

RELATIONS BETWEEN WORK GROUP CHARACTERISTICS AND EFFECTIVENESS: IMPLICATIONS FOR DESIGNING EFFECTIVE WORK GROUPS

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Five common themes were derived from the literature on effective work groups, and then characteristics representing the themes were related to effectiveness criteria. Themes included job design, interdependence, composition, context, and process. They contained 19 group characteristics which were assessed by employees and managers. Effectiveness criteria included productivity, employee satisfaction, and manager judgments. Data were collected from 391 employees, 70 managers, and archival records for 80 work groups in a financial organization. Results showed that all three effectiveness criteria were predicted by the characteristics, and nearly all characteristics predicted some of the effectiveness criteria. The job design and process themes were slightly more predictive than the interdependence, composition, and context themes. Implications for designing effective work groups were discussed, and a 54-item measure of the 19 characteristics was presented for future research.

The use of work groups in organizations is gaining substantial popularity (e.g., Banas, 1988; Goodman, Ravlin, & Schminke, 1987; Guzzo & Shea, 1992; Magjuka & Baldwin, 1991; Majchrzak, 1988). The difficulty with groups is that sometimes they lead to negative outcomes, such as low productivity (Whyte, 1955), poor decisions (Janis, 1972), and conflict (Alderfer, 1977). However, according to some current models (e.g., Gladstein, 1984; Hackman, 1987) and reviews (e.g., Goodman, Devadas, & Hughson, 1988; Katzell & Guzzo, 1983), groups hold the potential for simultaneously increasing both productivity and employee satisfaction.

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This is very important. From a work design point of view, the establishment of groups is consistent with a psychological approach, and is thus intended to increase satisfaction and related outcomes. But psychological approaches to work design have been historically, theoretically, and empirically in conflict with traditional engineering approaches (e.g., specialization, assembly lines, etc.) which are intended to increase efficiency and related outcomes (Campion, 1988; Campion & McClelland, 1991; Campion & Thayer, 1985). Therefore, if work groups are truly related to both productivity and satisfaction, they may be the key to avoiding the production-satisfaction trade-off previously presumed to be inherent in work design. In summary, work groups are gaining importance in many organizations and they present many potential risks and opportunities, so there is a need to understand the characteristics of effective work groups.

The Present Study

This study adopts a work design perspective on groups. In that tradition, it attempts to examine relationships between design characteristics and various outcomes. It is recognized that other perspectives on groups exist (e.g., organizational design perspective), and that they might conceptualize the issues differently (e.g., regarding trade-offs) and examine different variables (e.g., centralization, formalization, etc.).

Specifically, the study tries to make three contributions. First, it reviews a wide range of literature and derives five common themes or clusters of work group characteristics that may be related to effectiveness. The review includes social psychology (e.g., McGrath, 1984; Steiner, 1972), socio-technical theory (e.g., Cummings, 1978; Pasmore, Francis, & Haldeman, 1982), industrial engineering (e.g., Davis & Wacker, 1987; Majchrzak, 1988), and, in particular, organizational psychology (e.g., Gladstein, 1984; Hackman, 1987; Guzzo & Shea, 1992; Sundstrom, De Meuse, & Futrell, 1990). It also delineates an extensive set of 19 characteristics within these themes, and then develops a measure.

Second, this study relates these characteristics to effectiveness criteria in a field setting with natural work groups. Most group research has involved concocted groups in the laboratory, and it is not absolutely certain that inferences can be made about natural groups based on this research (Guzzo & Shea, 1992). More empirical research is needed to confirm the generalizability of findings from laboratory studies to actual work settings. This study answers the frequent call in recent reviews for more field research on groups (e.g., Levine & Moreland, 1990; McGrath, 1986; Shea & Guzzo, 1987).

Third, this study is more methodologically rigorous than many previous efforts. Consistent with most theories (e.g., Gladstein, 1984; Hackman, 1987; Sundstrom et al., 1990) and some previous studies (e.g., Gladstein, 1984; Goodman, 1979; Wall, Kemp, Jackson, & Clegg, 1986;

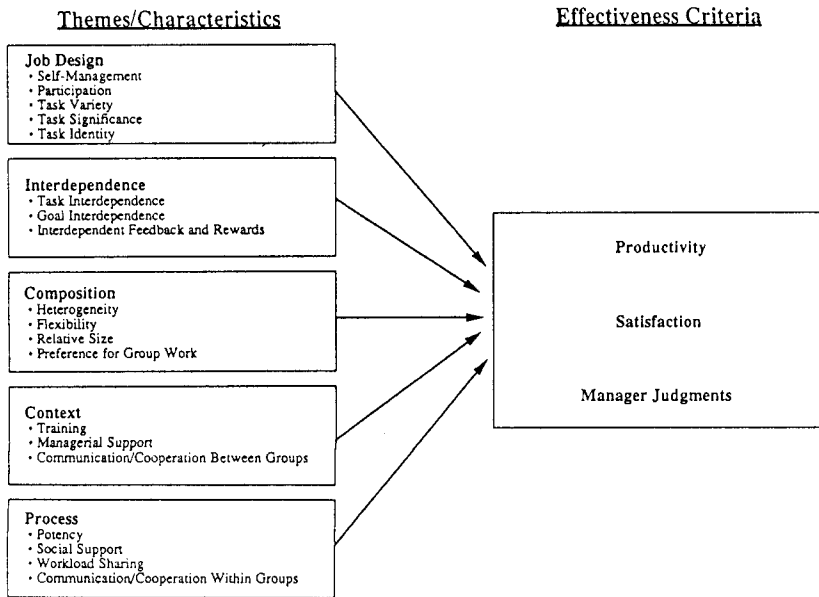


Figure 1: Themes and Characteristics Related to Work Group Effectiveness

Walton, 1972), work group effectiveness is defined in terms of both productivity and employee satisfaction. The inclusion of productivity criteria enhances the objectivity of the effectiveness evaluation, and it avoids the sole reliance on affective outcomes which typifies much of the research in the area. The other criteria examined in this study—employee satisfaction and manager judgments of effectiveness—are measured using methods which minimize common method variance. Finally, large samples and multiple sources of respondents are also used to enhance the rigor of the empirical evaluation.

Work Group Characteristics Related to Effectiveness

The five themes below are summaries of key components of previous theories. Together, the themes depict a hybrid conceptual framework (Fig. 1) based on the models of Gladstein (1984); Hackman (1987); Guzzo and Shea (1992); and Tannenbaum, Beard, and Salas (1992).

Job Design

This theme is most closely linked to the work of Hackman (1987), but is also reflected in the group structure component of Gladstein's (1984) model, the group task school of thought in Guzzo and Shea's (1992) review, and the task characteristics and work structure components of Tannenbaum et al.'s (1992) model. This theme contains work group

characteristics that derive directly from theories of motivational job design. The main distinction is in terms of level of application rather than content (Campion & Medsker, 1992; Shea & Guzzo, 1987; Wall et al., 1986). All the job characteristics of Hackman and colleagues (e.g., Hackman & Lawler, 1971; Hackman & Oldham, 1980) can be applied to groups, even though there have been few tests at the group level.

One characteristic in this theme is *self-management*, which is the group level analogy to autonomy at the individual job level. It is central to many definitions of effective work groups (e.g., Cummings, 1978, 1981; Hackman, 1987; Pearce & Ravlin, 1987) and part of most interventions (e.g., Cordery, Mueller, & Smith, 1991; Goodman, 1979; Goodman et al., 1988; Pasmore et al., 1982; Wall et al., 1986; Walton, 1972). A related characteristic is *participation*. Regardless of management involvement in decision making, work groups can still be distinguished in terms of the degree to which all members are allowed to participate in decisions (McGrath, 1984; Porter, Lawler, & Hackman, 1987). Self-management and participation are presumed to enhance group effectiveness by increasing members' sense of responsibility and ownership of the work. These characteristics may also enhance decision quality by increasing relevant information and by putting decisions as near as possible to the point of operational problems and uncertainties.

Another characteristic is *task variety*, or giving each member the chance to perform a number of the group's tasks. Variety motivates by allowing members to use different skills (Hackman, 1987) and by allowing both interesting and dull tasks to be shared among members (Davis & Wacker, 1987; Walton, 1972). *Task significance* is also applicable. Members should believe that their group's work has significant consequences, either for others inside the organization or its customers (Hackman, 1987). Finally, group work should have *task identity* (Hackman, 1987) or task differentiation (Cummings, 1978), which is the degree to which the group completes a whole and separate piece of work. Identity may increase motivation because it increases a group's sense of responsibility for a meaningful piece of work (Hackman, 1987), and it may facilitate cooperation within a group and increase control over sources of disturbance from goal attainment (i.e., technical variances) by keeping those sources within group boundaries (Cummings, 1978).

Interdependence

This theme comes primarily from the work of Guzzo and Shea (1992; Shea & Guzzo, 1987), although it is implicit in all the models. Interdependence is often the reason groups are formed in the first place (Mintzberg, 1979), and it is a defining characteristic of groups (Salas, Dickinson, Converse, & Tannenbaum, 1992; Tannenbaum et al., 1992; Wall et al., 1986). Interdependence may increase the motivational

properties of work or the efficiencies with which the work is done, and thus may be related to effectiveness.

One form of interdependence is *task interdependence*. Group members interact and depend on one another to accomplish the work. Interdependence may vary across groups, increasing as work flow goes from pooled to sequential to reciprocal (Thompson, 1967). There has been little research at the group level, but interdependence among tasks in the same job (Wong & Campion, 1991) or between jobs (Kiggundu, 1983) has been related to increased motivation. It may also increase group effectiveness because it enhances the sense of responsibility for others' work (Kiggundu, 1983) or because it enhances the reward value of group accomplishments (Shea & Guzzo, 1987).

Another form of interdependence is *goal interdependence*. Goal setting is a well documented individual level performance improvement technique (Locke & Latham, 1990). There is less evidence at the group level, but a clearly defined mission or purpose is thought to be critical to group effectiveness (Davis & Wacker, 1987; Gladstein, 1984; Guzzo & Shea, 1992; Hackman, 1987; Hackman & Walton, 1986; Sundstrom et al., 1990). Its importance has also been shown in some empirical studies on groups (e.g., Buller & Bell, 1986; Koch, 1979; Pearson, 1987; Pritchard, Jones, Roth, Stuebing, & Ekeberg, 1988; Woodman & Sherwood, 1980). Not only should goals exist for groups, but individual members' goals must be linked to the groups' goals to be maximally effective.

Finally, *interdependent feedback and rewards*, or what Guzzo and Shea (1992) call outcome interdependence, is also important to group effectiveness. Individual feedback and rewards should be linked to the group's performance in order to motivate group-oriented behavior. This characteristic is recognized in many other theoretical treatments (e.g., Gladstein, 1984; Hackman, 1987; Hackman & Walton, 1986; Kolodny & Kiggundu, 1980; Leventhal, 1976; Pearce & Ravlin, 1987; Steiner, 1972; Sundstrom et al., 1990) and some research studies (e.g., Koch, 1979; Pasmore et al., 1982; Pritchard et al., 1988; Wall et al., 1986). Most of what is known about the effects of feedback and rewards on performance has been from research at the individual level, however, and it is uncertain how well the findings generalize to the group level (Shea & Guzzo, 1987). Feedback is one of the motivating job characteristics discussed by Hackman (Hackman & Oldman, 1980), but it is included here because of the need for interdependence of feedback for group members.

Composition

The composition of the work group is a theme in all the models of effectiveness. Gladstein (1984) and Guzzo and Shea (1992) refer to it directly as group composition, while Hackman (1987) refers to it under

group design, and Tannenbaum et al. (1992) refer to it under team characteristics. The importance of composition has not been widely investigated for its impact on task performance, however, and the evidence has been mixed when it has been investigated (Guzzo & Shea, 1992).

Several aspects of composition may influence effectiveness. For one, membership *heterogeneity* in terms of abilities and experiences has been found to have a positive effect on performance. This is especially the case when tasks assigned to the group are diverse, because a wide range of competencies are needed (Gladstein, 1984; Goodman, Ravlin, & Argote, 1986; Hackman, 1987; Pearce & Ravlin, 1987; Shaw, 1983; Wall et al., 1986), and when tasks are disjunctive, because performance is determined by the most competent member (Steiner, 1972). Heterogeneity may also increase effectiveness because employees can learn from each other. On the other hand, the beneficial effects are unclear because most data are based on problem solving and creativity outcomes. Homogeneity may lead to better outcomes when satisfaction, conflict, communication (Pearce & Ravlin, 1987), and turnover (Jackson et al., 1991) are considered. Thus, heterogeneity is expected to have a positive effect in the present study, but the prediction is made with caution.

Another composition characteristic of effective groups is whether members have *flexibility* in terms of job assignments (Goodman, 1979; Poza & Markus, 1980; Sundstrom et al., 1990; Walton, 1972). If members can perform each other's jobs, effectiveness is enhanced because they can fill in as needed. *Relative size* is another aspect of composition. Groups need to be large enough to accomplish work assigned to them, but when too large, groups may be dysfunctional due to heightened coordination needs (Gladstein, 1984; O'Reilly & Roberts, 1977; Steiner, 1972) or reduced involvement (McGrath, 1984; Wicker, Kirmeyer, Hanson, & Alexander, 1976). Thus, groups should be staffed to the smallest number needed to do the work (Goodman et al., 1986; Hackman, 1987; Hackman & Walton, 1986; Sundstrom et al., 1990). However, most previous research on size has been in the laboratory (Sundstrom et al., 1990), so it is unclear if these findings generalize to actual work groups.

A final characteristic is employee *preference for group work*. Employees who prefer to work in groups may be more satisfied and effective in groups (Cummings, 1981; Hackman & Oldham, 1980). This preference is somewhat similar to cohesiveness (Cartwright, 1968; Goodman et al., 1987; Zander, 1979). It differs in that cohesiveness refers to attraction to and the desire to remain in a particular group, while preference for group work is not specific to a particular group, but refers to a general preference for working in groups. Research supports the notion that employee preferences may influence their reactions to their jobs (Fried & Ferris, 1987; Hackman & Oldham, 1980; Hulin & Blood, 1968), but little research has focused on this issue at the group level.

Context

Organizational context and resources are considered in all recent models of work group effectiveness. Gladstein (1984) considers organizational level resources, Hackman (1987) considers organizational context, Guzzo and Shea (1992) consider contextual influences, and Tannenbaum et al. (1992) consider organizational and situational characteristics.

One resource that groups need is adequate *training*. Training is an extensively researched determinant of group performance (for reviews see Dyer, 1984; Salas et al., 1992), and training is included in most interventions (e.g., Cordery et al., 1991; Goodman, 1979; Pasmore et al., 1982; Tannenbaum et al., 1992; Wall et al., 1986; Walton, 1972). Training content often includes team philosophy, group decision making, and interpersonal skills, as well as technical knowledge. It was recently shown that group member familiarity with the work and environment is related to productivity (Goodman & Leyden, 1991). Yet, the overall evidence in support of team training is mixed, methodologies of most studies have been weak, and most studies have focused on process outcomes rather than effectiveness (Baker, Dickinson, & Salas, 1991; De Meuse & Liebowitz, 1981; Shea & Guzzo, 1987).

Managerial support is another contextual characteristic. Management controls resources (e.g., material and information) required to make group functioning possible (Shea & Guzzo, 1987), and an organization's culture and top management must support the use of groups (Sundstrom et al., 1990). Teaching facilitative leadership to management is often a feature of work group interventions (Pasmore et al., 1982). Although managerial support seems logically related to group effectiveness, there has been little prior research examining its influence.

Finally, *communication and cooperation between groups* is a contextual characteristic because it is often the responsibility of the management. Supervising group boundaries (Brett & Rognes, 1986; Cummings, 1978) and externally integrating the group with the rest of the organization (Sundstrom et al., 1990) enhances effectiveness. However, research has not extensively tested this, and there is little data on the link between intergroup relations and group effectiveness (Guzzo & Shea, 1992).

Process

Originally proposed by McGrath (1964), an input-process-output perspective is probably the dominant view of groups historically (Guzzo & Shea, 1992). The four themes above deal with the inputs to the group. Process describes those things that go on in the group that influence effectiveness. Gladstein's (1984) and Tannenbaum et al.'s (1992) models refer directly to group process, while Hackman (1987) refers to process

criteria of effectiveness, and Guzzo and Shea (1992) refer to the social interaction process.

One process characteristic is *potency*, or the belief by a group that it can be effective (Guzzo & Shea, 1992; Guzzo, Yost, Campbell, & Shea, 1993; Shea & Guzzo, 1987). It is similar to the lay-term of "team spirit" and the notions of self-efficacy (Bandura, 1982) and high expectancy (Vroom, 1964). Hackman (1987) argues that groups with team spirit (potency) are more committed and willing to work hard for the group, but there has been little research on potency thus far (Guzzo et al., 1993).

Another process characteristic is *social support*. Effectiveness may be enhanced when members help each other and have positive social interactions. Gladstein (1984) describes supportiveness as a group maintenance behavior. Like social facilitation (Harkins, 1987; Zajonc, 1965), social support is arousing and may enhance effectiveness by sustaining effort on mundane tasks.

Another process characteristic is *workload sharing*, which enhances effectiveness by preventing social loafing or free-riding (Albanese & Van Fleet, 1985; Harkins, 1987; Latané, Williams, & Harkins, 1979). To enhance sharing, group members should believe their individual performance can be distinguished from the group's, and that there is a link between their performance and outcomes. Most research has been conducted in laboratory settings, however (Sundstrom et al., 1990). It is assumed to relate to greater productivity, but the actual connection to productivity has not been tested.

Finally, *communication and cooperation within the work group* are also important to effectiveness. They have long been shown to influence effectiveness in laboratory studies (Deutsch, 1949; Leavitt, 1951), and they are considered in many current models (e.g., Gladstein, 1984; Pearce & Ravlin, 1987), but they have not been extensively field tested.

In the sections below, these characteristics are examined empirically in terms of their ability to predict several effectiveness criteria.

Method

Setting

The study was conducted in 5 geographic units of a large financial services company. Each unit supported 1 to 3 geographic territories ($M = 1.80$, $SD = .84$), for a total of 9 territories. Each territory was divided into 5 to 14 subterritories ($M = 8.89$, $SD = 2.67$), for a total of 80 subterritories. Each subterritory was staffed with a single work group and manager. The groups ranged in size from 6 to 30 ($M = 14.93$, $SD = 4.88$), but were more comparable in size within a territory. They were formal groups in that employees were permanently assigned; viewed themselves and were seen by others as groups; and interacted

and shared resources to accomplish mutual tasks, responsibilities, and goals (Shea & Guzzo, 1987; Sundstrom et al., 1990).

Jobs were clerical and involved processing paperwork for other units that sold the products. Tasks included sorting, coding, computer keying, quality checking, answering customer inquiries, and related activities. Each group performed the same set of tasks. Jobs were interdependent in several ways. In addition to shared resources and responsibilities, work was often sequentially interdependent in that products flowed from some employees to others, and it was often reciprocally interdependent in that products flowed back and forth between employees. They were also interdependent in that members depended on each other for their knowledge of different products. Thus, the groups were teams and were referred to as such by the organization; they were not simply collections of individual workers (Salas et al., 1992).

Aside from performing the same work, the groups were similar in many other ways. Because they were in the same division of the same company, they were managed under the same policies and practices. Physical settings were very similar; furniture was identical and buildings were very comparable. Employees were similar in many ways (e.g., sex, education) as were managers (e.g., education, tenure) as described below. As a check, the measures were correlated with the demographics (e.g., age, tenure, sex, and education), and only trivial or nonsignificant relationships were observed.

Sample

Because the unit of analysis in group research is the group (McGrath, 1986; Shea & Guzzo, 1987), a sufficiently large and randomly selected sample of employees had to be included from each group so that the data accurately estimated the population parameters (i.e., values that would have been obtained had all the employees in each group been included). Using standard sampling accuracy formulas (e.g., Warwick & Lininger, 1975) and assuming an average variance on the measures of .50 ($SD = .71$; based on previous research and confirmed post hoc), an average 95% confidence interval of plus or minus 15% on the measures (i.e., .6 on the 1–5 scales) would require sampling no more than 5 members per group for the range of group sizes.

Thus, 5 employees were sampled from each of the 80 groups for a total of approximately 400 (usable sample = 391). Managers were also included for 77 of the 80 groups (7 managed two groups and provided data on both). Sample sizes below vary from 75 to 79 groups due to incomplete data and are indicated in the tables. Statistical power was 93% to detect an $r = .30$ and 70% for an $r = .20$ ($p < .10$, one-tailed; Cohen, 1977). To balance Type I and II errors, both the $p < .05$ and $p < .10$ significance levels were interpreted.

Employees were nearly all female (96.1%). Average age was 32.9

years ($SD = 9.9$), with half being 30 years old or younger. Average tenure was 6.0 years ($SD = 6.3$), with half having 3 years or less. Almost half (44.2%) had a high school education only, 51.9% had some additional education, but only 1.6% had a 4-year degree or more. Half the managers were female (51.5%). Average age was 29.3 years ($SD = 3.6$), with 69.1% under 30 years. Average tenure was 3.9 years ($SD = 2.5$), with 63.2% having 2 or 3 years. Nearly all had a 4-year college degree or more (92.6%).

Measurement Overview

Three objectives guided measurement based on McGrath's (1986) recommendations for studying work groups. First, multiple constructs of both characteristics and effectiveness were assessed, and data were collected from multiple sources for each. Characteristics were obtained from employees and managers; effectiveness was obtained from employees, managers, and records. Thus, self-perceptions, observer perceptions, and objective measures were used.

Second, common method variance between characteristics and effectiveness measures was minimized. Methodological separation was accomplished by using different data sources or time frames, by including respondents who only provided one set of measures but not both, or by using objective records.

Third, the group was the level of analysis. For some measures, data were collected at the group level; for others, data were collected from individuals and aggregated to the group level. Aggregation is a controversial issue, but several recommendations have emerged (e.g., Goodman et al., 1987; James, 1982; Roberts, Hulin, & Rousseau, 1978; Van de Ven & Ferry, 1980).

One recommendation is that there should be a strong rationale or "composition" theory to justify aggregation (Roberts et al., 1978, p. 84). As in aggregation in climate research (James, 1982, p. 219), this study views the characteristics as "macro perceptions" or shared views of the group. Another rationale (Van de Ven & Ferry, 1980) is that the meaning of the characteristics do not change from the individual to the group perspective. Further, in the work design literature it is not unusual to conceptualize and measure design at the incumbent level when examining individual positions, and then aggregate to the job level when examining positions held by multiple people (e.g., Algera, 1983; Campion, 1988; Campion & McClelland, 1991).

Another recommendation is that measures refer to the level of interest (Van de Ven & Ferry, 1980). In this study, most items refer to the group. Those referring to the individual are in the context of group membership. Lastly, the study performs the recommended check of demonstrating that the ratio of within- to between-group variance is

statistically significant before aggregation (Goodman et al., 1987; James, 1982; Roberts et al., 1978).

Measures of Work Group Design

A questionnaire was developed to assess the 19 characteristics. It was completed individually by five randomly selected employees and the manager of each group. Based on the literature, three items were written for nearly all characteristics to obtain minimally adequate internal consistency yet limit length. Each characteristic's items were grouped under a descriptive label to help respondents clearly understand their meaning (with minor changes to labels to clarify meanings to laypersons). "Team" was used to refer to the group. A 5-point response format was used ranging from 5 = "strongly agree" to 1 = "strongly disagree." Items were averaged to form a scale for each characteristic. A copy of the 54-item questionnaire is in the Appendix.¹

The 54 items were too many to use in confirmatory factor analysis (Bentler & Chou, 1987), so exploratory factor analysis was used to examine the acceptability of maintaining the 19 characteristics as separate scales ($n = 8.7$ per item). Common factor analysis was used because the factors were presumed to represent underlying attributes (Ford, MacCallum, & Tait, 1986). Although simpler solutions could be derived, it is noteworthy that each of the 19 characteristics loaded on its own factor when a 19-factor solution was imposed. That is, all items for each characteristic had their highest loadings on the same factor, separate from items of other characteristics. And there were only a few cross-loadings of .30 or above. This was found with both orthogonal and oblique rotations. Principal components analysis produced fairly similar results. The 19 factors explained 73% of the total variance, and 17 of the 19 characteristics loaded on their own factors with either orthogonal or oblique rotations. As an additional assessment of the independence of characteristics, intercorrelations among scales were examined (Table 1). With exceptions, intercorrelations were generally low (average r using z transformation = .22). Based mainly on conceptual distinctions between characteristics, but bolstered by these analyses, the 19 characteristics are kept separate in analyses below.

Several types of reliability were examined (Table 1). First, internal consistency reliabilities assessed unidimensionality. Only one was much below .60. Second, intraclass correlations assessed interrater reliability of the aggregate responses across the five employees in each group (Cronbach, Gleser, Nanda, & Rajaratnam, 1972). With five exceptions, all were significant although some were modest in size. Third, interrater

¹The heterogeneity scale was slightly modified. See the Discussion for explanation. Original items are available from the authors.

TABLE 1
Means, Standard Deviations, Reliabilities, and Intercorrelations Among the Work Group Characteristics

Themes/Characteristics	M ^a	SD	r ^b	r ^c	r ^d	r ^e	1 ^f	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Job design																								
1) Self-management	3.33	.79	.76	.41**	.58	.24**																		
2) Participation	3.44	.81	.88	.54**	.66	.20*	.55																	
3) Task variety	3.14	.76	.71	.43**	.58	-.03	.34	.44																
4) Task significance	4.24	.56	.74	.26*	.55	.07	.21	.33	.27															
5) Task identity	4.03	.56	.71	.24*	.83	-.03	.20	.24	.25	.35														
Interdependence																								
6) Task interdependence	3.54	.66	.61	.04	.68	.05	.06	.17	.19	.15	.09													
7) Goal interdependence	3.37	.77	.68	.03	.56	.12	.28	.33	.31	.34	.23	.12												
8) Inter. feedback & rewards	3.05	.75	.59	.16	.50	.11	.20	.26	.28	.14	.10	.11	.29											
Composition																								
9) Heterogeneity	4.05	.51	.74	.04	.87	.15*	.09	.08	.04	.24	.14	.11	.04	.09										
10) Flexibility	3.05	.79	.66	.33**	.46	.18	.21	.25	.37	.17	.21	.04	.14	.16	.05									
11) Relative size	2.82	1.05	—	.42**	.18	.15*	.13	.11	.14	.10	.07	.00	.03	-.01	-.07	.15								
12) Preference for group work	3.84	.78	.90	.53**	.71	.30**	.12	.37	.32	.40	.24	.21	.29	.19	.16	.22	.03							
Context																								
13) Training	3.39	.81	.81	.39**	.59	.30**	.19	.28	.29	.27	.24	.07	.18	.11	.03	.28	.18	.32						
14) Managerial support	4.00	.62	.74	.14	.78	.18*	.27	.30	.21	.42	.30	.07	.26	.16	.27	.19	.07	.29	.34					
15) Comm./Coop. bet. groups	3.46	.67	.47	.21*	.57	.15*	.13	.13	.14	.20	.08	.03	.10	.08	.05	.20	.09	.16	.25	.17				
Process																								
16) Potency	3.67	.77	.80	.66**	.65	.53**	.27	.39	.38	.43	.23	.10	.22	.18	.05	.35	.16	.50	.34	.28	.18			
17) Social support	3.85	.64	.78	.44**	.79	.14	.22	.45	.37	.50	.25	.20	.25	.14	.21	.28	.10	.51	.34	.38	.22	.55		
18) Workload sharing	3.22	.92	.84	.58**	.36	.37**	.19	.26	.24	.23	.10	.05	.16	.17	-.04	.32	.05	.29	.34	.23	.14	.45	.38	
19) Comm./Coop. within group	3.87	.65	.81	.57**	.80	.20*	.18	.40	.29	.42	.18	.16	.28	.15	.15	.28	.07	.46	.32	.35	.20	.57	.62	.48

^a n = 391 employees and 77 managers.

^b Internal consistency reliability.

*p < .10; **p < .05, one-tailed.

^c Interrater reliability (intraclass correlation).

^d Interrater agreement (James et al., 1984).

^e Correlation between employees and managers.

^f Intercorrelations of .08 significant at p < .05, one-tailed.

agreement was assessed using the James, Demaree, and Wolf (1984) procedure (see Kozlowski & Hattrup, 1992), which compares observed variance of the ratings with the null variance expected with slight positive leniency. With three exceptions, agreement was moderate (.50) to high. Fourth, manager ratings were correlated with average employee ratings. Only 11 of 19 were significant, and most were small. In summary, each analysis showed some scales had low reliability. But each analysis suggested the scales were reliable as a set, all 19 scales showed reliability in one or more analyses, and 15 of 19 showed reliability in two or more analyses. All scales are tested below, but results for scales with low reliabilities should be interpreted cautiously. Further, employees and managers converged only moderately, and thus are tested separately.

Measures of Work Group Effectiveness

Three measures of work group effectiveness were collected.

Productivity. Interviews with managers and employees were conducted to determine the productivity measures collected, the degree to which they were contaminated or deficient as criteria, and the extent to which they were used to evaluate effectiveness. Indications were that the measures most carefully collected and closely monitored were indicators of the amount of work not finished on a weekly basis which was received by the group from the subterritory it supported. That is, the groups' goals were not to reach the highest productivity per se, but to complete all the work that came in each week. Most territories did not even record the amount of work completed, but they did record most of these six measures related to unfinished work per week: (1) New Work Unfinished—number of new pieces of work not finished, (2) Percentage of New Work Unfinished—amount of new work unfinished as a percentage of new work received, (3) Revisions Unfinished—number of revisions to existing pieces of work not finished, (4) Percentage of Revisions Unfinished—number of revisions unfinished as a percentage of revisions received, (5) Calls Not Answered—number of phone calls to members of the group not answered, and (6) Percentage of Calls Not Answered—number of calls not answered as a percentage of calls received.

Each piece of work required the same set of tasks (e.g., coding, computer keying, quality checking, etc.). Although pieces of work varied somewhat in difficulty, distribution of difficulty was considered equivalent across groups in a given territory. Group size was used to adjust for differences in workload generated by the subterritories or skills among employees. Groups with higher workloads or fewer trained employees were assigned more employees. Group size did not change frequently because workload was fairly stable. Thus, groups were comparable *within* a territory, even though they differed in number of employees, and there was no need to standardize productivity data based on group size. There were differences across territories, however, such as

complexity of the work and average group size. Therefore, productivity measures were standardized across territories using z -scores.

Although productivity is often stable (e.g., Deadrick & Madigan, 1990), the range of jobs studied has been limited. Thus, productivity data was collected and aggregated for each group over a long period ($M = 27.89$ weeks per group, $SD = 3.88$). To avoid temporal influences, the time period was the same for each group, from 3 months before to 3 months after the collection of the characteristics data. Intraclass correlations were used to assess reliability, or the degree of variance in productivity across weeks within a group compared to between groups. They can be interpreted as the correlations between the mean of this 30 weeks of productivity and the mean of another (hypothetical) 30 weeks. Average intraclass correlations ranged from .77 to .95 ($p < .05$), thus suggesting substantial reliability.

The six measures were intercorrelated, so they were averaged into a composite ($M = .00$, $SD = .42$, internal consistency = .74). All measures were not available for all groups (range from 46–79), so the composite was based on the available data for each group. Analyses with measures having the least missing data were similar, so only data for the composite are presented.² The signs on the correlations were reversed so that positive numbers indicate relationships with *higher* productivity (i.e., less work not finished).

Employee satisfaction. To avoid common method variance, the organization's opinion survey was used as the measure of satisfaction rather than adding a scale to the questionnaire. That is, it was administered at a different point in time (3 months earlier) and for an unrelated purpose, thus mitigating any consistency or priming effects. Data were obtained from all employees (total $n = 1,175$), not just the 5 who provided other measures. This gave the maximum data for each group ($M = 14.87$ employees per group, $SD = 5.52$), enhanced interrater reliability, and further reduced common method variance because satisfaction data were included from many additional employees who did not provide characteristics data.

The aggregate data from all employees in each group was used as the satisfaction measure. Such aggregation of satisfaction data is common, and may be somewhat justified by the definition of morale as referring to either the individual or group (Webster's, 1965), even though the practice is not without criticism (Roberts et al., 1978).

The survey consisted of 71 items on a range of topics. Five-point response formats were used, usually ranging from 5 = "very satisfied" or "strongly agree" to 1 = "very dissatisfied" or "strongly disagree." A

²Results for relationships between the characteristics and individual productivity measures are available from the authors.

principal components analysis revealed 12 factors explaining 61% of total variance: supervision, job, quality of service, upper management, career development, rewards, management's commitment to quality, employee relations, communications, co-workers, recognition, and workload. Scales were formed for each factor. They showed good reliability and a pattern of relationships very similar to a single average composite combining all items ($M = 3.54$, $SD = .55$). Thus, only results for the composite are presented.³ Internal consistency was .97, interrater reliability was .79 ($p < .05$), and interrater agreement was .96. Satisfaction was fairly independent of productivity ($r = .15$, $p < .10$).

Manager judgments of effectiveness. Managers evaluated all groups in their territories on four items in their questionnaire: (1) Quality of Work, (2) Customer Service, (3) Satisfaction of the Members, and (4) Productivity. These items reflected the company's definition of effectiveness. Having both productivity and satisfaction is also consistent with effectiveness definitions in the literature (Gladstein, 1984; Hackman, 1987; Sundstrom et al., 1990). A 5-point response format was used ranging from 5 = "well above" to 1 = "well below" the average in the territory. Reliability was increased, and common method variance decreased, by collecting judgments on each group from all managers in each territory ($M = 6.18$ managers judging each group, $SD = 1.52$) as opposed to just collecting judgments from the manager providing characteristics data.

Principal components analysis revealed one factor (explaining 64% of total variance), thus items were averaged into a composite ($M = 3.31$, $SD = .46$). Relationships with characteristics were highly comparable between items and the composite.⁴ Internal consistency was .82, interrater reliability was .75 ($p < .05$), and interrater agreement was .77. Judgments were related to productivity ($r = .56$, $p < .05$), but more independent of satisfaction ($r = .29$, $p < .05$).

Procedures

Researchers visited two sites prior to data collection to qualitatively evaluate the conceptual framework and degree to which the characteristics would capture the differences between groups (cf. Strauss & Corbin, 1990), as well as to identify effectiveness criteria. Discussions were held with intact work groups and the managers at each site.

Selection of employees began by including those involved in a study of job design 2 years before (Campion & McClelland, 1991) who were still with the company and assigned to a group ($n = 126$). Additional employees were randomly sampled using a random number table and

³Results for relationships between the characteristics and individual satisfaction subscales are available from the authors.

⁴Results for relationships between the characteristics and individual items of the managers' effectiveness judgments are available from the authors.

alphabetical listings so that 5 employees were included from each group (additional $n = 265$). Using employees who were in the prior study did not substantially decrease randomness because they were originally randomly sampled. All employees agreed to participate if available. Those unable to do so due to absenteeism or scheduling problems ($n = 51$) were replaced by randomly chosen alternates. Questionnaires were completed at individual work stations on company time.

Managers of all 80 groups agreed to participate, but 3 were unavailable. They were instructed to respond to group characteristics questions based on their perceptions of employees' views of the group. Productivity, opinion survey, and demographic data were obtained from records. Productivity data required considerable study and communication with personnel from each site to ensure comparability across sites and minimize contamination and deficiency.

Results

Primary Analyses

Primary analyses correlated the five sets of work group characteristics with the three effectiveness criteria (Table 2). Job design characteristics were related to all criteria, with half the relationships significant and in the positive direction. Self-management and participation related to effectiveness in five of six analyses. Variety and significance showed three positive relationships each. Task identity was unrelated to any of the criteria.

To examine the predictiveness of all job design characteristics together, and control for experiment-wise error rate, characteristics were averaged to a composite and correlated with the criteria. Unit-weighted averages were more robust than differentially weighted regressions (Wainer, 1976), and unlike regressions, unit-weighted averages did not lose statistical power. Five of the six correlations were significant (Table 2), although modest in size.

Interdependence characteristics were related to all three criteria, but proportionately fewer of the correlations were significant. Each characteristic showed one or two positive significant relationships, but the composite was significantly related to effectiveness in four of six analyses.

Composition characteristics were related to all three criteria, especially manager judgments. A third of the correlations were positive and significant. Relative size was related to effectiveness in all six analyses, flexibility had two positive relationships, preference for group work had one positive relationship, but heterogeneity only showed a reversal. The composite was significant in five of six analyses.

Context characteristics related mostly to satisfaction and manager judgments criteria, with a third of the correlations positive and significant. Managerial support had four relationships, training had three, and

TABLE 2

Correlations of Work Group Characteristics Reported by Employees and Managers with Productivity, Employee Satisfaction, and Manager Judgments of Effectiveness

Themes/ Characteristics	Productivity		Employee satisfac.		Manager judg.	
	Empl. data (n= 78)	Manag. data (n= 75)	Empl. data (n= 78)	Manag. data (n= 75)	Empl. data (n= 79)	Manag. data (n= 76)
Job design						
Self-management	.23**	.18*	.13	.16*	.28**	.16*
Participation	.15*	.22*	.34**	.11	.16*	.16*
Task variety	.10	.20**	.23**	.09	.19**	.12
Task significance	.14	.10	.20**	-.22**	.21**	.19**
Task identity	.06	.07	.07	-.06	.06	.12
Composite	.19**	.25**	.28**	.07	.25**	.25**
Interdependence						
Task interdep.	.14*	.06	.01	.06	.05	-.14
Goal interdep.	.13	.01	.11	.10	.18*	-.02
Inter. feedback and rewards	.13	.08	.27**	.16*	.13	.06
Composite	.20**	.08	.20**	.18*	.18*	-.04
Composition						
Heterogeneity	-.05	-.15*	-.05	-.04	.03	-.14
Flexibility	.12	-.02	-.02	-.01	.35**	.19**
Relative size	.23**	.19**	.23**	.25**	.29**	.24**
Preference for group work	.10	.01	.18*	.05	.13	-.10
Composite	.21**	.08	.19**	.17*	.36**	.20**
Context						
Training	.11	.08	.18**	.08	.19**	.15*
Managerial support	.14	.16*	.28**	.20**	.09	.18*
Comm./Coop. between groups	.04	-.06	-.03	-.12	-.01	.02
Composite	.13	.08	.20**	.06	.14	.16*
Process						
Potency	.29**	.22**	.20**	.27**	.38**	.28**
Social support	.20**	.12	.03	-.06	.13	.14
Workload sharing	.21**	.22**	.06	.07	.20**	.23**
Comm./Coop. within the group	.18**	.20**	.08	-.01	.18*	.13
Composite	.26**	.25**	.11	.11	.27**	.27**

* $p < .10$; ** $p < .05$

communication/cooperation between groups had none. Two of six correlations with the composite were significant.

Finally, process characteristics related mostly to productivity and manager judgments criteria, with over half the correlations positive and significant. Potency was related in all six analyses. Workload sharing had four relationships, communication/cooperation within the group had three, and social support had one. The composite was significant in four of six analyses.

In summary, many relationships were observed between group characteristics and effectiveness, even though small in size. The manager judgments criterion was most predictable, followed by productivity, and

then satisfaction. All five themes predicted some of the effectiveness criteria. Job design and process characteristics were slightly more predictive than interdependence, composition, and context characteristics. Characteristics data provided by employees and managers were somewhat similar (i.e., both significant in about a third of the cases, both non-significant in about a third, and one significant and the other not in about a third), thus modestly strengthening the findings.

Supplementary Analysis

The practical significance of the findings was examined because results in Table 2 suggested small effects. Based on the average of the 19 characteristics, the best (top ranked one third) and worst (bottom ranked one third) groups were identified and compared on two effect size indicators: standard deviation differences and differences expressed as percentages of the means. For employee data, the standard deviation (percentage of mean) differences were .66 (33%) for productivity, .52 (5%) for satisfaction, and .70 (12%) for manager judgments. Differences for manager data were slightly smaller, with differences of .26 (12%) for productivity, .22 (2%) for satisfaction, and .43 (7%) for manager judgments. Thus, differences between best and worst groups were practically important, especially in terms of productivity.

Discussion

Summary and Conclusions

Based on a review of the work group effectiveness literature, 5 themes and 19 characteristics were delineated. They were then evaluated against both objective and subjective criteria of effectiveness for 80 work groups.

Job design characteristics were very useful in predicting effectiveness. They related to all three criteria. Except for task identity, all the characteristics showed positive relationships with most criteria. Self-management and participation were the most predictive, perhaps partly because they were the more readily observable characteristics of effective work groups (cf. higher correlations between employees and managers in Table 1).

Theoretically, the findings suggest that the model validated so many times at the job level may also be valid at the group level. The motivational value of group work may come in part because such work designs, especially self-managed groups, enhance the motivational quality of members' jobs.

Interdependence characteristics, which are much more recent in the literature (Shea & Guzzo, 1987) and relatively untested, may also have some value. They showed several relationships with effectiveness criteria. In particular, interdependent feedback and rewards were related to employee satisfaction in both samples.

Composition characteristics showed relationships with all three criteria, but mainly with manager judgments. This may be because composition is determined by staffing, which is an important responsibility of managers. Relative size was related to all criteria in both samples, with larger groups more effective. Relationships were also observed for flexibility, with groups having flexible members viewed as more effective by managers. And preference for group work also showed one positive relationship with satisfaction.

Heterogeneity showed no positive relationships with effectiveness. This could have been partly due to the lack of heterogeneity in the sample (e.g., nearly all female and similar levels of education), but this may have also been due to improper construct operationalization. The literature may have recommended that a variety of different skills be present in the group (Cordery et al., 1991; Gladstein, 1984; Goodman et al., 1986; Pearce & Ravlin, 1987; Shaw, 1983; Wall et al., 1986). That is, all members must be skilled, but in different areas. Whereas, the measures in this study assessed the variation of skill levels in the group, perhaps implying that some members were skilled and others were not. The scale in the Appendix has been modified for future research to be more consistent with the former meaning of heterogeneity.

Context characteristics related mainly to satisfaction and manager judgments, but characteristics relevant to each were different. Management support was more predictive of employee satisfaction, while training was more predictive of manager judgments. This may represent the inputs to the group perceived as most valuable by each party. Employees view manager support as most critical, while managers view observable contributions like training as most critical. Communication and cooperation between groups was not related to effectiveness probably because the groups were very independent in this sample.

It is a recent trend to recognize the importance of context and resources (Guzzo & Shea, 1992). These characteristics showed somewhat fewer relationships than some others, but the results suggest they do add to our understanding of potential determinants of effectiveness.

Process characteristics related mainly to productivity and manager judgments. Potency related to all three criteria in both samples. It was the strongest predictor of all characteristics, thus supporting assertions as to the importance of the construct (Shea & Guzzo, 1987; Guzzo et al., 1993). Workload sharing was also very predictive, and social support and communication and cooperation within the group showed several relationships. These results highlight the importance of proper group processes to the functioning of effective work groups (Gladstein, 1984; Hackman, 1987; McGrath, 1964).

Implications for Work Group Design

The implication of relating work group characteristics to effectiveness is that such information might be used to design more effective work groups. As such, this study may make practical contributions. First, it focuses attention on characteristics management can influence. The degree to which they can be controlled or designed into groups by management varies, however. Input characteristics (i.e., job design, interdependence, composition, and context) are more directly controllable than process characteristics. Process may be only indirectly affected by management through encouragement, modeling, and reinforcement. Nevertheless, identifying and validating these characteristics is a first step in learning how to design effective work groups. Second, the study provides 19 characteristics and a 54-item measure (Appendix) as practical tools for designing work groups. Each characteristic can be viewed as a group design recommendation. With due consideration of the limits of the study, it is cautiously recommended that groups be designed to have higher levels of each characteristic (e.g., higher levels of self-management, interdependence, managerial support, etc.). The Appendix could even be converted into a work design checklist for enhancing team effectiveness. Third, it illustrates the potential importance of proper design in terms of productivity and satisfaction differences associated with groups that are high or low on the characteristics.

Practical implications could also be recognized by conceptualizing these work group characteristics within a human resources (HR) management framework. That is, many characteristics relate to HR activities line managers perform (e.g., staffing, training, assigning work, appraising performance, allocating rewards, etc.). Linking characteristics to HR activities has several advantages. First, it helps line managers understand how they can create and maintain effective work groups as part of their HR responsibilities. Second, by linking to HR activities organizations understand, it provides focal points for work group interventions. Note that reviews of interventions by Katzell and Guzzo (1983) and Guzzo, Jette, and Katzell (1985) were also organized by HR activities. Third, it might enhance awareness in HR departments of their responsibilities regarding work groups (e.g., advising management how to staff, train, appraise, and reward groups), in addition to traditional concerns for individual employees (Shea & Guzzo, 1987). Finally, integration of work group design with HR activities may identify important interactions not recognized previously (e.g., between job design and compensation, Campion & Berger, 1990).

Limitations and Future Research

The implications of the study should perhaps be viewed as propositions for future research given the study's limitations. Some ideas for

future research derive from methodological limitations. First, statistical power was only moderate for small effect sizes. Group research is susceptible to this problem because of the group level of analysis. Objective criteria like productivity exacerbate the problem because of smaller effect sizes than subjective measures with common method variance. Second, reliabilities of some scales were low. Future studies might lengthen or purify some scales, include more than five employees per group, and examine perceptual differences between employees and managers. Third, some data were collected from individuals and then aggregated to the group. Future research might use a group level of measurement (e.g., have groups give consensus ratings). Fourth, passive observation research does not allow causal inferences, and thus causation could be reversed (e.g., employees were aware of their effectiveness and described the groups accordingly). However, there is substantial laboratory experimental evidence that many of these characteristics cause the outcomes (e.g., Cartwright & Zander, 1968; Levine & Moreland, 1990; McGrath, 1984; Steiner, 1972; Zander, 1979), and the present study complements this research by assessing generalizability to the field. Nevertheless, field experiments should be conducted. Fifth, static research does not allow an examination of change over time, as is likely with work design (Campion & McClelland, 1993; Campion & Medsker, 1992; Griffin, 1991).

Other ideas for future research are more theoretical. First, tasks and technologies may be moderators of design-outcome relationships (Fry & Slocum, 1984; Gladstein, 1984). For example, heterogeneity may relate to productivity in creative tasks, and communication between groups might relate to productivity in groups with highly interdependent tasks. Second, future research might combine and test the themes in an integrated input-process-output model. It would be useful to know which inputs enhance key process variables, like potency, and whether these process variables mediate the influence of input variables on the outcomes. Third, other potentially important design characteristics could be examined in future research. For example, leadership and employee abilities have been shown to be highly influential in other areas of personnel research and most certainly play a role in determining group effectiveness. Finally, from a practical perspective, more needs to be known about how managers can actually affect these design characteristics when implementing group work design in organizations.

REFERENCES

- Albanese R, Van Fleet DD. (1985). Rational behavior in groups: The free-riding tendency. *Academy of Management Review*, 10, 244-255.
- Alderfer CP. (1977). Group and intergroup relations. In Hackman JR, Suttle JL (Eds.), *Improving life at work: Behavioral science approaches to organizational change* (pp. 227-246). Santa Monica, CA: Goodyear.

- Algera JA. (1983). Objective and perceived task characteristics as a determinant of reactions by task performers. *Journal of Occupational Psychology*, 56, 95-107.
- Baker TA, Dickinson TL, Salas E. (1991, April). *The influence of team and individual training in interdependent tasks*. Paper presented at the Annual Conference of the Society of Industrial and Organizational Psychology, St. Louis, MO.
- Banas PA. (1988). Employee involvement: A sustained labor/management initiative at the Ford Motor Company. In Campbell JP, Campbell RJ & Associates (Eds.), *Productivity in organizations* (pp. 255-294). San Francisco: Jossey-Bass.
- Bandura A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122-147.
- Bentler PM, Chou CP. (1987). Practical issues in structural modeling. *Sociological Methods & Research*, 15, 78-117.
- Brett J, Rognes J. (1986). Intergroup relations in organizations. In Goodman PS (Ed.), *Designing effective work groups* (pp. 202-236). San Francisco: Jossey-Bass.
- Buller PF, Bell CH Jr. (1986). Effects of team building and goal setting on productivity: A field experiment. *Academy of Management Journal*, 29, 305-328.
- Campion MA. (1988). Interdisciplinary approaches to job design: A constructive replication with extensions. *Journal of Applied Psychology*, 73, 464-481.
- Campion MA, Berger CJ. (1990). Conceptual integration and empirical test of job design and compensation relationships. *PERSONNEL PSYCHOLOGY*, 43, 525-554.
- Campion MA, McClelland CL. (1991). Interdisciplinary examination of the costs and benefits of enlarged jobs: A job design quasi-experiment. *Journal of Applied Psychology*, 76, 186-198.
- Campion MA, McClelland CL. (1993). Follow-up and extension of the interdisciplinary costs and benefits of enlarged jobs. *Journal of Applied Psychology*, 78, 339-351.
- Campion MA, Medsker GJ. (1992). Job design. In Salvendy G (Ed.), *Handbook of industrial engineering* (2nd ed., pp. 845-881). New York: Wiley.
- Campion MA, Thayer PW. (1985). Development and field evaluation of an interdisciplinary measure of job design. *Journal of Applied Psychology*, 70, 29-43.
- Cartwright D. (1968). The nature of group cohesiveness. In Cartwright D, Zander A (Eds.), *Group dynamics: Research and theory*. New York: Harper & Row.
- Cartwright D, Zander A (Eds.). (1968). *Group dynamics: Research and theory*. New York: Academic Press.
- Cohen J. (1977). *Statistical power analysis for the behavioral sciences* (Rev. ed.). New York: Academic Press.
- Cordery JL, Mueller WS, Smith LM. (1991). Attitudinal and behavioral effects of autonomous group working: A longitudinal field study. *Academy of Management Journal*, 34, 464-476.
- Cronbach LJ, Gleser GC, Nanda H, Rajaratnam N. (1972). *The dependability of behavioral measurements: Theory of generalizability for scores and profiles*. New York: Wiley.
- Cummings TG. (1978). Self-regulating work groups: A socio-technical synthesis. *Academy of Management Review*, 3, 625-634.
- Cummings TG. (1981). Designing effective work groups. In Nystrom PC, Starbuck WH (Eds.), *Handbook of organization design* (Vol. 2, pp. 250-271). New York: Oxford University Press.
- Davis LE, Wacker GL. (1987). Job design. In Salvendy G (Ed.), *Handbook of human factors* (pp. 431-452). New York: Wiley.
- Deadrick DL, Madigan RM. (1990). Dynamic criteria revisited: A longitudinal study of performance stability and predictive validity. *PERSONNEL PSYCHOLOGY*, 43, 717-744.
- DeMeuse KP, Liebowitz SJ. (1981). An empirical analysis of team building research. *Group and Organization Studies*, 6, 357-378.
- Deutsch M. (1949). An experimental study of the effects of cooperation and competition upon group process. *Human Relations*, 2, 199-231.

- Dyer J. (1984). Team research and team training: A state-of-the-art review. In Muckler FA (Ed.), *Human factors review* (pp. 285-323). Santa Monica, CA: Human Factors Society.
- Ford JK, MacCallum RC, Tait M. (1986). The application of exploratory factor analysis in applied psychology: A critical review and analysis. *PERSONNEL PSYCHOLOGY*, 39, 291-314.
- Fried Y, Ferris GR. (1987). The validity of the job characteristics model. *PERSONNEL PSYCHOLOGY*, 40, 287-322.
- Fry LW, Slocum JW. (1984). Technology, structure, and workgroup effectiveness: A test of a contingency model. *Academy of Management Journal*, 27, 221-246.
- Gladstein DL. (1984). Groups in context: A model of task group effectiveness. *Administrative Science Quarterly*, 29, 499-517.
- Goodman PS. (1979). *Assessing organizational change: The Rushton quality of work experiment*. New York: Wiley.
- Goodman PS, Devadas R, Hughson TLG. (1988). Groups and productivity: Analyzing the effectiveness of self-managing teams. In Campbell JP, Campbell RJ (Eds.), *Productivity in organizations* (pp. 295-327). San Francisco: Jossey-Bass.
- Goodman PS, Leyden DP. (1991). Familiarity and group productivity. *Journal of Applied Psychology*, 76, 578-586.
- Goodman PS, Ravlin EC, Argote L. (1986). Current thinking about groups: Setting the stage for new ideas. In Goodman PS (Ed.), *Designing effective work groups* (pp. 1-27). San Francisco: Jossey-Bass.
- Goodman PS, Ravlin EC, Schminke M. (1987). Understanding groups in organizations. In Staw BM, Cummings LL (Eds.), *Research in organizational behavior* (Vol. 9, pp. 121-173). Greenwich, CT: JAI Press.
- Griffin RW. (1991). Effects of work redesign on employee perceptions, attitudes, and behaviors: A long-term investigation. *Academy of Management Journal*, 34, 425-435.
- Guzzo RA, Jette RD, Katzell RA. (1985). The effects of psychologically based intervention programs on work productivity: A meta-analysis. *PERSONNEL PSYCHOLOGY*, 38, 275-291.
- Guzzo RA, Shea GP. (1992). Group performance and intergroup relations in organizations. In Dunnette MD, Hough LM (Eds.), *Handbook of industrial and organizational psychology* (Vol. 3, pp. 269-313). Palo Alto: Consulting Psychologists Press.
- Guzzo RA, Yost PR, Campbell RJ, Shea GP. (1993). Potency in groups: Articulating a construct. *British Journal of Social Psychology*, 32, 87-106.
- Hackman JR. (1987). The design of work teams. In Lorsch JW (Ed.), *Handbook of organizational behavior* (pp. 315-342). Englewood Cliffs, NJ: Prentice-Hall.
- Hackman JR, Lawler EE III. (1971). Employee reactions to job characteristics [Monograph]. *Journal of Applied Psychology*, 55, 259-286.
- Hackman JR, Oldham GR. (1980). *Work redesign*. Reading, MA: Addison-Wesley.
- Hackman JR, Walton RE. (1986). Leading groups in organizations. In Goodman PS (Ed.), *Designing effective work groups* (pp. 72-119). San Francisco: Jossey-Bass.
- Harkins SG. (1987). Social loafing and social facilitation. *Journal of Experimental Social Psychology*, 23, 1-18.
- Hulin CL, Blood MR. (1968). Job enlargement, individual differences, and worker responses. *Psychological Bulletin*, 69, 41-55.
- Jackson SE, Brett JF, Sessa VI, Cooper DM, Julin JA, Peyronnin K. (1991). Some differences make a difference: Individual dissimilarity and group heterogeneity as correlates of recruitment, promotions, and turnover. *Journal of Applied Psychology*, 76, 675-689.
- James LR. (1982). Aggregation bias in estimates of perceptual agreement. *Journal of Applied Psychology*, 67, 219-229.

- James LR, Demaree RG, Wolf G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, 69, 85-98.
- Janis IL. (1972). *Victims of groupthink: A psychological study of foreign-policy decisions and fiascos*. Boston: Houghton Mifflin.
- Katzell RA, Guzzo RA. (1983). Psychological approaches to productivity improvement. *American Psychologist*, 38, 468-472.
- Kiggundu MN. (1983). Task interdependence and job design: Test of a theory. *Organizational Behavior and Human Performance*, 31, 145-172.
- Koch JL. (1979). Effects of goal specificity and performance feedback to work groups on peer leadership, performance, and attitudes. *Human Relations*, 33, 819-840.
- Kolodny HF, Kiggundu MN. (1980). Towards the development of a sociotechnical systems model in woodlands mechanical harvesting. *Human Relations*, 33, 623-645.
- Kozlowski SWJ, Hattrup K. (1992). A disagreement about within-group agreement: Disentangling issues of consistency versus consensus. *Journal of Applied Psychology*, 77, 161-167.
- Latané B, Williams K, Harkins S. (1979). Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology*, 37, 822-832.
- Leavitt HJ. (1951). Some effects of certain communication patterns on group performance. *Journal of Abnormal and Social Psychology*, 46, 38-50.
- Leventhal GS. (1976). The distribution of rewards and resources in groups and organizations. In Berkowitz L, Walster E (Eds.), *Advances in experimental social psychology* (Vol. 9, pp. 91-131). New York: Academic Press.
- Levine JM, Moreland RL. (1990). Progress in small group research. *Annual Review of Psychology*, 41, 585-634.
- Locke EA, Latham GP. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice Hall.
- Magjuka RJ, Baldwin TT. (1991). Team-based employee involvement programs for continuous organizational improvement: Effects of design and administration. *PERSONNEL PSYCHOLOGY*, 44, 793-812.
- Majchrzak A. (1988). *The human side of factory automation*. San Francisco: Jossey-Bass.
- McGrath JE. (1964). *Social psychology: A brief introduction*. Holt, Rinehart, and Winston.
- McGrath JE. (1984). *Groups: Interaction and performance*. Englewood Cliffs, NJ: Prentice-Hall.
- McGrath JE. (1986). Studying groups at work: Ten critical needs. In Goodman PS (Ed.), *Designing effective work groups* (pp. 362-391). San Francisco: Jossey-Bass.
- Mintzberg H. (1979). *The structuring of organizations: A synthesis of the research*. Englewood Cliffs, NJ: Prentice-Hall.
- O'Reilly CA, Roberts KH. (1977). Task group structure, communication, and effectiveness. *Journal of Applied Psychology*, 62, 674-681.
- Pasmore W, Francis C, Haldeman J. (1982). Sociotechnical systems: A North American reflection on empirical studies of the seventies. *Human Relations*, 35, 1179-1204.
- Pearce JA, Ravlin EC. (1987). The design and activation of self-regulating work groups. *Human Relations*, 40, 751-782.
- Pearson CAL. (1987). Participative goal setting as a strategy for improving performance and job satisfaction: A longitudinal evaluation with railway track maintenance gangs. *Human Relations*, 40, 473-488.
- Porter LW, Lawler EE III, Hackman JR. (1987). Ways groups influence individual work effectiveness. In Steers RM, Porter LW (Eds.), *Motivation and work behavior* (4th ed., pp. 271-279). New York: McGraw-Hill.
- Poza EJ, Markus ML. (1980). Success story: The team approach to work restructuring. *Organizational Dynamics*, 8(4), 3-25.

- Pritchard RD, Jones S, Roth P, Stuebing K, Ekeberg, S. (1988). Effects of group feedback, goal setting, and incentives on organizational productivity [Monograph]. *Journal of Applied Psychology*, 73, 337-358.
- Roberts KH, Hulin CL, Rousseau DM. (1978). *Developing an interdisciplinary science of organizations*. San Francisco: Jossey-Bass.
- Salas E, Dickinson TL, Converse SA, Tannenbaum SI. (1992). Toward an understanding of team performance and training. In Swezey RW, Salas E (Eds.), *Teams: Their training and performance* (pp. 3-29). Norwood, NJ: ABLEX.
- Shaw ME. (1983). Group composition. In Blumberg HH, Hare AP, Kent V, Davies M (Eds.), *Small groups and social interaction* (Vol. 1, pp. 89-96). New York: Wiley.
- Shea GP, Guzzo RA. (1987). Groups as human resources. In Rowland KM, Ferris GR (Eds.), *Research in human resources and personnel management* (Vol. 5, pp. 323-356). Greenwich, CT: JAI Press.
- Steiner ID. (1972). *Group process and productivity*. New York: Academic Press.
- Strauss A, Corbin J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.
- Sundstrom E, De Meuse KP, Futrell D. (1990). Work teams: Applications and effectiveness. *American Psychologist*, 45, 120-133.
- Tannenbaum SI, Beard RL, Salas E. (1992). Team building and its influence on team effectiveness: An examination of conceptual and empirical developments. In Kelley K (Ed.), *Issues, theory, and research in industrial/organizational psychology* (pp. 117-153). Amsterdam, Holland: Elsevier.
- Thompson JD. (1967). *Organizations in action*. New York: McGraw-Hill.
- Van de Ven AH, Ferry DL. (1980). *Measuring and assessing organizations*. New York: Wiley.
- Vroom VH. (1964). *Work and motivation*. New York: Wiley.
- Wainer H. (1976). Estimating coefficients in linear models: It don't make no nevermind. *Psychological Bulletin*, 83, 213-217.
- Wall TD, Kemp NJ, Jackson PR, Clegg CW. (1986). Outcomes of autonomous workgroups: A long-term field experiment. *Academy of Management Journal*, 29, 281-304.
- Walton RE. (1972). How to counter alienation in the plant. *Harvard Business Review*, 50(6), 70-81.
- Warwick DP, Lininger CA. (1975). *The sample survey: Theory and practice*. New York: McGraw-Hill.
- Webster's Seventh New Collegiate Dictionary. (1965). Springfield, MA: G.C. Merriam.
- Whyte WF. (1955). *Money and motivation: An analysis of incentives in industry*. New York: Harper.
- Wicker A, Kirmeyer SL, Hanson L, Alexander D. (1976). Effects of manning levels on subjective experiences, performance, and verbal interaction in groups. *Organizational Behavior and Human Performance*, 17, 251-274.
- Wong CS, Campion MA. (1991). Development and test of a task level model of motivational job design. *Journal of Applied Psychology*, 76, 825-837.
- Woodman RW, Sherwood JJ. (1980). The role of team development in organizational effectiveness: A critical review. *Psychological Bulletin*, 88, 166-186.
- Zajonc RB. (1965). Social facilitation. *Science*, 149, 269-274.
- Zander A. (1979). The psychology of group processes. In Rosenzweig MR, Porter LW (Eds.), *Annual Review of Psychology*, 30, 417-451.

APPENDIX**Work Group Characteristics Measure****Self-Management**

1. The members of my team are responsible for determining the methods, procedures, and schedules with which the work gets done.
2. My team rather than my manager decides who does what tasks within the team.
3. Most work-related decisions are made by the members of my team rather than by my manager.

Participation

4. As a member of a team, I have a real say in how the team carries out its work.
5. Most members of my team get a chance to participate in decision making.
6. My team is designed to let everyone participate in decision making.

Task Variety

7. Most members of my team get a chance to learn the different tasks the team performs.
8. Most everyone on my team gets a chance to do the more interesting tasks.
9. Task assignments often change from day to day to meet the work load needs of the team.

Task Significance (Importance)

10. The work performed by my team is important to the customers in my area.
11. My team makes an important contribution to serving the company's customers.
12. My team helps me feel that my work is important to the company.

Task Identity (Mission)

13. The team concept allows all the work on a given product to be completed by the same set of people.
14. My team is responsible for all aspects of a product for its area.
15. My team is responsible for its own unique area or segment of the business.

Task Interdependence (Interdependence)

16. I cannot accomplish my tasks without information or materials from other members of my team.
17. Other members of my team depend on me for information or materials needed to perform their tasks.

18. Within my team, jobs performed by team members are related to one another.

Goal Interdependence (Goals)

19. My work goals come directly from the goals of my team.
20. My work activities on any given day are determined by my team's goals for that day.
21. I do very few activities on my job that are not related to the goals of my team.

Interdependent Feedback and Rewards (Feedback and Rewards)

22. Feedback about how well I am doing my job comes primarily from information about how well the entire team is doing.
23. My performance evaluation is strongly influenced by how well my team performs.
24. Many rewards from my job (e.g., pay, promotion, etc.) are determined in large part by my contributions as a team member.

Heterogeneity (Membership)

25. The members of my team vary widely in their areas of expertise.
26. The members of my team have a variety of different backgrounds and experiences.
27. The members of my team have skills and abilities that complement each other.

Flexibility (Member Flexibility)

28. Most members of my team know each other's jobs.
29. It is easy for the members of my team to fill in for one another.
30. My team is very flexible in terms of changes in membership.

Relative Size (Size)

31. The number of people in my team is too small for the work to be accomplished. (Reverse scored)

Preference for Group Work (Team Work Preferences)

32. If given the choice, I would prefer to work as part of a team rather than work alone.
33. I find that working as a member of a team increases my ability to perform effectively.
34. I generally prefer to work as part of a team.

Training

35. The company provides adequate technical training for my team.
36. The company provides adequate quality and customer service training for my team.
37. The company provides adequate team skills training for my team (e.g., communication, organization, interpersonal, etc.).

Managerial Support

38. Higher management in the company supports the concept of teams.

39. My manager supports the concept of teams.

Communication/Cooperation Between Work Groups

40. I frequently talk to other people in the company besides the people on my team.
41. There is little competition between my team and other teams in the company.
42. Teams in the company cooperate to get the work done.

Potency (Spirit)

43. Members of my team have great confidence that the team can perform effectively.
44. My team can take on nearly any task and complete it.
45. My team has a lot of team spirit.

Social Support

46. Being in my team gives me the opportunity to work in a team and provide support to other team members.
47. My team increases my opportunities for positive social interaction.
48. Members of my team help each other out at work when needed.

Workload Sharing (Sharing the Work)

49. Everyone on my team does their fair share of the work.
50. No one in my team depends on other team members to do the work for them.
51. Nearly all the members on my team contribute equally to the work.

Communication/Cooperation Within the Work Group

52. Members of my team are very willing to share information with other team members about our work.
53. Teams enhance the communication among people working on the same product.
54. Members of my team cooperate to get the work done.

Note. Headings in parentheses are the labels in the questionnaire if they were different from the headings in Table 1. Heterogeneity items have been modified (see Discussion). Instructions: "This questionnaire consists of statements about your team, and how your team functions as a group. Please indicate the extent to which each statement describes your team." Common response scale: "(5) Strongly agree, (4) Agree, (3) Neither agree nor disagree, (2) Disagree, or (1) Strongly disagree. (Leave blank if you don't know or the statement is not applicable)."