

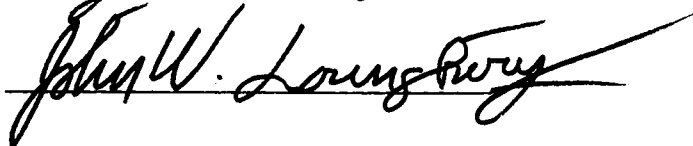
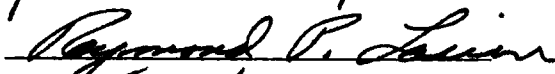
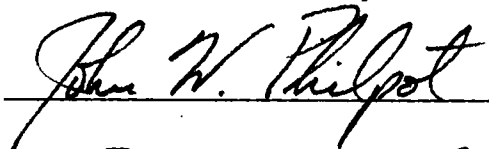
To the Graduate Council:

I am submitting herewith a dissertation written by Jeraldine Price Town entitled "Effects of Participation in Office Design on Satisfaction and Productivity." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

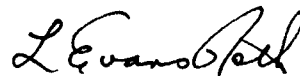


Eric D. Sundstrom
Major Professor

We have read this dissertation
and recommend its acceptance:



Accepted for the Council:



Vice Chancellor
Graduate Studies and Research

EFFECTS OF PARTICIPATION IN OFFICE DESIGN
ON SATISFACTION AND PRODUCTIVITY

A Dissertation
Presented for the
Doctor of Philosophy
Degree
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Jeraldine Price Town
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3065066

Dedicated to

My loving husband, Alan,

and to my parents,

Jack and Freda Price

ABSTRACT

The present research examined the relationship of participation in office design to satisfaction and productivity among office workers. Previous research suggests that participation in organizational decision making has a positive influence on employee attitudes, and may lead to increased productivity; but these effects are often found to be moderated by other factors. In the present study it was hypothesized that design participation would be related to increased environmental satisfaction, job satisfaction, and productivity. Differences due to variations in the degree of participation (consultation versus decision making) were explored along with the possible moderating roles of individual differences, job level, and organizational context. Questionnaire data were collected from 2,630 office employees at 58 locations. Participants completed a comprehensive survey either before relocating to new office facilities, after relocating, or both.

Analysis of the cross-sectional data revealed strong associations between participation and environmental satisfaction, job satisfaction, and motivation. Consultation was associated with increased satisfaction, motivation, and congruence; whereas decision making was related to even greater satisfaction, reduced helplessness, and lower self-rated performance. Examination of job-type differences revealed that participation was more strongly associated with performance ratings among clerical workers, with motivation among managerial and professional-technical groups, and with reduced helplessness among managers.

Individual satisfaction with the level of participation also moderated satisfaction, showing stronger effects among individuals who desired greater participation. Results of the repeated-measures data confirmed the effect of participation in increasing both environmental and job satisfaction regardless of initial differences in satisfaction. Findings are discussed with respect to possible mechanisms through which design participation influences satisfaction. Suggestions for future research and practical applications are noted.

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CHAPTER 1

INTRODUCTION

Over the past few years the importance of user participation in the planning and design of environments has gained wide support. However, surprisingly little research has been directed toward a systematic understanding of the purported benefits of design participation. Existing emphasis has been based primarily on rhetoric, ideology, and assumption rather than on empirical evidence (Wandersman, 1979a). The present study investigates the impact of participation among office workers in design decisions as it affects environmental satisfaction, job satisfaction, and performance.

In the popular literature, participatory design has been seen as a major factor contributing to employees' satisfaction and productivity ("Offices of the 80's," 1980). And in the political arena all major legislation concerning urban planning and design activities as well as environmental modification projects passed in recent years have called for citizen participation in the decision-making process (Zube, 1980).

The growing interest in user participation in design can be considered to be partially a result of increased social science research concerning the relationship between human behavior and attitudes and the physical environment. This includes research in the area of man-environment relations which emphasizes the concepts of "behavior settings" (Barker, 1968) and the fit between the user and the environment (e.g., Altman, 1973; Sims, 1978).

There is also an increased interest on the part of design professionals in the incorporation of social science input into the design solution. The role of such research is to develop: (1) processes for understanding critical social and behavioral issues inherent in a particular design process, (2) a focus on human psychological processes and social-systems mechanisms, and (3) processes of programming and postoccupancy evaluation by which designers can learn to improve upon their design decisions (Conway, 1974). Thus, research on participation in environmental design appears to be warranted on the basis of its implications for a number of areas of interest.

Employee Participation in Decision Making

A number of large scale research and social action programs highlighting participation in decision making, the quality of working life, and worker management recently have been initiated (Dachler, 1978) resulting in a large and rapidly growing international literature in this area. A major factor in these attempts has been the diffusion of responsibility in the direction of giving workers greater control over decisions concerning working conditions. An important aspect of such expanded control involves participation in decisions concerning the work environment itself.

User participation in environmental design may be viewed as a specific form of participation in which workers provide input into the design process in the form of suggestions or decisions concerning their own environments, and much of the reasoning advanced regarding the

effects of participatory social arrangements may be directly relevant to understanding the process of design participation. However, there may also be limiting factors in generalizing from findings in the participation literature to that involving environmental planning (Wandersman, 1979a). In the discussion to follow many of the issues inherent in research on participation are raised, major findings of this literature are reviewed, and in a latter section consideration is given to the importance of such factors in relation to design participation.

Issues in Participation Research

The appeal of participation has its basis in several different approaches or ideological perspectives. Advocates of participation have ranged from those who consider it a natural outgrowth of political and social philosophies of democracy and individual self-actualization (e.g., Argyris, 1957; Bennis, 1966; Locke, 1976) to those who find that participation increases satisfaction (Meyer, Kay, & French, 1965) and productivity (e.g., Coch & French, 1948; Morse & Reimer, 1956). These perspectives may be considered to represent different theoretical or ideological bases with correspondingly different goals and implications (Greenberg, 1975; Dachler, 1978). The lack of explicit recognition of underlying theoretical bases in much of the participation research is an important reason for the difficulty in interpreting the research on this topic.

Within the frame of reference of traditional Democratic theory, participation is tied to the goals of self-governance and self-

determination. Concern is focused on the health and development of the human personality and the ideal of a truly democratic society. The Marxist Socialistic perspective has a similarly broad view of participation. In this view, participation is a means through which workers gain an increase in control of the production process as well as the education and development necessary to eventually supplant capitalist managers. Both of these perspectives view participation as a general social phenomena with implications for the institutions, organizations, and individuals in society.

Another set of theories consider participation within a narrower scope. The human growth and development perspective is based on the tension between the classical Weberian model of organizations which seeks stability and efficiency through autocratic control and increasing differentiation and fragmentation of work, and more recent personality and motivation theories emphasizing personality growth and the development of individual potential (e.g., Herzberg, 1966; Likert, 1967; Maslow, 1954; McGregor, 1960). In this perspective participation is thought to have its effect through enhanced mental health, creativity, self-esteem, increased sociability, and greater maturity and responsibility. These individual effects are in turn thought to result in improved industrial efficiency, stability and productivity. A final perspective arises from direct concern with production and efficiency per se and addresses itself to widespread dissatisfaction and alienation in the work force. This position assumes that participation increases satisfaction, morale and commitment toward issues on which people are allowed to participate (Coch

& French, 1948) and emphasis is placed on the relevance of participation to the work itself (e.g., Lawler & Hackman, 1969; Lowin, 1968).

These different theoretical orientations, while not necessarily contradictory, are based on different assumptions about human nature and lead to different conceptions of the context within which participation is to occur, the characteristics of participatory social arrangements, and the eventual outcomes to be derived from participation. For example, from the perspective of productive efficiency one might assume that it is the output of participatory activity (in the sense that it consists of organized problem solving and joint decision making) that results in increased productivity. Participation is based on economic value for the organization and worker satisfaction is not necessarily a causal variable (Rosenberg & Rosenstein, 1980). In contrast, the human growth and development paradigm would assume that participation increases motivation and therefore both productivity and satisfaction.

This brief overview of the major tenets of these theoretical traditions is obviously oversimplified, but it does allow us a heuristic framework within which to view some of the important findings in the participation literature. It also delineates the reasoning behind the large number of expected benefits of participation and contradictions that sometimes arise.

Several authors have recognized that the effects of participation are moderated by a large number of interacting variables operating at the individual, group, organizational, and societal levels (e.g., Singer, 1974; Lowin, 1968; Dachler & Wilpert, 1978) which affect the

type and quality of participatory arrangements. Each of the above theoretical orientations differs with respect to which of these categories it concentrates on and which factors it emphasizes. Participatory arrangements based on these different perspectives differ with respect to direct versus indirect (or representative) participation, formal (or legitimate) versus informal participation, as well as along dimensions of intensity, social range, complexity and importance of the decisions involved.

Effects of Participation

Participation has been discussed under a number of topic headings including participatory decision making, industrial democracy, power equalization, worker management, and democratic leadership to name a few. However, regardless of the degree, content, or scope of participatory arrangements, the concept is generally used to refer to some form of joint decision making. Thus, participation could occur through various forms, to various degrees, and within any conceivable content area.

The expected benefits of participation include: increased creativity, morale, self-esteem, independence, and responsibility among workers, along with decreased hostility, competition, alienation, and anxiety--all of which can be considered to be associated with greater morale and satisfaction. Another broad category of effects concerns increased productive efficiency, including higher production, better decision quality, better production quality, and reduced conflict (Locke

& Schweiger, 1979). In addition, participation is also often thought to result in increased decision acceptance and improved communications and human relations.

However, as pointed out by Locke and Schweiger (1979), the mechanisms by which participation brings about these effects are less frequently discussed. Their analysis points to the possibility that participation as a means of value attainment (e.g., self-expression, respect, influence, equality, etc.) is one explanation for the effects of participation on satisfaction and morale. Of course, this reasoning must take into account individual differences in wants and values.

They also consider both cognitive and motivational factors as important in producing increases in productive efficiency. For example, research on group decision making (e.g., Maier, 1967; Kelley & Thibaut, 1968; Davis, Laughlin, & Komorita, 1976) suggests that group decision making may result in greater knowledge, information and creativity being brought to bear upon a problem. An important assumption is that group members actually have relevant knowledge and that the group process will lead to greater utilization and integration of knowledge, which may be debatable (e.g., Janis, 1972; Vroom, 1969). Additionally, participation may result in greater understanding of decisions by those who are affected. Motivational mechanisms include reduced resistance to change (Coch & French, 1948) possibly due to greater trust (Lawler, 1974; Davis, 1973) or a greater sense of control (Locke & Schweiger, 1979). Increased commitment, ego-involvement and group support are other possible motivational factors related to productivity.

Although it is beyond the scope and purpose of the present paper to provide a comprehensive review of the participation literature (see Jain & Jain, 1980; and Locke & Schweiger, 1979, for recent reviews), a synopsis of the major findings in the literature is provided below.

Research involving participatory decision making has often been carried out through field experiments and field studies within organizational contexts. Positive results of such interventions have often been documented (see Singer, 1974; and Lowin, 1968). These findings include positive relationships between various aspects of participation and increased acceptance of managerial ideas and changes, cooperation between management and workers, productivity, morale, motivation toward organizational objectives, commitment to organizational goals, and reduced turnover, absenteeism, grievances, tension and stress. Other researchers report that participation is positively related to job satisfaction (Lischeron & Wall, 1977) and job involvement (Rabinowitz & Hall, 1977).

However, negative results and reports of failures in attempted organizational changes through participatory methods are also evident in the literature. Both Powell and Schlecter (1970) and Lowin (1968) describe studies in which productivity either did not improve as participation increased, or productivity actually decreased. Locke and Schweiger (1979) found that the link between participation and productivity is highly tenuous and often nonexistent but that participation was related to increases in employee satisfaction in about 40% of the instances cited. Powell and Schlecter (1970) conclude that, "while

participative management techniques may produce more involved, happy workers, it does not necessarily achieve productive results for the organization" (p. 165).

Other research suggests that participation may not always be positively viewed by workers. Argyris (1957) reports a study in which the introduction of participatory decision-making opportunities led to "confusion, anxiety, and frustration on the part of the employees" (p. 215). In surveying research by Van der Velden on the functioning of Dutch work councils, Mulder (1971) reports that half the voluntary work members of work councils were not strongly motivated to participate in decision making while the other half complained of having insufficient expertise. Similarly, Obradovic (1975) describes an observational study of Yugoslavian workers' councils which included 20 companies over a three-year period. The results indicated that deliberations in these councils are largely dominated by high-level managers and technical experts rather than actual workers.

It is also important to note that several legitimate criticisms have been raised concerning many of the studies that have been conducted in field settings. Often broad and diverse changes have occurred along with the introduction of participatory arrangements, limiting the unambiguous demonstration of an essential link between participation and productivity (Lawler, 1971). Additionally, Wall and Lischeron (1980) discuss the effect of participation on various measures of job satisfaction and point out that while the association between the two has been well established, the causal direction of the relationship has not

been established at all. This criticism may be extended to include participation effects on productivity as well, considering the pervasive problems in establishing the internal validity of previous participation studies.

The ambiguity surrounding questions concerning the effectiveness of participation suggests that numerous other variables may bear important relationships to the success or failure of participatory practices. These include individual or personality variables, organizational characteristics, job context and job level.

Although it is reasonable to expect that workers would not all have equal desire for and reactions to participation, the empirical literature on this question remains equivocal. Vroom (1969) reported that the individual difference variable of need for independence moderated the effects of participation on behavior; however, a recent attempt to replicate this finding by Tosi (1970) failed. Trow (1957) found that need for autonomy interacted with degree of autonomy in determining satisfaction. More recently, Hackman and Lawler (1971) found a measure of higher order need satisfaction to be significantly correlated with autonomy, variety, task identity, and feedback; and measures of motivation, satisfaction, performance and attendance. Other studies have found similar effects on measures of desire for and legitimacy of participation (e.g., Tannenbaum, 1954; French, Israel, & Aas, 1958).

Organizational factors (e.g., general mission of the organization, managerial climate, etc.) may also influence the effectiveness of

participation if they result in a rigid structure resistant to the necessary changes implied by greater participation. Group decision making would be expected to be ineffectual to the extent that few organizational levels are included and useful information is lacking at lower levels (Lowin, 1968). Leavitt (1965) pointed out that limits to the feasibility of group decision making could also result from organizational size and complexity.

Job context and job level variables are also important in determining participation effectiveness. For example, simple tasks with little room for creativity are often accomplished more effectively under autocratic management (Singer, 1974). Further, the need for autonomy and self-expression also have been found to be related to the particular hierarchical level of the job (e.g., Rabinowitz & Hall, 1970). In higher organizational levels, complex problems and demands may be more facilitative of participatory approaches. On the other hand, while it is often asserted that participation will be less effective among employees with low job involvement, low need for achievement, or low commitment to organizational goals (Fein, 1976; Singer, 1974), participation has often been found to be associated with enhanced motivation among such populations (e.g., Carroll & Tosi, 1977; Lawler & Hackman, 1969). Locke and Schweiger (1979) suggest that a possible explanation for this apparent paradox is that employees with low motivation feel powerless and unefficacious and that participation gives them a feeling of greater control.

Design Participation

The above discussion of the major issues and findings in the participation literature is relevant to environmental design participation in a number of ways. First, to the extent that participatory decision making as a process is independent of the content of decision areas, direct parallels can be assumed between participation in general and design participation. However, the issue of the generality of participation effects must be raised here. Strauss (1963) referred to this as the problem of "generalization"--the extent to which the impact of participation in one area carries over into a more positive attitude and orientation generally. He suggests that carry-over effects are most likely when participation leads to more balanced interactive patterns between workers and management and/or when it tends to reduce workers' resentment.

A second parallel between participatory decision making and design participation is that the widespread interest and support for the concept of design participation can be considered to arise from some of the same ideological perspectives as those discussed above. For example, the concept of citizen participation in the planning of local social programs and urban development projects is based both on Democratic postulates and on behavioral scientists theories of participation (Spiegel, 1968). Sommer (1969; 1972; 1974) has written extensively on the social implications of architecture and the role of user participation in design as a political issue. Additionally,

managers and professionals in work place design have embraced the idea that employees' participation in creating their own work spaces leads to improved attitudes, satisfaction and morale (Magnus, 1981). This thrust seems to be based on the idea of allowing self-expression in order to enhance personal growth and development. Providing users with some choice and control over their environments is thought to provide wide ranging attitudinal and behavioral effects.

Other parallels between the literature on participation and that directly concerning environmental design participation can be found in the discussion of issues in design participation research which follows.

Empirical Findings on Participatory Design

Despite the wide interest in environmental design participation, very little empirical research has been addressed to this area. Wandersman (1979a) concludes that research on this topic has been limited, confounded and unsystematic. In a later paper (1979b) he elaborates upon some of the important dimensions of design participation. This analysis provides a useful starting point for discussion.

Participation in design decisions is considered to differ along the dimensions of: (1) setting and scale, (2) stage of the design process, (3) type of participant, (4) type of participation, and (5) techniques of participation. Whereas most of the research on participatory decision making has concerned work settings, design participation can take place in various settings (e.g., residential, recreational, etc.). Variations in scale refer to differences in the range (e.g., extent of

the project in terms of size and number of persons affected) and complexity (e.g., difficulty, cost, etc.) of the participatory arrangement.

As there are different stages in the decision-making process, various steps or stages in the design process also have been identified (Zeisel, 1975). The first step in both processes refers to the definition of the problem and goals of the solution, and the second step refers to the generation and choice between possible solutions. The third stage set forth by Zeisel (1975) concerns the implementation of the decision, which in the case of environmental design is thought to refer to construction, but may also be construed to represent the idea of optimal utilization of the environment. The potential for participation exists at any and all of these stages.

The type of participant refers to the roles of various individuals in the design process. As there may well be differences among any group of persons involved in a decision-making endeavor, and the problem of design is no exception. Design experts are in the position of integrating needs and wishes of both paying clients and users (if they are different) just as managers must balance the needs and values of employees with those of the organization (including directors and stockholders). Users themselves have different wants, roles and statuses; and perhaps more importantly, different levels of expertise and knowledge relevant to design. Locke and Schweiger (1979; p. 326) considered the "separation of responsibility from knowledge" to be the key issue in limiting the practice of participatory decision making.

Lack of sufficient expertise is also considered by workers to be a major problem in participation (e.g., Mulder, 1971).

Sommer (1972) has suggested that while this is a point well taken it is also limited, and that the obvious solution is to educate people so that they can take part in design decisions. A small amount of research in environmental design has addressed the issue of training people in design techniques (e.g., Salvadori, 1977; van Wagenberg, Krasner, & Krasner, 1981). The results of this research suggest that with very little training in basic design concepts even children as young as eight or nine years old can acquire knowledge relevant to the design process. Along the same lines, Kaplan (1977) presents evidence regarding the efficacy of the use of simple models, as opposed to the highly complex models generally used in design presentations, in increasing peoples' understanding and conceptualization of design issues.

The "expert" argument proposes that it is not beneficial (and may even be detrimental in terms of quality and time) for users to participate in design decisions and further assumes that the objective quality of the environment determines user satisfaction (e.g., Goldblatt, 1968). On the other hand, the humanistic position would hold that satisfaction comes about through participation. Increased ego involvement and greater feelings of control brought about by participation may be more important determinants of satisfaction than external criteria of quality (cf., Wandersman, 1979a).

One study relevant to this point was conducted on a university campus and involved students designing and building their own living environments (Corbett, 1973). Although the student-built housing was "objectively" evaluated as crude and unaesthetic, student participants reported a high degree of satisfaction both with the experience and with the physical qualities of their dormitories. Another study carried out by the Research and Design Institute of Providence, Rhode Island in conjunction with the University of Rhode Island, obtained considerable student input in planning the renovation of a run-down dormitory. While resident satisfaction after remodeling was not significantly higher for the experimental dormitory than for other dormitories on campus (possibly because student expectations were frustrated due to a reduction in available funds), the dormitory did climb from the least preferred on campus to among the most preferred (Friedman, Zimring, & Zube, 1978). Unfortunately, in this study it was not possible to separate the effects of participation from those due to the improved quality of the environment.

Another dimension of participatory design concerns the "type" or degree of participation engaged. Design participation can range from total design and decision-making power through consultation roles, to no participation. Few studies have examined the effects of various degrees of participation in environmental design on user satisfaction. Wandersman (1979a) manipulated degree of participation (self-planning, choice among alternatives, no participation) in a simulation study in which students participated to various degrees in designing dormitory rooms. The

results indicated that participation, either in the form of self-planning or choice, led to greater satisfaction than no participation. The same pattern of results also was found on measures of the degree to which the design suited the needs and values of the participants and on feelings of control. Students in both participation conditions also reported feeling more creative, helpful and responsible, and less anonymous and alienated.

Participation in design also can take place through a variety of techniques, and for different purposes. The most widely used method for citizen participation currently in practice takes place through public hearings. Unfortunately, such meetings generally occur at a rather late stage in the design process and the purpose more often than not is for designers to sell the participants a "bill of goods" or finished design rather than to gain input. Other methods include modeling and surveys to determine initial needs. Kaplan and Kaplan (1978) discuss the importance of determining environmental preferences of a population of possible users (e.g., in the development of a recreational area) and also suggest the role of survey data as a form of participation.

There is some evidence to indicate that design participation may result in greater acceptance of changes in the environment. One study, conducted in an institutional setting, found that inmates allowed to offer opinions and suggestions concerning planned improvements in the prison grounds were more willing to volunteer their labor than others who did not participate (Lounsbury & Tornatsky, 1975). In addition, citizen participation in urban renewal projects is thought necessary to

ensure support and to subvert potential opposition on the part of the residents (Goldblatt, 1968).

In the field of office design Lou Harris and associates (1978), reporting the results of the second Steelcase Survey, point to the negative effects of a lack of participation for workers moving into an open plan office. They conclude that there was:

. . . too little consultation with office workers affected by change, too much avoidance of the privacy issue by office decisionmakers, too little understanding by office workers of the reasons office decisionmakers feel the open plan office has important advantages over a conventional plan office, and too little dialogue between office workers and office decision-makers about potential drawbacks. (p. vii, author's summary)

Variables that Mediate or Moderate Participation Effects

Wandersman (1979b) points to the importance of mediating variables such as the congruence of the environment with individual needs and values and the sense of mastery and control that may come through participation as determinants of effects on satisfaction and attitudes. Individual differences such as personality, environmental preferences (e.g., importance of the issue, desire to participate), and the relation of the individual to the designed environment may be important moderator variables. For example, in the simulation study described above (Wandersman, 1979a) participation was found to have independent associations with both evaluations of congruence between the environment and needs and values and feelings of control. However, there were no substantial differences due to the individual difference variables of locus of control or need for independence. Farrenkopf and Roth (1980)

and Farrenkopf (1974) in surveys of faculty attitudes toward their offices found only marginal relationships between being able to choose one's office location and satisfaction.

In this review of the literature and research in environmental design participation we find a good deal of similarity, both in the presumed effects and the hypothesized processes used to explain them, to those put forth in the participatory decision-making literature. Environmental design participation as a field of inquiry, however, remains relatively unexamined. What is needed is a greater empirical understanding based on systematic examination of various theoretical positions. Perhaps investigators in this area can both draw on the larger body of research on participation and learn to avoid making the same mistakes that characterize previous research while proceeding in this endeavor.

Summary of Previous Research on Participation

From this overview of research on participatory decision making in general and design participation in particular, it can be seen that the greater portion of this literature comes from a variety of sources, addresses quite diverse questions, and does not readily form an integrated theory of participation. However, several general conclusions can be drawn from previous research.

First, participation can be viewed along a continuum from no participation to complete control over particular decisions and including various possibilities between the two extremes. Several other

dimensions of participatory arrangements concerning the setting, the participants, and the point in the decision or design process in which participation takes place may also play an important role in determining participation effectiveness.

Second, participatory decision making has frequently been found to have effects on affective, attitudinal, and behavioral responses of individuals. In work situations, participation has been found to affect job satisfaction and acceptance of change, but it is less frequently found to have positive effects on productivity. Although design participation has been found to be related to environmental satisfaction in residential settings, little research has addressed this effect in relation to work settings.

The fact that some studies have found positive relationships between participation and productivity, whereas others found negative or no relationships, suggests the possibility that participation may have a positive relationship with one type of performance (say quality) and a negative relationship with another (e.g., quantity), and that both relationships may be moderated by several factors. Individual level variables such as relevant knowledge and the desire to participate operating at the individual level and contextual variables such as job level and organizational support may be important determinants of participation effects for various groups of persons. Another possibility is that participation may have its effects on productivity through job satisfaction (Srivasta et al., 1975).

A third conclusion to be drawn from previous research is that participation generally leads to increased involvement, autonomy, and cooperation; greater feelings of control, and less alienation. This finding is relevant to the question of variables which may mediate between participation and particular outcomes. Possible explanatory concepts for participation effects include value attainment (or congruence between outcomes and needs and values), increased motivation, and enhanced autonomy or feelings of control among others.

CHAPTER 2

THE PRESENT RESEARCH

The study to be described is part of a larger project (BOSTI, 1982) concerned with the impact of the physical environment on job satisfaction and productivity. The design of the research is that of a quasi-experimental field study utilizing a national sample of office workers in a large variety of organizations and settings.

The purposes of the present study were: (1) to assess the importance of degree of participation by separating participatory activity into three distinct types along a continuum from no participation to total decision-making authority; (2) to investigate the relationship of participation in office design to environmental satisfaction, job satisfaction, and productivity among office workers; (3) to evaluate the relationship of participation to two possible mediating variables--congruency between the designed environment and the needs and values of workers, and feelings of control; and (4) to assess the role of individual differences in desire to participate, as well as job and organizational variables in moderating the effects of participation on the criterion variables.

Degree of Participation

From the previous discussion of the participation literature, it can be seen that the concept of participation is complex and that

participation can differ along a number of dimensions. One such dimension is that of degree (e.g., Sadler, 1970; Vroom & Yetton, 1973). Little previous research has been directed toward determining the differential effects of differing degrees of participation since most studies consider participation in an all-or-none fashion.

Participation can be considered to range from no participation, to various forms of consultation in which participants express their opinions and preferences, to full participation in which participants share equal power and/or make their own decisions. Although it has been suggested that participation will be ineffectual to the extent that actual influence is constrained (Hoffman, 1979), it may be the case that a lesser degree of participation is sufficient to bring about changes in feelings of satisfaction, involvement and productivity (e.g., Hoffman & Maier, 1965; Mulder, 1971). In the one study on design participation in which the degree of participation was investigated (Wandersman, 1979a) there were no differences on any of the dependent measures between groups given the opportunity to do their own planning and those who simply chose among available alternatives. But it should be noted that the element of choice or final decision authority existed in both of these groups.

In the present study three degrees of participation were investigated corresponding to no participation, consultation, and full participation as defined above. It was hypothesized that any positive benefits of participation with regard to the dependent measures would be enhanced for the decision-making group relative to the consultation group.

Participation, Satisfaction, and Productivity

The benefits in increased job satisfaction and productivity brought about through participatory decision making in organizations often have been demonstrated (e.g., Baumgartel, 1957; Coch & French, 1948; French, Israel, & Aas, 1960; Katz, Maccoby, & Morse, 1950; Lanzetta & Roby, 1960; Lawler & Hackman, 1969; Lischeron & Wall, 1977; Maier, 1950, 1953; Morse & Reimer, 1956; Patchen, 1970; Tosi, 1970; Vroom, 1960). However, as pointed out in the above review, negative and contradictory findings are also abundant. In addition, the extent of carry-over effects to be expected from participation in one limited aspect of one's job into the larger area of total job satisfaction and productivity remains unascertained. Given this equivocal evidence it is unclear just what the expected effects of participation might be in a given situation. As suggested by Lowin (1968), Singer (1974), and Locke and Schweiger (1970), participation effects may depend on a number of contextual variables. There is a need for research to focus on such features as well as delimiting possible mediating variables in order to ascertain the parameters of participation effectiveness.

The present study attempted to relate participation in design decisions to environmental satisfaction, job satisfaction, and productivity. The idea that participation in office design is associated with satisfaction and productivity among office employees rests on the assumption that such participation will lead to an environment that is more congruent with workers' needs and values and/or

that participation in and of itself leads to greater feelings of control over the environment which then have an impact on measures of satisfaction and performance.

The influence of design participation on environmental satisfaction has received some documentation in previous research. Wandersman (1979a) reported greater satisfaction with a residential environment for those students who were given higher degrees of participation in designing dormitory rooms. In the area of office design, Sloan (1972) described a study in which a conventional office was redesigned on the basis of behavioral observation of the needs and psychological characteristics of employees (e.g., territoriality, sociability). He found that levels of dissatisfaction with the environment were reduced by more than 50% following renovation. Such evidence suggests that participation may influence satisfaction with the environment by enabling users to develop an environment which is more closely suited to their own needs and values than when they do not participate. Based on this reasoning it was predicted that higher degrees of participation would be associated with greater environmental satisfaction among office workers.

Evidence concerning the impact of the physical environment on workers' job satisfaction and productivity comes from research on design influenced effects on users in specific settings. These include physiological processes, overt individual behaviors, and overt social behaviors (Baum, Singer, & Baum, 1981; Ittelson, Proshansky, Rivlin, & Winkel, 1972). According to Ittelson et al.:

Poorly organized space can be stressful to work in alienating the individual from his setting and lowering efficiency. Wall colors and aesthetics may evoke either satisfaction or annoyance. The arrangements of rooms, partitions, and hallways may serve to encourage or hinder social interaction. (p. 358)

The design of the environment may serve directly or indirectly to block or facilitate important goals. For example light levels, acoustic qualities, and temperature may be appropriate or inappropriate for a given task; the arrangement, separation, and size of spaces may support or frustrate users' goals (Zimring, 1981). In addition, the design of the physical environment may influence an individual's means of coping with the environment by making desired privacy or social interaction easier or more difficult to achieve (Sundstrom, 1981).

The issue of control (or freedom of choice) has often been considered a critical aspect of individual behavior in relation to the physical environment (e.g., Wohwill & Carson, 1972; Baron & Rodin, 1978). It has been found that the designed environment affects individuals' perceptions of personal control (see Zimring, 1981) and that greater control often has a positive effect on performance (e.g., Sherrod, Hage, & Halprin, 1977; Glass & Singer, 1972). This result is generally explained in motivational terms such that perceived control increases expectancies for success leading to the perception of greater competency in manipulating the environment (cf., Seligman, 1975; White, 1959; de Charms, 1972). This in turn is thought to result in either a generalized increase in intrinsic motivation or a higher level of voluntary responding (Sherrod, Hage, & Halprin, 1977). Lack of personal

control is often thought to lead to feelings of helplessness and anxiety.

Design participation can be considered to provide increased control over the environment either directly--as a means of control per se--or indirectly by providing an environment that is more adaptable and allows for more effective coping. In research on participatory decision making it has been found that the introduction of participatory arrangements is generally associated with reports of greater feelings of competency and responsibility; lending support to the argument that participation can be considered as a means of increasing perceived control. Additionally, Wandersman (1979a) obtained evidence that participation in design increases perceived control relative to no participation. However the hypothesis that design participation is associated with increased job satisfaction and productivity remains untested; there is only indirect evidence suggesting that control may play a role in mediating the effects of design participation.

We assumed that design participation would affect job satisfaction and productivity through providing a subjectively "better" environment (i.e., one that is congruent with users' needs) or by increasing people's feelings of control and competency. This reasoning, accompanied by evidence relating greater control to increased performance leads to the prediction that participation in design decisions would be associated with higher levels of reported job satisfaction and increased job performance. It also was expected that participation would be positively related to intrinsic motivation and to congruency between individual

needs and the environment; and negatively associated with feelings of helplessness with regard to controlling the environment.

The design of the present study allows for a comparison of environmental satisfaction, job satisfaction, and productivity for certain individuals both before and after their moving to new offices, allowing relatively strong inferences concerning the direction of the relationships between participation and measures of satisfaction and performance. It was expected that participation in the design of new office facilities would serve to increase satisfaction and performance relative to their initial levels for participants for whom repeated measures were collected.

Role of Individual Differences, Job and Organizational Variables

The present study also examined the role of individual differences, type of job, and organizational context variables as possible moderators of participation effects. These classes of variables are considered to moderate both the effects of participation on intervening processes such as control, and the relationships between these processes and organizational outcomes such as attitudes and performance (Wood, 1973).

Various writers have taken the position in the literature that there are individual differences in various needs related to the desire for participation. Some of the variables that have been investigated include: personality, needs for autonomy, needs for independence, and "desire to satisfy higher order needs" (Tannenbaum & Alport, 1956;

Vroom, 1969; Hackman & Lawler, 1971). Clearly, some people working under a formal structure with little participation can be highly motivated and satisfied; while some individuals given much participation are not motivated and less satisfied (Singer, 1974; Morse & Lorsch, 1970). In the present study it was expected that satisfaction with one's level of participation would moderate the effects of participation on measures of satisfaction and performance. More specifically, individuals who were satisfied with their participation were expected to be more satisfied and to perform better regardless of their level of participation. However, participation should have a greater effect on satisfaction and performance among those individuals who would have liked to participate more.

Other individual difference variables employed in the study included the participant's age and sex. Although no specific predictions were made concerning the differential impact of participation for various age groups or for male and female employees, the design allowed for these possibilities.

Similarly, it has been asserted that there may be differences in participation effectiveness depending on job level (e.g., Singer, 1974). Whereas low level employees might be expected to benefit most from greater opportunity to exercise control, it is also possible that these employees would feel they have less expertise and less relevant prior experience in dealing with design decisions. On the other hand, high level employees may require greater control over the environment in order to more efficiently accomplish more complex activities. Thus,

although we expected that managers would be more likely to be allowed to participate in design decisions than other job types, no specific predictions were made concerning differential effects of participation due to job level.

Finally, although there has been little research on the effects of specific situational variables in the organizational context on participation effectiveness, it is generally noted that contextual variables within the organization are likely moderators of participation effects. In the present study it was assumed that the effectiveness of design participation would be subject not only to participants' needs and motives, but also to the paths the organization provides or does not provide for need attainment. For example, in a given organization, several avenues for participation may be available as a matter of course, whereas in others opportunities for participation may be more limited. More specifically, such differences may exist based on whether a particular facility is in the public or the private sector. Therefore, the possible moderating effect of this variable also was examined.

Summary of Hypotheses

The present study examined links between employee participation in office design and various aspects of satisfaction and productivity.

Hypotheses were:

1. Increases in the degree of reported participation from no participation to consultation to decision making are associated with corresponding increases in: environmental satisfaction, job satisfaction, and productivity.

2. Satisfaction and performance generally increase with average overall participation; but these relationships may be moderated by individual differences, job level, and organizational variables. More specifically, it is expected that:
 - (a) Participation is associated with measures of satisfaction and productivity even after the effects of other extraneous variables were controlled. And the causal influence of participation on satisfaction and performance can be demonstrated after controlling for initial differences in the criterion measures as well as other control variables.
 - (b) The effects of participation on satisfaction and productivity is greater among employees who are not satisfied with their present level of participation (and hence, have a greater "desire to participate") than among those who do not desire greater participation.
 - (c) Participation varies by job type: Managers have greater opportunity to participate in decisions concerning office design than do lower level employees, and possible differences in the strength of participation effects among job types may also exist.
3. Greater participation is also associated with greater congruence between the designed environment and users' needs, and with reduced helplessness (reflecting greater control over the environment). Either or both of these two variables may mediate the association between participation and satisfaction and performance.

CHAPTER 3

METHOD

Overview

As part of a larger study of the social and psychological impact of the office environment (BOSTI, 1982), data were collected from 2,630 office workers at 58 locations. A number of government and private sector organizations were selected on the basis of their plans to move from their current office facilities to new offices.

Comprehensive questionnaires were presented at two times: approximately six weeks prior to moving, and again eight to ten months after relocation. Some participants completed the questionnaire either before or after moving to new locations, while others completed it both before and after moving. This method of data collection resulted in two basic research designs; one correlational and one quasi-experimental.

Measurements used in the present study included: participation in several aspects of office design, satisfaction with participation, congruence between needs and the designed environment, and feelings of helplessness with regard to the environment. Dependent measures included: satisfaction with the work space, job satisfaction, intrinsic motivation, and self-rated and supervisor-rated job performance. (See Appendix A for a listing of relevant questionnaire items.)

The cross-sectional data were analyzed by means of moderated multiple regression analyses including several control variables and

interaction effects for suspected moderators. The repeated-measures data was examined through similar regression equations with the pretest measures of the criteria used as covariates.

Participants and Settings

Participants were drawn from 15 U.S. government agencies, 10 private corporations, and two state governmental offices. A total of 2,241 office workers who completed the questionnaire at only one time of measurement make up the cross-sectional sample; 389 persons were included in the repeated-measures sample.

The overall sample represented a broad cross section of individuals, jobs, organizations, and physical settings, allowing a high degree of external validity. Of the 2,630 participants in the sample, 56% were male with an average of 7 years tenure and 3.5 years on the same job. Ages ranged from 17 to 64 years old with a mean of 36 years. Participants also represented a wide range of jobs of which 19% were classified as administrative in nature, 57% were professional or technical positions, and 24% were clerical positions. More than half of the sample (54%) reported having a college degree.

Procedure

The survey was conducted at each of the 58 sites within the participating organizations at different times over an 18 month period in 1979 and 1980. Relocations occurred at different times throughout much of this period, so events coincident with any one relocation could

have only a minor impact on the whole study. Questionnaires were administered approximately six to eight weeks before participants moved to new offices and again eight to ten months following the move.

At each site a random sample of 80% of the population was selected to participate in the study; and a response rate for completion of the questionnaire of 61% was obtained. However, not all sites completed the questionnaire at both times of measurement--some sites received the pretest or posttest only while others received both the pretest and the posttest. An in-house coordinator at each organization distributed questionnaires to individuals on the morning of a single day. Most participants completed the questionnaires in their work spaces the same day (a few were returned the next day). Sealed questionnaires were returned to a central point where they were collected and returned by mail. At each of the sites professional space planning was available either through in-house capability or through the use of private sector firms.

Design

There were two basic research designs. Cross-sectional data were available for a relatively large sample at two times of measurement. In addition, matched data from measurements before and after relocation to new office facilities resulted in a quasi-experimental design for the repeated-measures data set.

Cross-Sectional Data

The cross-sectional data provide a "snapshot" of the relationships among relevant variables at a given point in time. Although these data

provide no basis for drawing causal inferences concerning the impact of participation on satisfaction and productivity, they allow assessment of correlations among the variables. The most important contribution of the cross-sectional data is to an understanding of contingencies. That is, they allow a test of differential relationships among discrete subgroups formed on the basis of moderator variables.

Quasi-Experimental Design

The matched data used in the before-and-after design provide observations on the same individuals at more than one point in time and are relevant to knowledge of cause-effect relationships. These data, along with appropriate controls and comparison groups, allow inferences as to the causal links between participation and satisfaction and productivity. The design is basically that of a pretest-posttest design with selected controls and refinements (Cook & Campbell, 1979). The following elaborations to the basic design contribute to internal validity:

1. The use of multiple regression in analysis of the principal effects allows examination of the partial correlation of participation with the criterion variables; with the effects of initial differences in the pretest measures, as well as the effects of several other extraneous variables, removed.

2. The posttest, administered eight to ten months following the move to new facilities, represents a delayed follow-up measure in that

it allows assessment of changes that persist after the disruptive effects of the move have had time to dissipate.¹

3. Not all participating organizations moved to new offices at the same time. Rather, moves were staggered over an 18 month period. The result is a series of staggered replications ruling out the alternative hypothesis that simultaneous events (i.e., "history" or "maturation") caused any observed changes in outcome.

4. The theoretical relationships between participation and satisfaction and productivity, and previous evidence of the importance of particular moderators (e.g., "desire to participate") allow a priori predictions of people who would be expected to show increases or decreases in satisfaction and productivity. Such predictable differential effects are a strong asset in drawing inferences in quasi-experimental field research.

In summary, the resulting "patched up" design (Evans, 1975) provides several characteristics that contribute to strong internal validity. These include selected controls, delayed followups, and staggered replications, as well as predictable differential effects (for some hypotheses), which together deal with most of the plausible rival hypotheses that have been suggested (Campbell & Stanley, 1966; Cook & Campbell, 1979).

¹ At some sites the survey was also administered one to two months after relocation, but results of this immediate posttest revealed changes that had disappeared by the eight-to-ten month posttest.

Power Analysis

The relatively large number of participants in the present study also allows for a relatively high degree of power for testing the major hypotheses (see Cohen, 1977; and Cohen & Cohen, 1975). In examining the relationship between participation and the major dependent measures, sample sizes of over 1,000 provide power to test a "small" correlation coefficient (e.g., $r = .10$, with $\alpha = .05$, one-tailed) of .94. That is, the probability of detecting such an effect if present is 94%.

The major analysis of the cross-sectional data relies on moderated multiple regression analyses in which a number of control variables, participation, and the interaction of participation and other variables will be used to predict satisfaction and performance measures. In this type of analysis, the effect size is determined as an estimate of the proportion of variance in the dependent variable accounted for by the source in question relative to error variance (referred to as f^2 ; see Cohen, 1977, p. 410). The present sample size of 2,241 provides power of approximately .90 to detect a "small" effect size ($f^2 = .02$, with $k = 75$ predictors) at the 95% confidence level for the overall test. The presence of missing data for many of the variables in the present study could serve to reduce power, but on the other hand if one were to postulate a more moderate effect size (i.e., $f^2 = .15$, expected Multiple $R = .38$), only 413 observations would be needed for the same level of power.

The test of the increment in R^2 provided by a single variable entered into the regression analysis (with $\alpha = .05$ and $f^2 = .02$) is

.99 with sample sizes of 900 or larger. And finally, for the repeated measures analysis, the power to test an increment in R^2 due to a single variable with 389 observations (assuming a pretest/posttest correlation of .5 or better for the criterion) is .90 if the .05 level of significance is used.

Measures

The Office Environment User's Survey is a comprehensive questionnaire providing data on the physical environment, job characteristics and activities, demographic characteristics and several issues related to satisfaction and job performance. Because the survey was so long, shortened forms of the questionnaire were used at most sites. Each of three shortened versions of the questionnaire were randomly distributed to approximately one-third of the participants. (This procedure led to reduced sample-sizes for some of the correlations.) The present study reports data from the following measures:

Participation in Office Design

The extent of participation in office design was assessed by six items. These referred to participation in decisions concerning the location of the work space; the size of the work space; furniture and partitions; the color scheme and other decorative items; the location of office equipment; and the plan of the work flow. Respondents were asked to indicate whether they: (1) did not participate, (2) gave an opinion or information on the issue, or (3) made the decision concerning each of these aspects of office design.

For purposes of analysis, two separate measures of participatory activity were constructed from this scale. In order to examine differences due to the degree or type of participation in design, respondents were assigned to one of three groups representing no participation, consultation, or decision authority. Those respondents who reported making decisions on two or more of the six participation items constituted the decision group; those who reported being consulted on two or more items but making fewer than two decisions fell into the consultation group; and those who gave opinions on one or fewer aspects of the office environment were classified as the no participation group. This variable was referred to as degree of participation.

The second measure represented the average overall amount of participation and was calculated as an average response over the six items, thus taking into account both the number of items and the extent of participatory activity on each. The composite scale ranged from 1 to 3, where 1 represented no participation and 3 represented complete decision authority in all aspects of design. (See Table 1 for scale reliabilities.) However, it is possible that there may have been differences between the subjective perception of participation depending on the normative level of participation within a given organization. For example, if only a moderate level of overall participation was possible in a given setting, this would likely be perceived by those employees as a high level of participation. Therefore, this variable was transformed to a standard scale based on the mean and standard

Table 1
Internal Consistency Reliabilities

Scale	Cronbach's alpha
Participation	.88
Environmental Satisfaction	.89
Job Satisfaction	.88
Self-Rated Performance	.89
Supervisor-Rated Performance	.95

Note. Reliabilities were calculated for the cross-sectional data.

deviation of each of the 58 sites. This variable is referred to here as average participation or simply as participation.

These two measures provided both an absolute and a relative or normatively based index of participation. Both measures were used for comparisons in the cross-sectional data enabling examination of the major differences related to degree of participation, as well as the relationship of average participation to the variables of interest.

Satisfaction with Participation

An individual difference variable suggested by the literature as a possible moderator of the relationship between participation and satisfaction and performance is "desire to participate." The extent to which respondents were satisfied with their participation was assessed by a single item. Participants were asked to rate the extent to which they agreed with the statement, "I participated as much as I wanted in the planning of this office." Ratings were made on a 5-point Likert scale anchored by disagree strongly to agree strongly.

Environmental Satisfaction

The extent of user satisfaction with the personal work space was assessed through responses to a three item scale. Respondents were asked to rate the extent to which they agreed with the statements: "I'm proud to show my workspace," "My work space helps me to get work done efficiently," and "All things considered, I am very satisfied with my work space." Ratings were made on 5-point scales ranging from disagree

strongly to agree strongly. The mean response to these items was used as an index of environmental satisfaction.

Job Satisfaction

Two previously developed measures of job satisfaction were included in the questionnaire. The first was a modified version of the five-item Michigan scale of facet-free job satisfaction (Quinn & Staines, 1979). Items were reworded slightly to more clearly refer to the specific job rather than to the generic "type of job" and an additional item was added. The scale items were as follows: "All in all, how satisfied would you say you are with your job?" (very satisfied to not at all satisfied); "If you were free right now to go into any job you wanted, would you--take the same job, take a different job, not want to work?"; "Knowing what you know now, if you had to decide all over again whether to take the job you have now, would you--decide without hesitation to take the same job to decide definitely not to take this job?"; "In general, how well would you say your job measures up to the job you wanted when you took it?" (very much like the job I wanted to not very much like the job I wanted); "If a friend was interested in a job like yours, would you--strongly recommend it to advise against it?" ; and "How do you feel about coming to work?" (very good to very bad). Responses were made on three or five point scales. The resulting composite scale ranged from 1 to 5 with higher numbers representing greater job satisfaction.

The second measure of job satisfaction was the widely used and respected Job Diagnostic Survey (Hackman & Oldham, 1975; Roberts &

Glick, 1981). The index contains a number of items (rated on 7-step scales) designed to measure several dimensions along which jobs may vary--skill variety, task identity, task significance, autonomy, and feedback. These core dimensions were weighted and combined into a single summary score, the Job Diagnostic Survey Motivating Potential Score (JDSMPS) as described by Hackman and Oldham (1974). The resulting JDSMPS score represents the degree to which a job is intrinsically motivating. Although the weighted JDSMPS score is not readily amenable to a reliability analysis, the simple sum of the 15 items included in the scale has a reliability of .86. This simple scale correlates with the JDSMPS quite highly ($r = .94$), suggesting that the reliability of the weighted index is also high.

Job Performance

Performance ratings were obtained from a multi-item scale asking respondents to assess their productivity along the dimensions of: quantity of work, punctuality, accuracy, quality of work, frequency of errors, willingness to take responsibility, cooperation, ability to resolve disagreements, and overall performance. Ratings were made on 11-step scales anchored by absolutely unacceptable and absolutely acceptable, with higher numbers indicative of greater acceptability. In addition to ratings made by the participants themselves, supervisors of a subset of respondents independently rated their subordinates on the same scale.

Additional Measures

Two additional items were included as indirect measures of the processes assumed to mediate between participation and satisfaction and performance. Perceived congruency between workers' needs and their immediate environment was assessed through an item asking participants to rate the extent of their agreement with the statement, "The physical layout of my work space is well suited to the tasks I do." Ratings were made on a 5-step scale from disagree strongly to agree strongly. A similar scale was used to assess helplessness with regard to the environment. This item asked for ratings of agreement with the statement, "It seems as if I could make a better work space with my office furniture, but I'm not sure how." In this instance higher numbers reflect greater feelings of helplessness.

CHAPTER 4

RESULTS

Cross-Sectional Sample

Data on participation were available for 70% of the cross-sectional sample. Among these, only 21% ($n = 320$) reported some degree of participation (i.e., they reported being consulted or making decisions on some aspect of workspace design). Consultation was the major mode of participation; 62% of those participating provided information or opinions while only 38% had any actual decision-making authority. The main avenues of participation included issues of locating office equipment and planning the work flow; there was relatively less participation concerning decisions about the size of the workspace and color schemes, graphics, and plants.

Degree of Participation

To examine the effects of different degrees of participation on the various dependent measures, participants were divided into three groups representing no participation, consultation, and decision-making based on their responses to the six items concerning participation. These groups were then compared in terms of the variables reported in Table 2.

Due to the proportion of significant intercorrelations among the dependent variables, a multivariate analysis of variance (MANOVA) was conducted to control for the possibility of spuriously significant

Table 2

Differences between No Participation, Consultation, and
Decision-Making Groups on Selected Variables

Variable	Degree of participation			<u>F</u>
	No participation	Consultation	Decision making	
Environmental Satisfaction	47.5 ^a (729)	53.5 ^b (81)	58.5 ^c (67)	50.4***
Job Satisfaction	48.7 ^a (1242)	52.8 ^b (148)	55.0 ^b (89)	24.7***
Self-rated Performance	49.2 ^a (1235)	51.6 ^b (141)	49.4 ^{ab} (88)	3.0*
Supervisor-rated Performance	48.4 (296)	52.3 (37)	49.6 (24)	2.3
Intrinsic Motivation	47.8 ^a (734)	51.8 ^b (88)	55.5 ^c (51)	21.1***
Helplessness	50.0 ^a (743)	51.2 ^a (80)	45.5 ^b (55)	5.9**
Congruency	48.9 ^a (1311)	53.3 ^b (155)	57.0 ^c (93)	40.2***

Note. All variables are standardized with $\bar{X} = 50$, standard deviation = 10. Within a row means with different superscripts differ at $p < .05$. Numbers in parentheses are cell ns.

*** $p < .001$.

** $p < .01$.

* $p < .05$.

results among the series of tests performed. The data entered into this analysis included measures of environmental satisfaction, job satisfaction, self-rated performance, helplessness, and congruency. (The data for supervisor-rated performance and intrinsic motivation were insufficient due to the coincidence of missing values among the set of variables.) The MANOVA yielded a highly significant main effect for degree of participation (Wilk's Lambda = .86; $F = 9.3$; $df = 10, 1498$; $p < .001$).

Univariate analyses also are presented in the table. Significant effects for degree of participation with mean differences in the predicted direction were found for measures of environmental satisfaction, job satisfaction, intrinsic motivation, feelings of congruency between needs and the physical environment, and helplessness. Multiple comparisons (Newman-Keuls) among the means for the three groups showed that consultation was associated with increased environmental satisfaction, job satisfaction, and intrinsic motivation, as well as greater feelings that the workspace is well suited to the needs of the worker. The ability to make decisions concerning office design was associated with even greater congruency, environmental satisfaction, and motivation, and with reduced feelings of helplessness.

In terms of the performance ratings, there was a significant effect ($p < .05$) of degree of participation on self-rated performance. Consultation was associated with higher self-ratings of performance than was no participation; however, the mean for the decision-making group was not significantly different from either of the other two groups. No

effect of degree of participation was found on supervisor-ratings of performance.

These data confirm the expected association between degree of participation and satisfaction but not performance. However, although the means for increasing degrees of participation were (with the exception of the performance ratings) in the predicted direction, decision making was not clearly superior to consultation on all measures.

To further examine the question of variables that are uniquely associated with decision making as opposed to consultation, a discriminant function analysis was conducted on the three groups. (A randomly generated subsample of the no participation group was used to make group sizes more nearly equal.) Measures of environmental satisfaction, job satisfaction, congruency, helplessness, and self-rated performance were used as predictors of group membership. This analysis yielded two significant discriminant functions (Wilk's Lambda = .69; $F = 9.6$; $df = 4, 372$; $p < .001$). The first, composed of satisfaction with the workspace and job satisfaction, discriminated between all three participation groups with greater participation being characterized by greater satisfaction. The second function discriminated principally between the consultation and decision-making groups, and was composed of the helplessness and self-rated performance measures.² Decision

²See Appendix B for a plot of group centroids with respect to the two discriminant functions.

making was associated with reduced helplessness and lower self-rated performance.

Consistent with the hypothesis, these results suggest that decision making regarding aspects of workspace design is related to increases in satisfaction over and above those provided by consultation alone and may bring about reduced feelings of helplessness. However, decision making also was associated with lower self-ratings of performance. A possible explanation for this unexpected finding is addressed in a later section.

Satisfaction and Performance

It was hypothesized that participation in office design would be associated with satisfaction and performance, as well as with measures of intrinsic motivation, helplessness, and congruency; and that these effects would be moderated by individual, job level, and organizational factors. To examine these hypotheses, correlation coefficients were initially calculated between the variables of interest. Table 3 presents zero-order correlations among selected variables for the cross-sectional sample.

Participation (measured as the average of the six item scale normalized to the organizational mean) showed moderate, significant correlations with environmental satisfaction, job satisfaction, and intrinsic motivation. Weaker correlations were found between participation and self-rated performance and reduced helplessness.

There also was substantial intercorrelation among several of the dependent variables: job satisfaction was significantly correlated with

Table 3
Intercorrelation among Variables Measured for the Cross-Sectional Data

Variable	Variable (listed by number)							
	1	2	3	4	5	6	7	8
1. Participation	—							
2. Environmental Satisfaction	.30* (859)	—						
3. Job Satisfaction	.17* (1452)	.29* (1381)	—					
4. Self-Rated Performance	.05* (1438)	.12* (1349)	.09* (1960)	—				
5. Supervisor-Rated Performance	.06 (342)	.15* (363)	.11* (518)	.53* (500)	—			
6. Intrinsic Motivation	.20* (855)	.07* (761)	.52* (1378)	.14* (1361)	.11* (413)	—		
7. Helplessness	-.07* (861)	-.10* (1456)	-.09* (1395)	.05* (1363)	.13* (367)	-.17* (762)	—	
8. Congruency	.19* (1529)	.63* (1450)	.20* (2078)	.06* (2037)	.08* (534)	.08* (1435)	-.12* (1467)	—
9. Satisfaction with Participation	.40* (1471)	.34* (1387)	.22* (1990)	-.01 (1951)	.05 (512)	.15* (1307)	-.09* (1403)	.28* (2093)

Note. Numbers in parentheses are *ns* on which the correlations are based. All but 3 of the 36 correlation coefficients were significant at the $p < .05$ level or less.

* $p < .05$.

environmental satisfaction, intrinsic motivation, and congruency. Both environmental satisfaction and job satisfaction showed small, but significant relationships with the two performance measures. In addition, a substantial relationship was found between self-rated and supervisor-rated performance measures. Whereas congruency of needs and the environment showed moderate to high correlations with environmental satisfaction, job satisfaction, and participation, helplessness showed a moderate association only with intrinsic motivation.

Satisfaction with participation was highly correlated with actual participation, as well as being associated with the same dependent measures. This suggests that, in general, the more people were allowed to participate, the more satisfied they were with their level of participation. (The repeated measures samples, both pretest and posttest, showed essentially the same pattern of findings for the bivariate correlational analyses. A table of these correlation coefficients can be found in Appendix B.)

The above data are suggestive of the importance of participation to several aspects of satisfaction though there is little evidence of an association between participation and performance. However, such bivariate analyses are subject to a number of alternative interpretations --the chief of which is that the relationship between participation and satisfaction is the result of the association of each with other extraneous variables. In order to examine the nature and extent of participation effects while controlling for the effects of individual,

job, and organizational characteristics, moderated multiple regression analyses were employed.

Each of the dependent or criterion variables was analyzed separately by means of a hierarchical model in which several control variables and their interactions were entered prior to participation. In this manner extraneous factors are accounted for by examining the partial correlations between participation and the criterion measures independent of the effects of the control variables. Control variables used in these analyses included time of testing (either before or after relocation), job type (managerial, professional-technical, or clerical), sex, government or private sector, and age. Dummy codes were used to represent each possible combination of categories for discrete variables. The interaction of participation and the control variables (computed as the product of participation with each of the control variables) was entered last. The presence of significant interaction effects would suggest differential effects of participation depending on the level of the moderating variable.

The results of these analyses are presented in Table 4. When the effects of the five control variables and their interactions have been partialled out, participation is still found to contribute significant increments to the explained variance in environmental satisfaction, job satisfaction, and intrinsic motivation. A marginally significant effect ($p < .07$) also was found on self-rated performance.

For each measure, significant main effects also were found for the set of control variables. In addition, slight interaction effects were

Table 4

Summary of Multiple Regression Analyses of Satisfaction and Performance Measures in the Cross-Sectional Data

Variable	Effect	R^2 increment	F^c
Environmental Satisfaction	Control Variables ^a	.21	4.12***
	Participation ^b	.06	52.59***
	Interactions ^b	.02	2.00
	Overall Equation (df = 60, 679)	$\Sigma = .29$	4.41***
Job Satisfaction	Control Variables	.09	2.69***
	Participation	.02	24.83***
	Interactions	.01	<1
	Overall Equation (df = 65, 1191)	$\Sigma = .12$	2.54***
Self-Rated Performance	Control Variables	.25	8.52***
	Participation	.01	3.27*
	Interactions	.02	4.16**
	Overall Equation (df = 66, 1171)	$\Sigma = .28$	6.35***
Supervisor-Rated Performance	Control Variables	.29	3.13***
	Participation	.00	<1
	Interactions	.03	1.20
	Overall Equation (df = 49, 273)	$\Sigma = .32$	2.65***
Intrinsic Motivation	Control Variables	.21	4.19***
	Participation	.02	13.64***
	Interactions	.03	1.59*
	Overall Equation (df = 65, 687)	$\Sigma = .26$	3.68***

^aTime of measurement, job type, sector, sex, and age and all possible interactions of these variables were entered as dummy codes or continuous variables.

^bParticipation interactions were represented as products of participation with each previously entered variables.

^c F test for R^2 increment.

*** $p < .01$.

** $p < .05$.

* $p < .10$.

found for each of the measures; however, only for the measures of self-rated performance and intrinsic motivation did these effects reach significance. To examine these effects more closely, supplemental regression analyses were conducted in which each of the control variables was entered individually after the main effect of participation had been partialled. A final term in the equation represented the interaction of participation with the control variable under consideration. Interaction effects are discussed in a separate section on moderator variables below.

Environmental satisfaction. Participation accounted for 6% of the variance in environmental satisfaction after the effects of job type, age, sex, sector, and all possible interactions among these variables had been removed. Taken as a set, the control variables accounted for an additional 21% of the variance. Supplemental analyses considering the effect of each of these variables separately revealed that regardless of the level of participation, environmental satisfaction was generally higher at the second time of measurement, higher for managers relative to other job types, and higher for females and private sector, relative to government sector, employees. (See Appendix B for mean differences.) There were no significant interactions of participation with any of these variables on environmental satisfaction.

Job satisfaction. A similar pattern of results was found for the measure of job satisfaction. The overall equation, while still significant, was somewhat less successful. Taken as a set the control

variables accounted for 12% of the variance in job satisfaction. Participation contributed significantly to prediction with an R^2 increment of 2%. Job satisfaction was higher at the first time of measurement, higher for managers than other job types, higher for males and private sector employees, and also increased with age. The effect of interactions between participation and these control variables was negligible.

Intrinsic motivation. For the measure of intrinsic motivation, participation was also a significant predictor, accounting for 2% of the variance after the control variables had been partialled. In terms of the control variables, which together accounted for 21% of the variance, there were main effects for time of testing, private versus government sector, sex, and age. Motivation was higher at the first time of measurement, higher for government employees, and higher for males and older employees. In addition, a significant interaction of participation with the government versus private sector variable was found ($R^2 = .01$; $F = 5.3$; $p < .05$). Examination of means for government and private sector workers showed that participation was relatively more effective for government sector employees ($\bar{X}$ for participants = 54.7) than for private sector employees ($\bar{X}$ for participants = 50.7), although there was little difference between the two groups for nonparticipants ($\bar{X} = 48.0$ for government sector; $\bar{X} = 47.5$ for private sector). Participation also interacted with job type on this measure; these results are discussed in a separate section on moderator variables below.

Job performance. There was a marginal ($p < .07$) main effect for participation on the self-rated performance measure, but no effect for participation was found on supervisor ratings of performance. Participation contributed an additional 1% to the 25% of variance in self-rated performance accounted for by the control variables. The set of control variables accounted for 29% of the variance in supervisor-rated performance. For both performance measures ratings were higher at the second time of measurement, and higher for females and for government sector employees (see Appendix B). There also were small interaction effects on both performance measures; however, only for the self-rated performance measure was the interaction significant. This effect was due to an interaction of participation with job level (see below).

The results of the moderated regression analyses on the cross-sectional data set supported the hypothesis that participation in office design would be associated with environmental satisfaction, job satisfaction, and intrinsic motivation. Participation added significantly to prediction even when the effects of job type, sex, sector, age, and time of testing were controlled. There also was some support for the hypothesized association of participation to self-rated performance, but no relationship to participation was found for performance ratings by supervisors.

There was some evidence for the moderating effects of job level and government versus private sector. Participation was relatively more effective in increasing intrinsic motivation among government sector

employees. The moderating effects of job type on intrinsic motivation and self-rated performance are discussed next.

Moderating Variables

Job type. It was predicted that there would be differences in the overall level of participation due to job type. Consistent with this hypothesis, managers ($\bar{X} = 54.0$) were more likely to be allowed to participate than were professional or technical employees ($\bar{X} = 48.9$), or clerical workers ($\bar{X} = 49.8$; $F = 27.2$; $df = 2,1378$; $p < .001$). It also was hypothesized that the effectiveness of participation might differ due to job-type differences. To investigate this question, correlations between participation and the criterion variables were computed separately for the three job groups and compared statistically. As can be seen from Table 5, the relationships of participation to environmental satisfaction, job satisfaction and congruency were similar for each job group. Participation was significantly associated with each of these variables for all three job groups. However, differential relationships for the three job types were found on intrinsic motivation, both performance measures, and helplessness.

Participation showed a significant relationship with self-rated performance only among clerical workers. For supervisor-rated performance, the correlation with participation also was significant only for the clerical group, but this coefficient was not significantly different than that for managers. Opposite effects for job type were found on the measures of intrinsic motivation and helplessness. Whereas

Table 5
Correlations of Average Participation with Selected Variables
as a Function of Type of Job

Variable	Type of job		
	Administrative	Professional- technical	Clerical
Environmental Satisfaction	.26* (132)	.23* (480)	.23* (150)
Job Satisfaction	.16* (255)	.15* (782)	.16* (281)
Self-Rated Performance	-.05 (255) ^a	-.02 (770) ^a	.13* (272) ^b
Supervisor-Rated Performance	.17 (61) ^{ab}	-.02 (212) ^a	.22* (59) ^b
Intrinsic Motivation	.23* (158) ^a	.20* (449) ^a	.05 (175) ^b
Congruency	.18* (263)	.19* (809)	.12* (294)
Helplessness	-.15* (134) ^a	-.06 (485) ^{ab}	.08 (155) ^a

Note. Within a row correlation coefficients with different subscripts differ at $p < .05$, as tested through pairwise comparisons using Fisher's R to Z transformation. Numbers in parentheses are ns.

* $p < .05$.

participation was significantly associated with intrinsic motivation for managers and professional or technical workers, there was no relationship between the two for clerical workers. Similarly, helplessness showed a significant negative association with participation for the managerial group and this was significantly different from the slight positive relationship found for clericals.

Interactions between job type and participation on the measures of intrinsic motivation and self-rated performance also are relevant to the moderating effects of job type. To examine the nature of these interactions, employees in each job category were further divided into two groups; those who participated (in any decisions concerning office design and to any extent), and those who were not allowed to participate. Table 6 presents mean values for each of these six groups on measures of intrinsic motivation, self-rated performance, and helplessness. Three (managerial, professional or technical, or clerical jobs)-by-two (participants versus nonparticipants) analyses of variance conducted for each of these variables revealed significant interactions between participation and job level on each (see the table for F values and significance levels).

The pattern of mean differences supports the findings obtained in the above correlational analyses. For intrinsic motivation, tests of simple main effects for participation within each level of job type revealed significant effects for participation for both the managerial ($F = 26.7$, $p < .01$), and professional-technical ($F = 20.6$, $p < .05$) groups, but not for the clerical group ($F < 1$). Participation also was

Table 6

Mean Differences on Intrinsic Motivation, Self-Rated Performance,
and Helplessness as a Function of Participation
and Type of Job

Variable	Managerial	Professional- technical	Clerical
		<u>Participants</u>	
Intrinsic Motivation ^a	55.5	53.4	47.1
Self-Rated Performance ^b	48.5	49.7	53.8
Helplessness ^c	50.9	50.0	47.7
		<u>Nonparticipants</u>	
Intrinsic Motivation ^a	50.3	47.6	45.3
Self-Rated Performance ^b	47.1	49.0	50.3
Helplessness ^c	45.6	48.4	46.6

^a $\underline{F}$ for Participation = 39.1**; $\underline{F}$ for Job Type = 18.7**; $\underline{F}$ for Interaction = 3.6*.

^b $\underline{F}$ for Participation = 3.2; $\underline{F}$ for Job Type = 4.1*; $\underline{F}$ for Interaction = 3.3*.

^c $\underline{F}$ for Participation = 1.6*; $\underline{F}$ for Job Type = 4.9*; $\underline{F}$ for Interaction = 2.5*.

** $p < .01$.

* $p < .05$.

associated with reduced helplessness among managers ($\underline{F} = 4.0$, $p < .05$), but not for the other two groups ($\underline{F} = 1.8$ for the professional-technical group and $\underline{F} < 1$ for clerical workers). Finally, participation was related to self-rated performance only for the clerical group ($\underline{F} = 8.5$, $p < .01$; other $\underline{F}s < 1$).

These data suggest that whereas participation was not necessarily associated with performance for administrators or managers and performance for clerical employees. Participation also was associated with greater intrinsic motivation and reduced helplessness for the managerial group suggesting that the opportunity to participate may contribute to greater feelings of autonomy, if not to performance, among this group.

Satisfaction with participation. It also was predicted that the effects of participation would differ depending on the level of satisfaction with participation. For individuals who were satisfied with their level of participation, no effect of actual participation was expected; but individuals who would have liked to participate more were expected to show participation effects. The high correlation between actual participation and satisfaction with participation prevented the use of regression analysis in addressing this question because of problems with multicollinearity. Therefore, this question was addressed by comparing the effects of participation for those who were satisfied versus dissatisfied with their participation. The latter two groups

were formed on the basis of the satisfaction with participation scale; those participants who said they were dissatisfied with their level of participation formed the "participated less than desired" group, whereas those who were satisfied with their level of participation formed the "participated as much as desired" group. (Responses in the middle of the scale represented a neutral position and were omitted from the analysis.) Participation was scored as those who participated to any degree versus those who did not.

A two (Participated less than desired versus Participated as much as desired)-by-two (Participants versus Nonparticipants) MANOVA was conducted on the measures of environmental satisfaction, job satisfaction, helplessness, congruency, and self-rated performance. Main effects for both satisfaction with participation (Wilk's Lambda = .92; $F = 10.2$; $p < .001$) and participation (Wilk's Lambda = .90; $F = 14.3$; $p < .001$) were found. But the interaction between satisfaction and participation did not reach significance (Wilk's Lambda = .99; $F = 1.5$) when all variables were considered as a set.

However, since the hypothesis concerned specific differences between groups, tests of simple main effects for participation within each level of satisfaction were conducted. The four groups were compared on the variables listed in Table 7. The predicted differential effects of participation for those who were not satisfied with their participation were found on measures of environmental satisfaction, job satisfaction, intrinsic motivation, and congruency. For each of these variables, satisfaction was lowest among those who were not allowed to

Table 7

Mean Differences on Selected Variables as a Function of Participation
and Satisfaction with Participation

Variable	Participated less than desired			F for participation	Participated as much as desired			F for participation
	Nonparticipants	Participants	Participants		Nonparticipants	Participants	Participants	
Environmental Satisfaction	45.8 (509)	51.7 (83)	29.1**		53.8 (52)	57.0 (78)		3.6
Job Satisfaction	47.7 (878)	51.7 (115)	16.0**		52.7 (91)	54.0 (130)		<1
Self-Rated Performance	49.6 (875)	50.5 (109)	<1		49.6 (86)	51.8 (126)		2.4
Supervisor-Rated Performance	48.1 (199)	51.5 (26)	<1		48.8 (30)	50.8 (35)		<1
Intrinsic Motivation	47.1 (517)	50.6 (48)	5.8*		51.5 (57)	54.3 (78)		3.0
Congruency	47.7 (920)	51.1 (121)	12.8**		54.1 (95)	56.2 (136)		2.7
Helplessness	50.5 (518)	49.5 (80)	<1		45.4 (52)	47.7 (71)		1.5

Note. F tests presented are tests of simple main effects for participation versus nonparticipation within each level of satisfaction with participation. Numbers in parentheses are cell ns.

**p < .01.

*p < .05.

participate but would have liked to. There was no difference between participation and nonparticipation for those who were satisfied with whatever level of participation they had. There were no significant differences between any of the groups for measures of helplessness, or self- or supervisor-rated performance.

These results support the hypothesis that one's desire to participate may play a role in moderating participation effects. Participation may be relatively more effective in increasing satisfaction with the workspace, job satisfaction, intrinsic motivation, and congruence for those who want to participate; but relatively ineffective for those who have no desire for greater participation.

Mediating Variables

Both congruence between the environment and the needs of workers and feelings of control were hypothesized to play important roles in mediating the relationships between participation in office design and satisfaction and performance. Previous literature and research suggests that participation may influence satisfaction and performance by increasing congruence or by reducing feelings of helplessness.

In the analyses described above, congruency was found to be significantly related to overall participation, to show significant increases for increasing degrees of participation, and to be correlated with the same criterion variables as participation.

Evidence concerning the role of congruency as a mediator of participation effects on satisfaction is provided by examination of the

partial correlation of participation with satisfaction while controlling for congruency. The zero-order correlation of .30 between participation and environmental satisfaction was significantly reduced when controlling for congruency ($\underline{r} = .16$, $\underline{z}$ for the difference = 3.0, $p < .01$). For job satisfaction the partial correlation (.14) was only slightly lower than the bivariate correlation (.17). But the relationship between participation and intrinsic motivation practically disappears when controlling for congruency (partial $\underline{r} = .01$ versus $\underline{r} = .20$, $\underline{z} = 2.5$, $p < .01$). Helplessness also mediated this relationship (partial $\underline{r} = .03$, $\underline{z} = 2.2$, $p < .01$) but the second-order partial, controlling for both helplessness and congruency, was not different from that for congruency alone.

The results for helplessness were more complicated. Although reduced helplessness was significantly associated with average participation, the size of the relationship was relatively small; and whereas reduced helplessness was associated with decision making, the no participation and consultation groups did not differ on this variable. In addition, feelings of helplessness were negatively associated with satisfaction measures, but positively related to the performance ratings. It is possible that this set of findings can be explained through the relationship of helplessness to job type. The job type analysis revealed that helplessness was associated with participation only for the managerial group. This group also participated to a greater extent in decision making and showed lower performance ratings. This suggests that helplessness (or conversely, feelings of control) may have a substantial impact only among higher level employees.

Repeated-Measures Sample

What remains unsubstantiated in the analyses so far is the causal role that participation plays in satisfaction. The answer to this issue could not be ascertained from the cross-sectional data. However, the repeated measures sample provides a much stronger basis for causal inference. The pretest measures, taken prior to the move to new office facilities, can be used as covariates in the analysis of participation effects on the criterion variables at the second time of measurement. In this manner any initial differences in the dependent measures due to extraneous factors are removed prior to the determination of participation effects.

To address the hypothesized causal influence of participation on satisfaction and productivity, moderated multiple regression analyses were again used. Each dependent measure was analyzed separately using the same method as was used in the cross-sectional analyses, with the exception that pretest measures were entered first as covariates. The results of these analyses are presented in Table 8. Significant participation effects were found for environmental satisfaction and job satisfaction. Participation was found to account for a substantial 10% of the variance in environmental satisfaction even after the effects of initial differences in satisfaction, job type, age, sex, and sector had been removed. The main effects of the control variables and interactions of these variables with participation were negligible and nonsignificant.

Table 8

Summary of Multiple Regression Analyses of Satisfaction and Performance Measures for the Repeated-Measures Sample

Variable	Effect	R^2 increment	F
Environmental Satisfaction	Covariate	.19	69.73***
	Control Variables	.10	<1
	Participation ^b	.10	11.19***
	Interactions ^b	<u>.02</u>	<1
	Overall Equation (df = 20, 78)	$\Sigma = .51$	5.76***
Job Satisfaction	Covariate	.47	164.17***
	Control Variables	.03	<1
	Participation	.02	4.83**
	Interactions	<u>.02</u>	1.79
	Overall Equation (df = 26, 196)	$\Sigma = .54$	9.71***
Intrinsic Motivation	Covariate	.45	85.66***
	Control Variables	.17	3.21
	Participation	.01	2.43
	Interactions	<u>.00</u>	<1
	Overall Equation (df = 20, 99)	$\Sigma = .63$	9.10***
Self-Rated Performance	Covariate	.30	72.32***
	Control Variables	.08	1.40
	Participation	.00	<1
	Interactions	<u>.02</u>	1.69
	Overall Equation (df = 24, 180)	$\Sigma = .40$	5.26***
Supervisor-Rated Performance	Covariate	.53	99.54***
	Control Variables	.03	<1
	Participation	.00	<1
	Interactions	<u>.01</u>	<1
	Overall Equation (df = 14, 77)	$\Sigma = .57$	7.07***

Note. Variables were coded as in the cross-sectional analyses. Covariates are pretest measures of the criterion variables.

*** $p < .01$.

** $p < .05$.

* $p < .10$.

Additionally, participation accounted for 2% of the variance in job satisfaction when the initial level of job satisfaction and other control variables had been partialled. The small interaction effect found for this measure was due to the interaction of participation with government versus private sector, but since the overall interaction was not significant, this finding must be considered unreliable until substantiated in future research.

The effect of participation on intrinsic motivation only approached significance in this analysis ($p < .12$), and no main effects of participation or interactions were found on either of the measures of self-rated or supervisor-rated performance.

These results provide strong evidence of the effect of participation in office design in increasing environmental satisfaction and job satisfaction. However, there is no evidence that participation affects performance.

CHAPTER 5

DISCUSSION

The results of this study show strong support for the hypothesis that participation in office design is associated with greater environmental satisfaction and job satisfaction. The relationship of participation to both satisfaction measures held even when the effects of other potentially confounding variables had been controlled. Further, these relationships were independent of any differential effects due to job type, sex, age, or organizational sector; and significant contributions of participation were obtained in the repeated-measures sample regardless of initial differences in satisfaction. These findings support earlier research findings that participation in design leads to greater environmental satisfaction (Wandersman, 1979b), as well as the more general association between participation and job satisfaction. The study contributes additional evidence concerning the causal direction of participation effects on job satisfaction through the quasi-experimental results. (Had the converse relationship held--greater satisfaction leads to greater participation --no effects of participation on later satisfaction ratings would have been found when controlling for initial satisfaction levels.)

Little or no support was found for the hypothesized relationship between design participation and self- and supervisor-ratings of job performance. One likely reason for this lack of a finding is that in

the present study, the overall level of participation was quite low, and options available to participants were limited. (Participation occurred largely in the design of the work-flow and the positioning of office equipment.) It is possible that this resulted in an experimental manipulation that was too weak to produce the expected effects on performance.

The initial bivariate correlational analysis of participation and performance data showed small and inconsistent relationships of participation to self-rated performance, and further analysis suggested that this association apparently depended on job type. A moderate relationship was found for clerical workers, but no such association was found for managers or professional-technical employees. Although one might speculate that the relatively low level of participation observed might be more successful in increasing motivation or providing greater feelings of control among lower level employees, the results concerning these variables do not support this interpretation. Participation was more closely associated with intrinsic motivation for both the managerial and professional-technical groups than for the clerical group; and participation was associated with reduced helplessness only among managerial employees.

An interpretation more consistent with the present findings is that clerical workers may have viewed the opportunity to participate as a reward for superior performance, thus producing higher self-rated performance scores. The lack of a significant interaction on this measure in the repeated measures data supports this reasoning, but the

possibility of differential performance effects due to job type remains an empirical question. Future research under more controlled conditions may illuminate the reasons for potential differences.

Similar inconsistencies between satisfaction and performance were found in the analyses concerning degree of participation. Consistent with the hypothesis, increases in environmental satisfaction, intrinsic motivation, and congruency were found for each level of degree of participation; and job satisfaction was found to be an important discriminating variable. However, there were no differences in supervisor-rated performance due to degree of participation. Moreover, decision making was actually associated with lower self-rated performance, as well as reduced helplessness. Job type differences may again be relevant to this unexpected finding. Managerial employees were characterized by greater participation, reduced helplessness, and somewhat lower self-ratings of performance than were either of the other two groups. Possibly, the association between participation and lower self-rated performance is due to the fact that while managers were more likely to participate, they also were more stringent in their definitions of acceptable performance than were others. Also, acceptable criteria for managerial performance have proved extremely difficult to define--they very likely differ from those which have been found useful for lower level employees.

The importance of participation in design for the managerial group was evident in the associations between participation and satisfaction, congruence, intrinsic motivation and reduced helplessness for this

group. While the results of this study suggest that decision making contributes important additional benefits in increased satisfaction, motivation, feelings of congruency, and reduced helplessness over and above those provided by consultation alone, any moderating effect of other variables on participation effects will also affect these relationships.

Three variables were found to have some significance in moderating the effects of participation on the dependent measures. These were job type, sector, and satisfaction with participation. The effect of participation on satisfaction with the workspace, job satisfaction, and congruence were consistent across job types, but differential relationships were found for the different job groups in terms of self-rated performance, intrinsic motivation, and helplessness. Participation was more closely associated with self-rated performance among clerical employees, with motivation among both managerial and professional-technical employees, and with reduced helplessness among managers. These data suggest that the opportunity to participate may be more important in contributing to feelings of autonomy and control among higher level employees whose jobs involve more complex and demanding tasks. In addition, previous research suggests that managers and administrators may have special needs with regard to the physical environment which are not as salient for other types of employees (Sundstrom, Town, Brown, Forman, & McGee, 1982). Hence, future research on participation in office design should take into account the importance of job type in moderating participation effectiveness.

Some support also was found for the moderating role of satisfaction with participation. There were no differences between participants and nonparticipants for those individuals who agreed that they were satisfied with their level of participation. However, strong effects for participation were found on measures of satisfaction, motivation, and congruency for those individuals who would have liked the opportunity to participate more. (This group also was relatively lower on satisfaction regardless of whether or not they participated.) These results confirm the importance of individual differences in desire to participate in determining participation effects. But this assertion must be somewhat tempered by the fact that there was no overall multivariate interaction effect, and no substantiating difference in the correlations of participation with the dependent measures for the two "satisfaction with participation" groups. Perhaps stronger overall effects would have been found with a more precise measure of one's desire to participate. For example, the method used by Ivancevich (1979) and introduced by Alutto and Belasco (1972) involves measurement of desired and actual decision-making opportunities on specific issues to identify three groups of individuals; those whose level of participation was less than, greater than, or the same as they wanted.

A final moderation effect was found for government versus private sector on the measure of intrinsic motivation. Participation was seen to be more strongly associated with intrinsic motivation among government workers relative to private sector employees. Although no other substantial effects of this variable were obtained, it is possible

that differences between government and private sector organizations may contribute to the effectiveness of participation. Future research should consider this possibility.

Another hypothesis predicted that participation would have its effects on satisfaction and performance through influencing the degree to which the environment is congruent with the user's needs or through providing greater control over the environment and thus reducing helplessness. The present findings provide some support for the role of congruency in mediating participation effects on environmental satisfaction and intrinsic motivation, but there was less evidence of the role of congruency in mediating job satisfaction. Reduced helplessness was associated with participation only among managerial employees, whose average participation was relatively high. This seems to indicate that greater environmental satisfaction comes about through providing those individuals who are allowed to participate with a workspace that is more consistent with their ideal of an efficient environment. This may be brought about through simple consultation with employees concerning office design. However, it may require a higher degree of involvement in the decision-making process in order to bring about feelings that the individual has greater control over the environment. (An interesting direction for future research would be to observe the possible reactive effect of a reduction in participatory activities on satisfaction.) Obviously these ideas are speculative and require further investigation. The present analysis also provides little evidence of the mechanism through which participation affects job

satisfaction. Other possible explanations such as greater self-expression, respect or feelings of influence and equality brought about through participation have not been ruled out.

It is also possible that participation in office design could lead to an "objectively" better environment for all employees rather than affecting only the attitudes of those who actually participate. Some evidence concerning this question is provided by a preliminary analysis of the data by BOSTI (1982). Questionnaire responses for both the present cross-sectional and repeated-measures samples following the move to new facilities (Time 2 data) were rank ordered by site according to the proportion of employees who were allowed to participate. To address the question of whether or not greater participation and better facilities were related, nonparticipants in "high" versus "low" participation sites were compared on environmental satisfaction. The lack of a significant improvement in satisfaction for these nonparticipants in the "high participation" sites suggests that participation is more closely related to positive attitudes for those who were allowed to participate rather than being a function of an actually improved environment.

Although the present study argues that participation has its effects on satisfaction through improving employees' attitudes, an alternative interpretation is provided by the theory of cognitive dissonance (Festinger, 1957). This theory suggests that given a choice, individuals will tend to change their attitudes in the direction of greater liking for the chosen alternative in the face of aversive

consequences. Thus, employees who participated in office design and later found less than desired aspects, would adjust their feelings to be more satisfied with these aspects. The present study provides no evidence on the question of dissonance. A test of this explanation would require an objective index of possible aversive consequences of chosen alternatives with respect to design, as well as a comparison group who were given sufficient justification for making such decisions. Thus, although dissonance cannot be ruled out as a possible interpretation of the present data, there is little to suggest that design participation brought about any such negative consequences. This reasoning is perhaps more relevant to situations in which participation leads to increased acceptance of changes that may be perceived as costly or unnecessary by workers.

The present study has provided a test of the proposed effect of participation in office design in increasing satisfaction and performance. However, several caveats are in order before delineating the implications of this work for design practitioners and office management. The most serious limitation of the present study rests in the self-report nature of the measures. In such a large project, objective measurement of the variables of interest would be quite costly; however, objective measures of employee performance would have been highly preferred, and may even have led to different results. This problem is pervasive in most field research in organizations. Several other measures also left something to be desired. The measure of "desire to participate" has already been discussed. In addition, better designed measurements of actual feelings

of control as well as other possible mediating variables could have been included. Closer specification of the mechanisms through which participation has its effects on satisfaction remains for future research. Finally, interpretation of the repeated-measures analysis would have been bolstered by the inclusion of a no-move control group. This would have provided a more stringent control over questions of the effects of history and maturation than those currently provided.

Nevertheless, the present results are based on a highly generalizable sample, and some conclusions concerning the implications of the present study can be drawn with regard both to future research in design participation and practical applications. First, this study should constitute a response to criticisms of previous participation research for its failure to specify the causal direction of the association of participation to satisfaction. In the present study participation was seen to contribute significantly to the prediction of environmental satisfaction and job satisfaction even when initial levels of these variables had been controlled. Second, this study provides a beginning in the attempt to determine what kinds of participation works best for which kinds of participants. As in previous research (Wandersman, 1979b), the results suggest that there may be some improvements in employee attitudes brought about by simply consulting employees on issues of workspace design. Conscious efforts to develop effective employee participation in design need to be made. Future research in this area should take into account the possible differential effects of different kinds of participation for various job levels, as

well as focusing more clearly on theoretical development of the mechanisms through which such effects occur. It is hoped that this work will encourage further empirical study in an all-too-neglected area of participation research.

In conclusion, the present study confirmed the association between participation in workspace design and environmental satisfaction and job satisfaction among office employees. Some evidence suggests that these effects are moderated by peoples' satisfaction with their participation and their hierarchical level within the organization. However, no relationship of participation to job performance was found.

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APPENDIXES

APPENDIX A

EXPERIMENTAL MATERIALS

QUESTIONNAIRE ITEMS USED TO MEASURE PARTICIPATION
IN DESIGN

Participants were asked to indicate whether they (1) didn't participate, (2) gave an opinion or information, or (3) make the decision for various aspects of the workspace.

	<u>Didn't Participate</u>	<u>Gave Opinion/ Information</u>	<u>Made Decision</u>
1. Choosing where my work space is	1	2	3
2. Deciding about size of my work space	1	2	3
3. Selecting furniture, storage units or space divider partitions	1	2	3
4. Choosing color scheme, graphics or plants	1	2	3
5. Choosing the location of my office equipment	1	2	3
6. Planning the work flow	1	2	3

QUESTIONNAIRE ITEMS USED TO MEASURE

JOB SATISFACTION

Participants were asked to select the response that best described how they felt about their present position. All items were reverse scored and combined to form a single index. Adapted from Quinn and Staines (1979).

53. All in all, how satisfied would you say you are with your job?
1. Very satisfied
 2. Somewhat satisfied
 3. Not too satisfied
 4. Not at all satisfied
54. If you were free right now to go into any job you wanted, what would your choice be? I would . . .
1. Take the same job as I now have
 2. Take a different job
 3. Not want to work
55. Knowing what you know now, if you had to decide all over again whether to take the job you now have, what would you decide? I would . . .
1. Decide without hesitation to take the same job
 2. Have some second thoughts
 3. Decide definitely not to take this job
56. In general, how well would you say that your job measures up to the job you wanted when you took it? It is . . .
1. Very much like the job I wanted
 2. Somewhat like the job I wanted
 3. Not very much like the job I wanted

57. If a friend of yours told you he/she was interested in working in a job like yours and was qualified, would you . . .

1. Strongly recommend it
2. Have doubts about recommending it
3. Advise him/her against it

58. How do you feel about coming to work?

1. Very good
2. Somewhat good
3. Neutral
4. Somewhat bad
5. Very bad

QUESTIONNAIRE ITEMS USED TO MEASURE
PERFORMANCE RATINGS

Participants were asked to circle the number at the right which best reflected how they rate their own work performance along each dimension. In addition, for a subset of the participants, performance ratings were obtained from the participant's immediate supervisor on the same scale.

	<u>ABSOLUTELY UNACCEPTABLE</u>										<u>ABSOLUTELY IDEAL</u>
59. Amount of work accomplished	0	1	2	3	4	5	6	7	8	9	10
60. Quality of work accomplished	0	1	2	3	4	5	6	7	8	9	10
61. Meeting deadlines	0	1	2	3	4	5	6	7	8	9	10
62. Frequency of errors	0	1	2	3	4	5	6	7	8	9	10
63. Taking responsibility	0	1	2	3	4	5	6	7	8	9	10
64. Creativity	0	1	2	3	4	5	6	7	8	9	10
65. Getting along with others	0	1	2	3	4	5	6	7	8	9	10
66. Dependability	0	1	2	3	4	5	6	7	8	9	10
67. Overall performance	0	1	2	3	4	5	6	7	8	9	10

JOB DESCRIPTIVE INDEX--MOTIVATING

POTENTIAL SCORE

The following instructions and items were used as a measure of intrinsic motivation after Hackman and Oldham (1975). Items were combined into a single index in the manner described by the authors.

This part of the questionnaire asks you to describe your job, as objectively as you can.

Please do not use this part of the questionnaire to show how much you like or dislike your job. Questions about that will come later. Instead, try to make your descriptions as accurate and as objective as you possibly can.

The items below ask you to describe your job, as objectively as you can. Please circle the number which is the most accurate description of your job.

25. In general, how significant or important is your job? That is, are the results of your work likely to significantly affect the lives or well-being of other people?

1	2	3	4	5	6	7
Not very significant; the outcomes of my work are <u>not</u> likely to have important effects on other people.			Moderately significant			Highly significant; the outcomes of my work can affect other people in very important ways.

26. To what extent does doing the job itself provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing--aside from any "feedback" co-workers or supervisors may provide?

1	2	3	4	5	6	7
Very little; the job itself is set up so I could work forever without finding out how well I am doing.			Moderately; sometimes doing the job provides "feedback" to me; sometimes it does not.			Very much; the job is set up so that I get almost constant "feedback" as I work about how well I am doing.

27. How much autonomy is there in your job? That is, to what extent does your job permit you to decide on your own how to go about doing the work?

1	2	3	4	5	6	7
Very little; the job gives me almost no personal "say" about how and when the work is done.			Moderate autonomy; many things are standardized and not under my control, but I can make some decisions about the work.			Very much; the job gives me almost complete responsibility for deciding how and when the work is done.

28. To what extent does your job involve doing a "whole" and identifiable piece of work? That is, is the job a complete piece of work that has an obvious beginning and end? Or is it only a small part of the overall piece of work, which is finished by other people or by automatic machines?

1	2	3	4	5	6	7
My job is only a tiny part of the overall piece of work; the results of my activities cannot be seen in the final product or service.			My job is a moderate-sized "chunk" of the overall piece of work; my own contribution can be seen in the final outcome.			My job involves doing the whole piece of work, from start to finish; the results of my activities are easily seen in the final product or service.

29. How much variety is there in your job? That is, to what extent does the job require you to do many different things at work, using a variety of your skills and talents?

1	2	3	4	5	6	7
Very little; the job requires me to do the same routine things over and over again.			Moderate variety			Very much; the job requires me to do many different things using a number of different skills and talents.

Listed below are a number of statements which could be used to describe a job.

You are to indicate whether each statement is an accurate or an inaccurate description of your job.

Once again, please try to be as objective as you can in deciding how accurately each statement describes your job--regardless of whether you like or dislike your job.

Write a number in the blank beside each statement, based on the following scale:

How accurate is the statement in describing your job?

1	2	3	4	5	6	7
Very Inaccurate	Mostly Inaccurate	Slightly Inaccurate	Uncertain	Slightly Accurate	Mostly Accurate	Very Accurate

- ___ 30. The job requires me to use a number of complex or high-level skills.
- ___ 31. The job provides me the chance to completely finish the pieces of work I begin.
- ___ 32. The job itself provides very few clues about whether or not I am performing well.
- ___ 33. The job gives me considerable opportunity for independence and freedom in how I do the work.
- ___ 34. The job itself is not very significant or important in the broader scheme of things.
- ___ 35. This job is one where a lot of other people can be affected by how well the work gets done.
- ___ 36. The job denies me any chance to use my personal initiative or judgment in carrying out the work.
- ___ 37. The job is arranged so that I do not have the chance to do an entire piece of work from beginning to end.
- ___ 38. Just doing the work required by the job provides many chances for me to figure out how well I am doing.
- ___ 39. The job is quite simple and repetitive.

QUESTIONNAIRE ITEMS USED TO MEASURE ENVIRONMENTAL SATISFACTION,
CONGRUENCE, HELPLESSNESS, AND SATISFACTION WITH PARTICIPATION

For each of the following items or scales participants were asked to rate the extent of their agreement or disagreement with the statement on a 5-step scale.

Environmental Satisfaction

19. I'm proud to show people my work space.

1	2	3	4	5
Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

20. My work space helps me get my work done efficiently.

1	2	3	4	5
Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

21. All things considered, I am very satisfied with my work space.

1	2	3	4	5
Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

Satisfaction with Participation

22. I participated as much as I wanted to in the planning of this office.

1	2	3	4	5
Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

Congruence

11. The physical layout of my work space is well suited to the tasks I do.

1	2	3	4	5
Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

Helplessness

16. It seems as if I could make a better work space with my office furniture, but I'm not sure how.

1	2	3	4	5
Disagree Strongly	Disagree Somewhat	Neutral	Agree Somewhat	Agree Strongly

APPENDIX B

SUPPLEMENTARY MATERIALS

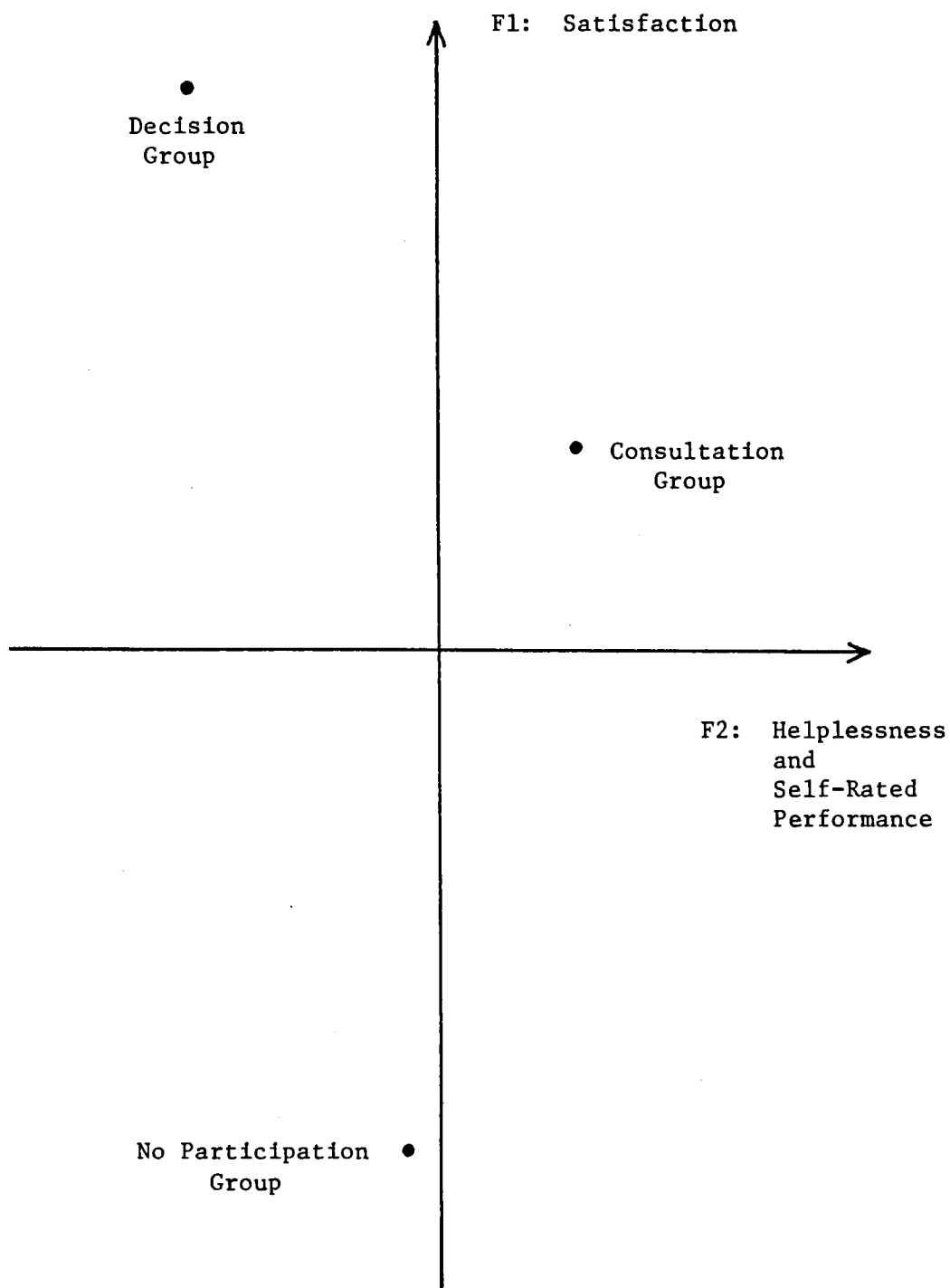


Figure 1. Location of group centroids for three degrees of participation with respect to the two significant discriminant functions.

Table 9
Intercorrelation among Variables Measured for the Repeated-Measures Sample

Variable	Variable (listed by number)								
	1	2	3	4	5	6	7	8	9
1. Participation	-	.50* (121)	.25* (237)	.05 (225)	.00 (131)	.15* (146)	-.21* (121)	.22* (239)	.41* (241)
2. Environmental Satisfaction	.15* (137)	-	.35* (246)	.10 (229)	.07 (131)	.20* (166)	-.12* (262)	.60* (253)	.42* (258)
3. Job Satisfaction	.17* (239)	.19* (246)	-	.17* (333)	.12* (196)	.55* (272)	-.06 (246)	.22* (360)	.21* (364)
4. Self-Rated Performance	-.05 (231)	.13* (235)	.16* (351)	-	.15* (185)	.21* (261)	.12* (228)	.00 (336)	.03 (342)
5. Supervisor-Rated Performance	.00 (123)	.11 (132)	.18* (194)	.13* (190)	-	.23* (161)	.03 (131)	.14* (199)	.06 (201)
6. Intrinsic Motivation	.17* (137)	.01 (166)	.48* (265)	.23* (260)	.27* (169)	-	.17* (166)	.10 (276)	.12* (281)
7. Helplessness	-.13 (139)	-.07 (253)	-.08 (269)	.00 (257)	-.11 (134)	-.10 (169)	-	-.22* (253)	-.07 (259)
8. Congruency	.17* (248)	.54* (253)	.17* (373)	.11* (362)	-.04 (203)	.04 (276)	-.17* (277)	-	.34* (371)
9. Satisfaction with Participation	.44* (231)	.19* (240)	.27* (348)	-.03 (338)	.04 (191)	.13* (257)	-.08 (261)	.20* (362)	-

Note. Pretest data are presented in the lower left and posttest in the upper right. Numbers in parentheses are ns on which correlation coefficients are based.

* $p < .05$.

Table 10
Means and Significance Tests for Main Effects of Control Variables
on Satisfaction and Performance

Variable	Job type ⁱ			Sex ^j			Sector ^k			Test time ^l	
	Managers	Prof.- Tech.	Clerical	F	Male	Female	F	Private	Govt.	F	Before After
Experimental Satisfaction	54.5 ^a	47.8 ^b	51.5 ^b	49.8**	49.2	50.3	4.6*	51.2	48.8	21.2**	47.9 50.0
Job Satisfaction	52.3 ^a	49.8 ^b	49.0 ^b	12.4**	50.6	49.4	6.4*	50.8	49.6	6.3**	50.6 49.6
Self-Rated Performance	49.4	49.7	50.0	3.1*	48.8	51.6	38.1**	47.6	51.4	73.1**	48.5 51.1
Supervisor-Rated Performance	49.2	50.0	50.4	<1	48.9	51.4	8.3**	46.9	53.2	56.1**	48.3 51.5
Intrinsic Motivation	53.7 ^a	50.4 ^b	46.0 ^c	46.6**	51.8	47.6	64.2**	49.6	50.4	2.6	51.0 49.3
Congruency	53.1 ^a	49.1 ^b	50.5 ^c	23.5**	50.3	49.8	<1	50.9	49.6	9.1**	48.2 51.3
Helplessness	47.9 ^a	49.9 ^b	51.2 ^c	6.9**	49.0	51.1	14.6**	50.0	49.8	<1	49.5 50.4
											2.7

Note. All dependent measures expressed as standard scores with $\bar{X} = 50$ and Standard Deviation = 10. Within a row means with different subscripts differ at $p < .05$.

ⁱMANOVA for Job Type: Wilk's Lambda = .88, $F = 7.4**$.

^jMANOVA for Sex: Wilk's Lambda = .95, $F = 12.1**$.

^kMANOVA for Sector: Wilk's Lambda = .93, $F = 17.6**$.

^lMANOVA for Test Time: Wilk's Lambda = .93, $F = 20.2**$.

** $p < .01$.

* $p < .05$.

VITA

Jeraldine Price Town is the former Jeraldine Price of Gatlinburg, Tennessee. She was born in Sevierville, Tennessee, on May 29, 1951, and attended school in Gatlinburg where she was graduated from Gatlinburg-Pittman High School in June 1969. She attended Berea College in Berea, Kentucky, where she received the Bachelor of Arts degree in psychology in 1974.

She returned to school four years later at the Graduate School of Vanderbilt University in Nashville, Tennessee, and was awarded a Master of Arts degree with a major in social psychology in May 1980.

The author is a member of the American Psychological Association, Southeastern Psychological Association, Society for Personality and Social Psychology, Society for the Advancement of Social Psychology, and the Society of Southeastern Social Psychologists.

Ms. Town is married to Alan Town of Detroit, Michigan, and currently resides in Silver Spring, Maryland.