This research examined the relationships between objective office characteristics (openness, office density, workspace density, accessibility, and office darkness) and several measures of employee reactions (satisfaction, behavior during discretionary periods, and spatial markers). In addition, the research examined the extent to which three sets of intervening variables explained these relationships. The intervening variables were interpersonal experiences (conflict, friendship opportunities, agent feedback), job experiences (task significance, autonomy, task identity), and environmental experiences (crowding, concentration, privacy). Data were collected from 114 clerical employees of 19 offices. Each of the office characteristics related significantly to one or more of the employee reaction measures. Moreover, office characteristics affected several employee reactions through their impact on the intervening variables.*

INTRODUCTION

Although some writers have estimated that the majority of American employees will work in offices in the 1980s (Goldfield, 1981), the study of the effect of office design on members of the organization is one of the most neglected areas in the field of organizational behavior (Manning, 1965; Steele, 1973; Becker, 1981). Very little is known about the impact that office characteristics, e.g., density and openness, might have on the affective and behavioral reactions of employees. The purpose of this research was to address this problem.

To do this, we used a theoretical perspective based on the amount of interpersonal contact in an office. We proposed that many office characteristics affected employee reactions through their influence on the amount of interpersonal contact among individuals in the office. Since the characteristics of physical settings have been shown to affect levels of interpersonal contact (Sommer, 1969; Altman, 1975), we proposed that certain office characteristics encouraged and facilitated interpersonal contact among employees, while others discouraged it, and that it is the amount of interpersonal contact among employees in the office that actually affects employees’ reactions to their work and work setting.

Office Characteristics

Research in environment and behavior, social psychology, ergonomics, and, to a lesser extent, organizational behavior suggests four general office characteristics that might influence the amount of interpersonal contact among employees: openness, density, architectural accessibility, and darkness.

Openness. This refers to the overall openness of the office, more specifically, to the ratio of total square footage of the office to the total length of its interior walls and partitions (Gump and Ross, 1977). If square footage is kept constant, then offices with few interior boundaries are considered more open than offices with many walls and partitions.

Density. This refers to the number of square feet available to an employee in the office (Stokols, 1972; Schmidt and Keating, 1979). Offices are dense to the extent that a large number of employees work in a relatively small area or space.
Office Characteristics

Architectural accessibility. This refers to the extent to which an employee’s individual workspace (e.g., desk) is accessible to the external intrusions of others. In this study, workspaces that were surrounded by walls or partitions were considered inaccessible, since physical boundaries would limit, to some degree, behavioral and visual intrusions (Archea, 1977).

Darkness. This refers to the overall darkness of the office setting. Illumination levels and wall colors would contribute substantially to this dimension. Thus, dark offices are here defined as those that have both low levels of illumination and dark-colored walls.

It is suggested that each of the above characteristics influences the amount of interpersonal contact among employees in an office. Indeed, on the basis of these characteristics, it is possible to develop a profile of an office that facilitates interpersonal contact: one that is open, dense, relatively dark, and has accessible workspaces. Specifically, it was proposed that high interpersonal contact is likely in offices that are open or have accessible workspaces, since they would have few partitions or boundaries that might reduce verbal or visual access.

High levels of interpersonal contact were also expected in dense settings (Altman, 1975), largely because social interactions would be more prevalent when there is relatively little distance between employees. The connection between office darkness and interpersonal contact is less obvious and more speculative than the linkages involving the other office characteristics. When actual room size is held constant, people consider dark rooms smaller and less spacious than light rooms (Baum and Davis, 1976; Mandel, Baron, and Fisher, 1980). Given this, we proposed that more interpersonal contact was probable in dark offices than in light offices, because employees experience these spaces as small and, hence, would feel physically closer to other employees.

The notion of the probable amount of interpersonal contact in an office was used in this research to generate predictions about the effects of office characteristics on employee reactions. The employee reactions studied were: (1) the degree to which employees were satisfied with their work and work setting, (2) the extent to which employees showed “ownership” of a workspace (Becker, 1973) by placing spatial markers (e.g., personal items) in or around that space, and (3) the amount of discretionary time (i.e., coffee-break time) that employees actually spent within the office boundaries. Employees who worked in offices that facilitated interpersonal contact were expected to respond differently from employees who worked in offices where the physical setting encouraged little interpersonal contact.

Office Characteristics and Employee Reactions

Office characteristics that promote high interpersonal contact may affect employee reactions in two ways. First, they may directly affect the reactions of an employee, with some characteristics of the office being positively valued and others being negatively valued. Second, office characteristics may affect intervening variables, which, in turn, affect employee reactions to the work and work setting. Three different sets of interven-
ing variables are described, then we report on a study that examined the extent to which they were effective in explaining relations between office characteristics and employee reactions.

Interpersonal experiences. Office characteristics might affect employee reactions through their influence on employees' interpersonal experiences in the office. Office characteristics that make high interpersonal contact probable can have either a positive or a negative effect on the quality of interpersonal relationships. On the one hand, such office characteristics may provide employees with many opportunities to share thoughts, feelings, and values with other employees. As a result, employees may develop friendships at work, resolve interpersonal conflicts, and receive high levels of interpersonal feedback. On the other hand, such office characteristics may adversely affect the quality of interpersonal relationships, because they may not provide the protected space necessary for sharing thoughts, feelings, and values, and so may prevent employees from developing friendships, resolving interpersonal conflicts, or offering interpersonal feedback.

Regardless of the direction of the effect of office characteristics on interpersonal relationships, it is argued that employee reactions are substantially affected by their interpersonal experiences in the office. For example, if interpersonal relationships are poor, i.e., characterized by high conflict, low interpersonal feedback, and few friendship opportunities, employees are likely to be dissatisfied with them. Moreover, poor interpersonal relationships may extend to an employee’s satisfaction with his or her work and the office where these relationships have developed. Furthermore, to the extent that spatial markers signify ownership of an area (Becker, 1973), employees may separate themselves from a space that is associated with poor interpersonal relationships by leaving few markers in and around their workspaces. Finally, employees who experience poor interpersonal relationships may avoid unpleasant interactions by leaving their offices during discretionary times, e.g., during coffee-breaks.

Earlier research supports the proposed relationships between office characteristics, interpersonal relationships, and employee reactions to the work and work setting. Several studies have shown that employees experience positive interpersonal relationships and positive affective reactions in offices that tend to facilitate contact among individuals (Hundert and Greenfield, 1969; Brookes and Kaplan, 1972; Allen and Gerstberger, 1973). One such study (Szilagyi and Holland, 1980) examined the impact of density changes resulting from moving to a new building. Results showed that professional employees who experienced an increase in density reported significantly more friendship opportunities and greater work satisfaction than before the move; employees who experienced a decrease in density reported decreases in friendship opportunities and less work satisfaction. Similarly, Allen and Gerstberger (1973) demonstrated that ease of communication improved significantly after employees moved from a traditional, closed office to an open office.

Other studies have shown that office characteristics that tend to facilitate contact among employees have an adverse effect
on interpersonal relationships and affective reactions. For example, Clearwater (1979) found that interpersonal communication significantly worsened after a move from a conventional to an open office. Oldham and Brass (1979) found significant decreases in friendship opportunities and supervisor feedback, as well as in work and social satisfaction, after employees moved from a conventional to an open office.

Earlier research also supports the proposed relationship between interpersonal experiences and employee reactions (Hackman and Lawler, 1971; Oldham and Brass, 1979). Oldham and Brass (1979) found substantial associations between employees' work and social satisfaction and measures of supervisor and coworker feedback, friendship opportunities, and interpersonal conflict.

**Job experiences.** Office characteristics might affect employee reactions, e.g., satisfaction and discretionary behavior, through their influence on employees' job experiences. This possibility suggests that office characteristics affect employees' perceptions of the attributes of the work they do, which, in turn, affect their reactions to their work and work setting.

Offices that facilitate interpersonal contact may affect employee perceptions of job autonomy, task identity, and task significance. For example, in such offices employees are likely to experience little autonomy, because many unwanted intrusions may interfere with or infringe upon their discretion and freedom to work. Employees may also experience low task identity (i.e., the degree to which a job requires completion of a whole and identifiable piece of work) in such offices, because they can become aware of the work of others and, therefore, of the continuation of the work process in the office. The product of the entire office is, therefore, likely to be considered the whole unit of work, and the employee's contribution perceived as just one small part of this product.

The association between offices that facilitate interpersonal contact and task significance (i.e., the degree to which a job has a substantial impact on the lives or work of other people) can be either positive or negative. When employees are able to observe and appreciate the impact of their work on the lives and work of colleagues, they may perceive their task as significant or insignificant, depending on its actual effect on the lives or work of others.

Employees whose job experiences are unsatisfactory, i.e., characterized by low levels of autonomy, identity, and significance, are likely to be dissatisfied with their work and work setting. Such employees may also (1) leave the office during discretionary time to avoid unpleasant job experiences and (2) leave few markers around their workspaces, since they are likely to have unpleasant associations with their workplace.

Earlier research provides support for the proposed relationships between office characteristics, job experiences, and employee reactions. Several studies have shown that characteristics of offices that facilitate interpersonal contact relate significantly to employees' job experiences. Schuler, Ritzman, and Davis (1980), examining relationships between employee proximity to others and ratings of job autonomy and satisfaction, found that
employees reported low autonomy and satisfaction when close to many coworkers. Szilagyi and Holland (1980) found that employees who experienced a density increase after an office changeover reported significantly lower job autonomy than before the move; employees who experienced decreases in density reported greater autonomy. Finally, Oldham and Brass (1979) found significant decreases in task identity and task significance after employees moved from a conventional, closed office to an open office.

Earlier studies also support the proposed relationship between job experiences and employee reactions (Hackman and Lawler, 1971; Hackman and Oldham, 1975). Hackman and Oldham (1975) found significant, positive associations between employees' work and interpersonal satisfactions and the amount of autonomy, identity, and significance associated with their jobs.

Environmental experiences. Office characteristics might affect employee reactions through their influence on employees' experiences with the environment of the office itself (crowding, concentration, privacy). Office characteristics that facilitate interpersonal contact are likely to have a generally negative effect on employees' evaluations of the environment. For example, employees may experience such offices as crowded because coworkers are in close proximity and have easy access to their personal workspaces. Employees may also have trouble concentrating in such offices. They may find it difficult to avoid interpersonal contact, which may lead to numerous distractions for the typical employee. Furthermore, since employees in such offices have little protected space and are in close physical proximity to their colleagues, an employee's behavior can be monitored by his or her coworkers and supervisor. The result of this is likely to be a perceived lack of privacy.

Employee reactions may be substantially affected by their environmental experiences. Employees in crowded offices and in offices that offer little opportunity for privacy and concentration are likely to find the space unpleasant and to experience low satisfaction with the office itself. Moreover, these experiences may spill over to employees' feelings about their work and social relationships. Finally, employees who experience the environment as unpleasant are likely to (1) leave the office during discretionary times and (2) not mark their area with personal items that signify ownership.

Earlier investigations support the proposed relationships between office characteristics, environmental experiences, and employee reactions. Some studies have demonstrated that employees' environmental experiences are influenced by characteristics of the office environment (Hundert and Greenfield, 1969; Sundstrom, 1975; Baum and Davis, 1976; Sundstrom, Burt, and Kamp, 1980). Schiffenbauer et al. (1977) found that if all other architectural features were held constant, dark dormitory rooms were judged by residents as more crowded than light rooms. Desor (1972), examining the impact of room partitions on the number of simulated figures (representing people) placed in scaled-down rooms, found that fewer figures were placed in unpartitioned (accessible) rooms than in partitioned rooms, regardless of the types of partitions used (i.e., waist-high barriers, glass walls, or solid walls). Desor
concluded that these results indicated that individuals felt less crowded in partitioned rooms. Boyce (1974) found that lack of privacy was a major complaint of employees one year after moving from a conventional office to an open office. Finally, Langer and Saegert (1977) found that customers of a grocery store felt more crowded and less comfortable during high density periods than during low density periods.

Earlier research also supports the proposed relationship between employees' environmental experiences and reactions to the work and work setting. Sundstrom, Burt, and Kamp (1980) found negative relationships between perceived crowding and employees' job and workspace satisfaction. The study also showed positive relationships between experienced privacy and the measures of satisfaction. Oldham and Brass (1979) found positive associations between employees' ability to concentrate at work and their satisfaction with work and social relationships.

The present study was designed to examine the extent to which these three sets of intervening variables — interpersonal experiences, job experiences, and environmental experiences — were effective in explaining the relationships between office characteristics and various employee reactions to the work and work setting.

METHOD

Research Setting and Subjects

The research was conducted in 19 offices of a large Midwestern university. The number of employees working in the offices ranged from 2 to 31. Data were collected from 114 full-time employees, 93 percent of whom were women. All employees worked on clerical jobs, which were at approximately the same level in the university and involved very similar duties. The median education level was "some college experience."

Procedure

All data were collected on site by one of the authors or an associate. A Job and Workplace Survey was administered to groups of employees (ranging from 2 to 15 at a time). The intervening variables, satisfaction variables, and discretionary-time variable were measured in this questionnaire. All subjects were asked to put their names on the questionnaire so that a feedback report summarizing participants' responses could be provided to them. They were assured that their responses would be confidential and were given the option of not participating. All employees agreed to complete the questionnaire.

The researchers evaluated the characteristics of each of the 19 offices for openness, office density, workspace density, architectural accessibility, darkness, and spatial markers at the workspace. These characteristics were typically evaluated during the noon hour, when employees were absent.

Office Characteristics

1. Openness. The overall openness of each office was measured by a method developed by Gump and Ross (1977), in which openness was operationalized as the ratio of total square footage of the office to the total length of its interior walls and partitions. Thus, offices with few interior walls and partitions...
have higher openness quotients than offices of equal area with many interior boundaries.

2. **Office density.** The overall density of the office was calculated by dividing the total square footage of the office by the total number of employees who worked in the office. This value was then reverse-scored; thus, the higher the score, the less space per employee, and the more dense the office.

3. **Workspace density.** The density of the immediate workspace was assessed by calculating the number of coworker workspaces within a 25-foot walking distance of each employee's desk (Sundstrom, Burt, and Kamp, 1980). The more workspaces within 25 feet of the employee's desk, the greater the workspace density.

4. **Architectural accessibility.** The number of walls and partitions that surrounded each employee's individual workspace determined accessibility. Doors that could be closed were counted as walls. Partitions were counted as walls if they were 4 feet or more high. The fewer boundaries surrounding a workspace, the more architectural accessibility.

5. **Darkness.** For this measure, (1) the color of the office walls and (2) the level of office illumination were rated on a three-point scale ranging from light to dark. Scores on the two measures were then combined to form an office-darkness index (alpha = .59). This measure of office darkness is relatively crude, given the complexity of the characteristic it is intended to measure and given that other variables, such as intensity and distribution of light, are also relevant. However, the measure is intended as a first approximation of this dimension to ascertain if further investigation, with a more complex measure, is warranted.

The relationships among the office characteristics are shown in Table 1. Although the five characteristics tend to be related to one another, only one of the correlations is of substantial magnitude: high-density workspaces tend to be located in open offices. Overall, the level of interrelationship among the five characteristics does not prevent their use as separate variables in the substantive analyses to follow.

### Table 1

<table>
<thead>
<tr>
<th>Office characteristics</th>
<th>X</th>
<th>SD</th>
<th>Openness</th>
<th>Office density</th>
<th>Workspace density</th>
<th>Accessibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
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<td>38.3</td>
<td>-22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office density</td>
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<td>52.4</td>
<td></td>
<td>.49*</td>
<td>.13</td>
<td></td>
</tr>
<tr>
<td>Workspace density</td>
<td>5.3</td>
<td>2.4</td>
<td>.07</td>
<td>.05</td>
<td>.33*</td>
<td>.27*</td>
</tr>
<tr>
<td>Accessibility</td>
<td>2.0</td>
<td>.9</td>
<td></td>
<td>.03</td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>Darkness</td>
<td>1.7</td>
<td>.5</td>
<td>.26*</td>
<td></td>
<td></td>
<td>.27*</td>
</tr>
</tbody>
</table>

*p < .01 (two-tailed)

### Intervening Variables

The variables expected to intervene between office characteristics and employee reactions were grouped into three types of experiences: interpersonal experiences (conflict, friendship opportunities, agent feedback), job experiences (task signifi-
Office Characteristics

cance, autonomy, task identity), and environmental experiences (crowding, concentration, privacy). The items used to tap each variable were averaged to form a summary index.

1. **Conflict**, the degree to which the employee perceived conflict as existing in the office, was measured by five items suggested by Walton, Dutton, and Cafferty (1969).

2. **Friendship opportunities**, the degree to which employees had the opportunity to develop close friendships on the job, was measured by three items provided by Hackman and Lawler (1971).

3. **Agent feedback**, the degree to which the employee received clear information about his or her performance from supervisors or from coworkers, was measured by six items developed by Hackman and Oldham (1975) and Oldham and Brass (1979).

4. **Task significance**, the degree to which the job had a substantial impact on the lives or work of other people, whether in the immediate organization or in the external environment, was measured by three items from the Job Diagnostic Survey (JDS) (Hackman and Oldham, 1975, 1980).

5. **Autonomy**, the degree to which the job provided substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out, was measured by three JDS items.

6. **Task identity**, the degree to which the job required completion of a "whole and identifiable piece of work," was measured by three JDS items.

7. **Crowding**, the degree to which the employee felt crowded at work, was measured by six items developed for this study.

8. **Concentration**, the degree to which the employee was able to concentrate on his or her job, was measured by three items provided by Oldham and Brass (1979).

9. **Privacy**, the degree to which the employee experienced his or her workspace as private (i.e., being able to control the interaction of others) (Rapoport, 1972), was measured by five items developed for this study.

### Table 2

<table>
<thead>
<tr>
<th>Intervening variables</th>
<th>( \bar{X} )</th>
<th>SD</th>
<th>( \alpha )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interpersonal experiences</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Conflict</td>
<td>3.9</td>
<td>1.5</td>
<td>.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Friendship opportunities</td>
<td>5.4</td>
<td>1.2</td>
<td>.64</td>
<td>-.24*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Agent feedback</td>
<td>3.8</td>
<td>1.4</td>
<td>.83</td>
<td>-.35*</td>
<td>.26*</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Job experiences</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Task significance</td>
<td>5.6</td>
<td>1.3</td>
<td>.67</td>
<td>-.12</td>
<td>.30*</td>
<td>.36*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Autonomy</td>
<td>4.6</td>
<td>1.4</td>
<td>.73</td>
<td>-.04</td>
<td>.26*</td>
<td>.21</td>
<td>.31*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Task identity</td>
<td>4.7</td>
<td>1.6</td>
<td>.72</td>
<td>.01</td>
<td>.15</td>
<td>.07</td>
<td>.27*</td>
<td>.36*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental experiences</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Crowding</td>
<td>4.6</td>
<td>1.6</td>
<td>.83</td>
<td>.29*</td>
<td>-.16</td>
<td>-.09</td>
<td>.01</td>
<td>-.17</td>
<td>-.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Concentration</td>
<td>4.4</td>
<td>1.4</td>
<td>.77</td>
<td>-.39*</td>
<td>.24*</td>
<td>.27*</td>
<td>.18</td>
<td>.22</td>
<td>.14</td>
<td>-.36*</td>
<td></td>
</tr>
<tr>
<td>9. Privacy</td>
<td>1.8</td>
<td>1.1</td>
<td>.68</td>
<td>-.34*</td>
<td>.08</td>
<td>.21</td>
<td>.08</td>
<td>.13</td>
<td>.28*</td>
<td>-.42*</td>
<td>.32*</td>
</tr>
</tbody>
</table>

*\( p < .01 \) (two-tailed)
The relationships among the nine intervening variables are shown in Table 2. Although the variables tend to relate significantly to one another, only one of the correlations is of substantial magnitude: employees who feel crowded at work also experience little privacy.

Reactions
1. Work satisfaction, the degree to which the employee was satisfied and happy with the job, was measured by averaging nine items from the "general" and "growth" satisfaction sections of the JDS.
2. Social satisfaction, the degree to which the employee was satisfied with coworkers and supervisors at work, was measured by averaging six items from the "social" and "supervisory" satisfaction sections of the JDS.
3. Office satisfaction, the degree to which an employee was satisfied with the office setting itself, was measured by averaging five items developed for this study.
4. Discretionary time, how employees typically spent their coffee-break time, was measured by assigning a score of 2 to employees who remained in their offices during break, and a score of 1 to those who left.
5. Spatial markers, personal, nonuniversity-related items (e.g., plants, posters) placed on the employee's desk or in the area around the desk were measured by summing them. Interviews with employees and office managers indicated that employees had complete discretion to place personal items around their workspaces. There were no rules preventing (or encouraging) the use of spatial markers.

Table 3 shows the intercorrelations among the five reaction measures. Results show positive and significant relationships among the three satisfaction indices. The remaining correlations are positive but not significant. Overall, the magnitude of the correlations is not so large as to prevent the use of five reaction measures as separate variables in the substantive analyses.

Table 3

<table>
<thead>
<tr>
<th>Employee reactions</th>
<th>Work satisfaction</th>
<th>Social satisfaction</th>
<th>Office satisfaction</th>
<th>Discretionary time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work</td>
<td>4.9</td>
<td>1.3</td>
<td>.88</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>5.2</td>
<td>1.3</td>
<td>.88</td>
<td>.65*</td>
</tr>
<tr>
<td>Office</td>
<td>3.4</td>
<td>1.5</td>
<td>.91</td>
<td>.37*</td>
</tr>
<tr>
<td>Discretionary time</td>
<td>1.4</td>
<td>.6</td>
<td>.11</td>
<td>.11</td>
</tr>
<tr>
<td>Spatial markers</td>
<td>4.5</td>
<td>4.7</td>
<td>.19</td>
<td>.18</td>
</tr>
</tbody>
</table>

* p < .01 (two-tailed)

RESULTS

Office Characteristics and Reactions

Table 4 shows that nearly all the correlations between office characteristics and measures of employee reactions are negative — and many are statistically significant. Dense, accessible,
dark offices are correlated with low satisfaction and with coffee breaks outside the office. In addition, spatial markers are not likely to be found in accessible, dark offices. The negative correlation between accessibility and spatial markers may be an artifact. Since the spatial markers index is a summation of personal items on and around an employee's desk, employees may have fewer markers simply because they have fewer walls around them on which to place personal items. However, this possibility is unlikely since the negative correlation between accessibility and markers was replicated when the spatial markers index was based only on personal items on employees' desks.

### Table 4

Correlations between Office Characteristics and Reactions and Intervening Variables

<table>
<thead>
<tr>
<th>Reactions</th>
<th>Openness</th>
<th>Office density</th>
<th>Workspace density</th>
<th>Accessibility</th>
<th>Darkness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>.01</td>
<td>-.17*</td>
<td>-.11</td>
<td>-.05</td>
<td>-.23**</td>
</tr>
<tr>
<td>Social</td>
<td>.01</td>
<td>-.29**</td>
<td>-.02</td>
<td>-.13</td>
<td>-.38**</td>
</tr>
<tr>
<td>Office</td>
<td>.00</td>
<td>-.24**</td>
<td>-.24**</td>
<td>-.18*</td>
<td>-.10</td>
</tr>
<tr>
<td>Discretionary time</td>
<td>-.23**</td>
<td>-.01</td>
<td>-.17*</td>
<td>-.28**</td>
<td>-.30**</td>
</tr>
<tr>
<td>Spatial markers</td>
<td>.11</td>
<td>-.12</td>
<td>-.14</td>
<td>-.50**</td>
<td>-.26**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intervening variables</th>
<th>Office characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openness</td>
<td>.14</td>
</tr>
<tr>
<td>Workspace density</td>
<td>.19*</td>
</tr>
<tr>
<td>Accessibility</td>
<td>.12</td>
</tr>
<tr>
<td>Darkness</td>
<td>.20**</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Intervening variables</th>
<th>Work satisfaction</th>
<th>Social satisfaction</th>
<th>Reactions</th>
<th>Discretionary time</th>
<th>Spatial markers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflict</td>
<td>-.27**</td>
<td>-.51**</td>
<td>-.38**</td>
<td>-.02</td>
<td>-.13</td>
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<tr>
<td>Friendship opportunities</td>
<td>.34**</td>
<td>.50**</td>
<td>.35**</td>
<td>.22**</td>
<td>.08</td>
</tr>
<tr>
<td>Agent feedback</td>
<td>.45**</td>
<td>.60**</td>
<td>.25**</td>
<td>.18**</td>
<td>.17*</td>
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<td>Task significance</td>
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<td>.48**</td>
<td>.18**</td>
<td>.09</td>
<td>.26**</td>
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<td>.33**</td>
<td>.40**</td>
<td>.24**</td>
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<tr>
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<td>.20**</td>
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<th>Reactions</th>
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<th>Spatial markers</th>
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*p < .05 (one-tailed); **p < .01
Office Characteristics and Intervening Variables

Table 4 shows that each of the intervening variables relates significantly to one or more of the office characteristics. Employees tend to have poor interpersonal experiences in offices that facilitate contact among employees; that is, dense, dark offices are associated with low agent feedback, few friendship opportunities, and high interpersonal conflict. The results for the job experience variables are mixed. The more open the office, the more significant employees find their tasks — a result opposite of that obtained by Oldham and Brass (1979). In dense, dark, accessible offices, however, employees tend to experience low task identity, autonomy, and task significance. Several of the correlations between the office characteristics and the environmental experiences are also statistically significant. Employees in dense, dark, accessible offices experience low privacy and concentration, and find the office crowded.

Intervening Variables and Reactions

Table 4 shows that all of the intervening variables relate significantly to two or more of the measures of satisfaction (i.e., work, social, or office) — and in a direction specified in the introduction. Employees tend to be satisfied when they have positive interpersonal, job, and environmental experiences in the office. A careful examination of the correlation coefficients suggests that work satisfaction is most substantially associated with job experiences, social satisfaction with interpersonal experiences, and office satisfaction with environmental experiences.

Results involving the spatial marker and discretionary-time variables are less clear. Two of the interpersonal experiences (agent feedback and friendship opportunities) and two of the job experiences (significance and autonomy) related positively and significantly to these measures. Thus, employees are likely to mark their spaces and to take coffee breaks inside their offices when they have positive job and interpersonal experiences at work. None of the environmental experiences, however, are significantly associated with employees' discretionary time or spatial markers.

Although the correlational results suggest that one or more sets of intervening variables may be effective in explaining the relationship between office characteristics and employee reactions, a more direct and complete test is necessary. It is to this direct test that we now turn.

Explanatory Effectiveness of the Intervening Variables

Hierarchical regression analyses were used to test the extent to which each of the three sets of intervening variables explained the relationship between office characteristics and employee reactions. First, each reaction measure was regressed separately on the interpersonal, job, and environmental intervening variables. Next, each reaction measure was regressed on the combination of (1) office characteristics and interpersonal variables, (2) office characteristics and job variables, and (3) office characteristics and environmental variables. If a set of intervening variables explains the relationship of reactions to office characteristics well, the multiple correlations between that set of variables and the reaction measures should not differ.
significantly from those computed using both the office characteristics and the intervening variables as predictors. In other words, adding the office characteristics should not increase the variance explained over that already explained by the intervening variables.

Results of these analyses are shown in Table 5. Consistent with the correlations reported in Table 4, the results show that the office characteristics explain a significant amount of variance in each of the employee reactions. The F-tests for differences between the multiple correlations for interpersonal experiences and interpersonal experiences plus office characteristics indicate that the interpersonal variables are moderately effective in explaining the relationships between the reaction measures and office characteristics. Adding the measures of office characteristics to the regression equations that already contain the interpersonal variables results in nonsignificant increases for three of the reaction measures: work satisfaction, social satisfaction, and office satisfaction. Discretionary time and spatial markers, on the other hand, are not well explained by the interpersonal variables. The addition of the office characteristics to the regression equations explains variance in these reaction measures significantly beyond that explained by the interpersonal variables alone.

Table 5

| Regression of Reactions on Office Characteristics and Intervening Variables |
|----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                 | Work satisfaction | Social satisfaction | Reactions Office satisfaction | Discretionary time | Spatial markers |
| Office characteristics (OCS)    | .10*             | .20**            | .10*             | .15**            | .30**          |
| Interpersonal experiences       | .25**            | .53**            | .22**            | .06             | .03            |
| Interpersonal experiences + OCS | .29**            | .57**            | .29**            | .20**            | .30**          |
| Job experiences                 | .43**            | .24**            | .16**            | .06             | .08*           |
| Job experiences + OCS           | .47**            | .39**            | .26**            | .18**            | .32**          |
| Environmental experiences       | .09*             | .17**            | .67**            | .02             | .01            |
| Environmental experiences + OCS | .21**            | .34**            | .68**            | .13**            | .34**          |

F-test

|                                 | .13             | 1.86            | 1.97             | 3.50**          | 7.71**         |
| Interpersonal experiences vs.   |                 |                 |                 |                 |                |
| interpersonal experiences + OCS |                 |                 |                 |                 |                |
| Job experiences vs. job         | 1.52            | 3.41**          | 2.70*            | 2.96*           | 7.13**         |
| experiences + OCS              |                 |                 |                 |                 |                |
| Environmental experiences vs.   | 3.07*           | 5.20**          | 0.63             | 4.24**          | 10.10**        |
| environmental experiences + OCS |                 |                 |                 |                 |                |

*p < .05; **p < .01

The results for the job experience variables show that they effectively explain the relationship between office characteristics and work satisfaction. Adding the measures of office characteristics to the regression equation containing the job variables results in no increase in the amount of variance explained in work satisfaction. Results in Table 5 also indicate, however, that the job experience variables do little to explain the relationships between the office characteristics and the four remaining reaction measures.

For the environmental experience variables, the results show that they are very effective in explaining the relationship between the office characteristics and office satisfaction. The
results also indicate that the environmental variables are generally ineffective in explaining the relationships between office characteristics and the remaining reaction measures.

DISCUSSION

The results of this study indicate that the design of office settings can have substantial implications for the way people react in offices. Further studies are needed to identify other office characteristics that might relate to employee responses, for example, the actual distance between an employee and his or her coworkers. A considerable amount of social psychological research suggests that there are substantial relationships between spatial proximity and liking others (Evans and Howard, 1973; Altman, 1975).

Employees might also respond differently in an office when they have “visual access to others” (Archea, 1977) than when they do not, and so are unable to monitor others’ behaviors. Furthermore, although results of this study indicate that office darkness relates significantly to several measures of employee reactions, it is not clear which elements of darkness (e.g., lighting, window placement, wall color) affect employees most. The complexity of the characteristics of office darkness needs to be measured, including such aspects as positioning, intensity, and distribution of light within an office (Hayward, 1974).

More work is also needed to assess the impact of the office setting on other employee reactions, such as work performance, attendance, or even nonverbal behavior. Finally, the discretionary behavior of employees needs to be explored further.

The results of this study, examining the extent to which the three sets of intervening variables explained the associations between the office characteristics and reactions, suggest that the office characteristics examined affect employees’ affective reactions through their impact on individuals’ experiences in the office environment — especially their interpersonal experiences. None of the intervening variables effectively explained the significant relationships between the office characteristics and spatial markers and discretionary time. Using markers may reflect something other than ownership, as assumed in this study. And perhaps none of the intervening variables included in this study were connected conceptually to the actual meaning of spatial markers. It is possible that employees remain in offices during coffee break for reasons other than the quality of their interpersonal or job experiences. Employees may remain in offices during break time because coffee is provided in these offices or because the offices are far from attractive locations where one might spend a break period. More research is needed to understand why some people mark their workspaces and spend discretionary time in their offices.

Several of the results obtained in the study should be interpreted with caution. First, the study focused only on clerical employees, mostly women; thus, the results may not be generalizable to other groups, e.g., men or managerial or professional employees. Second, many of the intervening variables (e.g., autonomy) and reaction measures (e.g., work satisfaction) were included in the same questionnaire. Therefore, common-method variance may have inflated the associa-
Office Characteristics

tions among these variables, influencing both the correlational and regression results. Previous studies, however, by Oldham, Hackman, and Pearce (1976), Algera (1983), and others have shown that ratings of work characteristics (e.g., autonomy), made independently by observers, typically correlate as strongly with incumbents’ reactions as do the incumbents’ own ratings of the work characteristics. These findings suggest that the results obtained here are not simply a product of response-response error.

Finally, although the results of this research have been discussed as if it were unequivocal that the objective characteristics of offices relate causally to employee reactions, the study was not a true experiment, and causal interpretations are not technically justified. However, there are reasons to believe that the causal direction is as proposed. Many of the results of this study are consistent with previous laboratory and field experiments (Baum and Davis, 1976; Heller, Groff, and Solomon, 1977; Oldham and Brass, 1979). For example, this study showed a positive and significant relationship between density and crowding — a result that has been documented in numerous laboratory studies (e.g., Worchel and Teddlie, 1976). Furthermore, it is hard to imagine reaction measures such as satisfaction and discretionary time influencing the characteristics of office settings. It seems unlikely that unhappy employees would tend to gravitate to dense, dark offices or that these employees somehow alter the characteristics of their offices to fit their particular attitudes. Nevertheless, these possibilities cannot be dismissed, given the research design used in this study, and more experimental studies of the relationships between office characteristics and employee reactions are needed.

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