PARTICIPATIVE DECISION-MAKING AND THE QUALITY OF WORK LIFE: A QUASI-EXPERIMENTAL STUDY

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PARTICIPATIVE DECISION MAKING AND THE QUALITY OF WORK LIFE:
A QUASI-EXPERIMENTAL STUDY

BY

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A DISSERTATION

Submitted to the University of New Hampshire in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy in Psychology

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Working on this dissertation during the past two years has been a sometimes stressful, often enlightening experience. Fortunately, I have had a good deal of advice, encouragement, and help along the way.

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the quality of work life questionnaire. But more than anything else, Jeaneen provided a warm and loving refuge from the doubts and uncertainties of graduate school. I will always be grateful for the life and time we shared together.
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"I started out.....with considerable uneasiness. I felt that my so-called system was outdated, and that it was a waste of time to try to rehash it and that it would be pretentious now to seek to make it fit any accepted set of prescriptions laid down by the philosophy of science. I have to confess, however, that as I have gone along I have become again more and more involved in it, though I still realize its many weak points. The system may well not stand up to any final canons of scientific procedure. But I do not much care. I have liked to think about psychology in ways that have proved congenial to me. Since all the sciences, and especially psychology, are still immersed in such tremendous realms of the uncertain and the unknown, the best that any individual scientist, especially any psychologist, can do seems to be to follow his own gleam and his own bent, however inadequate they may be. In fact, I suppose that actually this is what we all do. In the end, the only sure criterion is to have fun. And I have had fun."

Edward C. Tolman (1959), Principles of Purposive Behavior, p. 152
ABSTRACT

PARTICIPATIVE DECISION MAKING AND THE QUALITY OF WORK LIFE:
A QUASI-EXPERIMENTAL STUDY

by

James W. Grosch
University of New Hampshire, December, 1986

A quasi-experiment was conducted to explore the impact of a type of
participative decision making on the quality of work life. Quality
circles were developed for operating room (OR) nurses and technicians in
three New England hospitals. These circles, each consisting of 8-12 OR
staff members, met regularly over a seven month period with the goal of
identifying and solving problems in the work environment of the OR. The
OR staffs in three other New England hospitals served as the control
group and did not participate in any quality circle activities.

Quality of work life was measured primarily with a questionnaire
that was given to all participants at the beginning, middle, and end of
the study. The questionnaire contained scales for job stress, job
burnout, and four aspects of the work environment (perceived influence,
peer cohesion, supervisor support, and involvement). Participants also
provided demographic information and filled out two personality
inventories.

Results found that by the end of the study, OR staff in the three
quality circles improved significantly on measures of involvement, job
stress, and burnout due to depersonalization. When compared to the
quality circle group, OR staff in the control group had significantly
poorer scores on several measures at the beginning of the study. These
to be older and more experienced than their
circle participants tended to be older and more experienced than their
control group counterparts. An ANCOVA analysis, designed to control for
the initial questionnaire differences between the two groups, revealed
that by the end of the study, the quality circle group scored
significantly better on six of the ten dependent measures. However,
absenteeism due to illness appeared to be unaffected by the quality
circles and scores on the two personality inventories did not reliably
predict who would benefit most from participating in a quality circle.

The results are discussed in terms of methodological issues which
arise in a quasi-experiment involving nonequivalent groups. In
addition, the results are related to recent quality circle research and
areas for future research are outlined.
CHAPTER ONE

PARTICIPATIVE DECISION MAKING

Introduction

The use of participative decision making (PDM) in organizations has been the subject of much research and controversy. Early studies demonstrated that participation by employees had a seemingly magical effect, dramatically improving productivity and job satisfaction (e.g. Coch and French, 1948). More recent research, however, has found that several important conditions must be met within an organization before PDM can have beneficial effects (Vroom, 1959). A few studies have even suggested that participation, by itself, does little to improve job performance or attitudes (e.g. Latham and Yukl, 1976).

The purpose of this dissertation is to further explore how PDM may affect employees in an organizational setting. Specifically, the relationship between PDM and the quality of work life will be examined through the development of quality circles in three New England hospitals. Before describing this study and its results, the first two chapters of this dissertation will present an overview of the literature on PDM and the quality of work life. This overview will serve as a background and rationale for the quasi-experiment which follows.
Research on Participative Decision Making

In his review of the PDM literature, Lowin (1968) defined participation as "a mode of organizational operations in which decisions as to activities are arrived at by the very persons who are to execute those decisions" (p. 69). This definition suggests that PDM is a broad construct that may take many forms. For instance, Lowin's definition does not limit the number or types of employees who can participate in decision making. PDM may involve groups of varying size with memberships that are either homogeneous (e.g. all inside the organization) or heterogeneous (e.g. both inside and outside the organization). Furthermore, this definition does not necessarily mean that all persons have equal input into a decision, but only that they have some input.

It is important to note that PDM does not involve any specific content, but instead refers to a process of reaching decisions. Locke and Schweiger (1979) have pointed out that this process has at least three different dimensions. First, PDM can be direct or indirect. Direct PDM is a process where each employee in a group has the opportunity to assert his/her views. Indirect PDM exists when employees have representatives who speak for the employees as members of higher-level committees or groups.

Second, PDM may be forced or voluntary. If forced, PDM is a mandatory process brought about by law or contractual agreement. While individual participants may have some choice, their involvement in the process is at the discretion of management. On the other hand,
voluntary PDM occurs when employees can decide to participate in a decision making group without any outside coercion. This would occur where management initiates the idea of PDM and the employees voluntarily agree to it or vice versa.

Finally, PDM can be formal or informal. Formal PDM involves the creation of an officially sanctioned decision making body (e.g. unions, committees, and boards) within an organization. This body usually has specific meeting times and specific procedures that are followed in decision making. Informal PDM occurs when the personal relationships between each manager or supervisor and his/her subordinates determine what decisions are made. When PDM is informal, one-to-one interactions are usually more influential than carefully arranged group meetings.

PDM can also be conceptualized by contrasting it with the more traditional hierarchial approach (HIER) to decision making that exists in many organizations. In HIER, decisions are made by supervisors and passed down to subordinates to be acted upon. Decision and action functions are thereby separated within the organization. PDM shifts the locus of decision making downwards in the hierarchy so that those individuals who make decisions also have the opportunity to carry them out. This difference, however, is more one of degree than of kind since no complex organization can operate on a purely HIER or PDM principle. The crucial question becomes how much decision making should be distributed throughout an organization and which decisions, if any, are better made by employees who are lower in the organizational hierarchy.
While it is not practical to review the entire PDM literature, it is possible to describe several classic PDM studies and discuss issues that have reappeared continually throughout the literature. This summary of PDM research is divided into three broad categories: laboratory experiments, correlational research, and field experiments.

**Laboratory Experiments**

Laboratory research on PDM has the advantage of arranging experimental control of variables and allowing causal inferences to be made. However, a major limitation of this type of research is that laboratory findings may not generalize to a more complex organizational setting where experimental control is not possible. Despite this limitation, numerous laboratory studies have been conducted on PDM. Many of these studies took place in the 1950's and 1960's and compared democratic (i.e. participative) and authoritarian (i.e. directive) styles of group leadership on measures of (1) group performance on a relatively simple problem solving task and (2) satisfaction of group members with the decision making process.

An early assumption of many PDM researchers was that participation would improve group decision making by tapping the experience and creativity of group members (Argyris, 1964; Likert, 1961). Some laboratory research on PDM has clearly supported this position. For example, in a role playing experiment, Maier (1950) had undergraduates work in a situation which involved the introduction of a more efficient method of doing assembly line research. Groups with democratically trained leaders produced more correct solutions (according to Maier's
preestablished criteria) than groups without democratically trained leaders. Also, when democratic techniques were used, group members were more likely to agree with the decisions reached by the group.

Subsequent studies by Maier (1953) and Maier and Serkin (1971) found comparable results in similar role playing situations. Maier and his colleagues hypothesized that democratic leadership produced better decision quality because differences in opinion were likely to be expressed and result in a more creative problem solving process.

However, not all laboratory research has supported such a straightforward description of the relationship between PDM and group problem solving. McCurdy and Eber (1953) separated undergraduate subjects into either democratic or authoritarian groups on the basis of F-scale scores. Each group was given different directions (directive for authoritarian; participative for democratic) as to how a group maze task should be approached. McCurdy and Eber found that groups which followed a directive approach produced slightly fewer errors than the democratic groups, although this difference was not statistically significant. There were no differences between the groups in the time required to solve the group maze task.

In another study, Calvin, Hoffmann, and Harden (1957) had subjects play a game of "Twenty Questions" after they had been separated into groups according to achievement test scores ("dull" or "bright") and method of leadership (permissive or authoritarian). Results indicated that a permissive (or participative) leadership style produced slightly better task performance for "bright" students, whereas an authoritarian style resulted in better performance for "dull" students. Although the
differences were small, Calvin et al found the same effect in three successive experiments involving the "Twenty Questions" game. They suggested that intelligence was an important individual difference determining the effect of participation.

Shaw and Blum (1966) reported that the nature of the task should also be considered in predicting the effectiveness of a particular leadership style. Groups of subjects were asked to complete tasks that varied in terms of structure. A structured task could be solved in only a few ways (e.g. after being given a clue, subjects were permitted forty questions to identify an object). An unstructured task had several possible solutions (e.g. subjects were asked to list the five most important traits that a person needs for success). Using time scores as the measure of performance, Shaw and Blum found that participative leadership was more effective for groups when the task was highly unstructured, whereas directive leadership was more effective when the task was highly structured.

Taken together, the laboratory research reviewed above suggests that the relationship between PDM and problem solving performance is complex. While PDM may improve group problem solving in some laboratory situations, individual differences and task characteristics must be taken into account.

Less controversial is the relationship between PDM and satisfaction with the decision making process. For example, Shaw (1955), in a study of groups and different communication patterns, found that although problems were solved faster and with fewer errors under authoritarian
leaders, morale was higher under democratic leaders. Shaw hypothesized that democratic leadership improved morale by increasing the independence and freedom of each group member. Similarly, Fox (1957) examined the effects of different leadership styles on member satisfaction in conference groups. Participative leadership was found to promote a more permissive and friendlier group atmosphere, greater member satisfaction with the leader, and greater member satisfaction with and acceptance of group decisions than authoritarian leadership. Although a few studies have failed to find that PDM improves satisfaction with decision making (e.g. Mulder, 1959), the majority of laboratory research indicates a positive relationship between PDM and satisfaction (e.g. Katzell, Miller, Rotter, and Venet, 1970; Wexley, Signh, and Yukl, 1973).

Correlational Research

A second method of studying the effects of PDM has been to correlate the presence of a participative or authoritative style of management in an organization with observed differences in employee behavior or attitudes. Most correlational studies have taken place in actual companies and offer the advantage of results that are more generalizable to other organizations than laboratory findings. However, correlational studies, by definition, do not involve experimental manipulation and therefore cannot be used to verify the existence of causal relationships.
Results from correlational research also paint a complex picture of the relationship between PDM and employee productivity. In a classic study, Katz, Maccoby, and Morse (1950), investigated the relationship between productivity of groups of clerks who worked in an insurance company and various leadership characteristics that existed within each group. Supervisors of high-producing groups were evaluated by group members as employing less "close" and more "general" supervision, being less "production centered" and more "employee centered", exercising better judgment, and being more democratic than supervisors of the low-producing groups.

However, an attempt by Katz, Maccoby, Gurin, and Floor (1951) to replicate these findings with groups of employees in a railroad company failed. Katz et al (1951) found no relationship between PDM and productivity. In fact, low-producing groups made more suggestions for improvements to the railroad company management than high-producing groups. Katz et al suggested that the availability of information to the group supervisors made a "close" supervisory style an effective management strategy. Low-producing groups were hypothesized to have made more suggestions because their supervisors were perceived as incompetent and therefore the responsibility of offering suggestions to management rested with individual group members.

The findings of Katz and his co-workers suggest that there are certain conditions within an organization that may affect how PDM is related to productivity. Correlational research has been successful in identifying several of these conditions. For example, Vroom (1960) surveyed a sample of 108 supervisory personnel in a delivery company and
found that participation was significantly correlated with job performance for the total sample. These correlations, however, were significantly higher for supervisors who scored either high on a measure of need for independence or low on a measure of authoritarianism. Furthermore, when need for independence and authoritarianism scores were used together in the analysis, the relationship between participation and performance was significant only for those supervisors who were both high in need for independence and low in authoritarianism.

Other correlational research has found a positive relationship between PDM and productivity when participation is at moderate levels (Adams, 1952), when a group has a goal of personal significance to group members (e.g. Patchen, 1970), and when the level of interaction between group leader and subordinates is high (Pelz, 1956). A negative relationship has been reported when employees work under a direct incentive system (Argyle, Gardner, and Ciofi, 1958), when the task is highly structured (Fleishman, Harris, and Burtt, 1955), and when employees do not perceive PDM as a legitimate form of management (Berkowitz, 1953).

As in laboratory PDM experiments, correlational research has found a generally positive relationship between PDM and job satisfaction. In a study of employees at a naval research laboratory, Weschler, Kahane, and Tannenbaum (1952) found that 69.3 percent of employees in a division that was headed by a permissive leader were "well satisfied" with their job. This compared to 39.3 percent who were "well satisfied" in a division headed by a restrictive leader. In addition, morale in immediate work groups and throughout the laboratory was significantly
higher under the permissive leader.

Several other researchers (e.g. Foa, 1957; Runyon, 1973; and Falcione, 1974) have reported similar findings in a variety of different organizations. An important mediating factor may be an employee's preference for a particular leadership style. Sadler (1970) found that a moderately participative style (consults) was correlated with higher job satisfaction and confidence in management than any other management style (tells, sells, or joins). However, regardless of the management style, job satisfaction and confidence were lowest when an employee's preferred management style was different from the actual management style of the organization.

Field Experiments

The most realistic test of the effects of PDM has come through field experiments carried out in organizational settings. These studies avoid many of the disadvantages that accompany correlational and laboratory research. Field experiments, however, take place in such complex environments that a number of different variables may be responsible for a study's outcome. For example, in most field experiments there is a risk of encountering a Hawthorne effect in which simply the attention a subject receives for being in an experiment is sufficient to produce a desired change in behavior. Some field experiments also lack a suitable control group which further clouds interpretation of the data.
Despite these limitations, field experiments have provided some of the most dramatic accounts of the possible effects of participation. In one of the earliest studies, Mayo (1924) allowed employees in a textile mill to decide for themselves when they could take four 10-minute rest periods during their work day. Prior to this intervention, all employees worked five 10-hour days with a 45-minute lunchbreak and no rest periods. Following the introduction of rest periods, Mayo reported that morale improved and turnover eventually dropped from a 250 percent annual rate to between 5 and 6 percent. Mayo felt that participation by employees in setting up the rest periods was a crucial factor. But the obvious confounding of participation with the physical and mental benefits of rest periods, makes such a conclusion tentative at best.

In a more controlled study, Coch and French (1948) provided some impressive evidence in favor of PDM. This study was conducted in a Virginia pajama factory that was experiencing high turnover and absenteeism, resistance by employees to new production methods, and poor work efficiency. Three small groups of workers were allowed to participate in deciding how their jobs would be redesigned. The first group was allowed indirect participation through representatives, whereas the second and third groups were allowed direct participation by all group members. Participation involved meetings with management in which production problems were discussed and suggestions requested from employees. A control group was not allowed to participate in decisions regarding job redesign and was simply told that changes were necessary because of "competitive conditions."
Following the redesign of the jobs, Coch and French found that the experimental groups had learned their new jobs faster than the control group and quickly surpassed prechange productivity levels. In addition, the group which had direct participation learned faster than the group with indirect participation. In fact, the rate of recovery was directly proportional to the amount of participation. In a second experiment, the control group from the earlier experiment was allowed to participate in decisions related to transferring to a new job. Following the transfer, the group's productivity recovered rapidly to a level well above the prechange level.

Despite the success of the Coch and French study, two later field experiments failed to replicate these findings. Fleishman (1965) introduced PDM in a dress factory that was undergoing job redesign for several groups of employees. Fleishman found that both the control and PDM groups increased their productivity by about the same amount. Hawthorne effects and complications due to communication between the PDM and control groups were identified as possible reasons for these results. French, Israel, and As (1960) varied the degree of participation in job redesign across five experimental groups. No significant differences in productivity were found between the experimental and control groups. French et al suggested that management's reluctance to let employees participate in decisions that were important to them (e.g. rate setting, production level) was a major reason for the failure of PDM to increase productivity.
Several other field experiments have yielded mixed results as to the benefits of PDM. Morse and Reimer (1956) conducted a study in a non-unionized industrial organization in which four parallel divisions exited. For two of the divisions, participation was increased by encouraging more autonomy for employees. For the other two divisions, participation was decreased by creating a more hierarchial structure. These changes were introduced through a training program for division supervisors which emphasized either a PDM or a HIER approach. After one and a half years, Morse and Reimer reported that productive efficiency had improved more in the two HIER divisions than in the PDM divisions. However, several measures of employee satisfaction had increased significantly in the PDM divisions whereas they had decreased significantly in the HIER divisions. In this study, the "success" of PDM depends on whether one is more concerned with efficiency or employee satisfaction.

Ivancevich (1977) compared the effect of different methods of goal setting on the job performance of skilled technicians who worked in a large manufacturing organization. Technicians were placed in one of three goal setting conditions: participative, assigned, or "do your best." An analysis of performance data after six months revealed that technicians in the participative and assigned goal setting conditions performed significantly better on three measures (cost, safety, and service complaints). The assigned-goal technicians scored significantly higher on measures of service complaints and costs, whereas the participative goal technicians scored significantly higher when it came to safety. This relative equivalence between assigned and participative
goal setting has been reported by other researchers (e.g. Yukl and Latham, 1975; Latham and Steele, 1983). Participative goal setting is superior to assigned goal setting only when participation results in a more difficult goal being accepted by group members (Latham, Mitchell, and Dorsett, 1978).

Despite this mixed picture of PDM effectiveness, some field experiments have strongly supported the positive findings reported originally by Mayo (1924) and Coch and French (1948). For example, Chaney (1969) gave participative management training to nine supervisors in a computer manufacturing company. As part of this training, each supervisor conducted at least eight problem solving sessions with his/her group of employees. These groups were then compared to matched control groups according to output, employee attitudes, and the level of participation as judged by an independent observer. Results indicated that as the level of group participation increased, so too did parts per week (output) and favorable attitudes toward the job. The percentage of favorable job attitudes ranged from 35% under no participation (control) to 80% under groups with high participation. Average production improvements ranged from 0% under no participation to 95% under high participation.

Finally, numerous studies have reported that a participation oriented program called the Scanlon plan is effective at increasing job satisfaction and productivity. Devised by a Steelworker union officer in the later 1930s, the Scanlon plan consists of two main elements: a participation system which involves problem solving committees composed of employees and managers and a reward system that provides employees
with a bonus contingent on improved efficiency. The Scanlon Plan has been implemented mainly in industrial settings and has met with general success (e.g. Frost, Wakeley, and Ruh, 1974). While the Scanlon Plan involves both PDM and the promise of financial reward, research has shown that there is a strong positive relationship between the level of PDM reported by employees and rated success of the Scanlon Plan (White, 1979).

Summary of PDM Research

The three categories of research described above yield a fairly consistent picture of the effects of PDM. First, PDM seems to have a more reliable effect on attitudes (e.g. job satisfaction) than it does on behavior (e.g. productivity). While PDM has often led to more satisfied employees, this has not always translated into greater productivity or efficiency.

Second, the effects of a particular PDM program seem to depend on a number of factors. These include factors related to the individual (e.g. intelligence), task (e.g. structured vs non-structured), leader (e.g. amount of contact with group members), and organization (e.g. size and organizational structure). Although some studies have shown dramatic effects of PDM, others have failed to find any systematic effect at all. This suggests that a simple conclusion concerning PDM effectiveness is unlikely to emerge from the current literature. Instead of trying to "prove" or "disprove" the general value of PDM, it may be more useful to focus on those factors which determine whether or not a particular PDM program will change job related attitudes and
Third, there are many different ways that PDM can be implemented. Based on Locke and Schweiger's (1979) typology, most research has focused on direct PDM. In those studies where PDM has been indirect (e.g. Coch and French, 1948), the effect of PDM on behaviors and attitudes has been less dramatic. PDM research has also tended to be forced rather than voluntary. Subjects in a PDM experiment are typically assigned by the researcher to either a participative or non-participative condition. Even in correlational studies, the use of PDM by an organization is a decision made by management, not employees.

One dimension on which many studies differ is whether PDM is informal or formal. Informal PDM is represented by research in which group leaders adopt either a participatory or non-participatory style of management (e.g. Maier, 1951). In these studies, PDM usually occurs through one-to-one interaction between group members and the group leader. In contrast, formal PDM is represented by studies in which an attempt is made to have employees meet in groups and make decisions. (e.g. Frost, Wakeley, and Ruth, 1974). In this case, leadership style is less of a concern and the focus rests with changing the organizational structure so that participation is encouraged.

Finally, a major limitation of PDM research is that often there is no clear description of what exactly takes place within a PDM group or how decisions are arrived at. In some studies, group decisions may be made only after a consensus is reached whereas in others a majority vote may be required. Many PDM investigations also differ greatly with
respect to how much autonomy a PDM group is given by management. The fact that there is no generally agreed upon format for PDM research makes the comparison of different studies all the more difficult.

**Quality Circles**

One approach to PDM that has not yet been described is that of quality circles. A quality circle is a small group of employees doing similar or related work who meet regularly to discuss, study, and solve problems which arise in the workplace. Quality circles represent a type of PDM that is formal, direct, and voluntary. Like the Scanlon Plan, quality circles originated as a method of improving productivity in the workplace and in many respects incorporate the humanistic philosophy of Argyris (1955), McGregor (1944) and Likert (1961) which underlies other forms of PDM. However, quality circles are distinctive in that they represent a structured approach to group problem solving that has been developed largely within the Japanese culture.

In a review of the development of quality circles, Munchus (1983) noted that quality circles originated in Japan in the early 1960's and represented a desire by the Japanese to increase industrial productivity and improve product quality. Two Americans, W. Demming and J. Juran are credited with providing the initial stimulus that led to the development of quality circles. Demming advocated using methods of statistical quality control and Juran promoted the idea of participation by middle and upper management in the implementation of quality control systems.
Influenced greatly by the Demming and Juran approach, the Japanese made one important modification: instead of limiting quality control to trained engineers or experts, Japanese management allowed quality control to become a concern of all employees. This led to the formation of quality circles consisting of between 5 and 20 workers (usually blue-collar) which focused on the problems of product quality and cost control. Each quality circle received training in statistics, data collection and PDM.

Over the last twenty years, quality circles have become an integral part of many Japanese businesses and have been credited with greatly increasing productivity and product quality (Munchus, 1983). Although the exact number of quality circles in Japan is unknown, Cole (1980) estimated that by 1978 there were almost 100,000 official circles, up from 1,000 in 1964. Assuming an average of 10 members per circle, Cole estimated a membership of close to 1 million workers, or approximately one-eighth of the total Japanese workforce.

The quality circle concept came to America in the early 1970's when it was first used by large American industrial companies that were also concerned with product quality and sagging productivity. Lockheed Missile and Space Company was one of the first major U.S. companies to adopt quality circles. According to Cole (1979), Lockheed began forming quality circles in 1974 for departments in production, development, machine, electronic, and composite shops. By 1977, there were 30 quality circles and the company estimated that the circles had saved over $3 million in operation expenses. In addition, the number of defects per 1,000 work hours caused by the manufacturing process
declined by two-thirds. Suggestions from quality circles included better methods for molding plastics, a more reliable system for stamping identification numbers on electrical components, and an improved construction process for circuit boards. A survey of company employees also showed improved morale and job satisfaction over 1974 levels.

Unfortunately, most investigations of quality circles have relied on a similar case study approach. This is largely because a quality circle can be evaluated only in an actual organization and it is usually very difficult to obtain a suitable control organization or eliminate possible Hawthorne effects. Following Lockheed's success with quality circles, several other companies including Hughes Aircraft, General Motors, Harley-Davidson Division of AMF, RCA, and American Airlines developed their own quality circles. In most cases, quality circles yielded positive results, improving productivity and overall employee satisfaction. However, the introduction of quality circles into American organizations has not been without controversy.

The adoption of quality circles in the United States was accompanied by an increasing awareness of the Japanese approach to management. Ouchi's (1981) Theory Z advocated that American organizations could benefit from many Japanese practices such as consensus decision making, long-term employment and a holistic concern for employees. Criticisms of adopting a Japanese approach have often focused on the differences between the Japanese and American cultures. For example, Keys and Miller (1984) argue that Japanese life has historically emphasized close social relations due of a lack of land and the need to share resources. In contrast, American life has emphasized
individualism and independence, arising historically from a developing frontier and a land-intensive economy rather than a labor-intensive one. American workers are seen as sharing this cultural bias toward individualism and, unlike their Japanese counterparts, will react unfavorably over the long run to a collective style of management.

Whether or not a Japanese management technique such as a quality circle is really appropriate for an American organization has been the subject of much debate (e.g. Sullivan, 1983, Sethi, Namiki, and Swanson, 1984). While American quality circles have often reported initial positive results, there are cases where quality circles were unsuccessful or became ineffective with time (e.g. Lawler and Mohrman, 1985). In addition, several Japanese firms (e.g. Matsushita Electric) that use quality circles in Japan do not use them in their plants located in the United States.

Most books or articles on implementing quality circles emphasize that there are necessary conditions that must be met within an organization before quality circles will work (e.g. Gryna, 1981). These conditions include a favorable economic climate and upper management support of the PDM concept. The impression emerges from the current literature that quality circles are not a cure-all method for an organization's problems, but may in some instances be a useful tool for improving productivity and employee morale.

What makes quality circles appealing to many American organizations is that they represent a step-by-step problem solving process that has been carefully developed and used in other organizations. The steps a
quality circle progresses through include selecting a problem, collecting baseline data, analyzing reasons for the problem, developing solutions, evaluating outcome, and presenting a report to management. In addition, circle members receive training in methods of problem solving such as brainstorming, nominal group process, cause-effect diagrams, Pareto diagrams and the use of histograms. A quality circle is usually guided by a leader who is chosen by group members. The leader is given additional training in group dynamics and is responsible for guiding the quality circle through the problem solving process. If an organization has several quality circles, a steering committee is set up to coordinate the activities of the quality circles. However, most organizations begin first with a single "pilot" quality circle to determine the potential benefits of a quality circle program.

Despite the controversy surrounding their use, quality circles have spread to many service sector organizations in the United States. For example, Goldberg and Pegels (1985) document several case studies where quality circles have been implemented in hospitals for groups of intensive care unit nurses, occupational therapy employees, radiology technical assistants, and environmental service workers. These case studies, however, have been followed by very few systematic attempts to study the specific effects of quality circles on employees.

Empirical research on quality circles faces a number of problems. First, quality circle programs are usually implemented by professional consultants who have a vested interest in the outcome. This makes an objective evaluation of a quality circle difficult. Second, possible Hawthorne effects complicate the interpretation of research on quality
circles. Most quality circles are given extensive recognition and encouragement by management and in some cases an outside facilitator is used to help direct circle activities. In such cases, it may be that management support is the real reason for any observed improvements and not the quality circle. Finally, many organizations start off a quality circle program by informing employees of the benefits they can expect by participating (e.g. increased morale and productivity). This represents an obvious source of bias that may influence how employees respond to the quality circle program.

**Empirical Studies on Quality Circles**

Although quality circles have become one of the most common forms of PDM, they are also one of the least carefully studied. To date, only two empirical studies on quality circles have been published. Rafaeli (1985) administered a questionnaire to employees who were either members or non-members of a quality circle program at a large electronics company. The quality circle program had been introduced in the company three years prior to the study and involved over 3,000 employees who worked predominantly in manufacturing. All circle members received training in problem solving and group dynamics. The questionnaire assessed job satisfaction, perceived influence, intent to leave, task variety, job autonomy, and interaction with others. Results found that quality circle members reported significantly more perceived influence and task variety than non-members. There were no significant differences on the other four measures. Given the large number of subjects (455 members, 305 non-members) and the correlational nature of the study, these findings lend, at best, only modest support to the
contention that quality circles have a positive impact on employees.

In a smaller scale study, Marks, Mirvis, Hackett, and Grady (1986) investigated how participation in a quality circle over a 20-month period affected the productivity, absenteeism, and work attitudes of employees in a manufacturing division of a large corporation. The quality circle group consisted of 46 employees who volunteered to participate in the circles. The control group was comprised of 46 employees who chose not to participate. All dependent measures were assessed for the two groups prior to the introduction of the circles and throughout the subsequent 20 months. Productivity was defined in terms of percentage of hours spent on production, efficiency of output rate, and overall productivity. The work attitudes measured included participation in decision making, communication, meaning, challenge, personal responsibility, accomplishment, and advancement.

Marks et al reported that employees who participated in the quality circles improved significantly on each of the three measures of productivity whereas employees in the control group did not. The results for job attitudes, however, were more complex. The quality circle group remained the same on most measures of job attitudes while the control group became significantly worse. As a result, there was a significant difference between the quality circle and control groups on measures of participation in decision making, work group communication, accomplishment, and advancement. These differences occurred in the absence of any significant improvement in the quality circle group. Rates of absenteeism for the quality circle and control groups were not significantly different.
Both of the above studies suggest that a quality circle program can produce small beneficial results for an organization. However, these results are not as dramatic as those predicted by some of the advocates of quality circles. In addition, the Rafaeli (1985) and Marks et al (1986) studies were carried out with employees in manufacturing divisions and it is not clear whether the results would generalize to employees in other types of occupations. The present study will address this issue by focusing on quality circles developed in a hospital setting.
QUALITY OF WORK LIFE: JOB STRESS AND JOB BURNOUT

In many ways, the research on PDM of the 1950's and 1960's foreshadowed a broader focus on the quality of work life, an area which has emerged over the past 15 years. Quality of work life refers to the favorableness or unfavorableness of a job environment for employees (Walton, 1974). While quality circles and other types of PDM represent attempts to improve the quality of work life, organizational psychologists have developed several other approaches. For example, Hackman and Oldham (1980) proposed that quality of work life could be improved by changing at least one of five core job characteristics: skill variety, task identity, task significance, autonomy, and feedback. This influential theory suggests several methods for "enriching" jobs which may not include PDM. Task variety, for instance, can be improved by giving employees several jobs to perform, feedback can be increased by providing employees with accurate information about their performance, and greater task significance can result when employees are given work they feel is important. Other approaches to improving quality of work life have included innovative pay systems (Lawler, 1976), flexible work schedules (Rosow and Zager, 1983), and employee
assistance programs (Shore, 1984).

Along with these different approaches have come an increasing number of variables that are used to measure the quality of work life. The use of job satisfaction scales has been supplemented by measures of organizational commitment (Scholl, 1981), job responsibility (Mirvis and Lawler, 1984), perceived influence (Newman, 1977), and job involvement (Moos and Ensel, 1974). Two variables which have received especially widespread attention in the quality of work life literature are job stress and job burnout. Since both variables will serve as dependent measures in the present study, they are reviewed briefly below.

**Job Stress and Job Burnout**

**Job Stress.** In a review of the job stress literature, Ivancevich and Matteson (1980) labeled stress "the most imprecise [term] in the scientific dictionary" (p. 7). This uncertainty as to the precise meaning of stress is reflected in the many ways in which job stress has been conceptualized and studied. Researchers have viewed job stress as a response, a stimulus, an unidimensional construct, a multidimensional construct, an environmental characteristic, and an individual characteristic (cf. Parker and DeCotis, 1983). This lack of consensus makes job stress a rather nebulous, omnipresent construct that is in need of a more precise definition.
For the present discussion, job stress will be defined in a manner suggested by Newman and Beehr (1979), or as a situation in which specific job characteristics interact with characteristics of the worker to produce a change (i.e., either disruption or enhancement) in the psychological, behavioral, or physiological condition of the worker. While this definition is admittedly broad, it is theoretically linked to the personality theories of Lewin (1951) and Murray (1938, 1951) who both emphasized the need to consider variables of the person and the environment. More recently, this interactionist view of job stress has been referred to as person-environment fit (or P-E fit) and has been the subject of a great deal of stress-related research (e.g., Caplan, Cobb, French, Harrison, and Pinneau, 1975).

According to the Caplan et al model (1975), the degree of P-E fit is directly related to the amount of stress experienced by an individual in an organization. Misfit between person and job can occur in either of two ways. First, a situation may exist where a person's "needs" are not met by the "supplies" of the work environment. For instance, an employee with a need for autonomy may find himself/herself in a job that is narrowly defined and under the tight control of a supervisor. Second, misfit can be the result of insufficient abilities that don't meet the demands of the job. For instance, a job requiring specialized training or knowledge will result in a misfit for an employee without the necessary background or expertise. In both cases, a misfit is hypothesized to result in a lower quality of work life.
The measurement of job stress has tended to focus on the "needs" vs "supplies" approach and has usually entailed a survey/questionnaire type format. For instance, Kahn et al (1964) developed the Job-Related Tension Index which asks subjects to respond on a Likert scale to a series of 15 statements (e.g. "Feeling that you have little authority to carry out the responsibilities assigned to you"). These statements implicitly require the respondent to make a comparison between what he/she wants (i.e. "needs") and what the job environment provides (i.e. "supplies"). The higher the correspondence between "needs" and "supplies", the greater the P-E fit.

Numerous other types of questionnaires have been developed by stress researchers. Some of these focus on identifying general stressors such as role conflict and ambiguity which apply across occupations (e.g. "Rizzo et al, 1970) while others are more concerned with the specific stressors within an occupation (e.g. Koch et al, 1982). Regardless of the focus, these questionnaires all attempt to measure P-E fit by assessing the job environment from the viewpoint of the employee.

**Job Burnout.** Job burnout is regarded as a special form of job stress that occurs most commonly in helping professions where there is an intense involvement with other people (e.g. nursing and other health care professions, law enforcement, teaching, social work, day-care work, etc.). Maslach and Jackson (1981) have identified three specific aspects of burnout: (1) emotional exhaustion: a feeling that one can no longer cope with the emotional demands of work, (2) reduced personal accomplishment: the sense that work is no longer worthwhile and that
one's efforts have been ineffective, and (3) depersonalization: the
development of negative attitudes towards the people one works with.

The concept of P-E fit is relevant here since individuals in the
same work environment will not necessarily experience the same type of
burnout and some may not experience it at all. Burnout is seen as an
interaction between organizational conditions and personal
characteristics of the helping professional (Pines, Aronson, and Kafry,
1980).

The causes of job burnout are numerous and have been hypothesized
to include unrealistic job expectations, lack of social support, lack of
control over the work environment, inadequate reward system, ambiguity
and conflict as to what defines appropriate job behavior, and continuous
direct contact with people (cf. Golembiewski, Munzenrider, Stevenson,
1986). In most research, burnout is measured with a questionnaire. For
example, the Maslach Burnout Inventory (Maslach and Jackson, 1981)
consists of a series of statements (e.g. "I feel like I'm at the end of
my rope") which subjects are asked to rate in terms of magnitude and
frequency of occurrence. The inventory yields separate scores for each
of the three aspects of burnout. Scores on the Maslach Burnout
Inventory have been significantly correlated with job dissatisfaction,
turnover intention, problems with family and friends, and the increased
use of alcohol (Maslach and Jackson, 1981).
Strategies for Coping with Job Stress and Job Burnout

Organizational psychologists have offered numerous suggestions based largely on correlational research about how to help employees cope with job stress and burnout. These suggestions include providing education and counseling services (Cooper and Torrington, 1979), facilitating social support mechanisms (Caplan et al, 1975), reducing contact time with patients (Maslach and Jackson, 1982), and increasing participation in decision making (French and Caplan, 1972).

Unfortunately, few of these suggestions have been systematically tested in an organizational setting. The current state of our knowledge concerning coping strategies is perhaps best summed up by Newman and Beehr (1979, p. 35):

Although some of these strategies seem to glow with the aura of face validity, there remains the extremely difficult task of empirically validating their effectiveness. Until this is done, practitioners have little more than their common sense and visceral instincts to rely on as they attempt to develop badly needed preventive and curative stress management programs.

What evidence we do have concerning effective coping strategies is limited to a relatively small number of studies. For the purpose of this dissertation, our focus will rest with those studies which have focused on PDM and its possible relationship to reduced levels of job stress and burnout.

One of the earliest studies was conducted at Goddard Space Flight Center by French and Caplan (1972) who found a strong correlation between perceived lack of participation and role ambiguity (a common
measure of job stress). Employees who were judged "participators"
utilized their skills and abilities more effectively than did
"nonparticipators." French and Caplan concluded that of all the
stressors they considered (workload, role conflict, role ambiguity, poor
relations with co-workers and supervisor), lack of participation was the
most powerful predictor of psychological well-being and may the
essential antecedent cause of other strains (e.g. turnover and
absenteeism).

Similarly, Ivancevich (1979) reported in a study of 154 engineers
that "decisional deprivation," or the lack of PDM, was related to
greater role conflict, more frequent physical symptoms of strain (e.g.
upset stomach) and greater job tension. This finding was also supported
by by Alutto and Vredenburgh (1979) who found that 75% of nurses in two
urban hospitals judged themselves to be "decisionally deprived." These
nurses reported experiencing more job tension and dissatisfaction than
nurses who did not feel PDM-deprived. Virtually no participant in the
study felt she/he had too much PDM.

In light of these findings, researchers have suggested several
reasons why PDM is associated with lower levels of job stress. PDM has
been portrayed as a source of power and influence (Hammer and Tosi,
1974), information (Zaleznik, Kets de Vries, and Howard, 1977), and
social support (Caplan et al, 1975). However, little empirical research
is available to help us identify which of these factors is responsible
for the relationship between PDM and job stress.
There is also a noticeable lack of evidence as to whether PDM causes lower job stress or burnout. To date, only one field experiment on the topic has been published. Jackson (1983) manipulated PDM for nurses and clerical employees who worked in an outpatient facility of a University run hospital. The study involved twenty-six semi-autonomous work units that ranged in size from 2 to 13 employees. Work units were matched for size and randomly assigned to either a PDM or a non-intervention condition.

PDM consisted of increasing scheduled staff meetings to at least twice a month from a previous level of once per month or less. In addition, unit supervisors were given training in the use of the nominal group process prior to the formal intervention. The nominal group process is a form of group decision making that involves brainstorming and the opportunity for all group members to participate in the decision making process (see Delbecq, Van de Ven, and Gustafson, 1975). The dependent measures in the study included a series of self-report scales assessing emotional strain, job satisfaction, perceived influence, communication, role conflict and ambiguity, social support and turnover intention. Organizational records were examined to assess absenteeism. The self-report scales were administered two months prior to the PDM intervention, after 3 months, and after 6 months.

Results indicated that after 3 and 6 months, PDM work units experienced significantly lower role conflict/ambiguity and emotional strain and significantly higher job satisfaction and perceived influence than non-intervention units. Also, the difference between the PDM and non-intervention units became greater between 3 and 6 months, suggesting
that the effects of PDM on job stress were gradual and increased with time. Absenteeism, the only "objective" measure in the study, showed no significant differences between PDM and non-intervention units.

Jackson's findings offer support for the stress-reducing effects of PDM. The type of PDM used can be classified as forced (because of random assignment, unit supervisors had no choice), formal, and direct. Although this type of PDM is similar to a quality circle, there was one important difference. Group members in Jackson's study had only a limited voice in decision making. Unit supervisors were not required to hold discussions about particular topics or act in accordance with the outcomes of any votes taken. Therefore, participants did not have control over the decision making process. They were allowed to give input but decision making still rested in the hands of the supervisor.

**Job Stress and Burnout in the Nursing Profession**

The present study will examine the impact of quality circles on different measures of quality of work life. In this sense, it is an extension of Jackson's (1983) study as well as previous research on quality circles by Rafeli (1985) and Marks et al (1986).

The subject population will consist of operating room (OR) nurses from six New England hospitals who will be assigned to either an experimental or control group. OR nurses have been chosen since there is evidence that nurses as a group experience considerable job stress and burnout (e.g. Numerof and Abrams, 1984; Maslach and Jackson, 1982). Some of the most frequently rated stressors for nurses have been:
dealing with patient's families, inadequate staffing and work overload, awareness of tremendous responsibility for others, and interpersonal conflict with administrators, physicians or other nurses. These stressors are augmented by the fact that some health care professionals still hold outmoded views of nursing and in many cases actively discourage nursing participation in decisions related to nursing practice and administration (Kalish and Kalish, 1977; Lee, 1979).

O'Donovan and Bridenstine (1983) argue that "Documentation does not indicate that there is a shortage of professionally trained registered nurses in the United States. Rather it indicates that nurses are leaving active practice in large numbers, not to return" (p. 76). The authors suggest that prolonged job-related stress (stemming from work overload, conflicting demands, and lack of recognition) is a crucial factor influencing nurse's decisions to leave active practice. A study by Numerof and Abrams (1984) of different nursing specialties, reported that OR nurses experience as much if not more job stress than other nursing specialties (e.g. Intensive Care Unit nurses, Medical-Surgical nurses, Emergency Room nurses, etc.) Numerof and Abrams measured nursing job stress with a questionnaire that assessed perceptions of the hospital environment, work demands, emotional aspects of nursing, death-related issues, and lack of social support.

Despite a few empirical investigations, a significant proportion of the nursing stress literature rests on anecdotal evidence, making it difficult to render any definite statements about the nature of the problem and its possible solution(s). Since much of our empirical knowledge about job stress and PDM has been derived from research in the
industrial sector, additional research in the health-care sector is necessary to determine if generalities can be made across different types of occupations.

With respect to OR nursing, the concept of PDM is not new. In the past five years, AORN, the official journal of OR nursing, has published several articles on the topic of giving staff nurses more input into the decisions made by administration (e.g. Hoffman, 1983; Sullins, 1982; Boegli, 1984). The first documented case of a quality circle being developed in an OR dates back to 1980 at Barnes Hospital in St. Louis (Geldbach, Klein, and Moore; 1981). Despite this recent interest in participative management, it remains to be empirically determined how a quality circle affects the quality of work life of an operating room.

Focus of Present Study

In the present study, a quality circle will be developed for OR nurses in three New England hospitals. The quality of work life in these OR's will be measured and compared to that of three hospitals without quality circles.

As much as possible, the quality circles developed in this study will be similar to those described in the current PDM literature. This means that participation in a quality circle will be voluntary, training in problem solving techniques will be provided to circle members, and the circles will be allowed to study and discuss any problems they identify in the immediate work environment.
An attempt will also be made to avoid some of the methodological problems associated with quality circles. To reduce expectancy effects, no mention will be made to circle members of any potential benefits related to participating in a quality circle. To reduce Hawthorne effects, the emphasis in the quality circles will be placed on group problem solving and not on formal presentations to management. In addition, occasional visits will be made to the hospitals without quality circles to provide them with some attention for being in the study.

This study is unique in that the impact of quality circles will be examined across three different organizations. A drawback of previous PDM field research has been results of limited generality. The findings which emerge from the present study, however, should be generalizable beyond a single organizational setting. In addition, the present study will have experimental and control groups that are separated geographically. This will prevent any confounding due to interaction between the two groups. Previous field experiments on PDM (e.g. Jackson, 1983; Marks et al., 1986) have characteristically drawn experimental and control groups from the same organization, thereby making interaction between the two groups possible, if not likely.

Based on the current literature on job stress/burnout and PDM, this study will test the following hypotheses:

I. Quality circle participants will show a reduced level of job stress and burnout relative to the control group.

II. Overall quality of work life (as measured by perceptions
of the work environment) will improve for the quality circle participants but not for the control group.

III. Absenteeism due to illness will decrease in quality circle participants but not in control group participants. This hypothesis is based on research (e.g. Pines, Aronson, and Kafry, 1981) which has shown a positive correlation between job stress/burnout and absenteeism.

IV. In accordance with P-E fit theory, individual differences will play a role in the effect of the quality circles. Specifically, demographic and personality variables will influence which participants benefit the most from being in a quality circle. Two personality variables that will help predict how participants respond to a quality circle will be need for independence (Vroom, 1960) and desirability of control (Burger and Cooper, 1979).

In addition to testing the above hypotheses, this research study has an exploratory goal as well. Since quality of work life is such a general concept, several scales will be employed to measure it. The results of the present study should shed some light on which specific aspects of the work environment are affected most by a quality circle.
Design

The data for this study were collected using a pretest-posttest nonequivalent control group design (Cook and Campbell, 1979), modified to include two posttests. The experimental group consisted of three hospitals in which quality circles were developed by the investigator for the OR staff. Throughout this dissertation, the term OR staff will refer to OR employees, such as registered nurses and technicians, who work directly with doctors during operations. The control group consisted of three hospitals in which the OR staff did not have quality circles.

Over a seven month period, a comparison was made of the changes in the quality of work life for both groups of hospitals. Using the notation where $X$ represents the measurement of the dependent variables, the design for this study can be represented as follows:

<table>
<thead>
<tr>
<th></th>
<th>PRETEST (Month 1)</th>
<th>POSTTEST 1 (Month 4)</th>
<th>POSTTEST 2 (Month 7)</th>
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<tbody>
<tr>
<td>A, B, C</td>
<td>$X$</td>
<td>$X$</td>
<td>$X$</td>
</tr>
<tr>
<td>(Experimental Group)</td>
<td>Training</td>
<td>Quality Circles Meet</td>
<td></td>
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<tr>
<td>D, E, F</td>
<td>$X$</td>
<td>$X$</td>
<td>$X$</td>
</tr>
<tr>
<td>(Control Group)</td>
<td>No Training</td>
<td>No Quality Circles (Investigator visits hospitals twice)</td>
<td></td>
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</table>
The primary means of evaluating the impact of the quality circles was a questionnaire administered at the Pretest, Posttest 1 and Posttest 2. Participants returned the questionnaires to the investigator by mail and were asked not to consult with other hospital employees concerning their responses. Absenteeism data were also collected at each of the three measurement periods.

The six participating hospitals were all small (100-250 beds), private, non-profit, non-union institutions located in the same New England state. Participation by each hospital was entirely voluntary. The hospitals were approached by the investigator who described the characteristics of a quality circle and relevant aspects of the study (e.g. duration, administration of questionnaires, etc.) to the director of nursing. If interest was expressed by the director and by the OR supervisor, a formal presentation was made to the OR staff.

The OR staff received a brief description of the study and were told that several hospitals in New England would be participating, although not every hospital would have a quality circle. The OR staff were also informed of the questionnaires they would be asked to fill out and the time commitment that would be necessary (approximately one hour a week) should they participate in a quality circle. No mention was made of the study's hypotheses and, as much as possible, the concept of a quality circle was presented in a neutral fashion without reference to any benefits (or costs) a circle might produce.
Assignment of a hospital to a condition was non-random and depended on three basic criteria. First, the preferences of hospital administrators and OR staff were taken into account. In order for a hospital to be in the experimental condition, it was necessary for both administrators and staff to understand and support the idea of having a quality circle.

Second, it was important that all hospitals in the experimental condition conduct their quality circles in roughly the same manner. Therefore, experimental group hospitals were asked to hold quality circle meetings during regular working hours (7 a.m. to 4 p.m.), when employees would be paid for their participation. If a hospital desired a quality circle but did not want to conduct the circle during the regular working day, the hospital was assigned to the control condition.

Finally, an attempt was made to match up the hospitals so that the experimental and control groups would be as similar as possible. The hospitals in both groups were located in comparable areas of New England and the OR's in the hospitals performed similar types of operations. Table 1 presents some relevant descriptive data for each of the six participating hospitals in terms of overall number of beds, OR caseload, OR personnel, and OR cases per full-time employee.

Table 1 About Here
Although the first two criteria described above introduce obvious selection differences into the study, it should be noted that it is the very nature of quality circles that they be voluntary. In most situations, both organizations and employees choose whether or not to participate in a quality circle program. Thus, the present research design represents a realistic approach to studying the effects of quality circles across organizational settings. The extent to which treatment effects can be attributed solely to selection differences between the experimental and control groups is an issue that will be addressed in the Results and Discussion sections.

Participants

A total of 86 OR employees participated over the course of this study. Of this number, 80% were Registered Nurses (RNs), 16% were Certified Operating Room Technicians (CORTs), and 4% were Licensed Practical Nurses (LPNs). Ninety-eight percent of the participants were female.

Because of the longitudinal nature of the research design, participants were expected to contribute data at all three measurement periods. However, due to turnover, subject attrition and newly hired employees, the number of participants varied according to the measurement period. Sixty-seven participants contributed data at the Pretest with 57 at Posttest 1 and 65 at Posttest 2. There were a total of 42 OR employees who participated throughout the entire study and contributed data during all three measurement periods.
Table 2 presents a comparison of demographic data for participants in the experimental and control groups. In general, participants in the three experimental group hospitals tended to be slightly older, work more hours per week, and have more experience in OR than their control group counterparts. While all of these differences approached statistical significance, only the difference in hours worked per week was actually significant (p < .05, two-tailed, df=65).

Measures

Appendix A presents an example of the questionnaire which was used in the present study. This questionnaire required approximately 30-40 minutes to complete and contained the following six sections.

Work Environment. Perceptions of the quality of work life were measured by 33 statements that dealt with various aspects of the work environment. Participants rated each statement on a 7-point Likert scale according to their level of agreement with the statement during the past month. Ratings ranged from Strongly Agree (1) to Strongly Disagree (7) and all statements were worded so they were applicable to the OR environment. The Work Environment section contained four scales: Perceived Influence (10 items, alpha = .83), Peer Cohesion (9 items, alpha = .87), Supervisor Support (6 items, alpha = .87) and Job Commitment (8 items, alpha = .81).
The Perceived Influence scale contained four statements from Vroom's (1959) measure of influence scale and six statements from the Autonomy subscale of Moos and Insel's (1974) Work Environment Scale. The other three scales were comprised of statements drawn solely from the corresponding subscale of the Moos and Insel's (1974) Work Environment Scale.

**Job Stress.** Perceptions of job stress were measured by using the Organizational Environment scale of Numerof and Abrams (1984) Nursing Stress Inventory. This scale was chosen because it consists of 13 statements that reflect specific types of conflict that might be experienced in a nursing environment (e.g. conflicts with physicians, hospital administration, etc.). Participants rated each statement on a 5-point Likert scale according to (a) how often the conflict had occurred and (b) the degree of stress produced by the conflict. Ratings were based on the participant's experiences in the OR during the past month. Following Numerof and Abrams, scores for each item were computed by multiplying the frequency rating by the degree rating. In the present study, the alpha reliability for the scale was .91.

**Job Burnout.** The frequency scale from the Maslach Burnout Inventory (Maslach and Jackson, 1981) was used to measure participants' personal feelings and attitudes toward working in the OR. This 22-item inventory contains three subscales: emotional exhaustion (9 items, alpha = .91), personal accomplishment (8 items, alpha = .80), and depersonalization (5 items, alpha = .68). Participants rated each statement on a 7-point Likert scale as to how often the statement had occurred during the past month. Ratings ranged from Never (0) to Every
Day (6).

**Personality Measures.** Two personality scales were completed by participants. At the Pretest, participants responded to six statements from the short form of Vroom's (1960) need for independence scale (alpha = .48). This measure has been hypothesized to be important in determining how employees will react to PDM (Runyon, 1973). Responses to each statement were made by choosing the most appropriate answer on a 5-point scale. Vroom (1960) reported a test-retest reliability of .61 for this measure.

At Posttest 2, participants completed Burger and Cooper's (1979) 20-item desirability of control scale (alpha = .82). This scale is designed to measure the "general motivation to control the events in one's life" (Burger and Cooper, 1979, p. 381). Participants responded to each statement on a 7-point scale ranging from "This statement doesn't apply to me at all" (1) to "This statement always applies to me" (7). Burger and Cooper (1979) reported a test-retest reliability of .75 for the scale.

The two personality scales were administered at different times in order to reduce the length of the questionnaire. A drawback to this approach is that not all participants had the opportunity to complete both measures. As a result, the participants who filled out the need for independence measure overlapped with, but were not identical to, the participants who filled out the desirability of control measure. A total of 50 participants completed both personality measures.
Demographic Data. Each participant in the study was asked to provide information on background and demographic variables, including sex, age, education, professional certification, years worked in OR, years worked at present hospital, and hours worked per week. Participants were identified across measurement periods by the last four numbers of their social security number which they wrote down on the questionnaires.

Turnover Intention. The final section of the questionnaire measured each participant's intention to remain at her/his current job. This was assessed by asking the question: "What is the probability that you will still be working at your present job in one year?"
Participants chose a number from 0 (Absolutely certain you won't be working at your present job) to 100 (Absolutely certain you will be). Price and Mueller (1981) have reported that turnover intention is an important precursor to actual turnover among nurses.

Absenteeism Due to Illness. Hospital records were examined to assess absenteeism due to illness for each participant. This type of absenteeism was chosen because differences in personnel policy across hospitals made comparison of other types of absenteeism (e.g. total number of days absent) difficult. Hospitals varied with respect to how many days OR personnel were allowed to take off and how different types of absenteeism were classified. Absenteeism due to illness was one measure that was recorded in a consistent manner across hospitals. Absenteeism due to illness was computed at the three measurement periods (Pretest, Posttest 1, Posttest 2) by finding the average number of sick days during the preceding three months for each participant.
Quality Circle Activities. For each hospital in the experimental group, minutes were kept of the quality circle meetings. These minutes included a list of those participants attending and a brief description of the topics discussed at each meeting. The minutes were recorded by a volunteer and kept in a notebook located in the OR lounge so that circle members could review the minutes whenever necessary.

In order to document the range of issues discussed by the circles, a content analysis was conducted on the minutes for each hospital. Since no a priori hypotheses were being tested about what issues the circles would discuss, the categories for the content analysis were developed after inspection of the minutes once they had been recorded. Seven content areas were identified: administrative issues, interpersonal issues, patient concerns, paperwork/record keeping, inservice training, equipment and supplies, and issues related to improving the physical environment.

The content analysis involved coding each quality circle meeting according to the content areas that were discussed. A meeting received a 1 or a 0 for each content area. A 1 indicated any type of mention of the area in the recorded minutes.

Quality Circle Intervention

For each of the hospitals in the experimental group, a quality circle was developed by the investigator for the OR staff. Quality circles met during work hours, were open to voluntary participation by all OR staff (excluding administration and support personnel), and dealt with problems that came up in the immediate work environment of the OR.
Circle meetings were scheduled once per week for approximately one hour, caseload and time permitting.

Training. The first four meetings of the circles were led by the investigator and dealt with training circle members in problem solving techniques typically used by a quality circle. These techniques included brainstorming, nominal group process, cause-effect analysis, and data gathering methods. A primary goal of the training was to give the OR staff experience working together on various problems. The problems chosen for the training involved hypothetical situations (e.g. On a cold night, how would you close a window without getting out of bed?) that were not directly relevant to the work environment of an OR.

Each circle member also received a 46-page manual that explained the quality circle process in detail. This manual, written by the investigator, was intended to serve as a reference for circle members throughout the study. The manual provided additional information about problem solving techniques and contained examples that were relevant to a hospital environment. The manual was entirely descriptive and made no reference to any alleged effects of participating in a quality circle. Once training was completed, the manual was used infrequently by circle members and was rarely brought to circle meetings. The Table of Contents from this manual is presented in Appendix B.

Following the training sessions, the quality circles were guided by circle leaders who were members of the OR staffs chosen by their peers. Hospitals A and B had two circle leaders while hospital C had one. Circle leaders were responsible for facilitating group discussions
within each quality circle and ensuring that all members had a chance to participate. Between the third and fourth quality circle meeting, all circle leaders attended a one-day workshop at the University of New Hampshire sponsored by the investigator.

The workshop provided the leaders with additional experience in group decision making and the opportunity to have any remaining questions answered. Problem solving techniques were reviewed, a movie on "group think" was shown, and a discussion was held on how a quality circle might fit into the OR of each hospital. Workshop participants received $70 (approximately an average-day's salary) plus travel expenses for attending.

Problem Solving Procedure. Once the circle leaders began guiding their quality circles, the role of the investigator changed to that of an observer. The investigator attended every quality circle meeting at the three hospitals but did not participate in decision making activities. Judgments as to which problems to address and how those problems should be solved were left entirely up to circle members.

Problem solving in the quality circles followed a prescribed format. First, a quality circle chose a problem in the OR to study. Four general problem areas were suggested: staff needs, quality of patient care, cost effectiveness of OR practices, and risk management. As is customary with quality circles, issues directly related to personnel policy (e.g. salary issues, hiring/firing decisions) were designated as off limits since they represented areas outside the immediate control of the OR staff.
Second, the quality circle studied the problem it selected and attempted to arrive at a proposed solution. The problem solving techniques used and the time spent in this stage depended greatly on the nature of the problem under consideration. Typically, the circles began by using brainstorming and, once the problem was clearly defined, progressed to cause-effect analysis and data gathering. Group decisions were generally based on a consensus.

Finally, the solution arrived at by the circle was presented to the OR supervisor for approval or implemented by the OR staff if approval was not necessary. The presentation to the supervisor was usually made by one or two of the circle members and involved describing the problem which had been studied and the solution reached. Depending on the supervisor's response to the proposed solution, the circle either selected a new problem for study or continued to discuss the original problem, taking the supervisor's feedback into consideration.

Control Group Visits

The three control group hospitals received visits from the investigator at approximately 10 and 18 weeks into the study. The stated reason for these visits was to gather additional information about each hospital. An unstated reason was to provide the OR staffs in these hospitals with additional attention for their participation and thereby balance out any Hawthorne-like effects in the study.
The visits took place in the OR lounge at each hospital during working hours and lasted 45 minutes to one hour. All interested and available OR staff were invited to attend. During the visits, the OR staffs were asked questions about their hospital's policy in areas such as call time, inservice training, and overtime practices. Information was also sought concerning the nature of the work in OR and the type of operations performed. During these visits, the investigator took notes, remained neutral with respect to any comments that were made, and followed a set format so that visits across hospitals were kept as similar as possible.

The investigator met with the OR staffs of the control group hospitals three additional times for the purpose of distributing the questionnaires. These meetings lasted 10-15 minutes and were concerned solely with providing directions for the completion and return of the questionnaires. Once the study began, no mention was made to the control group participants concerning the activities or progress at the experimental group hospitals.
CHAPTER FOUR

RESULTS

The main emphasis in this results section will rest with analyzing the questionnaire and absenteeism data collected at the three measurement periods and evaluating the four hypotheses described in Chapter Two. However, first we will begin by examining the activities of the three quality circles.

Quality Circle Activities

A summary of the activities of the quality circles is presented in Table 3. Overall, the three circles met an average of 2.5 times per month. This is below the scheduled rate of one per week, and reflects the busy and sometimes unpredictable nature of work within an OR. Circle meetings were occasionally postponed because of emergencies, a backlog of cases, or other factors that took priority. Despite this fact, a circle rarely went more than three weeks without a meeting.

A content analysis revealed a great deal of diversity in the topics which the circles discussed. Across hospitals, administrative issues were the most popular area with physical environment issues the least popular. However, virtually every content area was touched on by each of the three circles. Eighty-two percent of the proposed solutions were
accepted by the supervisors, a rate similar to that typically reported in the quality circle literature (e.g. Gryna, 1981). Some of the issues addressed by the circles (e.g. use of nametags) were relatively straightforward and required little time, while other issues (e.g. peer evaluation) were far more complex and required several meetings before discussion was complete.

Comparison of Experimental and Control Group Hospitals

Given that the quality circles met fairly regularly and engaged in problem solving activities, a major prediction of this study is that quality circles should have a positive impact on the quality of work life that employees experience (Hypothesis II). This improvement should be reflected in lower rates of absenteeism (Hypothesis III) and reduced levels of job stress and burnout (Hypothesis I).

Table 4 presents the questionnaire and absenteeism data for the experimental and control groups at the Pretest and Posttest 2. In this table, the average group score and standard deviation is provided for each of ten dependent measures. For job stress, burnout due to lack of personal accomplishment, and turnover intention, the scores have been reversed so that the direction of change has the same meaning as for the other measures. An increase in the mean score indicates a worsening for that measure, whereas a decrease in the mean score indicates an

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Table 3 About Here

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Paired t-tests revealed a significant improvement (p < .05, one-tailed, df=24) for the quality circle group in job involvement, job stress, and burnout due to depersonalization. Of the other measures, five changed in the predicted direction (perceived influence, peer cohesion, burnout due to emotional exhaustion, burnout due to lack of personal accomplishment, and absenteeism/illness), although not significantly (p > .05, one-tailed, df=24). It should be noted that one drawback to this method of performing repeated t-tests is that the probability of a Type I error is increased above the .05 level.

For the control group hospitals, scores on several of the dependent measures actually got worse as can be seen by the negative paired t-values. In the case of supervisor support, burnout due to emotional exhaustion, burnout due to depersonalization, and turnover intention, this decline at Posttest 2 was significant (p < .05, one-tailed, df=24).

An additional aspect of the data in Table 4 that should be noted is the difference in Pretest scores for the experimental and control groups. For six of the measures (peer cohesion, supervisor support, involvement, and all three types of burnout), the hospitals with quality circles had significantly lower scores (p < .05, one-tailed, df=24) at the Pretest than those hospitals without quality circles. Along with
Table 2, this finding strongly suggests that the experimental and control groups were not equivalent at the start of the study.

**Analysis of Covariance**

One post-hoc method for dealing with data from non-equivalent groups is the use of ANCOVA (Wildt and Ahtola, 1978). ANCOVA allows for the adjustment of scores based on a covariate, in this case, the score at the Pretest. An ANCOVA analysis, however, is only meaningful if there is not a significant interaction between the covariate and the levels of the independent variable (control and experimental groups). A significant interaction indicates that the impact of the covariate is not the same for both groups, thus violating an important assumption of ANCOVA.

Table 5 presents the results from an ANCOVA analysis where the means for the scores at Posttest 1 and Posttest 2 have been adjusted by taking into account the difference in the scores at the Pretest. In Table 5, the comparison of interest is between the adjusted means (M(A)) of the experimental and control groups at Posttest 1 and Posttest 2. The reader should be careful not to overinterpret changes across measurement periods since the number and characteristics of the participants who contributed data at each period is different.
Table 5 reveals significant differences between the experimental and control groups at Posttest 1 and Posttest 2. At Posttest 1, three out of the ten measures showed a significant difference of at least $p < .05$ (df=47). At Posttest 2, this increased to six of the ten measures (df=49). Even when Pretest differences were controlled for, the quality circle employees perceived their work environment as being generally more positive than employees in the control group.

Multiple regression analysis was used to determine whether the ANCOVA assumption of an insignificant interaction between covariate and group was met. Out of 20 possible interactions between covariate and group (10 at both Posttest 1 and Posttest 2), only one was significant ($p < .05, df=49$). This number of significant interactions is no greater than what would be expected through chance.

A final aspect of Table 5 that is worth noting are the scores for the experimental and control groups at the Pretest. These scores are generally higher than the corresponding Pretest scores in Table 4. Since the Pretest scores in Table 5 include all subjects who initially filled out a questionnaire whether or not they remained in the study, this difference suggests that participants who dropped out of the study experienced a less favorable work environment than those participants who stayed. Unfortunately, there is no way to determine the impact of the quality circle for those participants who left the study.
The Hospital as the Unit of Analysis

In all of the analyses thus far, the number of participants has been used to arrive at a value for N. A possible shortcoming of this approach is that the data collected in this study may be non-independent. This non-independence is based on the fact that the OR staff in each of the hospitals worked together and undoubtedly interacted outside of the quality circles or visits by the investigator. If this interaction in any way affected participant's responses on the questionnaire, the data could be considered non-independent and, thus, not suitable for analysis with inferential statistics.

An alternative approach that reduces this problem is to define N as being equal to the number of hospitals and not the number of participants. Since the interaction of employees between hospitals is far less than the interaction of employees within a given hospital, using the hospital as the unit of analysis should increase the independence of the data. Tables 6A and 6B repeat the paired t-test and ANCOVA analyses, this time using a total N of six. Means and standard deviations were calculated by first averaging scores within each hospital and then averaging across the hospitals in the two conditions.

Insert Tables 6A and 6B About Here
With a reduced N, the data are less clear with respect to the differences between the two groups. In Table 6A, only involvement improved significantly for the experimental group at Posttest 2 (df=2). Interestingly, for the control group, four of the measures (the same number as in Table 4) were significantly worse at Posttest 2. In the ANCOVA analysis of Table 6B, there were no significant differences between the experimental and control group hospitals at Posttest 1 and only two significant differences (involvement and burnout due to depersonalization) at Posttest 2. These data suggest a rather weak effect of the quality circles when the hospitals are considered as the unit of analysis.

Comparison of Change at Posttest 1 and Posttest 2

An alternative way to view the data is to focus on the direction of change in the dependent measures. Tables 7A and 7B present data from the six hospitals at both measurement periods. For each of the ten dependent measures, comparisons were made between scores at Pretest and Posttest 1, and Pretest and Posttest 2. A "Yes" was used to signify a favorable change (decrease in score) for a given measure and a "No" signified an unfavorable change (increase in score). The data in Tables 7A and 7B are based on the responses of 42 participants who contributed data at all three measurement periods.

Insert Tables 7A and 7B Here
The comparison at Pretest and Posttest 1 revealed little difference between the experimental and control groups. Thirty-three percent of the changes for the experimental group improved whereas 27% of the scores for the control group improved. The Pretest and Posttest 2 comparison, however, showed that 19 out of 30 changes (or 67%) were favorable for the experimental group hospitals while only 8 out of 30 changes (again 27%) were favorable for the control group hospitals. A 2 x 2 chi-square found this difference to be significantly different from chance, \( (2, N=42) = 8.15, p < .05 \). These data support the position of a small but reliable effect of the quality circles across hospitals. In addition, they suggest that this effect was most noticeable at Posttest 2.

**Role of Individual Differences**

A second issue in this study concerns the role of individual differences. Since the experimental and control groups differed on several participant variables (see Table 2), a question arises as to what role these variables played in the impact of the quality circles. Again, ANCOVA provides a post-hoc method for addressing the issue.

An ANCOVA analysis was performed on Posttest 2 data, this time including the participant variables as covariates in addition to the Pretest scores. The purpose of this analysis was to determine whether controlling for participant variables would nullify the differences between the two groups reported in Table 5. The results of this analysis are presented on the following page.
When only Pretest scores were used as the covariate in the ANCOVA analysis at Posttest 2 (first column), six of the ten measures showed significant differences between the experimental and control groups. Placing each of the participant variables separately as covariates into the equation (columns 2-5) actually increased the number of significant differences in the cases of Age and Years Worked in OR (YWOR). Only when all four participant variables were used as covariates together (final column) did the number of significant differences drop to four. This suggests that, at best, participant variables played a small role in the differences between the two groups reported in Table 5. However, it should be noted that the use of ANCOVA to "equate" groups that differ on several measures is not without controversy. The interested reader is referred to Pedhazur (1982) for a detailed discussion of the pros and cons of ANCOVA.

Individual differences may also be important in helping predict how an OR employee will respond to a quality circle (Hypothesis III). To examine this possibility, an approach suggested by Hendrix, Carter, and Hintze (1979) was used. Gain scores for experimental group participants were calculated by subtracting the score at Posttest 2 from the Pretest score for each of the ten dependent measures. Multiple regression was then conducted using the gain score as the predicted variable and the
Pretest score as one of the independent variables. The second independent variable entered into the equation was one of six participant variables: age, hours worked per week, years worked in current hospital, years worked in OR, need for independence, or desirability of control. In this analysis, a significant t-score for a participant variable indicates an improved ability to predict the gain score for a given dependent measure.

Results of the multiple regression analyses found that of the six participant variables only need for independence showed any tendency to improve the predictability of the gain scores. Need for independence produced a significant t-score for burnout due to depersonalization ($t(24) = -2.5, p < .05$), burnout due to lack of personal accomplishment ($t(24) = 2.4, p < .05$), and turnover intention ($t(24) = 2.3, p < .05$). However, only two of these t-scores were in the predicted direction. The negative t-score for burnout due to depersonalization, indicates a negative relationship between need for independence and the gain score for depersonalization. Based on previous research on PDM and personality variables (e.g. Vroom, 1960), a positive relationship would be expected. None of the other five participant variables produced more than one significant t-score, a rate barely above that expected by chance.

Additional information on relationships among the dependent measures can be found in Appendix C which presents a correlation matrix for the data collected at Pretest and Posttest 2. The correlations in Appendix C are based on data provided by both the experimental and control groups. In general, the correlations between different measures
of quality of work life (e.g. perceived influence and peer cohesion) were higher than the correlations between quality of work life measures and non quality of work life measures (e.g. perceived influence and desirability of control). Of the six non quality of work life measures (need for independence, desirability of control, age, hours worked per week, years worked in OR, and years worked in current hospital), the participant's age appeared to have the highest correlations with other variables in the study.
CHAPTER FIVE

DISCUSSION

The goal of this research study was to assess the impact of quality circles that were developed for OR staffs in three New England hospitals. Specifically, it was hypothesized that quality circles would (1) reduce job stress and burnout, (2) improve perceptions of the work environment, (3) reduce absenteeism due to illness, and (4) affect some OR employees more positively than others, thus demonstrating the need of taking into account individual differences. The results found modest support for the first two hypotheses and little support for the second two. Before discussing these results and presenting an overall evaluation of the quality circles, this section will begin by addressing several methodological issues that must first be considered.

Methodological Issues

Cook and Campbell (1979) note that quasi-experimental designs can be used to "probe causal hypotheses about a wide variety of substantive issues in both basic and applied research" (p. ix). However, by its very nature, a quasi-experimental design lacks the control typically found in a true experiment, thus making casual inferences more problematic. In the present study, this lack of control manifested
itself in two basic ways. First, because intact groups were used, participants could not be randomly assigned to the two conditions. As we have already seen in Tables 2 and 4, one result of this non-random assignment was an experimental and control group that differed in several important ways. Second, because the research was carried out in a field setting, variables other than the introduction of quality circles may have been responsible for the improvement in the experimental group.

In both cases, the lack of control inherent in the research design produced confounding variables which may have biased the results. These confounding variables are identified and discussed below according to whether they represent a bias toward finding a significant difference between groups (positive bias) or a bias toward finding an insignificant difference (negative bias).

**Variables Involving Positive Bias**

**Hawthorne Effect.** One common criticism of field research is that participants may change their behavior simply because of the attention they receive by being in an experiment. Although the Hawthorne effect is itself controversial (e.g. Parsons, 1974), it represents a potential source of positive bias. Two factors, however, argue against the Hawthorne effect in the present study. First, participants in the control group did receive attention for participating in the study. This attention came in the form of five visits made by the investigator to each control group hospital (note: three of these visits were for the purpose of distributing questionnaires). While five visits is
admittedly far fewer than the number of visits paid to the experimental
group hospitals, participants in the control group nevertheless received
attention for their participation throughout the study.

Second, and perhaps more convincing, the results of the study are
inconsistent with those that would be expected from a Hawthorne effect.
If a Hawthorne effect occurred we would predict an initial improvement
at Posttest 1 followed by a stabilization or gradual decline at
Posttest 2, as participants grew accustomed to the novelty of being in a
quality circle. The actual results, however, go in the opposite
direction: little improvement at Posttest 1 followed by greater
improvement at Posttest 2 (see Tables 5, 7A, and 7B). This improvement
over time suggests that any benefit of the quality circles cannot be
attributed solely to the Hawthorne effect.

As was noted in the Chapter One, the quality circles which are
often found in organizations employ practices which are more prone to a
Hawthorne effect interpretation (e.g. extensive management involvement
and support). The present study sought to avoid these sources of
attention by focusing more on the PDM aspect of a quality circle. The
possibility remains, however, that at least some of the dramatic effects
of quality circles that have been reported in the literature (e.g.
Cole, 1979) are due to a Hawthorne effect.

Demand Characteristics. It is also possible in field research for
participants to become aware of the goal of the study and behave in such
a manner that will either confirm or disconfirm the study's hypotheses.
Orne (1962) has referred to cues used by subjects to guide their
behavior as demand characteristics. In the present study, participants were told that they were taking part in a study on job stress. However, at no time were they informed of any of the study's hypotheses and no mention was made of the study's results at Pretest or Posttest 1. Moreover, since the six hospitals were separated geographically, participants had no information about what was going on in the other hospitals and, hence, what hypotheses were being studied.

The investigator did play a major role in setting up the three circles. He wrote a quality circle manual for participants, led four training sessions on group problem solving, and attended every quality circle meeting. However, once the circles began to identify their own problems, the investigator assumed the role of an observer. Especially by the end of the study, when the quality circles appear to have had their greatest impact, the circles were discussing issues that involved technical aspects of the OR environment that went well beyond the investigator's knowledge and expertise.

Although it is impossible to completely rule out demand characteristics, the present study minimized them as much as possible. In a typical quality circle, participants are often exposed to a sales campaign concerning the alleged benefits of being a circle member. A facilitator attends circle meetings to make sure discussions stay on track. In the present research, the investigator presented the concept of a quality circle in a neutral light and did not assume the role of a facilitator in circle meetings.
Nonequivalence of Experimental and Control Groups. Perhaps the most serious methodological issue concerns the reported differences between the two groups. In addition to being younger and less experienced at the Pretest, control group participants tended to report greater job stress and burnout and perceived their work environments in a less favorable manner than participants in the experimental group. This nonequivalence complicates interpretation of the study's results in at least two ways.

First, the nonequivalence makes any absolute statement concerning cause and effect exceedingly difficult. It could be argued, for example, that the experimental group would have improved gradually over time without the quality circles. One feature of the results not entirely consistent with this possibility, however, is that improvement in the experimental group did not occur gradually as might be expected if the quality circles had no effect, but rather toward the end of the study, between Posttest 1 and Posttest 2 (see Tables 4 and 5). As shown in Tables 7A and 7B, this relatively sudden improvement clearly occurred in hospitals A and C, and to a lesser degree in hospital B. Although these data may be suggestive of a cause effect relationship, the exact role of group differences in these results cannot be determined. Additional research is necessary in which equivalent or matched OR's are used.

Second, the nonequivalence of the groups reduces the generalizability of this study's findings. It remains unclear whether the same results would have been found had OR's been randomly assigned to experimental and control groups. Indeed, there may have been some
feature of the experimental group hospitals (e.g. age or experience of OR staff) that made them more likely to benefit from a quality circle. If so, it would obviously be misleading to conclude that quality circles will work in every OR. The generalizability of this study's results can extend no further than to OR's where both staff and administration support the idea of a quality circle.

Variables Involving Negative Bias

Regression to the Mean. In a study where two groups score much differently on a pretest measure, there is a statistical tendency for posttest scores of the groups to be more similar than was the case at the pretest. This tendency, referred to as regression to the mean, is particularly relevant to the present study since the pretest scores of the experimental group were lower (i.e. more favorable) than pretest scores for the control group. In order to show a treatment effect, the scores for the experimental group had to decrease even further below the scores of the control group. The fact that this occurred for several measures at Posttest 2 (see Table 4) suggests that the change in scores of the experimental group at was not accidental or due to random fluctuations of the data. Regression to the mean represents a source of negative bias that would act to reduce any treatment effect of the quality circles.

Extent of Investigator's Background. Most quality circles are implemented by professional consulting firms which have had extensive experience developing circles for a variety of organizations. In the present study, the investigator, although having a background in
organizational behavior, had never before designed a quality circle program. Also, he had never worked in a hospital or OR. Especially at the beginning of the study, this lack of experience with quality circles and hospitals in general should have acted as a source of negative bias. It is possible that more convincing results would have been obtained if the circles had been developed under the guidance of an experienced consulting firm.

**Duration of Study.** As Huse (1980) notes, organizational change is a complex process that is rarely achieved without much time and patience. The seven month duration of the present study was a relatively short period of time for a quality circle program. Goldberg and Pegels (1985) describe several case studies in which the quality circles developed by hospitals were given a trial period of 1-2 years before being formally evaluated. After such a period, a quality circle can work on a variety of problems of importance to circle members and see the long term effects of any proposed solutions. In the present study, a longer evaluation period may have yielded more definitive results.

In summary, the variables involving negative bias suggest that with the use of additional resources (e.g. advice of an experienced consultant, longer evaluation period) differences between the experimental and control group might have been enhanced. However, the sources of positive bias suggest that no matter how great the differences, caution should be used before inferring a cause-effect relationship. The introduction of a quality circle into a hospital environment represents a very complex intervention and it is difficult
to know for sure what factors contributed to the observed results.

**Evaluating the Study's Hypotheses**

**Changes in Perceptions of the Work Environment (Hypotheses I and II).** A major goal of the present study was to compare the quality of work life perceptions of OR employees who participated in a quality circle with those who did not. The results indicate that quality circle participants improved on several self-report measures. The measures that changed the most tended to focus on interpersonal relationships or the nature of the work in the OR. For instance, Table 4 shows significant improvement for job involvement, job stress, and burnout due to depersonalization. In Table 5 significant differences are reported for these same three measures as well as peer cohesion and burnout due to emotional exhaustion. Surprisingly, measures that focused on perceptions of control (e.g., perceived influence and burnout due to lack of personal accomplishment) did not improve as much (see Tables 4, 5, 6A, and 6B). When there was a significant difference between groups for burnout due to depersonalization (see Table 5), this was in part due to a worsening of the control group.

These results suggest that the quality circles had their greatest benefit in increasing social support among the OR staff. Such a conclusion raises the question as to how the benefits of a quality circle differ from that of a discussion group in which participants voice their concerns but do not formally attempt to solve work related problems. Additional research needs to further examine the relationship between the degree of PDM (e.g., discussion group vs. problem solving
Another interesting feature of the data concerns the variable of supervisor support. In Tables 4, 5, 6A, and 6B, perceptions of supervisor support worsened for the experimental group, although not significantly. This decline is consistent with the fact that the supervisor did not participate in quality circle meetings and was left out of the problem solving process until a proposed solution reached by circle members. Case studies on quality circles (e.g. Cole, 1979) have often reported that the greatest resistance to a circle comes from middle management who see the circle as a threat to their authority. The present study lends at least tentative support to this observation by finding that a quality circle does not necessarily lead to better relations between a supervisor and her/his employees.

One result of the self-report data that was unexpected is the overall worsening of the control group on several measures (see Tables 4, 5, 6A, and 6B). This worsening, which rivals the improvement of the experimental group, may be due to a number of factors. First, it is possible that simply filling out questionnaires made control group participants more sensitive to their work environment and, hence, more likely to report negative perceptions. If this is true, however, we should also find a worsening in experimental group participants who filled out the same questionnaires. Since the experimental group improved on several measures, it seems likely that any negative effects of filling out previous questionnaires were small.
Another possibility is that the investigator's two visits to the hospitals to talk with the OR staff produced increased levels of job stress. It should be noted, however, that the visits were brief, not all OR staff were able to attend, and the topics discussed during the visits were kept as neutral as possible. While the visits may have focused some attention on the study, it seems unlikely that this alone would be sufficient to produce such a negative effect on employee's perceptions of the work environment.

Third, control group participants may have been reacting adversely to the fact that their OR was not getting a quality circle. It is interesting to note that in the Marks et al. (1986) study on quality circles, the control group also scored increasingly worse on several self-report measures. In that study, however, employees in the control and experimental groups were in the same plant so it was possible for participants in the two groups to interact. In the present study, the control group hospitals were not informed as to what was occurring in the experimental group so it is not clear they "knew what they were missing." While it is difficult to completely rule out resentment by control group participants as a contributing factor, conversations with OR staff in the three hospitals did not reveal any disappointment related to being in the control group.

Finally, it is possible that the work environments of the control group OR's were actually becoming more unpleasant for the OR staffs. At the beginning of the study, the primary reason given by the three control group hospitals for not having a quality circle was that circle meetings would be too time consuming and would not fit into the hectic
atmosphere of the OR. This concern may have reflected working
conditions within the hospitals (e.g. understaffing, poor relationship
between supervisor and staff) that led to growing dissatisfaction among
the OR staff. Another factor involves the financial issues currently
facing small private hospitals. The recent introduction of DRG's
(diagnosis-related groups), for example, has limited the insurance
payment for many types of operations and has put pressure on OR's (and
hospitals in general) to become more cost efficient. This emphasis on
reducing costs may result in an OR not hiring or replacing as many
staff, increasing work demands on already hired employees (e.g.
requiring more overtime), or allowing less time for support activities
such as inservice training. These are all practices that could result
in a lower quality of work life for OR employees across hospitals in
general.

Changes in Absenteeism (Hypothesis III). Another goal of the
present study was to measure changes in absenteeism due to illness.
Tables 4 and 5 indicate that absenteeism in the experimental group
decreased only slightly and was not significantly different from the
absenteeism in the control group. One reason for this result may be
that absenteeism due to illness was an issue only indirectly related to
the circle's activities. Although experimental group participants
reported significantly lower levels of job stress and burnout related to
work, this apparently was not enough to change absenteeism.
Another possibility is suggested by Steers and Rhodes (1978) who argue that an employee's decision not to come into work is the result of the opposing forces of job dissatisfaction and pressure to attend work. In the case of OR nurses and technicians, this pressure to attend work is great. Unlike other areas of a hospital, an OR cannot "float" nurses in who normally don't work in the OR. This means that if a nurse or technician is sick, the rest of the staff will have to assume her/his responsibility. This resulting pressure to attend work may be great enough so that a slight decrease in job dissatisfaction isn't enough to significantly reduce absenteeism. Whatever the reason, the present study found no evidence for a link between quality circles and reduced absenteeism due to illness.

**Individual Differences (Hypothesis IV).** Based on person-environment fit theory, we would expect that a quality circle would not have the same impact for all participants. Unfortunately, none of the personality or participant variables that were measured in the present study consistently increased the predictability of change in the dependent measures. Only need for independence came close by significantly increasing the predictability of three out of ten measures. However, one of these measures (burnout due to depersonalization) was negatively related to the need for independence. In other words, participants who ranked high in need for independence tended to improve less on the depersonalization measure than participants who were lower in need for independence. This would seem to contradict research by Vroom (1960) and Abdel-Halim and Rowland (1976) which found that individuals with high need for independence
showed a more positive reaction to PDM. The alpha reliability for the need for independence scale was a fairly low .48, thus further complicating any interpretation of the results. Although the present study provides little evidence for the importance of individual differences, it may be that a larger sample size is necessary before any significant relationships can be identified.

Relevance of Results to Recent Field Studies on PDM

The findings of the present study are consistent with those of Marks et al (1986) and Rafeli (1985) who both reported that quality circles had a small positive effect on the quality of work life. However, in the Marks et al (1986) study, the quality circle group improved significantly in terms of productivity but not job-related attitudes (e.g. personal responsibility, challenge). The present research found significant improvements for three out of ten quality of work life measures. In Rafeli's (1985) study, quality circle participants reported higher levels of perceived influence and task variety, but this was not true for job satisfaction or interaction with others. In the present study, the self-report measures which improved (e.g. job involvement, depersonalization, job stress) suggest that interaction with others was one of the main benefits of the quality circle.

These differences in results indicate that the impact of a quality circle may differ with the organizational setting. It is interesting to note that the results of the present study are most similar to those of Jackson (1983) who found that increasing staff meetings and training
supervisors in PDM led to lower levels of job stress. Jackson's research took place in a University hospital with registered nurses and clerical workers as participants. It may well be that employees in a hospital are affected differently by a PDM system than employees in a manufacturing company. If this is true, generalizations based on research in the industrial sector may not always be applicable to service-oriented occupations such as those in health care.

Overall Evaluation of the Quality Circles

Given that a main result of this study is that quality circle participants improved on measures related to the quality of work life, it is appropriate to ask whether the reported improvement was worth the time and expense entailed in setting up the circles. For the experimental group hospitals, the circles resulted in the OR staffs meeting every two and a half weeks. Since staff were paid for attending circle meetings, the approximate cost of a circle can be calculated as follows. Assuming an average circle attendance of 10 and a hourly salary of $10, the cost of a circle over 17 meetings would be $10 x 10 x 17 or $1700. This figure does not include reimbursement of those who set up and monitor the circles. In the case of a consulting firm, this expense would be considerable, probably totalling in the thousands of dollars over a seven month period.

In exchange, quality circle participants showed a small but reliable improvement on various self-report measures. The extent of this improvement depends on which approach to data analysis one prefers: analysis based on individuals (Tables 4 and 5), hospitals (Tables 6A and
6B) or the number of self-report measures which improved (Tables 7A and 7B). In all three cases, the value of the improvement is difficult to estimate especially since it was not accompanied by a significant reduction in absenteeism due to illness.

One approach is to ask whether or not other types of interventions may have produced similar changes without the expense and time commitment of a quality circle. The fact that the experimental and control groups differed on several measures at the Pretest suggests an affirmative answer. Tables 1 and 2 indicate that the experimental and control groups were similar with regard to workload (as measured by cases per full-time employee) and education (as measured by type of nursing degree). In fact, on average the experimental group hospitals were slightly busier and had nurses with slightly less education than the control group hospitals. What then might account for the differences between the two groups? One possibility is that experimental group hospitals followed management practices that produced a less stressful, more supportive work environment for employees.

Although these management practices were not directly measured in the present study, the investigator's experiences at the six participating hospitals suggest some specific practices that may have affected the quality of work life. For example, in at least two hospitals in the experimental group, the OR followed a practice of having a firm cut-off time in the afternoon after which operations could not be added to the caseload for the rest of the day, except in the case of an emergency. This resulted in a more predictable workload for OR employees and advance warning of when they might have to work overtime.
Although the control group hospitals had a policy of using a cut-off time, it was rarely, if ever, followed and unpredictable work loads and overtime were a common complaint.

The experimental group hospitals also tended to provide more time for interaction between the OR staff and OR supervisor. At one hospital, for example, every Tuesday morning was a "late start" and cases did not begin until mid-morning. This gave the OR staff a chance to meet in the early morning (usually between 7 a.m. and 8:30 a.m.), have a cup of coffee, get caught up on work assignments, or have inservice training. None of the control group hospitals had a similar policy of weekly "late starts" and there seemed to be less communication between the OR supervisor and OR staff in these hospitals.

Although these examples are qualitative observations based on post-hoc analysis, it seems entirely possible that changes in management policy may produce improvements in the quality of work life that rival those found in the present study with quality circles. In many cases, changes in management policy can be implemented more quickly and may not require a very great expenditure of money. A fruitful area of research would be to compare the management practices of organizations that agree to adopt a quality circle with those of organizations who do not. Once differences are identified, they may suggest areas of change in management practices that will improve the quality of work life.

The above discussion assumes that the effect of a quality circle is limited to changes in the perceptions of the work environment. However, there is evidence that quality circles produce lower production costs
(e.g. Cole, 1979) and improve productivity (e.g. Marks et al, 1986). In the present study, these variables were not measured and it is entirely possible that a quality circle in an OR may have an impact in these areas. Future research needs to examine the additional benefits or costs which a quality circle may have in a hospital environment.

Conclusion

As is perhaps the fate of all field research, this study's results have raised more questions than they have answered. The results do provide some tentative support for the claim that participation in a quality circle is accompanied by improved perceptions of the work environment. The quasi-experimental nature of the research design, however, has led to methodological issues concerning cause and effect that have already been reviewed. Fortunately, this research design has also produced some interesting results that suggest additional areas for future research on quality circles.

These areas of research include: (a) studying the differences between organizations who opt for a quality circle program versus those who do not; (b) looking for factors (e.g. employee characteristics, management practices) that may predispose an organization to choose and benefit from a quality circle program; (c) determining which aspects of a quality circle (e.g. problem solving, social support) contribute to improving the quality of work life; (d) comparing quality circles to other forms of organizational change; and (e) examining how quality circles are used in different types of organizations (e.g. hospital
versus assembly line plant).

During the past fifteen years quality circles have grown increasingly popular in the United States. They represent a form of PDM that is well defined and relatively nonthreatening to management. Researchers, however, have only recently begun to carefully study quality circles in organizational settings. There are still many questions that remain to be answered about quality circles and how they can be used to improve the quality of work life.
### TABLE 1: Descriptive data for the six participating hospitals.

<table>
<thead>
<tr>
<th>HOSPITAL</th>
<th>Beds</th>
<th>IN</th>
<th>OUT</th>
<th>TOTAL</th>
<th>OPERATING ROOM CASES PER PERSONNEL</th>
<th>OPERATING ROOM CASES PER FULL-TIME EMPLOYEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>111</td>
<td>223</td>
<td>95</td>
<td>318</td>
<td>RNs - 8 (FT) 1 (PT) CORTs - 1 (PT)</td>
<td>318/9 = 35.33</td>
</tr>
<tr>
<td>B</td>
<td>264</td>
<td>228</td>
<td>170</td>
<td>398</td>
<td>RNs - 14 (FT) 7 (PT) LPNs - 3 (FT)</td>
<td>398/20.5 = 19.4</td>
</tr>
<tr>
<td>C</td>
<td>206</td>
<td>150</td>
<td>146</td>
<td>296</td>
<td>RNs - 6 (FT) 4 (3/4 FT) LPNs - 1 (FT) CORTs - 1 (FT)</td>
<td>296/11 = 26.9</td>
</tr>
<tr>
<td>D</td>
<td>157</td>
<td>196</td>
<td>169</td>
<td>365</td>
<td>RNs - 11 (FT) 4 (PT) CORTs - 4 (FT) 2 (PT)</td>
<td>365/18 = 20.3</td>
</tr>
<tr>
<td>E</td>
<td>191</td>
<td>170</td>
<td>199</td>
<td>369</td>
<td>RNs - 6 (FT) 12 (PT) CORTs - 2 (FT) 2 (PT)</td>
<td>369/15 = 24.6</td>
</tr>
<tr>
<td>F</td>
<td>178</td>
<td>258</td>
<td>177</td>
<td>435</td>
<td>RNs - 7 (FT) 10 (PT) LPNs - 2 (FT) 1 (PT) CORTs - 4 (FT) 3 (PT)</td>
<td>435/20 = 21.8</td>
</tr>
</tbody>
</table>

**NOTE:**
1. Caseload data was collected at the end of each month.
2. Personnel data was collected as of Month 7.
3. RNs = Registered Nurses; LPNs = Licensed Practical Nurses; CORTs = Certified Operating Room Technicians
4. Cases per full-time employee was calculated by dividing the average monthly caseload by the number of full-time employees plus one-half the number of part-time employees.
<table>
<thead>
<tr>
<th>Participant Variable</th>
<th>Experimental Group</th>
<th>Control Group</th>
<th>T-Score (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>38</td>
<td>48</td>
<td>NA</td>
</tr>
<tr>
<td><strong>AGE</strong></td>
<td>36.7</td>
<td>33.8</td>
<td>-1.56</td>
</tr>
<tr>
<td></td>
<td>(SD) 9.1</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td><strong>HOURS WORKED (M)</strong></td>
<td>37.6</td>
<td>34.5</td>
<td>-2.15*</td>
</tr>
<tr>
<td><strong>PER WEEK</strong></td>
<td>(SD) 4.1</td>
<td>8.6</td>
<td></td>
</tr>
<tr>
<td><strong>YEARS WORKED (M)</strong></td>
<td>11.0</td>
<td>7.8</td>
<td>-1.97</td>
</tr>
<tr>
<td><strong>IN OR</strong></td>
<td>(SD) 7.9</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td><strong>YEARS WORKED (M)</strong></td>
<td>6.7</td>
<td>4.8</td>
<td>-1.84*</td>
</tr>
<tr>
<td><strong>AT CURRENT</strong></td>
<td>(SD) 5.2</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td><strong>HOSPITAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OR PERSONNEL</strong></td>
<td>RNs- 34</td>
<td>RNs- 35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LPNs- 1</td>
<td>LPNs- 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CORTs- 3</td>
<td>CORTs- 11</td>
<td></td>
</tr>
<tr>
<td><strong>TYPE OF NURSING</strong></td>
<td>DIP- 33</td>
<td>DIP- 25</td>
<td></td>
</tr>
<tr>
<td><strong>DEGREE</strong></td>
<td>ASSC- 2</td>
<td>ASSC- 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.A.- 2</td>
<td>B.A.- 3</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**

1. **DIP** = Diploma in Nursing  
   **ASSC** = Associates in Nursing  
   **B.A.** = Baccalaureate in Nursing  
2. * = p < .05 (two-tailed), df = 65  
3. In the experimental group, there was one nurse with both a DIP and ASSC degree, and another nurse with both a DIP and B.A. degree. In the control group, there was one nurse with both a DIP and ASSC degree.
### TABLE 3: Activities of the three quality circles.

<table>
<thead>
<tr>
<th>CIRCLE ACTIVITIES</th>
<th>HOSPITAL A</th>
<th>HOSPITAL B</th>
<th>HOSPITAL C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality Circle Meetings per Month</td>
<td>2.7</td>
<td>2.6</td>
<td>2.3</td>
</tr>
<tr>
<td>(includes Training)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Quality Circle Meetings</td>
<td>15</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Not Including Training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content of Topics:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(percentage of meetings topic area was discussed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Administrative issues</td>
<td>73% (11)</td>
<td>36% (5)</td>
<td>67% (8)</td>
</tr>
<tr>
<td>2. Interpersonal issues</td>
<td>27% (4)</td>
<td>36% (5)</td>
<td>25% (3)</td>
</tr>
<tr>
<td>3. Patient concerns</td>
<td>20% (3)</td>
<td>43% (6)</td>
<td>25% (3)</td>
</tr>
<tr>
<td>4. Supplies/Equipment</td>
<td>20% (3)</td>
<td>36% (5)</td>
<td>42% (5)</td>
</tr>
<tr>
<td>5. Physical Environment</td>
<td>7% (1)</td>
<td>29% (4)</td>
<td>50% (6)</td>
</tr>
<tr>
<td>6. Paperwork/Record Keeping</td>
<td>20% (3)</td>
<td>43% (6)</td>
<td>25% (3)</td>
</tr>
<tr>
<td>7. In-service Training</td>
<td>40% (6)</td>
<td>43% (6)</td>
<td>8% (1)</td>
</tr>
<tr>
<td>Number of Proposed Solutions to</td>
<td>7</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Solutions accepted by</td>
<td>5 (71%)</td>
<td>8 (80%)</td>
<td>5 (100%)</td>
</tr>
<tr>
<td>Supervisor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examples of Areas Studied</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scheduling of cases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of nametags</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Service training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preference cards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shelving space</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage of narcotics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient privacy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency call forms</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** For Content of Topics, percentages were calculated by dividing the total number of times topic was discussed (in parentheses) by the number of quality circle meetings not including training.
TABLE 4: Paired comparisons of Pretest and Posttest 2 measures.

<table>
<thead>
<tr>
<th>DEPENDENT MEASURE</th>
<th>PRETEST (Month 0)</th>
<th>POSTTEST 2 (Month 7)</th>
<th>PAIRED-T VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Perceived Influence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>37.4</td>
<td>8.9</td>
<td>35.6</td>
</tr>
<tr>
<td>No QC</td>
<td>42.4</td>
<td>12.6</td>
<td>44.0</td>
</tr>
<tr>
<td>Peer Cohesion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>28.6</td>
<td>6.5</td>
<td>28.2</td>
</tr>
<tr>
<td>No QC</td>
<td>40.0</td>
<td>7.5</td>
<td>40.0</td>
</tr>
<tr>
<td>Supervisor Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>24.5</td>
<td>8.2</td>
<td>25.8</td>
</tr>
<tr>
<td>No QC</td>
<td>31.2</td>
<td>8.0</td>
<td>33.0</td>
</tr>
<tr>
<td>Involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>24.0</td>
<td>6.5</td>
<td>21.6</td>
</tr>
<tr>
<td>No QC</td>
<td>33.9</td>
<td>9.3</td>
<td>34.4</td>
</tr>
<tr>
<td>Job Stress</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>192.4</td>
<td>46.8</td>
<td>182.0</td>
</tr>
<tr>
<td>No QC</td>
<td>206.0</td>
<td>36.3</td>
<td>212.4</td>
</tr>
<tr>
<td>Burnout (Emot.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>19.0</td>
<td>8.4</td>
<td>17.8</td>
</tr>
<tr>
<td>No QC</td>
<td>25.0</td>
<td>9.3</td>
<td>28.4</td>
</tr>
<tr>
<td>Burnout (Accom.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>16.3</td>
<td>5.5</td>
<td>15.9</td>
</tr>
<tr>
<td>No QC</td>
<td>21.9</td>
<td>8.0</td>
<td>22.8</td>
</tr>
<tr>
<td>Burnout (Depers.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>3.7</td>
<td>3.1</td>
<td>2.7</td>
</tr>
<tr>
<td>No QC</td>
<td>5.6</td>
<td>4.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Turnover Intention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>16.4</td>
<td>25.3</td>
<td>19.4</td>
</tr>
<tr>
<td>No QC</td>
<td>23.7</td>
<td>23.3</td>
<td>40.5</td>
</tr>
<tr>
<td>Absenteeism/Illness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>1.9</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>No QC</td>
<td>2.1</td>
<td>2.5</td>
<td>1.9</td>
</tr>
</tbody>
</table>

NOTE: (1) T-tests compare scores at Pretest and Posttest 2.
(2) *p < .05, (one-tailed); **p < .01, (one-tailed)
(3) For all comparisons, N = 50 (25 in each group).
(4) Scores for Job Stress, Burnout (Accom.), and Turnover Intention have been reversed so that direction of change is consistent with other measures.
<table>
<thead>
<tr>
<th>QUESTIONNAIRE MEASURE</th>
<th>PRETEST</th>
<th>POSTTEST1</th>
<th>POSTTEST2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Perceived Influence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>40.7</td>
<td>10.6</td>
<td>38.9</td>
</tr>
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<td>No QC</td>
<td>32.5</td>
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<td>32.1</td>
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<td>Job Involvement</td>
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<td>2.0</td>
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<tr>
<td>No QC</td>
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<td>2.8</td>
<td>2.4</td>
</tr>
</tbody>
</table>

**NOTE:**
(1) Comparisons should be made between QC and No QC conditions.
(2) At Pretest, N=67; at Posttest 1, N=48; at Posttest 2, N=50;
(3) *p < .05; **p < .01; M(A) is the adjusted mean from ANCOVA.
(4) Scores for Job Stress, Burnout (Accom.), and Turnover Intention have been reversed so that direction of change is consistent with other measures.
TABLE 6A: Paired comparisons of Pretest and Posttest 2 measures across hospitals (total N = 6).

<table>
<thead>
<tr>
<th>QUESTIONNAIRE MEASURE</th>
<th>PRETEST (Month 0)</th>
<th>POSTTEST 2 (Month 7)</th>
<th>PAIRED-T VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
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<tr>
<td>Perceived Influence</td>
<td></td>
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<tr>
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<td>37.5</td>
<td>5.5</td>
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<td>43.0</td>
<td>6.4</td>
<td>44.4</td>
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<tr>
<td>Peer Cohesion</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>QC</td>
<td>28.6</td>
<td>3.1</td>
<td>28.1</td>
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<tr>
<td>No QC</td>
<td>39.5</td>
<td>4.7</td>
<td>40.2</td>
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<td>5.9</td>
<td>26.9</td>
</tr>
<tr>
<td>No QC</td>
<td>31.7</td>
<td>5.3</td>
<td>33.6</td>
</tr>
<tr>
<td>Involvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>24.5</td>
<td>2.6</td>
<td>22.1</td>
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<tr>
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<td>33.2</td>
<td>8.2</td>
<td>34.1</td>
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<tr>
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<td>15.7</td>
<td>182.5</td>
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<td>206.8</td>
<td>9.8</td>
<td>212.6</td>
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<tr>
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<td>4.6</td>
<td>18.9</td>
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<td>29.0</td>
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<tr>
<td>Burnout (Accom.)</td>
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<td></td>
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<tr>
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<td>17.3</td>
<td>4.5</td>
<td>16.6</td>
</tr>
<tr>
<td>No QC</td>
<td>21.9</td>
<td>2.1</td>
<td>22.8</td>
</tr>
<tr>
<td>Burnout (Depers.)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
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<td>2.3</td>
<td>3.1</td>
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<td>No QC</td>
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<td>7.9</td>
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<td>Turnover Intention</td>
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<td>QC</td>
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<td>11.1</td>
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<td>2.1</td>
<td>.7</td>
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<td>No QC</td>
<td>2.3</td>
<td>.9</td>
<td>2.1</td>
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</tbody>
</table>

NOTE: (1) T-tests compare scores at Pretest and Posttest 2.
(2) *p < .05 (one-tailed); **p < .01, (one-tailed)
(3) For all comparisons, N = 6 (3 in each group).
(4) Scores for Job Stress, Burnout (Accom.), and Turnover Intention have been reversed so that direction of change is consistent with other measures.
**TABLE 6B: Comparison of experimental and control groups using Pretest scores as a covariate (total N = 6).**

<table>
<thead>
<tr>
<th>QUESTIONNAIRE MEASURE</th>
<th>PRETEST</th>
<th>POSTTEST 1 (with covariate)</th>
<th>POSTTEST 2 (with covariate)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
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</tr>
<tr>
<td>QC</td>
<td>39.3</td>
<td>6.5</td>
<td>38.8</td>
</tr>
<tr>
<td>No QC</td>
<td>43.3</td>
<td>5.1</td>
<td>45.4</td>
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<td></td>
<td></td>
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<tr>
<td>QC</td>
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<td>3.9</td>
<td>32.1</td>
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<td>No QC</td>
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<td>5.4</td>
<td>41.8</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>QC</td>
<td>25.2</td>
<td>6.2</td>
<td>26.6</td>
</tr>
<tr>
<td>No QC</td>
<td>32.4</td>
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<td>33.0</td>
</tr>
<tr>
<td>Job Involvement</td>
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<td></td>
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<tr>
<td>QC</td>
<td>24.5</td>
<td>3.4</td>
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<tr>
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<td>195.0</td>
<td>15.0</td>
<td>188.5</td>
</tr>
<tr>
<td>No QC</td>
<td>211.1</td>
<td>16.1</td>
<td>213.3</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>21.1</td>
<td>3.7</td>
<td>19.9</td>
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<tr>
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<td>27.0</td>
<td>3.1</td>
<td>29.4</td>
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<tr>
<td>Burnout (Accom.)</td>
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<td></td>
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<tr>
<td>QC</td>
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<td>3.6</td>
<td>19.1</td>
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<td>2.2</td>
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<td>Turnover Intention</td>
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<td>QC</td>
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<td>5.8</td>
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</tr>
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<td>0.7</td>
<td>1.9</td>
</tr>
<tr>
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<td>2.2</td>
<td>1.0</td>
<td>2.1</td>
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**NOTE:**
1. Comparisons should be made between QC and No QC conditions.
2. For all three measurement periods, N = 6 (3 in each group)
3. *p < .05; **p < .01; M(A) is the adjusted mean from ANCOVA.
4. Scores for Job Stress, Burnout (Accom.), and Turnover Intention have been reversed so that direction of change is consistent with other measures.
### TABLE 7A: A comparison of favorable changes between Pretest and Posttest 1.

<table>
<thead>
<tr>
<th>DEPENDENT MEASURE</th>
<th>EXPERIMENTAL GROUP HOSPITALS</th>
<th>CONTROL GROUP HOSPITALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A (n=5)</td>
<td>B (n=8)</td>
</tr>
<tr>
<td>Perceived Influence</td>
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<td>Yes</td>
</tr>
<tr>
<td>Peer Cohesion</td>
<td>No**</td>
<td>Yes</td>
</tr>
<tr>
<td>Supervisor Support</td>
<td>No**</td>
<td>Yes</td>
</tr>
<tr>
<td>Involvement</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Stress</td>
<td>Yes</td>
<td>Yes*</td>
</tr>
<tr>
<td>Burnout (Emot.)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Burnout (Accom.)</td>
<td>No</td>
<td>No*</td>
</tr>
<tr>
<td>Burnout (Deperson.)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Turnover Intention</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Absenteeism</td>
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</tr>
<tr>
<td><strong>TOTALS:</strong></td>
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</tbody>
</table>

Note: (1) A "Yes" indicates a favorable change.
(2) A "No" indicates no change or an unfavorable change.
(3) * = p < .05 (one-tailed); ** = p < .01 (one-tailed)
(4) Only participants who filled out questionnaires at all three measurement periods are included in analysis.

### TABLE 7B: A comparison of favorable changes between Pretest and Posttest 2.

<table>
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<th>DEPENDENT MEASURE</th>
<th>EXPERIMENTAL GROUP HOSPITALS</th>
<th>CONTROL GROUP HOSPITALS</th>
</tr>
</thead>
<tbody>
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<td>B (n=8)</td>
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<td>No</td>
</tr>
<tr>
<td>Peer Cohesion</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Supervisor Support</td>
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<td>Involvement</td>
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<td>Yes</td>
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<td>Stress</td>
<td>Yes</td>
<td>Yes*</td>
</tr>
<tr>
<td>Burnout (Emot.)</td>
<td>No</td>
<td>Yes*</td>
</tr>
<tr>
<td>Burnout (Accom.)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Burnout (Deperson.)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Turnover Intention</td>
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<td>No*</td>
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<td>Yes</td>
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<td><strong>TOTALS:</strong></td>
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</tbody>
</table>

Note: (1) A "Yes" indicates a favorable change.
(2) A "No" indicates no change or an unfavorable change.
(3) * = p < .05 (one-tailed); ** = p < .01 (one-tailed)
(4) Only participants who filled out questionnaires at all three measurement periods are included in analysis.
TABLE 8: Summary of ANCOVA analysis of Posttest 2 data with participant variables as covariates.

DIFFERENT COVARIATES USED IN ANALYSIS

<table>
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<th>Dependent Measure (Table 5)</th>
<th>Pretest</th>
<th>AGE</th>
<th>YWCH</th>
<th>HWPW</th>
<th>YWOR</th>
<th>YWCH</th>
<th>YWCH</th>
<th>YWCH</th>
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<tbody>
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<td>*</td>
<td>*</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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<td>*</td>
<td>*</td>
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<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Burnout (Emot.)</td>
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<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
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</tr>
<tr>
<td>Burnout (Accom.)</td>
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<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
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</tr>
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<td>*</td>
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<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>MS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NOTE: (1) This table summarizes the results of ANCOVA analyses with different covariates.
(2) Each cell shows whether ANCOVA found a significant difference between the experimental and control groups for a given measure.
(3) NS = not significant; * = $p < .05$, ** = $p < .01$, df=49
(4) KEY: AGE = age of OR employee
YWOR = years worked in OR
HWPW = hours worked per week
YWCH = years worked in current hospital
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Appendix A: Sample of questionnaire used in the present study on quality circles.

**DESCRIPTIONS OF YOUR JOB ENVIRONMENT**

**Instructions:**
Below are several statements describing what your job may be like. For each statement, circle the number that best represents your overall level of agreement during the PAST MONTH. The numbers range from 1 (STRONGLY AGREE) through 7 (STRONGLY DISAGREE) in the fashion shown below. Please circle only ONE number for each statement.

<table>
<thead>
<tr>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRONGLY</td>
<td>MODERATELY</td>
<td>SLIGHTLY</td>
<td>NEUTRAL</td>
<td>SLIGHTLY</td>
<td>MODERATELY</td>
<td>STRONGLY</td>
</tr>
<tr>
<td>AGREE</td>
<td>AGREE</td>
<td>AGREE</td>
<td>DISAGREE</td>
<td>DISAGREE</td>
<td>DISAGREE</td>
<td>DISAGREE</td>
</tr>
</tbody>
</table>

**STATEMENTS**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Level of agreement during past month?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am allowed a great deal of freedom to do my job as I see fit.................................................</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>2. There are opportunities for me to use my initiative to do things .............................................</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>3. When a problem arises, I must rely totally on myself to solve it.............................................</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>4. The hospital discourages people from trying things that are unique or different in OR.</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>5. I function fairly independently of my superiors..............................................................................</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>6. I am free to do things pretty much my own way .......................................................................................</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>7. My supervisor asks my opinion when a problem comes up that involves my work.........................................................</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>8. If I have a suggestion for improving the job setup in some way, it is easy to get my ideas across to my supervisor...........................................</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>Statement</td>
<td>Level of agreement during past month?</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>9. I feel I can influence the decisions of my supervisor regarding the things about which I am concerned.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>10. In general, I have a great deal of say about what goes on in my job.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>11. People I work with go out of their way to help each other feel comfortable.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>12. The atmosphere among my co-workers is somewhat impersonal.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>13. My co-workers stand up for me if I find myself in a difficult situation.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>14. Trouble gets started because people talk behind each other's backs.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>15. I eat lunch with one or more of the people I work with.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>16. I get together with my co-workers for social activities at least one day out of the week.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>17. When I don't know the answer to a question regarding my job, someone is available to talk to about it.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>18. When I feel emotionally exhausted my co-workers give me encouragement and support.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>19. The people I work with in OR talk to each other about their personal problems.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>20. My supervisor backs OR nurses (or technicians) when problems arise.</td>
<td>STRONGLY AGREE 2 MEAN 3 SLIGHTLY DISAGREE 5 STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>Statement</td>
<td>Level of agreement during past month?</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>1. If I need help handling a problem in OR,</td>
<td>STRONGLY AGREE 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>I can count on the nursing administration to give me assistance.........</td>
<td>NEUTRAL 3</td>
</tr>
<tr>
<td>2. My supervisor does NOT show concern for the needs of those who work in OR...</td>
<td>STRONGLY DISAGREE 6 7</td>
</tr>
<tr>
<td>3. My supervisor is pleasant when she or he tells us we will have to do something...</td>
<td>MODERATELY AGREE 4 5 6</td>
</tr>
<tr>
<td>4. My supervisor makes an effort to be helpful to me as a nurse (or technician)...</td>
<td>SLIGHTLY AGREE 3 4 5 6 7</td>
</tr>
<tr>
<td>5. My supervisor tries to make working in OR enjoyable..........................</td>
<td>AGREE 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>6. The work I do is really challenging.............................................</td>
<td>NEUTRAL 3</td>
</tr>
<tr>
<td>7. There is not much group spirit in my OR unit.....................................</td>
<td>DISAGREE 6 7</td>
</tr>
<tr>
<td>8. A lot of people I work with seem to be just putting in time..................</td>
<td>AGREE 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>9. People I work with seem to take pride in this OR unit..........................</td>
<td>AGREE 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>10. My co-workers put quite a lot of effort into what they do..................</td>
<td>AGREE 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>11. OR is quite a lively place..........................................................</td>
<td>AGREE 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>12. It is hard to get people to do any extra work in OR...........................</td>
<td>AGREE 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>13. The work in OR is usually very interesting.......................................</td>
<td>AGREE 1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>
SOURCES OF JOB STRESS

Instructions:

Below is a list of several activities that may produce job stress. For each activity, indicate (1) the degree of stress produced and (2) how often the activity results in stress during your work. Again, base your answers on experiences you have had during the PAST MONTH.

1. Meeting the doctor's demands.

<table>
<thead>
<tr>
<th>Degree of Stress Produced:</th>
<th>VERY</th>
<th>MUCH</th>
<th>MUCH</th>
<th>SOME</th>
<th>LITTLE</th>
<th>NO STRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
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<td>4</td>
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</table>

<table>
<thead>
<tr>
<th>How Often:</th>
<th>ALMOST</th>
<th>OFTEN</th>
<th>SOMETIMES</th>
<th>SELLDOM</th>
<th>ALMOST</th>
<th>NEVER</th>
</tr>
</thead>
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<tr>
<td></td>
<td>ALWAYS</td>
<td></td>
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</tbody>
</table>

2. Having conflicts with co-workers.

<table>
<thead>
<tr>
<th>Degree of Stress Produced:</th>
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3. Adapting to each doctor's personality.

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</table>

4. Having my work disturbed because of conflicts with other nursing personnel.

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<tr>
<th>Degree of Stress Produced:</th>
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<th>MUCH</th>
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</tbody>
</table>
5. Meeting the demands of my supervisor.

<table>
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<tr>
<th>Degree of Stress Produced</th>
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</table>

6. Dealing with personality problems among my colleagues.

<table>
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7. Lack of communication within the administration of the hospital.

<table>
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<tr>
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</tbody>
</table>

8. Working with too many bosses.

<table>
<thead>
<tr>
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</table>

9. Lack of communication between administration and the OR staff.

<table>
<thead>
<tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Hearing my department get blamed for something it didn't do.

<table>
<thead>
<tr>
<th>Degree of Stress Produced</th>
<th>VERY M U C H</th>
<th>M U C H</th>
<th>S O M E</th>
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<th>N O STRESS</th>
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<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

11. Trying to handle problems with administration.

<table>
<thead>
<tr>
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<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

12. Lack of feedback from supervisors regarding my job performance.

<table>
<thead>
<tr>
<th>Degree of Stress Produced</th>
<th>VERY M U C H</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. Having to ignore rules or policies in order to do my job in OR.

<table>
<thead>
<tr>
<th>Degree of Stress Produced</th>
<th>VERY M U C H</th>
<th>M U C H</th>
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</tr>
</tbody>
</table>
**REASONS TO YOUR JOB**

**Instructions:**

Below is a list of 22 statements about attitudes and feelings you may have toward your job. On a frequency scale of 0 (NEVER) to 6 (EVERY DAY), rate how often each statement has occurred during the PAST MONTH.

1. I feel emotionally drained from my work.

<table>
<thead>
<tr>
<th>How Often</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Past Month?</td>
<td>NEVER</td>
<td>ONCE A MONTH</td>
<td>A FEW TIMES</td>
<td>EVERY WEEK</td>
<td>A FEW TIMES</td>
<td>EVERY MONTH</td>
<td>ALMOST EVERY A MONTH</td>
</tr>
</tbody>
</table>

2. I feel used up at the end of the work day.

<table>
<thead>
<tr>
<th>How Often</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
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</tr>
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</table>

3. I can easily understand how patients in OR feel about things.

<table>
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<th>0</th>
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</tr>
</tbody>
</table>

4. I feel fatigued when I get up in the morning and have to face another day on the job.

<table>
<thead>
<tr>
<th>How Often</th>
<th>0</th>
<th>1</th>
<th>2</th>
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</tr>
</tbody>
</table>

5. Working with people all day is really a strain for me.

<table>
<thead>
<tr>
<th>How Often</th>
<th>0</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Past Month?</td>
<td>NEVER</td>
<td>ONCE A MONTH</td>
<td>A FEW TIMES</td>
<td>EVERY WEEK</td>
<td>A FEW TIMES</td>
<td>EVERY MONTH</td>
<td>ALMOST EVERY A MONTH</td>
</tr>
</tbody>
</table>

6. In my work I deal with emotional situations very calmly.

<table>
<thead>
<tr>
<th>How Often</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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</thead>
<tbody>
<tr>
<td>During Past Month?</td>
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<td>EVERY WEEK</td>
<td>A FEW TIMES</td>
<td>EVERY MONTH</td>
<td>ALMOST EVERY A MONTH</td>
</tr>
</tbody>
</table>
7. I feel I treat some patients in OR as if they were impersonal objects.

How Often During Past Month?
0 NEVER
1 ONCE A MONTH
2 A FEW TIMES WEEK
3 EVERY MONTH TIMES
4 A FEW EVERY DAY TIMES
5 ALMOST EVERY WEEK TIMES
6 ALMOST EVERY DAY TIMES

8. I feel frustrated by my job.

How Often During Past Month?
0 NEVER
1 ONCE A MONTH
2 A FEW TIMES WEEK
3 EVERY MONTH TIMES
4 A FEW EVERY DAY TIMES
5 ALMOST EVERY WEEK TIMES
6 ALMOST EVERY DAY TIMES

9. I feel very energetic.

How Often During Past Month?
0 NEVER
1 ONCE A MONTH
2 A FEW TIMES WEEK
3 EVERY MONTH TIMES
4 A FEW EVERY DAY TIMES
5 ALMOST EVERY WEEK TIMES
6 ALMOST EVERY DAY TIMES

10. I feel I'm working too hard on my job.

How Often During Past Month?
0 NEVER
1 ONCE A MONTH
2 A FEW TIMES WEEK
3 EVERY MONTH TIMES
4 A FEW EVERY DAY TIMES
5 ALMOST EVERY WEEK TIMES
6 ALMOST EVERY DAY TIMES

11. I don't really care what happens to some patients in OR.

How Often During Past Month?
0 NEVER
1 ONCE A MONTH
2 A FEW TIMES WEEK
3 EVERY MONTH TIMES
4 A FEW EVERY DAY TIMES
5 ALMOST EVERY WEEK TIMES
6 ALMOST EVERY DAY TIMES

12. I feel I'm positively influencing other people's lives through my work.

How Often During Past Month?
0 NEVER
1 ONCE A MONTH
2 A FEW TIMES WEEK
3 EVERY MONTH TIMES
4 A FEW EVERY DAY TIMES
5 ALMOST EVERY WEEK TIMES
6 ALMOST EVERY DAY TIMES

13. I feel burned out from my work.

How Often During Past Month?
0 NEVER
1 ONCE A MONTH
2 A FEW TIMES WEEK
3 EVERY MONTH TIMES
4 A FEW EVERY DAY TIMES
5 ALMOST EVERY WEEK TIMES
6 ALMOST EVERY DAY TIMES
14. I deal very effectively with the problems that come up in my OR unit.

How Often 0 1 2 3 4 5 6
During Past NEVER ONCE A A FEW EVERY A FEW ALMOST EVERY
Month ? MONTH TIMES WEEK TIMES EVERY DAY
A MONTH A WEEK DAY

15. I've become more callous toward people since I took this job.

How Often 0 1 2 3 4 5 6
During Past NEVER ONCE A A FEW EVERY A FEW ALMOST EVERY
Month ? MONTH TIMES WEEK TIMES EVERY DAY
A MONTH A WEEK DAY

16. I can easily create a relaxed atmosphere with the people I work with.

How Often 0 1 2 3 4 5 6
During Past NEVER ONCE A A FEW EVERY A FEW ALMOST EVERY
Month ? MONTH TIMES WEEK TIMES EVERY DAY
A MONTH A WEEK DAY

17. I feel I have accomplished many worthwhile things in this job.

How Often 0 1 2 3 4 5 6
During Past NEVER ONCE A A FEW EVERY A FEW ALMOST EVERY
Month ? MONTH TIMES WEEK TIMES EVERY DAY
A MONTH A WEEK DAY

18. I feel like I'm at the end of my rope.

How Often 0 1 2 3 4 5 6
During Past NEVER ONCE A A FEW EVERY A FEW ALMOST EVERY
Month ? MONTH TIMES WEEK TIMES EVERY DAY
A MONTH A WEEK DAY

19. I worry that this job is hardening me emotionally.

How Often 0 1 2 3 4 5 6
During Past NEVER ONCE A A FEW EVERY A FEW ALMOST EVERY
Month ? MONTH TIMES WEEK TIMES EVERY DAY
A MONTH A WEEK DAY

20. I feel exhilarated after working closely with my colleagues.

How Often 0 1 2 3 4 5 6
During Past NEVER ONCE A A FEW EVERY A FEW ALMOST EVERY
Month ? MONTH TIMES WEEK TIMES EVERY DAY
A MONTH A WEEK DAY
21. Working directly with people puts too much stress on me.

<table>
<thead>
<tr>
<th>How Often</th>
<th>0</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
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<td>A FEW TIMES</td>
<td>EVERY WEEK</td>
<td>A FEW TIMES</td>
<td>EVERY A MONTH</td>
<td>ALMOST EVERY WEEK</td>
</tr>
</tbody>
</table>

22. I feel that people I work with in OR blame me for some of their problems.

<table>
<thead>
<tr>
<th>How Often</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Past Month?</td>
<td>NEVER</td>
<td>ONCE A MONTH</td>
<td>A FEW TIMES</td>
<td>EVERY WEEK</td>
<td>A FEW TIMES</td>
<td>EVERY A MONTH</td>
<td>ALMOST EVERY WEEK</td>
</tr>
</tbody>
</table>

Personal Attitudes

Instructions:

The following questions are not directed towards your work but rather towards your life as a whole, both past and present. In answering these questions we are interested in what you as a person believe and feel in all your activities.

1. How often do you find that you can carry out other people's suggestions without changing them any? (check one)
   - Rarely
   - Sometimes
   - Often
   - Very Often
   - Almost Always

2. How important is it for you to feel that you can run your life without depending upon people who are older and more experienced than you? (check one)
   - Not at All
   - Slightly
   - Somewhat
   - Very
   - Extremely

3. How much do you usually want the person who is in charge of a group you are in to tell you what to do? (check one)
   - Not at All
   - A Little
   - Somewhat
   - Quite a Bit
   - Very Much
4. How much humility do you think you should show to those whom you respect and admire? (check one)

- None at All
- A Little
- Some
- Quite a Bit
- Very Much

5. How hard do you find it to disagree with others even in your own private thinking? (check one)

- Not at All
- Slightly
- Somewhat
- Quite
- Very

6. If you have thought about something and come to a conclusion, how hard is it for someone else to change your mind? (check one)

- Not at All
- Somewhat
- Quite
- Very
- Extremely

7. How much do you dislike being told to do something by a superior that is contrary to your wishes? (check one)

- Not at All
- A Little
- Somewhat
- Quite a Bit
- Very Much

DEMOGRAPHIC INFORMATION

DATE: ________________

1. Your sex: ___ Female  ___ Male

2. Your age: ________

3. Last four numbers of your Social Security Number: ___/___/___
   (used for coding purposes only)

4. Position: ___ Registered Nurse
   ___ OR Technician
   ___ Licensed Practical Nurse
   ___ Other (please specify: ______________________)
5. Nursing Related Education
   ___ Diploma in Nursing       ___ Masters in Nursing
   ___ Associates in Nursing    ___ Other (Please specify:
   ___ Baccalaureate in Nursing

6. Which hospital do you work at (check one)?
   ___ A (Name of hospital inserted)       ___ D
   ___ B                                   ___ E
   ___ C                                   ___ F

7. Approximately how many hours do you work per week? _____

8. How many years have you worked in OR? _____

9. How many years have you worked in the OR unit at your current hospital? _____

10. Briefly describe the nature of the work you usually do in OR, making note of any specialty areas. ______________________________
    ______________________________
    ______________________________

11. What is the probability that you will still be working at your present job in one year? Indicate the probability by choosing a number from 0 (Absolutely Certain you won't be working at your present job next year) to 100 (Absolutely Certain you will be).
   Probability = ______

12. If you think you might leave your present job within the next year, what would be your major reason? ______________________________
    ______________________________

*THANK-YOU VERY MUCH FOR COMPLETING THIS SURVEY*
Appendix B: Table of contents for quality circle manual.

1. What IS A QUALITY CIRCLE?
   1.1 A Brief History of the Quality Circle Concept
   1.2 Special Characteristics of a Quality Circle
   1.3 Topics Considered by a Quality Circle
   1.4 The Quality Circle Process
   1.5 The Quality Circle Meeting

2. BRAINSTORMING AND DECISION MAKING
   2.1 BRAINSTORMING: A Method for Generating Ideas
   2.2 Procedure for a BRAINSTORMING Session
   2.3 Decision Making: A Method for Selecting Ideas
   2.4 Some Useful Criteria for Decision Making

3. ANALYZING CAUSE AND EFFECT
   3.1 The FISHBONE DIAGRAM
   3.2 Some Tips on Cause and Effect Analysis

4. COLLECTING DATA
   4.1 Sampling
   4.2 A Procedure for Collecting Data
   4.3 Methods of Data Collection
   4.4 Overview of the Data Collection Process

5. ANALYZING DATA WITH GRAPHS AND CHARTS
   5.1 Using Graphs
   5.2 Using Charts
   5.3 Overview of Graphs and Charts

6. AN OVERVIEW OF THE QUALITY CIRCLE PROCESS
   6.1 The 7 Steps
   6.2 A Need for Flexibility
   6.3 Closing Thoughts
Appendix C: Correlations between variables at Pretest and Posttest 2.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>PI</th>
<th>PC</th>
<th>SS</th>
<th>I</th>
<th>JS</th>
<th>BE</th>
<th>BA</th>
<th>BD</th>
<th>TI</th>
<th>NI</th>
<th>DC</th>
<th>A/I</th>
<th>A</th>
<th>HWPW</th>
<th>YWOR</th>
<th>YWCH</th>
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<td>58*</td>
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<td>01</td>
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<td>08</td>
<td>-06</td>
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<td>26</td>
<td>03</td>
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<td>08</td>
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<td>-24</td>
<td>04</td>
<td>02</td>
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<td>07</td>
<td>75*</td>
<td>50*</td>
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<tr>
<td>Hours Worked Per Week (HWPW)</td>
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<td>-20</td>
<td>-14</td>
<td>03</td>
<td>04</td>
<td>05</td>
<td>-08</td>
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<td>-07</td>
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<tr>
<td>Years Worked in OR (YWOR)</td>
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<td>-20</td>
<td>-17</td>
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<td>06</td>
<td>08</td>
<td>75*</td>
<td>-04</td>
<td>--</td>
<td>55*</td>
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<tr>
<td>Years Worked in Current Hospital (YWCH)</td>
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<td>-24</td>
<td>-02</td>
<td>-17</td>
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<td>-09</td>
<td>55*</td>
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NOTE: (1) Correlations for Pretest are displayed below the diagonal and correlations for Posttest 2 are above the diagonal. Correlations are based on combined data of experimental and control groups.
(2) At Pretest, n=67; at Posttest2, n=57
(3) * = p < .05 (two-tailed)
(4) Decimal points have been omitted.