediate measures (e.g., people per room) has proven more successful (e.g., Galle, et al., 1972). In the present study, variation in density was not great, and these differences did not appreciably influence the data. However, a more immediate measure of density, reflecting the number of people encountered outside one's home, seemed to exert a consistent influence on experience and behavior. By increasing the density of street and sidewalk use, local stores appeared to reduce use of yard and porch areas and cause problems for residents' maintenance of regulatory control in these spaces. These considerations suggest that multi-level examinations of urban settings and recognition of these kinds of complexities are necessary for an adequate understanding of the effects of urban density.

REFERENCES

Bangs, H., & Mahler, S. Users of local parks. *AIP Journal*, 1970, September, 330-334.

Baum, A., & Valins, S. *Architecture and social behavior: Psychological studies of social density.* Hillsdale, N.J.: Erlbaum, 1977.

Buttimer, A. Community. In M. Stewart (Ed.), *The city: Problems of planning.* Baltimore, Penguin, 1972.

Calhoun, J. Population density and pathology. *Scientific American*, 1962, *206*, 139-148.

Cassel, J. Health consequences of population density and crowding. In R. Gutman (ed.) *People and Buildings.* New York: Basic, 1972.

Christian, J. The pathology of overpopulation. *Military Medicine*, 1963, *128*, 571-603.

Festinger, L., Schachter, S., & Back, K. *Social pressures in informal groups.* New York: Harper, 1960.

Fischer, C. Sociological comments on psychological approaches to urban life. In A. Baum, J. Singer, & S. Valins (Eds.), *Advances in environmental psychology*, Vol. 1. Hillsdale, N.J.: Erlbaum, in press.

Freedman, J. *Crowding and behavior.* San Francisco: Freeman, 1975.

Fried, M. and Gleicher, P. Some Sources of residential satisfaction in an urban slum. *AIP Journal*, 1961, *27*, 305-15.

Galle, O., Gove, W., & McPherson, J. Population density and pathology: What are the relationships for man? *Science*, 1972, *176*, 23-30.

Gans, H. Planning for the everday life and problems of suburban and new town residents.

In *People and places: Essays on urban problems and solutions.* New York: Basic Books, 1968.

Hester, R. *Neighborhood space.* Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1975.

Jacobs, J. *Death and life of great American cities.* New York: Random House, 1961.

Mercer, C. *Living in cities.* Baltimore: Penguin, 1975.

Newman, O. *Defensible space.* New York: MacMillan, 1972.

Perry, C. The neighborhood unit formula, 1939. In W. Wheaton, G. Milgram, & M. Myerson, (Eds.), *Urban housing.* New York: Free Press, 1966.

Sanoff, H., & Dickerson, J. Mapping children's behavior in a residential setting. *Journal of Architectural Education,* 1971, 25.

Schopler, J., & Walton, M. The effects of expected structure, unexpected enjoyment, and participants' internality-externality upon feelings of being crowded. Unpublished manuscript, Unversity of North Carolina (Chapel Hill), 1974.

Stokols, D. On the distinction between density and crowding: Some implications for future research. *Psychological Review,* 1972, *79,* 275-277.

Stokols, D., Rall, M., Pinner, B., & Schopler, J. Physical, social, and personal determinants of the perception of crowding. *Environment and Behavior,* 1973, *5,* 87-115.

Yancey, W. Architecture, interaction, and social control: The case of a large-scale housing project. In J. Wohlwill and D. Carson (Eds.), *Environment and the social sciences.* Washington, D.C.: American Psychological Association, 1972

Zlutnick, S., & Altman, I. Crowding and human behavior. In J. Wohlwill and D. Carson (Eds.), *Environment and the social sciences.* Washington, D.C.: American Psychological Association, 1972.