

RELATIONS BETWEEN WORK TEAM CHARACTERISTICS AND EFFECTIVENESS: A REPLICATION AND EXTENSION

MICHAEL A. CAMPION
Krannert School of Management
Purdue University

ELLEN M. PAPPER
Allstate Insurance Company

GINA J. MEDSKER
School of Business Administration
University of Miami

Previous research has demonstrated that work team characteristics can be related to effectiveness (Campion, Medsker, & Higgs, 1993). This study provides a replication with professional knowledge worker jobs, different measures of effectiveness, and work units that varied in the degree to which members identified as a team. Data were collected from 357 employees, 93 managers, and archival records for 60 teams in a financial services organization. Team characteristics were measured with questionnaires completed by employees and managers. Effectiveness measures included immediate manager judgments at two points in time, senior and peer manager judgments, employee judgments, and archival records of employee satisfaction and performance appraisals. Results were similar to previous findings in that most team characteristics were related to most effectiveness criteria. Relationships were strongest for process characteristics, followed by job design, context, interdependence, and other characteristics. Further, work units higher on single-team identity were higher on many team characteristics and effectiveness measures.

With the increasing popularity of work teams in organizations, research has begun to examine characteristics of teams that are related to various criteria of effectiveness. The goal is to develop recommendations for the design of work teams to enhance the likelihood that they will be effective. One such effort by Campion, Medsker, and Higgs (1993)

Paul R. Sackett was the acting editor for this manuscript. The authors thank Catherine Higgs at Allstate Insurance Company for her ideas and support. Thanks also to Robert Liden and his colleagues associated with the University of Illinois Center for Human Resource Management for help with the data collection and comments on the paper. Finally, thanks to the managers and employees who participated in the study and to the three anonymous reviewers for their constructive comments.

Correspondence and requests for reprints should be addressed to Michael A. Campion, Krannert School of Management, Purdue University, West Lafayette IN 47907-1310.

attempted to address this issue directly by delineating a large set of design recommendations from a broad range of literature on groups, developing a measure of the design characteristics, and then validating the measure against both productivity and satisfaction criteria in a sample of work teams. The present study endeavors to replicate Campion et al., as well as extend it by using more complex jobs, different criteria, and a wider variety of types of teams.

Prior Research

The conceptual framework in Campion et al. (1993) was based on a review of several literatures that addressed the topic of work groups or teams, including 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 organizational psychology (e.g., Gladstein, 1984; Guzzo & Shea, 1992; Hackman 1987; Sundstrom, De Meuse, & Futrell, 1990). Based on this review and the models of work group effectiveness proposed by Gladstein (1984), Guzzo and Shea (1992), Hackman (1987), and Tannenbaum, Beard, and Salas (1992), a hybrid conceptual framework was derived consisting of five themes that represented summaries of the key components of previous theories. In addition, 19 design characteristics were derived and used to operationalize the themes. The themes and characteristics are shown in Figure 1 and briefly described below.

The job design theme reflected the recommendations from theories and research on how to design motivational jobs (Campion & Thayer, 1985; Hackman & Oldham, 1980). Enhancing motivation is expected to increase effectiveness in team jobs, just like it does in individual jobs (Campion & Medsker, 1992; Shea & Guzzo, 1987). These characteristics motivate partly because they increase the sense of responsibility and ownership over the work, and partly because they make the work more interesting to perform. Characteristics include self-management, participation, variety, significance, and identity.

The interdependence theme comes from the work of Guzzo and Shea (1992; Shea & Guzzo, 1987), and it is also considered by other researchers as the defining characteristic of teams (Salas, Dickinson, Converse, & Tannenbaum, 1992). Interdependence is related to effectiveness because interdependent tasks can be completed more efficiently in a team. It also increases motivation by enhancing the sense of shared responsibility for, and reward value of, group accomplishment. Interdependence applies to tasks, goals, feedback, and rewards.

Effectiveness Criteria

Themes/Characteristics

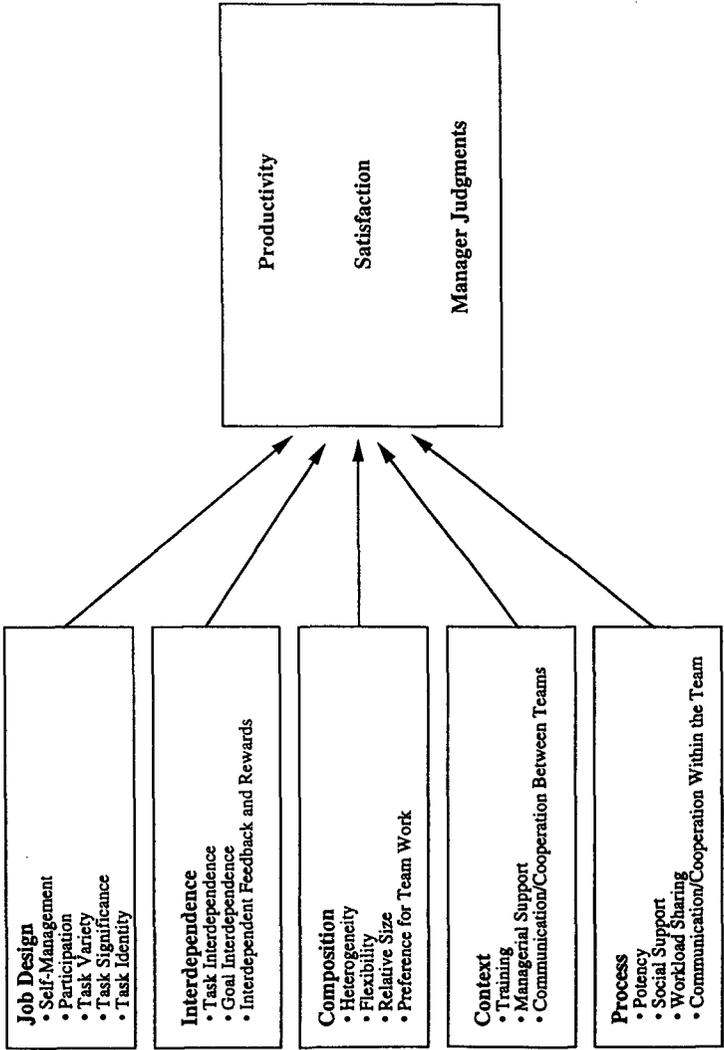


Figure 1: Themes and Characteristics Related to Work Team Effectiveness (from Campion, Medsker, & Higgs, 1993)

The composition theme reflects the collection of advice that has emerged on how teams should be staffed. Heterogeneity has been recommended because this increases the range of competencies in the group (Gladstein, 1984; Hackman, 1987), flexibility is recommended because team members can fill in for each other (Goodman, 1979; Sundstrom et al., 1990), size should be optimal to accomplish the work yet not incur undue coordination costs (Hackman, 1987; Sundstrom et al., 1990), and members should be more satisfied and productive if they prefer to work in a team (Cummings, 1981; Hackman & Oldham, 1980). However, the evidence relating composition to effectiveness has not been as strong as some of the other themes (Guzzo & Shea, 1992).

The context theme considers the resources and contextual influences needed to make the team effective. To be effective, teams need adequate training (Dyer, 1984; Salas et al., 1992), managerial support (Liden, Wayne, Bradway, & Sparrowe, 1994; Shea & Guzzo, 1987; Sundstrom et al., 1990), and help with communication and coordination between teams (Cummings, 1978; Sundstrom et al., 1990).

Finally, unlike the above themes that represent inputs to the team, the process theme reflects those things that go on in the team to influence effectiveness (Guzzo & Shea, 1992; McGrath, 1964). Teams should have a high sense of potency or belief that they can be effective (Guzzo, Yost, Campbell, & Shea, 1993), there should be social support among the members (Gladstein, 1984), there should be workload sharing to avoid loafing or free-riding (Albanese & Van Fleet, 1985), and there should be good communication and cooperation within the team (Gladstein, 1984; Pearce & Ravlin, 1987).

Campion et al. (1993) validated this conceptual framework in a study of 80 work teams with 391 employees and 70 managers in a large financial services company. The work team characteristics were measured with a questionnaire completed by a sample of employees and the manager of each work team. Three effectiveness criteria were used: (a) productivity which was obtained from archival sources, (b) employee satisfaction in the form of opinion survey results which were also obtained from archival sources, and (c) manager judgments of effectiveness which were obtained independently for all teams from all team managers in each work area. Results showed that the three effectiveness criteria could be predicted by the design characteristics, and nearly all the characteristics predicted some of the criteria. Further, the job design and process themes were slightly more predictive than the interdependence, composition, and context themes.

Present Study

The purpose of the present study was to examine the generalizability of these findings by attempting to replicate them in a new sample. The sample differs in three ways that might work against replication, thus extending the previous study. First, different jobs were examined. The earlier study examined nonexempt administrative support jobs, whereas the present study examined exempt professional jobs. This is important to generalizability because professional (“knowledge worker”) jobs are common and may be increasing in numbers (Mohrman, Cohen, & Mohrman, 1995.) However, the sample challenges replication for several reasons. For one, professional jobs are more complex, and complex jobs already tend to have higher levels of some team characteristics. In particular, job design characteristics such as self-management, participation, and significance show strong relationships with job complexity or job level (Campion & Berger, 1990). Likewise, some context characteristics, such as training and communication with other teams, might be higher on professional jobs. Higher natural levels on these characteristics might reduce their ability to predict effectiveness due to restriction of range. Also, professional employees have a greater degree of discretion over work assignments and approaches to completing their work, thus they are more able to voluntarily decide to participate in or even to initiate a team. This might weaken relationships with effectiveness, because professional employees might tend to participate only in teams that they view as effective.

Second, the previous study is extended by the use of different effectiveness criteria, which were partly required by the different nature of the jobs. The team literature has defined effectiveness to include both productivity and satisfaction (e.g., Gladstein, 1984; Goodman, 1979; Hackman, 1987; Sundstrom et al., 1990; Wall, Kemp, Jackson, & Clegg, 1986). Effective teams are not only more productive as a team, but they allow their members to be more productive and satisfied. As such, team effectiveness can be judged by both team-level and individual-level effectiveness outcomes.

The earlier study used team productivity, aggregated individual employee opinion survey results, and multiple-manager judgments of effectiveness. This study also used opinion survey results and manager judgments, but it could not use productivity because of the complexity and diversity of the jobs. Unlike nonexempt administrative jobs that often have clear productivity measures (e.g., number of files processed), work teams of professionals tend to have few clear-cut productivity measures, and the measures tend to be less comparable across work teams

especially with a diverse set of jobs. However, this study did examine four additional criteria. Senior and peer manager judgments provided an outside perspective on the teams' effectiveness. Performance appraisal records of team members and managers provided a measure of individual-level performance. They reflect the organization's official evaluation of the effectiveness of the team members. This study also examined delayed judgments (3 month) in addition to current judgments by the teams' managers, to explore the temporal stability of the relationships. Finally, employee judgments of team effectiveness were gathered to obtain their perspective.

Third, the work units in this study varied in the degree to which the members identified their unit as a single team. Sometimes employees worked on additional secondary teams as well as on their primary teams (Sundstrom et al., 1990), sometimes members on a team were temporary as opposed to permanent, and sometimes employees worked mostly with subgroups of co-workers or even individually rather than with their entire work unit. This variation in types of teams is especially likely with professional jobs, as in the present sample. Such teams may be more like traditional departments or groups of employees working together, rather than as true teams, thus posing another way that a replication could extend the previous study. Because some definitions of the word "team" consider the degree to which workers identify themselves as a team to be a defining characteristic which differentiates a team from a traditional work unit, this notion of "single-team identity" will be explored in the present study. It is possible that teams with higher team identity will be better designed and more effective than units of employees who do not describe themselves as teams. Also, it may be that relationships between team characteristics and effectiveness are stronger in units with higher team identity. Thus, both the possible direct and moderating effects of team identity will be evaluated.

Method

Sample

The Campion et al. (1993) study consisted entirely of nonexempt administrative support jobs in one business unit of a large financial services company. The present study was conducted in the same company, but collected data from exempt professional (knowledge worker) jobs. The sample was specifically selected to be representative of the range of such jobs throughout the major segments of the company. The jobs came from four different business areas and included information systems jobs (e.g., programmers and systems analysts), insurance jobs (e.g.,

underwriting and claims specialists), and administrative jobs (e.g., human resources and financial specialists).

As in the previous study, the teams were considered to be intact work groups consisting of employees (team members) and a manager (team leader). They were all identified by the organization as teams in that they had shared responsibilities and resources, worked together and depended on one another for knowledge and effort, and had interdependent tasks to various degrees. However, they ranged from highly developed teams to units similar to fairly traditional work groups. This enhanced variation on the team design variables, thus providing an ideal naturalistic setting to conduct research on correlates of team effectiveness. Also, this allows an evaluation of relationships between single-team identity and the other team measures.

The teams were slightly smaller in the present study compared to the previous study ($M = 9.36$ and $SD = 5.41$ vs. $M = 14.87$ and $SD = 5.52$, respectively). The number of teams in this study was 60 compared to 80 in the previous study. To enhance the representativeness of the sample and provide an adequate amount of variance on the predictor measures, teams were sampled based partly on the results of a prior employee opinion survey administered the previous year. Using survey questions related to empowerment and teamwork, areas of the company were selected for participation to ensure good range and variation, but not to select extreme groups that would make inferential statistics inappropriate. Ensuring adequate variance should reduce the likelihood of selecting groups that will be restricted in range and not representative of the full spectrum from poorly designed to well designed teams. Greater variance also increases the effect sizes that can be observed, thus increasing the likelihood of detecting those significant effects that exist (i.e., increasing statistical power). With $n = 60$, the statistical power to detect a correlation of .40 was 97%, .30 was 86%, and .20 was 60% ($p < .10$, one-tailed; Cohen, 1977). To balance Type I and II errors, both the .05 and .10 levels of significance were interpreted. The previous study randomly sampled 5 employees per team, whereas the present study invited all employees to participate which resulted in 5.95 ($SD = 2.80$) employees per team. Both the previous and the present study also included the managers of each team. Response rates for this study were 64% for employees and 100% for managers.

The sample consisted of 357 employees. Most (58%) had a bachelor's degree or more, and another 12% had associate's degrees. Average company tenure was 9.98 years ($SD = 7.80$) and job tenure was 4.17 years ($SD = 4.06$). Age was fairly evenly distributed, with 27% under 30 years, 37% between 30 and 39, 21% between 40 and 49, and 12% over 50 (3% missing). Slightly more than half (51%) were female. Compared to the

previous study, this sample was more educated, longer tenured, older, and had more males.

The sample also included 60 team managers. Nearly all (87%) had a bachelor's degree or more. Average company tenure was 13.68 years ($SD = 7.52$) and job tenure was 3.65 years ($SD = 4.22$). Most were in the age range of 30 to 39 (48%) or 40 to 49 (35%). Slightly less than half (42%) were female. Compared to the previous study, this sample was again more educated, longer tenured, and older, but of similar sex composition. Additional data were also obtained from 33 peer and higher level managers.

Measurement Overview

As in the previous study, three objectives guided measurement. First, multiple operationalism was used. Many different constructs were included to operationalize the team characteristics and the effectiveness criteria. Data were collected from multiple sources. Characteristics were obtained from employees and managers, and effectiveness was obtained from employees, managers, and archival records. (Employees described only their primary teams in cases where they belonged to more than one team.) Second, common method variance between characteristics and effectiveness measures was minimized by having methodological separation (e.g., different data sources or time frames). Exceptions are noted. Third, the group was the level of analysis. Where aggregation of measures was involved, it is conceptually supported (as appropriate) by measuring "macro perceptions" or shared views of the group (James, 1982), by having the measures refer to the level of the group (Van de Ven & Ferry, 1980), and by analyzing the interrater reliability (James, 1982; Roberts, Hulin, & Rousseau, 1978) and agreement (James, Demaree, & Wolf, 1984) before aggregating.

Measure of Work Team Design Characteristics

The questionnaire measure of work team characteristics developed and published in Campion et al. (1993) was used with several modifications. First, two scales were eliminated. Task identity and preference for teamwork were removed because they showed few relationships in the previous study. Also, task identity was expected to be confusing for members of teams that produced services rather than products, and preference for teamwork had an individual focus and did not refer to perceptions of the team. Second, several additional items were added to the managerial support scale to further inquire about the behavior of

the manager or team leader. Third, relative size was measured by a single item ranging from "too small" (1) to "too large" (7), rather than by separate items focusing on either "too small" or "too large" as in the last study. Fourth, some of the items were modified slightly to fit the jobs and contexts. The resulting scale had 53 items. Fifth, a 7-point response scale was used (ranging from 7 = *strongly agree* to 1 = *strongly disagree*) rather than the 5-point scale used previously in order to enhance variance. Finally, the questionnaires were completed by managers in interviews, whereas employees completed them individually as in the last study.

The items on each of the characteristics were averaged into scales. Scales were formed in this fashion because of the conceptual distinctions between characteristics, and so the results could be compared directly to the previous study where a factor analysis supported the empirical independence of the characteristics. Table 1 contains descriptive statistics and several types of reliability estimates. The means and standard deviations suggested good range and variance. Internal consistency reliabilities were all .70 or above. Interrater reliabilities of the means of the employees in each team (assessed with intraclass correlations throughout the study; Cronbach, Gleser, Nanda, & Rajaratnam, 1972) were significant for all scales, although small in size for several of the scales. The interrater agreement using the James et al. procedure (1984; Kozlowski & Hattrup, 1992) were moderate (about .50) to high in all but two cases, but these agreement estimates may be conservative because positive leniency was assumed in the null comparison distribution for all scales. Overall, the scales appeared fairly reliable as a set and somewhat more reliable than in the last study, with nearly all scales acceptable on two or more of the three indices. Finally, the correlation between employees and managers was significant for 13 of 17 scales, but their data were examined separately so as to be comparable to the previous study.

As in the last study, confirmatory factor analysis could not be used due to the large number of items, thus exploratory factor analysis was used to assess the acceptability of keeping the 16 characteristics separate ($n = 8.0$ per item). Relative size was excluded because it was only a single item. Common factor analysis was used with varimax rotation. Because the items for each characteristic did not load neatly on their own separate factor, as in the last study, the simplest solution was sought. Seven factors were extracted based on eigenvalues greater than 1.0, scree plot, and interpretability. Typically, all items for a given characteristic loaded on the same factor, and only two items had cross loadings greater than .40. The factors accounted for 88% of the total variance. Unit weighted scales formed for each factor had acceptable psychometric properties.

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

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	
Job design																							
1) Self-management	4.58	1.44	.84	.76**	.20	.46**																	
2) Participation	5.06	1.26	.89	.66**	.59	.38	.71																
3) Task variety	4.78	1.22	.80	.58**	.53	.26**	.42	.55															
4) Task significance	5.95	.79	.81	.29*	.87	.09	.25	.37	.35														
Interdependence																							
5) Task interdependence	4.77	1.09	.70	.36**	.60	.37**	.27	.33	.24	.19													
6) Goal interdependence	4.93	1.04	.70	.57**	.66	.19	.42	.46	.48	.42	.38												
7) Interdependent feedback	4.62	1.19	.71	.52**	.45	.31**	.36	.42	.49	.42	.27	.63											
Composition																							
8) Heterogeneity	5.55	.88	.71	.40**	.81	.26**	.29	.35	.28	.25	.30	.26	.28										
9) Flexibility	5.13	1.18	.85	.66**	.63	.61**	.13	.14	.43	.28	.16	.34	.39	.11									
10) Relative size	3.94	1.16	-	.57**	.81	.31**	.07	.03	.04	-.06	-.05	-.07	.00	-.03	-.05								
Context																							
11) Training	5.32	1.03	.81	.37**	.74	.28**	.16	.29	.40	.32	.19	.33	.35	.19	.36	.11							
12) Managerial support	5.50	.91	.90	.59**	.88	.33**	.34	.53	.53	.47	.23	.46	.53	.29	.35	.11	.57						
13) Communication/ cooperation between teams	5.62	.88	.75	.50**	.81	.04	.20	.29	.35	.35	.24	.24	.29	.36	.25	.02	.35	.39					
Process																							
14) Potency	5.41	1.08	.83	.55**	.71	.45**	.21	.34	.43	.49	.18	.42	.49	.30	.45	-.02	.29	.46	.32				
15) Social support	5.43	1.05	.87	.51**	.76	.40**	.34	.43	.52	.39	.35	.44	.48	.31	.47	-.07	.34	.46	.38	.69			
16) Workload sharing	4.70	1.46	.92	.63**	.27	.40**	.24	.37	.44	.30	.23	.37	.44	.22	.45	.02	.37	.47	.31	.55	.62		
17) Communication/ cooperation within the team	5.51	1.01	.87	.57**	.79	.36**	.28	.40	.45	.37	.29	.45	.47	.31	.40	-.13	.30	.47	.37	.66	.79	.65	

^a n = 357 employees and 59 managers. ^b Internal consistency reliability. ^c Interrater reliability (intraclass correlation). ^d Interrater agreement based on James et al. (1984). ^e Correlation between employees and managers. ^f Intercorrelations of .08 significant at $p < .05$, one-tailed. * $p < .10$, ** $p < .05$, one-tailed.

It is noteworthy that the factors largely reproduced the five major themes in the conceptual framework in Figure 1. The first factor contained all four characteristics from the *process* theme (13 items, coefficient alpha = .89, interrater reliability = .65, and interrater agreement = .96). The second factor contained primarily training and managerial support from the *context* theme (11 items, α = .90, reliability = .56, and agreement = .92). The third factor contained self-management, participation, and variety from the *job design* theme (9 items, α = .89, reliability = .72, and agreement = .90). The fourth factor was the *flexibility* characteristic by itself (3 items, α = .85, reliability = .66, and agreement = .63), and the fifth factor was the *task significance* characteristic by itself (3 items, α = .81, reliability = .29, and agreement = .87). The sixth factor contained all but one of the items in the three characteristics of the *interdependence* theme (8 items, α = .78, reliability = .53, and agreement = .89). The seventh factor contained communication between teams and heterogeneity; it is termed *cross-functionalism* because it largely reflected interaction with, and expertise in, other areas of the organization (5 items, α = .69, reliability = .49, and agreement = .83).

Measure of Single-Team Identity

Three measures were collected to reflect single-team identity. *Single-team membership* was measured with the item, "I belong to: only one work group (scored 3); one primary work group, but also some secondary work groups (scored 2); or more than one work group (scored 1)" (interrater reliability = .48 and interrater agreement = .38). *Team member permanence* was measured with the item, "My primary work group: consists mostly of members who are relatively permanent members of the group (scored 3), consists of some members who are relatively permanent and some members who change frequently (scored 2), or consists of members who frequently change (scored 1)" (reliability = .62 and agreement = .67). *Single-team functioning* was measured with the item, "I would describe my primary work group as: A group of members all working together as a single team (scored 3), two or more subgroups of co-workers (scored 2), or a collection of individual employees doing their own work (scored 1)" (reliability = .56 and agreement = .10). The employees' questionnaire included all items; the managers' just included the latter two. Employee-manager correlations are .25 and .29 ($p < .05$) for the two items.

The levels of interrater reliability were all significant although modest in size, but the levels of agreement were very low for the first and third items. Low agreement might be expected for the first item, because it referred to the individual rather than the team, but this does

TABLE 2
*Means, Standard Deviations, Reliabilities, and Intercorrelations
 Among the Effectiveness Criteria*

	<i>n</i>	<i>M</i> ^b	<i>SD</i>	<i>r</i> ^c	<i>r</i> ^d	<i>r</i> ^e	1	2	3	4	5
1) Employee satisfaction	550	3.76	.51	.95	.65**	.97					
2) Employee judgments of effectiveness	357	4.99	.99	.94	.50**	.90	.52**				
3) Manager judgments at Time 1	60	5.00	.76	.89	—	—	.34**	.47**			
4) Manager judgments at Time 2	36	3.51	.46	.86	—	—	.52**	.33**	.53**		
5) Other managers' judgments at Time 2	99 ^a	3.19	.47	.87	.66**	.98	.05	.13	.22*	.19*	
6) Performance appraisals	395	3.42	.52	—	.38**	.76	-.04	.17*	.34**	.39**	.13

^a 33 managers judging 42 teams, resulting in 99 data points.

^b Measures 1, 4, and 5 used a 5-point format, 2 and 3 used a 7-point format, and 6 used

^c Internal consistency reliability.

^d Interrater reliability (intraclass correlation).

^e Interrater agreement based on James et al. (1984).

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

not explain the third item. The three questions were not intercorrelated (mean $r = .06$), so they could not be combined into a scale to enhance their measurement properties. Therefore, results with these measures should be interpreted cautiously.

Measures of Work Team Effectiveness

Six measures were collected.

Employee satisfaction. In order to avoid common method variance, the organization's employee opinion survey was used to measure satisfaction rather than adding another scale to the questionnaire. The survey was conducted within 2 months of this study in the various units that participated. It was not the same survey used to select the sample; the survey used for the satisfaction criteria was conducted approximately 1 year after the earlier survey. Data were available for 53 of the 60 teams. Data were obtained for all 550 employees who completed the survey in those teams.

The survey included 40 items on a wide range of topics. A 5-point response format was used, with higher numbers indicating higher satisfaction. As in the previous study, both factor analyses and analyses of relationships with subscales suggested that averaging all the items into a single composite was not only parsimonious but it lost very little information. As shown in Table 2, this measure had good range and variance, and very good reliability and agreement on all indices.

Employee judgments of effectiveness. Employees of all 60 teams judged the effectiveness of their work team by rating nine items included in their

questionnaire: quality of work done, customer service provided, productivity, completing work on time, completing work within budget, providing innovative products or services, responding quickly to problems or opportunities, job satisfaction of members, and overall performance. A 7-point response format was used ranging from 7 = *outstanding* to 1 = *very poor*. Factor analysis suggested that one factor best explained the data, thus an overall composite was created by averaging the items. Table 2 shows that this measure had good range and variance, high internal consistency, moderately high interrater reliability, and high interrater agreement.

Manager judgments at Time 1. Managers of all 60 teams judged the effectiveness of their own teams during the interviews when they completed the questionnaire. These judgments were made on an 11-item scale which included the above 9 items plus two additional items relevant to the management view of group effectiveness: initiative of the group and cooperation with nongroup members. The same 7-point response format was used. Factor analysis again suggested one factor and an overall composite was computed. Table 2 shows that this measure had good range, variance, and internal consistency.

Manager judgments at Time 2. After 3 months, managers were again asked to judge the effectiveness of their own teams, and data were obtained on 36 teams. This measure was collected to assess the temporal stability of relationships between team characteristics and effectiveness, as well as to collect measures that were methodologically separated from the manager-provided measure of characteristics. The same items described above were used, except a 5-point response format was used, and psychometric results were comparable (Table 2).

Other managers' judgments at Time 2. Judgments from senior and peer managers were collected after 3 months to obtain an outside perspective and a measure that was methodologically separated from the manager-provided measure of team characteristics. A total of 33 other managers provided judgments of 42 teams, with an average of 2.36 managers rating each team. The same measure of effectiveness described above was used with the 5-point response format. Table 2 shows that the measure had good range and variance, and very good reliability on all three estimates.

Performance appraisals. The organization's performance appraisal records were collected for 395 (95%) of the participating employees and managers. The aggregated average performance rating of all the employees and the manager of the team combined was taken as the effectiveness measure. The appraisal was a management-by-objectives system with a single 4-point summary rating (ranging from 4 = *exceeds requirements* to 1 = *needs improvement*). Appraisals were given annually,

and the most recent appraisals of record were collected. Table 2 shows some positive leniency in the appraisals, but good variance. The aggregated mean of the performance appraisals had significant reliability and good agreement.

Table 2 also shows the intercorrelations among the effectiveness criteria. The two measures provided by the employees show moderately strong correlations, as do the two measures provided by the managers of their own teams. Further, the employee measures correlate with the manager measures. The performance appraisals also show positive correlations with both employee and manager judgments. Conversely, the judgments provided by the other managers have relatively lower correlations with the remaining measures of effectiveness.

Results

To replicate the analyses in the previous study, the five sets of work group characteristics were correlated with the six effectiveness criteria (Table 3). For each criterion, correlations were calculated separately for the employee and the manager-provided data on the team characteristics. Thus, there are 12 tests of each relationship. Note that 2 of the 12 tests are with method bound data (i.e., collected from the same respondents at the same time)—the third and sixth columns of correlations—and thus they could be somewhat inflated.

The job design characteristics are related to all criteria, except for the performance appraisals. The results are stronger for the employee data than the manager data. Participation and task variety show the most significant relationships, but self-management and task significance are also significant in a third of the correlations.

The interdependence characteristics are related to four of the six criteria. Interdependent feedback and rewards show the most relationships, but task and goal interdependence are also significant in the predicted direction in a third of the correlations.

The composition characteristics show the fewest relationships with the criteria. Heterogeneity and flexibility are significant in 3 of the 12 correlations each, but half of these are method bound. Relative size is significant in four cases, with three of them negative indicating that teams perceived to be too large for their tasks are less effective. Alternative scoring schemes for the size item (e.g., breaking into separate items for "too small" and "too large," or scoring the middle value of "about the right size" as the highest) did not change the results.

The context characteristics are typically significant in about half the correlations. Managerial support and communication and cooperation between groups show more significant relationships than training.

TABLE 3
*Correlations of Work Team Characteristics and Factor Composites
 with the Effectiveness Criteria*

Characteristics	Emp. satisfaction		Emp. judgments		Manager judgments at Time 1	
	Emp.data (n = 53)	Mgr.data (n = 52)	Emp.data (n = 60)	Mgr.data (n = 59)	Emp.data (n = 60)	Mgr.data (n = 59)
Job design						
Self-management	.07	.06	.24**	.23**	.15	.43**
Participation	.24**	.03	.39**	.16	.23**	.30**
Task variety	.31**	.09	.57**	.21*	.37**	.35**
Task significance	.29**	.02	.28**	.15	.16	.32**
Interdependence						
Task interdep.	.25**	-.22*	.33**	.08	.22**	.09
Goal interdep.	.23**	-.12	.38**	.06	.27**	.19*
Interdep. feedback	.27**	-.06	.34**	.21*	.27**	.40**
Composition						
Heterogeneity	.07	-.03	.25**	.13	.28**	.03
Flexibility	.13	-.01	.39**	.20*	.16	.25**
Relative size	.01	-.06	-.15	-.19*	.11	-.06
Context						
Training	.26**	.02	.19*	.01	.25**	.06
Managerial support	.46**	.16	.33**	.27**	.30**	.30**
Communication/ coop. between teams	.34**	.07	.16	.34**	.35**	.24**
Process						
Potency	.46**	.24**	.69**	.45**	.46**	.73**
Social support	.46**	.28**	.68**	.42**	.42**	.67**
Workload sharing	.43**	.21*	.54**	.26**	.49**	.47**
Communication/ coop. within the team	.43**	.18	.59**	.30**	.48**	.72**
Factor composites						
Process	.47**	.28**	.65**	.43**	.52**	.74**
Context	.33**	.11	.24**	.20*	.23**	.30**
Job design	.23**	.08	.37**	.27**	.23**	.49**
Flexibility	.13	-.01	.39**	.20*	.16	.25**
Task significance	.29**	.02	.28**	.15	.16	.32**
Interdependence	.24**	-.20*	.33**	.15	.22**	.31**
Cross-functional	.21*	-.01	.13	.25**	.20*	-.03
Job design						
Self-management	.11	.14	.22*	.01	.00	-.01
Participation	.24*	.00	.25*	.18	.15	-.12
Task variety	.29**	.28*	.08	-.09	.27**	.01
Task significance	.04	-.02	.23*	-.11	.06	.05

Table 3 (continued)

Characteristics	Manager judgments at Time 2		Other managers' judgments at Time 2		Performance appraisals	
	Emp.data (<i>n</i> = 36)	Mgr.data (<i>n</i> = 35)	Emp.data (<i>n</i> = 42)	Mgr.data (<i>n</i> = 41)	Emp.data (<i>n</i> = 60)	Mgr.data (<i>n</i> = 59)
Interdependence						
Task interdep.	.26*	.02	-.04	-.05	.16	-.03
Goal interdep.	.30**	.09	.09	-.26*	.09	-.11
Interdep. feedback	.53**	.27*	.09	-.02	.04	.09
Composition						
Heterogeneity	.01	.08	.27**	-.04	.03	-.07
Flexibility	.09	.04	-.14	-.01	.13	-.01
Relative size	.09	-.28*	.18	-.06	.19*	-.22**
Context						
Training	.07	-.23	-.07	-.24*	.01	-.14
Managerial support	.22	-.03	-.02	.02	.18*	-.05
Communication/ coop. between teams	.27*	-.09	.12	.04	.18*	.00
Process						
Potency	.38**	.42**	.16	.17	.25**	.19*
Social support	.48**	.34**	.00	.00	.24**	.12
Workload sharing	.42**	.25*	.11	.00	.21*	.14
Communication/ coop. within the team	.46*	.37*	.16	-.01	.19*	.10
Factor Composites						
Process	.48**	.40**	.12	.04	.23**	.15
Context	.23*	-.07	.13	-.08	.13	.00
Job design	.25*	.20	.24*	.03	.14	-.04
Flexibility	.09	.04	-.14	-.01	.13	-.01
Task significance	.04	-.02	.23*	-.11	.06	.05
Interdependence	.36**	.16	.12	-.15	-.01	-.05
Cross-functional	.20	-.10	.22*	.01	.11	-.11

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

The process characteristics show the most relationships of any of the themes. Every characteristic is consistently related with five of the six criteria. No significant relationships are observed for the other managers' judgments.

Looking across the analyses, it appears that manager-provided measures of team characteristics are somewhat less predictive of effectiveness than are the employee-provided measures. Further, the criterion data provided by the other managers are clearly the least predictable.

To simplify the data and to reduce the potential experiment-wise error rate, the hypotheses were tested using the factor composites (Table 3). The results generally mirror those described above. The process factor shows the most and the largest correlations (with 9 of 12 significant), followed by the job design factor (7 significant), the context factor (6 significant), the interdependence factor (5 significant), and the three other factors (3 or 4 significant).

Multiple regression was not useful for determining the simultaneous effect of all the factor composites considered together due to the loss of statistical power. At the group level of analysis, regressions including all seven factors suffered a 12% to 21% loss in degrees of freedom compared to their correlational counterparts. This, along with some multicollinearity among the composites, results in only the process factor being significant in most equations. The other factors are usually not significant, with or without the process factor included in the equation, despite their many significant zero-order correlations.

The practical significance of the results was examined by determining the best (top ranked one-third) and worst (bottom ranked one-third) teams based on the average of the 17 team characteristics and then comparing them on two effect size indicators: *SD* difference on the criteria and *SD* difference expressed as a percentage of the mean on the criteria. For the employee data, the differences are .85 (10%) for satisfaction, 1.00 (11%) for employee judgments of effectiveness, .80 (12%) for manager ratings at Time 1, .67 (8%) for manager ratings at Time 2, and .37 (4%) for the performance appraisals. Comparable results were obtained using the manager data.

Descriptive statistics on single-team membership shows that about half the respondents are members of only one team (54%), and another third have a primary team (which is the focus of this study) and some secondary team assignments (35%). Team member permanence indicates that members of the teams are fairly permanent (83%), even though some teams have a subset of members who change frequently (13%). On single team functioning, a third each of the respondents describe their team members as working together as a single unit (32%), as two or more subgroups (32%), and as individuals working independently (36%).

Both the direct and moderating effects of these single-team identity measures were assessed. The possible moderating effects were tested by partialling out each of the three single-team identity measures from the correlations in Table 3 between the team characteristic factor composites and the effectiveness criteria. This had virtually no effect on the results. The average absolute change in the correlations is .02, with no consistent exceptions.

TABLE 4
*Correlations of Single-Team Identity Measures with Team Characteristic
 and Effectiveness Measures*

Characteristics	Single-team membership	Team member permanence	Single-team functioning
Job-design			
Self-management	-.04	-.04	.64**
Participation	-.07	-.08	.57**
Task variety	.18*	-.05	.41**
Task significance	.10	.45**	.11
Interdependence			
Task interdependence	-.23**	-.23**	.41**
Goal interdependence	.18*	.02	.52**
Interdependent feedback	.18*	.10	.54**
Composition			
Heterogeneity	-.24**	-.25**	.38**
Flexibility	.34**	.25**	.09
Relative size	-.30**	-.32**	-.15
Context			
Training	-.10	-.12	.05
Managerial support	.05	.11	.16
Communication/Cooperation between teams	-.30	-.06	.09
Process			
Potency	.23**	.14	.18*
Social support	.21*	.02	.40**
Workload sharing	.13	.04	.24**
Communication/Cooperation within the team	.10	-.01	.43**
Effectiveness criteria			
Employee satisfaction	-.15	-.14	.03
Employee judgments	.23**	.12	.19*
Manager judgments, Time 1	-.07	-.13	.16
Manager judgments, Time 2	.10	.06	.34**
Other managers' judgments	-.12	-.10	.06
Performance appraisals	-.08	.03	.07

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

Direct effects were analyzed by correlating the team identity measures with the team characteristics and effectiveness measures (Table 4). Many positive relationships were found, suggesting that teams with higher identity had some better team characteristics and were often more effective. For example, teams with members who only belonged to one team, and teams with more permanent members, tend to be more flexible and smaller in relative size. They also sometimes have better job design and process characteristics. On the other hand, they tend

to be more homogeneous in membership and their tasks are less interdependent (perhaps because stability leads to more division of labor). Teams with members that actually functioned or worked together as a single-team have the most positive features. They have much more motivational job design, higher interdependence, more heterogeneity, more favorable group processes, and greater effectiveness.

Discussion

Overall, the results demonstrated the generalizability of the relationships between the work team characteristics and team effectiveness, despite reasons to expect they might not replicate (e.g., different jobs, different effectiveness criteria, and variation in single-team identity).

Job design characteristics were related to nearly all criteria, and it is the only set of team characteristics showing many relationships with other managers' judgments. These results are similar to those of Campion et al. (1993) both in terms of the proportion of significant correlations and the magnitude of the correlations that are not method bound. The results also confirm the finding that teams with higher motivational job design tend to be more effective, even if they consist of professional jobs which tend to be higher on motivational design anyway.

Interdependence characteristics were related to most of the criteria. The results are again highly similar to the previous study both in terms of the proportion and magnitude of the significant relationships. Therefore, interdependence is again found to be an important consideration in predicting the effectiveness of work teams.

Composition characteristics related to only a few criteria. Contrary to the previous study, teams perceived as too large for their tasks were less effective than those whose size was perceived as being appropriate or too small for their tasks. However, this result is consistent with the literature suggesting that larger teams may be detrimental to effectiveness (Sundstrom et al., 1990). It may be that coordination needs are already higher with professional jobs, so additional coordination requirements with larger teams create a burden. Conversely, with nonexempt administrative jobs, additional employees may simply provide more help to do the work, thus enhancing effectiveness.

Context characteristics were related to many criteria. These results are similar or slightly stronger than in the previous study. Communication and cooperation between groups may have been more important because professional jobs probably have more needs for integration with other parts of the company than nonexempt administrative jobs.

Process characteristics had the most criterion relationships. The process characteristics were also found to be highly predictive of the effectiveness criteria in the previous study, but the results are somewhat stronger here in terms of both the proportion of significant correlations and (especially) the magnitude of those correlations. From the perspective of an input-process-output model of teams (McGrath, 1984), it is possible that the process characteristics are more strongly related to the criteria because they are closer to the criteria than the other characteristics which are more like inputs. This causal ordering (i.e., mediation effect of process) could not be tested due to the small sample size and loss of degrees of freedom with regression analyses, and the fact that the cross-sectional research designs provide only weak tests of mediation. This is an issue for future research.

One important part of many definitions of teams is that the members should identify with and see themselves as a team. Three measures of single-team identity developed in this study showed substantial variation among teams. Relationships between team characteristics and effectiveness were not moderated by single team identity, thus attesting to the generalizability of the relationships. It may be that teams of professional (knowledge worker) employees can be more loosely knit than teams of nonexempt administrative employees, yet still be a team in the sense that the team characteristics predict their effectiveness.

However, there were some direct empirical relationships between single-team identity and several team characteristic and effectiveness measures. Teams with members that only belonged to one team, that had mostly permanent members, and especially that functioned as a team had more positive team characteristics and were often viewed as more effective. This suggests that single-team identity may play a role in defining teams and predisposing their effectiveness. This should be examined further in future research.

From a theoretical point of view, the study is valuable in providing a replication of the relationships between the team characteristics and effectiveness criteria in the conceptual framework (Figure 1). The factor analysis of the team characteristics was informative in this regard also in that it reproduced four of the five major themes in the conceptual framework. This occurred despite the fact that the items were not strictly grouped by theme in the questionnaire. This provides modest empirical support for the clustering of characteristics into themes, which was based primarily on conceptual similarity and previous models.

The support for the conceptual framework is limited in several ways, however. First, as noted, cross-sectional research does not allow causal directions to be established. Second, the conceptual framework is not

inclusive of all the possible variables that could be related to team effectiveness, such as leadership or member cognitive ability (Wright, McMahon, Smart, & McCormick, 1995). Third, the framework is not a theoretical model, but merely a means of outlining the variables examined in the study. Considerably more conceptual refinement and empirical testing are needed.

There were also several methodological lessons in the study. First, measures of team characteristics provided by employees were more predictive of effectiveness than those provided by managers. Given that the employees are the central members of the teams, while the managers are somewhat on the periphery, it is tempting to conclude that the employee data might more accurately describe the team characteristics. Alternatively, it may simply be that employees' perceptions matter most in influencing their productivity and satisfaction, irrespective of accuracy.

Second, the effectiveness judgments of other managers were not very predictable. Given the low intercorrelations between this criterion and the other criteria (Table 2), it appears that this criterion is measuring something different. Possibly these peer and senior managers have limited direct knowledge of the effectiveness of the teams.

Third, the factor analysis of the team characteristics in the previous study supported a much more differentiated structure, with most of the characteristics loading separately. This is partly due to the somewhat smaller intercorrelations among the characteristics in that study. Another explanation is that the items within each characteristic were separated under their own descriptive heading in the questionnaire in that study, but were not in the present study, and this has been shown to enhance discriminant validity (Schriesheim, Solomon, & Kopelman, 1989).

From a practical point of view, the results confirm the previous study in showing that team design characteristics are practically important as well as statistically significant. The strongest findings in both the present and the previous study would suggest the following advice for designing work teams to enhance the likelihood that they will be effective. First, design motivating jobs to the extent possible. Giving the team some degree of autonomy or self-management may be the easiest and most direct way to enhance motivation. Also, make sure there is wide participation in team decisions and all team members have a chance to perform a variety of the team's tasks. Second, strive to make the team members interdependent if the tasks permit or encourage such interdependence. This can be done partly by the choice of jobs formed into a team, and partly by setting interdependent goals and giving interdependent feedback. Third, create a supportive context for the team. In particular, provide adequate training, in terms of both technical and team skills, and adequate managerial support, in terms of resources, information, and encouragement.

Fourth, and perhaps most importantly, monitor and encourage positive team processes. Communication, workload sharing, and social support are all very important, but perhaps potency is most important. Enhancing potency (i.e., team self-efficacy or team spirit) highlights the value of coaching skills in the management of teams. Finally, based only on the current studies, strong recommendations cannot be made about many of the other characteristics, such as heterogeneity, size, flexibility, task identity, preference for team work, and several others. Likewise, it does not appear that job type or single-team identity would alter the practical advice based on this research.

In short, high performing teams in this context performed a variety of tasks that members perceived to be significant. They were allowed a high degree of self-management, were interdependent in terms of tasks, goals and feedback, and functioned as a single team. They tended to have members with complementary skills who were also flexible in the tasks they performed. They were not too large for the tasks assigned to them. They were well supported by the organization in terms of training, managerial support, and cooperation and communication from other teams. They had confidence in their teams' abilities, and members supported one another, communicated, cooperated, and fairly shared the workload.

The conclusions must all be tested more directly in future research using experimental or quasi-experimental methods to demonstrate that using the characteristics to actually design teams does, in fact, result in more effective teams. This future research is needed to prove that teams can be designed to simultaneously enhance both productivity and satisfaction, which have been viewed as inherently conflicting outcomes in past research on work design (Campion, 1988; Campion & McClelland, 1991).

REFERENCES

- Albanese R, Van Fleet DD. (1985). Rational behavior in groups: The free-riding tendency. *Academy of Management Review*, 10, 244-255.
- Campion MA. (1988). Interdisciplinary approaches to job design: A constructive replication with extensions. *Journal of Applied Psychology*, 73, 467-481.
- Campion MA, Berger CJ. (1990). Conceptual integration and empirical test of job design and compensation relationships. *PERSONNEL PSYCHOLOGY*, 43, 525-553.
- 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, Medsker GJ. (1992). Job design. In Salvendy G (Ed.), *Handbook of industrial engineering* (2nd ed., pp. 845-881). New York: Wiley.
- Campion MA, Medsker GJ, Higgs AC. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *PERSONNEL PSYCHOLOGY*, 46, 823-850.

- Campion MA, Thayer PW. (1985). Development and field evaluation of an interdisciplinary measure of job design. *Journal of Applied Psychology*, 70, 29–43.
- Cohen J. (1977). *Statistical power analysis for the behavioral sciences* (Rev. ed.). New York: Academic Press.
- 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.
- 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.
- 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.
- Guzzo RA, Shea GP. (1992). Group performance and intergroup relations in organizations. In Dunnette MD, Hough LM (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., 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, Oldham GR. (1980). *Work redesign*. Reading, MA: Addison-Wesley.
- 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.
- Liden RC, Wayne SJ, Bradway L, Sparrowe R. (1994, April). Leading empowered work groups. In Drasgow F (Chair), *Work group empowerment: Conceptual and practical issues*. Symposium conducted at the Ninth Annual Conference of the Society for Industrial Organizational Psychology, Inc., Nashville.
- Kozlowski SWJ, Hatrup K. (1992). A disagreement about within-group agreement: Disentangling issues of consistency versus consensus. *Journal of Applied Psychology*, 77, 161–167.
- 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.
- Mohrman SA, Cohen SG, Mohrman AM (1995). *Designing team based organizations: New forms for knowledge work*. San Francisco: Jossey-Bass.
- 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.
- 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.
- Schriesheim CA, Solomon E, Kopelman RE. (1989). Grouped versus randomized format: An investigation of scale convergent and discriminant validity using LISREL confirmatory factor analysis. *Applied Psychological Measurement*, 13, 19–32.
- 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.
- 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: Elsevier.
- Van de Ven AH, Ferry DL. (1980). *Measuring and assessing organizations*. New York: Wiley.
- 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.
- Wright PM, McMahan GC, Smart D, McCormick B. (1995, May). *Team cognitive ability as a predictor of team performance*. Poster session presented at the Tenth Annual Conference of the Society for Industrial and Organizational Psychology, Orlando.