Cohesiveness and Performance on an Additive Task: Evidence for Multidimensionality

STEPHEN J. ZACCARO
Department of Psychology
Virginia Polytechnic Institute and State University

CHARLES A. LOWE
Department of Psychology
University of Connecticut

ABSTRACT. This experiment contrasted two predictions regarding the effects of two types of cohesiveness on the performance of American students. Task-based cohesion and interpersonal cohesion were manipulated independently. Results show that high task cohesion facilitated performance, whereas interpersonal attraction had no apparent effect on production. Increases in interpersonal cohesion did, however, result in higher task commitment and more frequent interactions among group members. A path analysis suggested that potentially beneficial effects on production of increasing task commitment were obviated by the increased conversation also resulting from interpersonal cohesion. These data suggest that cohesiveness should be conceptualized as a multidimensional rather than as a unitary variable.

GROUPS may fail to attain their maximum productive potential because of inefficient group process. Steiner (1972) suggests that this failure, called "process loss," may be due either to faulty coordination of group member

This study was part of a doctoral dissertation submitted by Stephen J. Zaccaro to the University of Connecticut. A version of this study was presented at the 94th annual meeting of the American Psychological Association (1986).

We acknowledge Susan Fragola, Roxanne Gallica, Michelle Midyette, and Nancy Summa, who assisted as experimenters. We would also like to thank Philip Bobko, David Kenny, Christopher Peterson, Eugene Stone, and Peter Villanova for their suggestions and comments on earlier drafts of this manuscript.

Requests for reprints should be sent to Stephen J. Zaccaro, Department of Psychology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061.
resources or to the lack of individual effort vis-à-vis the group task. Because group experience may fulfill several goals for group members, individual efforts are sometimes directed away from task completion. Specifically, groups may "vary along a continuum that ranges from 'complete concern with task performance' to 'complete concern with sociability'" (Steiner, p. 6). Process loss reflects the extent to which individuals withhold their resources from the group goal of task completion and choose instead to direct their resources toward activities which do not promote and, in fact, may inhibit task achievement.

The present investigation examined one variable, group cohesiveness, which may be linked to process loss. Festinger (1950) defined cohesiveness as "the resultant of all the forces acting on the members to remain in the group" (p. 274). Cohesiveness can result from interpersonal attraction, liking for or commitment to the group task, and group status (Festinger, Schachter, & Back, 1950). Cohesiveness traditionally has been defined as a unitary construct, meaning that the effects of cohesiveness on any criterion variable will be the same even if sources of cohesion are different (Back, 1950; Schachter, 1952). For example, Schachter (1951) stated that "whether cohesiveness is based on friendship, the valence of the activity mediated by the group, or group prestige, the consequences of increasing group cohesiveness are identical" (p. 192). This argument established "effects equivalence" as the criterion for a unitary definition of cohesiveness (e.g., Back).

An alternate perspective, based on a multidimensional view of group cohesiveness, suggests that there are different "types" of group cohesiveness where each type is a function of the dominant reasons why members join and maintain membership in a group (Gross & Martin, 1952; Hackman, 1976; Tziner, 1982). For example, interpersonal cohesiveness represents the degree to which positive interpersonal relationships exist among members of the group (Festinger et al., 1950). Task-based cohesiveness results when group membership provides for the personal attainment of important goals (Festinger et al.), or when there is a "shared commitment to the task of the group" (Hackman, p. 1517). Theorists favoring a multidimensional interpretation of cohesiveness have suggested that different types of cohesion can be differently related to such consequences as group processes and productivity (Tziner).

The purpose of the present study was to contrast the effects of task-based and interpersonal cohesiveness on group performance. Prior studies investigating cohesiveness and performance have not varied the type of group cohesiveness (e.g., Berkowitz, 1954; Downing, 1958; Schachter, Ellerston, McBride, & Gregory, 1951). Indeed, McGrath (1984) noted that, although theorists have treated different forms of cohesiveness "as more or less substitutable one for another, they have relied mostly on . . . interpersonal attraction as the basis for manipulating group cohesion" (p. 241). This reliance has
stemmed from acceptance of the unitary definition of cohesiveness. The present investigation compares the unitary and multidimensional definitions of cohesiveness with group performance as the criterion.

The effects of different types of cohesion on performance can be expected to vary according to task characteristics. Groups in the present study complete a task where individual members make products called “moon tents” (Kolb, Rubin, & McIntyre, 1984; Zaccaro, 1984). Group performance scores are determined by summing individual production totals. Steiner (1972) defines such tasks as additive tasks. Several studies have used additive tasks to demonstrate the effects of group cohesion on performance (e.g., Berkowitz, 1954; Schachter et al., 1951). Successful group completion of such tasks requires that (a) members exert maximum individual effort on the task, and (b) members minimize interactions that may distract them and interfere with completion of their tasks (cf. Steiner, p. 33).

Based on these task requirements, we hypothesized that task and interpersonal cohesiveness may have opposite effects on the performance of such tasks. High task-based cohesiveness, which results from shared commitment to the group task, increases the effort members exert on the task (Hackman, 1976; Hackman & Morris, 1975). Therefore, group performance should co-vary positively with levels of task cohesion. Alternatively, group productivity could be inversely related to interpersonal cohesiveness. Several studies have shown that increases in interpersonal attraction may facilitate process loss by increasing the number of member interactions and activities directed away from the task (cf. Davis, 1969; Hackman; Lott & Lott, 1965). Indeed, Davis noted that “to the extent cohesiveness means proximity and distracting interaction, group cohesiveness can contribute to the reduced likelihood of successful goal attainment” (p. 79). Because performance on additive tasks, such as the one used in the present study, may be impaired by group interactions and because high interpersonal attraction should increase the amount of group interaction (Lott & Lott), we hypothesized that higher levels of interpersonal cohesiveness would result in lower group performance.

Our prediction is based on a multidimensional consideration of group cohesiveness. It is necessary to know both the level and the nature of cohesion in order to predict performance. A unitary definition, based on effects equivalence, would predict that higher levels of task-based cohesion would result in effects similar to those produced by higher levels of interpersonal cohesion. Therefore, the unitary prediction is that the highest performing groups will be those high on both task-based and interpersonal cohesiveness, whereas the lowest performing groups will be those low on both types of cohesiveness. In the present experiment these two types of cohesion were manipulated to contrast the unitary and multidimensional positions regarding cohesiveness and performance of an additive task.
Method

Subjects and Design

Introductory psychology students \( N = 158 \) at the University of Connecticut partially fulfilled a course credit requirement by participating in this study. The study included two factors: (a) level of task-based cohesion (high and low) and (b) level of interpersonal cohesion (high and low). Groups were nested within treatments. Group size was varied for purposes not relevant to the present investigation (see Zaccaro, 1984). Because no second order interactions were found with variables described in this paper, the data were collapsed across levels of group size.

Group Task

Subjects were assigned to work either in two- or four-person groups, where they constructed objects called “moon tents” (Kolb et al., 1984). This task involved folding paper in a certain number of steps until a tent-like object was completed. Members placed completed products in separate containers near each work station. Groups were told to produce as many moon tents as possible in a 15-min period.

Manipulations

Subjects were told that the study concerned group performance and its causes and then were randomly assigned to two interpersonal cohesion conditions. Subjects in the high interpersonal cohesion condition participated in an exercise designed to enhance member liking. They indicated on index cards their name, academic major, home state, class year, and favorite hobbies and attached this card to their apparel. Each subject was then paired with one other member of the group and told to introduce him or herself to the other member. After a short period the entire group came together and each subject was told to introduce his or her partner to the rest of the group. In two-person groups, each member continued to interact with his or her partner. The items on the card were used to facilitate group discussion. This entire discussion period lasted for 15 min (see Pfeiffer & Jones, 1981, and Rutkowski, Gruder, & Romer, 1983, for similar manipulations of interpersonal cohesion).

Subjects in the low interpersonal cohesion conditions performed an exercise designed to inhibit member attraction and engender perception of dissimilarity (cf. Byrne, 1961). They were placed in cubicles but within sight of each other and given a survey in which they were asked to "indicate at least
two (four, or six) good points and two (four, or six) bad points about the University of Connecticut.' The purpose of this manipulation was to stagger the amount of time different subjects would spend on the task and to minimize interactions among group members. Homans (1950) suggested that low rates of interaction among group members precluded the development of interpersonal liking.

After being placed in high or low interpersonal attraction conditions, groups were then randomly assigned to high or low task-based cohesion conditions. High task cohesive groups received a cover story that emphasized the importance of both the study and member task performance by noting recent worker productivity declines in the American work force and the subsequent consequences for monetary inflation. The stated purpose was to investigate the causes of these declines. An article from a regional newspaper (The Hartford Courant) on productivity declines and rising inflation was included as part of the cover story to inject a further sense of importance.

Additionally, subjects in the high task group were told that the group having the best score would receive an extra ½ experimental credit. Thus, a salient incentive, based on overall group performance, was used to enhance the valence of the group's activity. After Gross and Martin (1952), Tziner (1982) defined task-based cohesion as "cohesiveness based on the potential of the group to mediate in the attainment of material personal interests and goals which cannot be attained in the individualistic framework" (p. 228). Because the extra credit as a desired reward was available only through summative group action, its potential attainment provided a basis for task-based group cohesion. Prior studies have used similar reward manipulations to establish group cohesion (e.g., Back, 1950). In low task cohesive groups, subjects received neither the importance information nor information about the additional credit. Regardless of task condition, however, all subjects received the additional credit, at the end of the experiment.

To control possible experimenter biases, different researchers were used to manipulate interpersonal attraction and task attraction. These experimenters were counterbalanced and blind to the other manipulation.

**Measures**

The major purpose of the pretask questionnaire was to access manipulation effectiveness. Task commitment was measured by asking subjects to indicate (a) the degree to which they felt success was personally important, (b) the amount of effort they believed they would expend completing the task, (c) the degree to which doing well in this experiment was more or less important than doing well in the average psychology experiment in which they had participated, (d) the degree to which subjects would recommend participa-
tion in the experiment to a friend, (e) the perceived applicability of the experiment's results, and (f) the perceived personal benefit accrued by participating in the experiment.

In addition, interpersonal attraction was assessed beforehand by asking subjects to rate their group on ten 11-point scales anchored as follows: cold-warm, unpleasant-pleasant, dislikable-likable, courteous-discourteous, undependable-dependable, friendly-unfriendly, bold-cautious, casual-deliberate, liberal-conservative, and nonchalant-serious (Anderson, 1968). Subjects were also asked to rate from 1 to 11 the degree to which they felt their group was a "close" group.

Group performance was measured by totaling the number of moon tents constructed by each group member. As a measure of potential process loss, the frequency of group interaction during the 15-min performance period was recorded. Only those utterances made by each group member either in response to another member's utterance or after a significant pause (5 s duration) were tabulated.

Procedure

After being assigned into their respective conditions, subjects were given the instructions for completing the moon tents. Subjects then watched a demonstration by the experimenter and were given 5 min to practice making up to three moon tents. Following this initial practice period, they were given the pretask questionnaire. They were then reminded that they were to work for 15 min and told to begin. When the performance period ended, subjects completed a questionnaire that assessed performance attributions. This questionnaire, however, was not relevant for the present report (cf. Zaccaro & Lowe, 1983). The subjects were then debriefed and dismissed.

Results

Unit of Analysis

The design employed in this study was a hierarchical, groups-nested-within-treatments, factorial design. In such designs, one potential source of variability is the particular group to which a subject is assigned (Meyers, 1979). Anderson and Ager (1978) suggested that the groups mean square be tested against the error mean square to assess independence of intragroup responses. If, in this preliminary test, the groups source of variance is found to be nonsignificant, then the groups mean square may be pooled, and this subsequent term used to test treatment effects. If intragroup responses are not independent, then the groups mean square is considered the appropriate error term. Such a test is a conservative test of treatment effects. In describ-
ing each test of treatment effects in the present study, we will note whether the groups mean square or the pooled mean square served as the appropriate error term.

**Manipulation Effectiveness**

Two composite scores labeled “member-liking” and “task commitment” were created by averaging subject responses on manipulation effectiveness items. Mean responses are shown in Table 1.

A two-way, groups-nested-within-treatments analysis of variance (ANOVA), performed on member-liking scores and using the groups mean square as the error term, indicated a significant main effect for interpersonal attraction, \( F(1, 50) = 40.54, p < .0001 \). As expected, subjects receiving the high interpersonal attraction manipulation liked their fellow members more (\( M = 8.83 \)) than those subjects who received the low member attraction manipulation (\( M = 7.33 \)). This analysis also revealed a task cohesion by interpersonal cohesion interaction, \( F(1, 50) = 8.92, p < .01 \). A Newman-Keuls analysis performed on the cell means indicated that high task/low interpersonal subjects liked their fellow members significantly less than did their low task/low interpersonal counterparts. No such difference emerged in the high interpersonal attraction conditions.

An ANOVA performed on task commitment scores using the pooled mean square as the error term revealed a significant main effect for task-based attraction, \( F(1, 154) = 7.50, p < .01 \). Subjects receiving the high task manipulation were more committed to task performance (\( M = 7.70 \)) than low task subjects (\( M = 6.98 \)). This analysis also revealed a significant main

<table>
<thead>
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<th>Variable</th>
<th>High interpersonal cohesion</th>
<th>Low interpersonal cohesion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High task (14)</td>
<td>Low task (14)</td>
</tr>
<tr>
<td>Member liking</td>
<td>8.91</td>
<td>8.74</td>
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<tr>
<td>Task commitment</td>
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<tr>
<td>Productivity</td>
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<td>21.98</td>
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*Note: Numbers in parentheses refer to the number of groups within each condition. Means for manipulation effectiveness items are based on 1- to 11-point scales. Higher scores indicate greater member liking and greater task commitment.*
effect for interpersonal attraction, $F(1, 154) = 9.86, p < .01$. High interpersonal subjects indicated greater task commitment than did low interpersonal subjects ($M$s = 7.72 and 6.93, respectively).

**Group Performance**

Table 1 also indicates the mean number of moon tents made by each group member. A two-way, groups-within-treatments ANOVA, using the groups mean square as the error terms, indicated a main effect for task-based cohesiveness, $F(1, 50) = 12.67, p < .001$. Groups having members highly committed to the task performed better ($M = 28.44$) than groups having members less concerned with the task ($M = 22.99$). This analysis also indicated, however, that interpersonal attraction had no significant influence on performance scores.

The failure of heightened interpersonal attraction to have an effect on performance scores is puzzling in the light of the increased task commitment found as a function of higher member liking (see Table 1). The relatively low production scores of low task/high interpersonal groups suggest that perhaps some process loss resulting from interfering interpersonal activities may indeed have been present. The measure of interaction frequency during the production period was one possible indicator of this potential process loss.

**Assessment of Interaction Frequency**

A groups-within-treatments ANOVA performed on interaction frequencies, using the groups mean square as the appropriate error term, revealed a main effect for interpersonal cohesion, $F(1, 50) = 6.76, p < .05$. Groups high in interpersonal attraction conversed more than groups low in interpersonal attraction ($M$s of 20.93 and 6.08, respectively).

A multiple regression analysis was used to determine whether differences in conversation rates between high and low interpersonally attractive groups indeed resulted in process loss; in this analysis, productivity was regressed on levels of task and interpersonal cohesion and on interaction frequency. Not surprisingly, the results indicated that increases in member conversation were indeed associated with performance decrements, $F(1, 154) = 10.27, p < .01$.

Increasing the interpersonal attraction among group members resulted in more member conversation, which in turn was counterproductive. Why this apparent process loss did not translate directly into observable performance decrements can perhaps be explained by the increase in task commitment also occurring as a consequence of increases in interpersonal attraction. This greater commitment should have facilitated performance levels.
Thus, the effect of interpersonal attraction on group performance may be mediated by two variables, each of which counteracts the other. One mediator, task commitment, is increased by greater member attraction. The subsequent effect on group performance is a facilitative one. The other variable, group interaction frequency, also increases as a function of increments in member attraction, however, and has an inhibitive influence on group performance.

A path analysis (Kenny, 1979) was used to investigate the feasibility of this model. The results of this analysis, shown in Figure 1, support the proposed model. Interpersonal attraction, although not directly affecting performance, did have a significant and positive influence on both task commitment (path coefficient = .23, *p < .01) and interaction frequency (path coefficient = .30, *p < .01). Further, task commitment facilitated productivity (path coefficient = .16, *p < .05), whereas interaction frequency in-
hibited productivity (path coefficient = −.37, p < .01). These results suggest then that the beneficial aspects of increased task commitment that accrued from heightened interpersonal cohesion were negated by the consequences of increased conversation created by this same attraction.

Discussion

The purpose of this study was to contrast unitary and multidimensional perspectives of group cohesiveness and its consequences. A criterion for selecting one perspective as being superior to the other is "effects equivalence" (Back, 1950; Schachter, 1951). If the effects of task-based cohesion are similar to those of interpersonal cohesion, then a unitary definition is favored. The multidimensional definition is supported if each type of cohesion has different consequences. Also, Gross and Martin (1952) noted that the utility of multidimensional cohesiveness depends upon whether or not separating the components of cohesiveness provided a better understanding of its effects than a unitary treatment. The present study yielded evidence of non-equivalent effects. High task-based cohesiveness increased group performance, presumably by increasing the amount of effort and motivation members applied to task completion (Hackman, 1976; Hackman & Morris, 1975). Interpersonal cohesiveness increased both task commitment and interaction frequency, producing offsetting consequences for group productivity. Higher intermember attraction facilitated process loss in the task groups by redirecting individual effort toward activities (i.e., conversation) not related to task completion. No overall effect on performance was discernible, however, because of corresponding increases in member task commitment that ought to result in greater performance effort.

These findings support a multidimensional interpretation of group cohesiveness. An understanding of how cohesion affects performance requires knowledge, not only of the level, but also of the type of group cohesiveness that characterizes the task group. We note, however, that the findings were task-specific. The task in this study was an additive one; success on such a task is a function of the amount of effort members commit to the task and the degree to which they minimize interfering interactions. Because interpersonal attraction increased conversation, it lowered success probability on the moon tent task. On different tasks, interpersonal cohesion may have effects different from those reported here. The same may be true of task cohesion. This does not dilute the argument for multidimensionality, however. Depending upon task characteristics, task-based and interpersonal cohesion may have similar or different effects on performance. Understanding these consequences is facilitated by splitting cohesiveness into its components parts.
Most prior research on group cohesiveness and its consequences has adopted a unitary definition of cohesiveness, operationalizing it primarily as interpersonal attraction (McGrath, 1984; Schachter et al., 1951). This adoption was empirically a function of a single demonstration of effects equivalence (Back, 1950). Our data indicated nonequivalent effects of task-based and interpersonal cohesion on performance of an additive task. The treatment of group cohesion as unitary is constraining in that important differences between these types of cohesion in their roles as mediating or moderating variables may be obscured. This study illustrates one advantage of a multidimensional perspective.

REFERENCES


*Received July 15, 1987*