The Effects of Interpersonal Trust on Work Group Performance

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This study explored 2 questions: Does the level of trust within a group affect group performance? If so, how does this relationship operate? An experimental method was used to examine 2 roles through which interpersonal trust could affect group performance: a main effect and a moderating effect. The data do not support the main effect that has dominated the literature on interpersonal trust. The data do support the moderating role: Trust seems to influence how motivation is converted into work group processes and performance. On the basis of these findings, it is suggested that trust may be best understood as a construct that influences group performance indirectly by channeling group members' energy toward reaching alternative goals.

Trust is commonly cited as a hallmark of effective relationships. This is one issue on which experts from psychology, sociology, management, economics, and political science tend to agree (Arrow, 1974; Berscheid, 1994; Coleman, 1990; Gambetta, 1988; Kramer & Tyler, 1996; Lindskold, 1978), even though there is limited understanding of exactly what role interpersonal trust plays in a relationship.

Most of the trust-related research appears to position trust as a variable that has direct (main) effects on work group process and performance. In other words, when the level of trust is increased, a group is expected to experience superior group processes (e.g., higher levels of cooperation) and higher performance; when trust is decreased, a group is expected to experience inferior group processes and lower performance. This idea appears to implicitly or explicitly underlie past and contemporary research on trust (e.g., see Golembiewski & McConkie, 1975; Mayer, Davis, & Schoorman, 1995; McGregor, 1967), is included in textbooks that discuss group performance (Kreitner & Kinicki, 1998; Rob-

bins, 1998), and has provided the impetus for scores of interventions (e.g., see Kaplan, 1979; Woodman & Sherwood, 1980). As is argued later, however, although this proposition is intuitively appealing, there is not sufficient evidence to substantiate its validity as of yet.

The approach described above has so dominated the literature that other possible roles for trust have been given limited attention. Although scholars may agree that interpersonal trust tends to be a hallmark of effective groups, the effect of trust does not necessarily have to be direct. For example, interpersonal trust could influence group process and performance indirectly through moderation. In this role, trust would facilitate (moderate) the relationship between other variables and group performance. This viable alternative role would imply a different treatment of trust in research and in practice.

This study was intended to advance understanding on how interpersonal trust affects work group performance by empirically examining if trust affects performance directly (main effect) or indirectly (moderating effect). By doing so, the study attempted to make several contributions. First, in examining the role of trust as a main effect, the study subjected the dominant proposition to careful empirical study. Furthermore, it attempted to pinpoint exactly how trust exerts a main effect on performance by examining the behavioral processes mediating the relationship—something that has not been explored in prior research. Second, in examining the moderating role of trust, this appears to have been one of the first studies to empirically test this idea. If this role is empirically substantiated, then it offers a different way of thinking about trust theoretically, studying it empirically, and using the concept practically. Lastly, from a practical perspective, this study may be particularly relevant for understanding how trust influences group process and performance in temporary work groups—an in-

creasingly prominent part of organizations (e.g., Meyerson, Weick, & Kramer, 1996; Peters, 1992).

Conceptualization of Interpersonal Trust

On the basis of their review, Mayer et al. (1995) conceptually defined trust as "a willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that party" (p. 712). The majority of published measures and/or empirical studies have used operational definitions that are consistent with this definition but focus on exactly what they believe about the partner (i.e., why they are willing to be vulnerable). Specifically, most operational definitions examine trust as a belief about whether a partner is dependable (e.g., McAllister, 1995), cares for your interests (e.g., Cook & Wall, 1980), is competent (e.g., Mishra, 1993), and/or will act with integrity (e.g., Robinson, 1996). Following the empirical research, I focused on interpersonal trust as a belief about the dependability of the partner and the extent to which the partner cares about the group's interests. I chose these two elements, as they have arguably been the most prevalent in the operational definitions of trust.[1] In this study, I focused on trust in group members (interpersonal), as opposed to another group or an institution.

Note that the conceptual definition suggests that trust is distinct from other relational variables that have been examined in group research such as cohesion, the attractiveness of a group to its members (Goodman, Ravlin, & Schminke, 1987); friendship, the close preexisting ties between individuals (e.g., Jehn & Shah, 1997); and familiarity, specific knowledge about another (e.g., Goodman & Leyden, 1991). Although the variables may be correlated in many situations, there are potentially meaningful distinctions between them. The constructs are often operationalized differently (although they do partially overlap across some studies). For example, as opposed to the trust measures cited above, familiarity is often measured as frequency of working with a partner (e.g., Goodman & Leyden, 1991). Given these distinct conceptualizations, one may also speculate that the variables operate on group performance through different mechanisms and have different predictive validity. For example, believing that a partner is dependable may influence group performance differently than wanting to remain in the group. Lastly, of practical significance, these variables would likely require different interventions to create or influence. For instance, forcing people to work together for a long period of time (creating familiarity) will not necessarily create friendship (liking), trust, or cohesion.

Researchers have suggested that trust is a dynamic concept that may be reciprocally related to group process and performance (Golembiewski & McConkie, 1975). While recognizing this idea, I focused on one component of that relationship—the effects of trust on group process and performance.

Interpersonal Trust as a Main Effect

Prior Research

Although trust is frequently cited as a determinant of work group performance, Kegan and Rubenstein's (1973) comment that "acceptance of this theory is often based on factors other than empirical testing and support" (p. 499) still seems appropriate today. There is a growing body of empirical research, but the proposition's validity continues to rest mostly on implicit theories and conceptual literature, as hinted at by Kegan and Rubenstein.

Empirical research has examined the main effects of trust on a variety of dependent variables including organizational citizenship behaviors (e.g., McAllister, 1995; Podsakoff, MacKenzie, Moorman, & Fetter, 1990; Robinson, 1996), effort (e.g., Williams & Karau, 1991), conflict (e.g., Ferrin & Shah, 1997), communication (e.g., Mellinger, 1959; O'Reilly & Roberts, 1974; Roberts & O'Reilly, 1974), decision making (e.g., Zand, 1972), and group performance (e.g., Friedlander, 1970; Klimoski & Karol, 1976). Is there evidence from this research that would allow us to conclude that trust exerts main effects on group performance? There are three factors that lead to a negative answer to this question.

First, the results from the research cited above could be labeled as providing mild and/or inconsistent empirical results. For example, in the study of the effects of trust on the performance of groups, two studies reported finding support for a main effect (Hughes, Rosenbach, & Clover, 1983; Klimoski & Karol, 1976), one study found support for an indirect effect (Friedlander, 1970), and one study found no

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[1] A review of empirical research found at least nine measures (Cook & Wall, 1980; Cummings & Bromiley, 1996; Johnson-George & Swap, 1982; McAllister, 1995; Mishra, 1993; O'Reilly & Roberts, 1974; Podsakoff et al., 1990; Kimmel, Pruitt, Magenau, Konar-Goldband, & Carnevale, 1980; Rempel, Holmes, & Zanna, 1985) that involved a belief about the partner caring about your interests in some fashion, and at least nine measures (Cook & Wall, 1980; Cummings & Bromiley, 1996; Johnson-George & Swap, 1982; McAllister, 1995; Mishra, 1993; Rempel et al., 1985; Schurr & Ozanne, 1985; Smith & Barclay, 1997; Zaheer, McEvily, & Perrone, 1998) that involved a belief about the dependability of the partner. In contrast, I was able to find only three measures that included a belief about competence (Cook & Wall, 1980; Mishra, 1993; Smith & Barclay, 1997). Although other variations of measures can be found, the two components that I have used seem to be reasonably representative of the extant empirical research. In any case, all of the components are likely to be highly empirically interrelated.

effect (Kimmel, Pruitt, Magenau, Konar-Goldband, & Carnevale, 1980). Studies of trust on behavioral dependent variables, with the possible exception of communication, have also shown relatively inconsistent and/or weak results. Second, the results from much of the work cited above are potentially inflated due to the designs used. For example, many of the studies collected cross-sectional data that limit the ability to ascertain the direction of causality. In addition, many of the studies collected all data with self-report surveys, thus potentially inflating the correlations. Lastly, related research on the role of interpersonal relations in affecting group performance has shown weak results. For example, reviews of the research on group performance and on team building tend to suggest that better interpersonal relationships among team members do not necessarily result in higher team performance (McGrath & Altman, 1966; Sundstrom, De Meuse, & Futrell, 1990; Tannenbaum, Beard, & Salas, 1992; Woodman & Sherwood, 1980).

In sum, given the mild support in prior research, the methodological limitations of this work, and research in related areas, it can not yet be concluded that trust exerts main (direct) effects on group process and performance. Clearly, this proposition needs to be subjected to further careful empirical study before such a conclusion can be drawn. As indicated in the above critiques, careful empirical study should include (a) isolating the effects of trust on behavior and performance, (b) measuring independent and dependent variables at different points in time, and (c) measuring independent and dependent variables using different methods and sources.

Theoretical Bases

Trust has been a frequently cited determinant of group performance (Golembiewski & McConkie, 1975). In prior research, the argument for a main effect of trust on performance is relatively straightforward. Put simply, trust increases the ability of group members to work together. Because work groups require that individuals work together, trust is expected to increase the performance of the group, both in terms of effectiveness and efficiency. Effectiveness is expected to be positively related to trust, as the latter may improve cooperation and the motivation to work jointly (Larson & LaFasto, 1989), which in turn may improve the group's execution of its task. Efficiency is expected to increase, as trust reduces the need for controls (e.g., rules, monitoring) and increases the ability to confront performance problems; both of these factors facilitate the maximal utilization of the group's resources (Bromiley & Cummings, 1995; Larson & LaFasto, 1989). In making this argument, as well as others in this article, moderate to high levels of interdependence act as a boundary condition. Lacking a moderate level of interdependence, trust becomes

less meaningful as individuals do not need to rely on each other to reach their goals.

> *Proposition 1a:* Interpersonal trust will exert a main effect on work group performance (effectiveness and efficiency).

Although these arguments have been made in prior research, the processes that carry this relationship have remained relatively unarticulated and unmeasured. By doing so, one might better understand if, and how, trust affects group performance. This study attempted to accomplish this objective.

According to the predominant theory of group performance, the input-process-output model (e.g., see Hackman & Morris, 1975; Weingart, 1997), one should expect behavioral processes to carry the relationship between trust and group performance. I attempted to identify the key behavioral processes that would be likely to mediate this relationship by referring to the literatures on trust and on group performance. First, I referred to the literature on trust to identify frequently cited outcomes of trust that could also be expected to affect group performance. Cooperation (e.g., McAllister, 1995), decision-making processes (e.g., Zand, 1972), and effort (e.g., Ferrin & Shah, 1997) were three concepts fulfilling this criterion. Second, to correspond with the literature on group performance, I chose three concepts that roughly matched the three mediators specified by Hackman and Morris (1975): (a) task performance strategies, (b) the relevant knowledge brought to bear on the task, and (c) effort. Cooperation is one way of operationalizing the strategy used by a group. Decision-making processes are the means by which members bring knowledge to bear on the task. And, effort is explicitly cited. Hence, using these two criteria helped identify a parsimonious set of processes.

In my analyses, I examined specific indicators of cooperation (coordination, helping), effort (intensity, direction), and decision-making processes (diagnosing performance, expressing ideas, committing to a decision). In the next several paragraphs, I attempt to explain why one might expect these specific variables to be an outcome of trust.

Cooperation. Cooperation is frequently associated with trust—particularly when cooperation puts one at risk of being taken advantage of by a partner (Mayer et al., 1995). I propose that trust will positively affect two components of cooperation: coordination and helping. The ability to harmoniously combine actions (i.e., be coordinated) is likely to be contingent on the extent to which individuals can depend on their partners and can predict their partners' behaviors. Dependability and predictability are constituent elements of trust. Helping behavior should also be greater in high-trust groups, as individuals anticipate that their partners will not take advantage of their assistance. Instead, in high-trust groups, individuals may expect their partner to respond in kind, as they know their partners are taking their interests

into account. Individuals in low-trust groups would not tend to hold these expectations.

Group decision-making processes. Group members could be expected to be more likely to diagnose (critique) performance of the group, express ideas for improving it, and commit to a plan if they feel that their partners are taking the group's interests into account and will be dependable. For example, if an individual suspects that her partners will betray her by not carrying out their ends of the bargain, she will be unlikely to agree to the plan. Hence, groups with low levels of trust will be likely to experience less diagnosis of performance, fewer ideas expressed, and fewer commitments to a decision.

Effort. Expectancy theory can be used to make predictions about the intensity of effort, as related to trust, in cases where individuals are highly interdependent (e.g., see Sheppard, 1993). Using the latter assumption, when an individual thinks her group members are undependable (i.e., she has low trust), she may perceive her effort as unrelated to group performance—because the poor performance of her partners will limit the performance of the group and make her efforts futile. In this case, the logic of expectancy theory would predict that she put forth a low level of effort. Put differently, trust influences a group member's expectations about the extent to which her effort can be converted into group performance.

Trust may also have a main effect on the direction of effort. In groups with high levels of trust, individuals can feel comfortable directing their effort toward the group task, because they are not afraid that their partners will take advantage of them or will be undependable. If they are concerned about being taken advantage of by their partners, or if they think that their partners are undependable, they may be more likely to direct their efforts toward goals where they do not have to rely on the behavior of others.

> *Proposition 1b:* The relationship between interpersonal trust and work group performance will be mediated by three group processes: cooperation (coordination, helping), decision-making processes (diagnosing performance, expressing ideas, committing to a decision), and effort (intensity, direction).

Interpersonal Trust as a Moderator

As indicated earlier, much of the research in organizational behavior appears to position trust as a variable that has direct effects on work group process and performance. Trust could, however, operate on group performance indirectly through a moderating role. Although this idea has been relatively unexamined in empirical research, it has been hinted at in conceptual work. For example, Hackman and Morris (1975) stated that team building (e.g., trust building) activities are intended to "remove some of the emotional and interpersonal obstacles to effective group functioning and thereby permit group members to devote a greater proportion of their energies toward actual task work" (p. 48). In recent work, Yeatts and Hyden (1998, p. 102) presented a similar argument. Lastly, Hwang and Burgers (1997) proposed that trust is an important "condition" for cooperation. In sum, the language used by these researchers suggests that trust operates by facilitating the effects of other variables on group process and performance.

This idea is theoretically appealing. Instead of thinking of trust as a variable that drives behavior and performance (e.g., *increasing trust leads to an increase in cooperation and performance*), trust may be better conceived of as a variable that influences how the team members direct their energy (which is provided by the driver). To be more specific about this model, theories of task motivation (e.g., Kanfer, 1990) suggest that behavior, and subsequently performance, are driven by needs, goals, or rewards—not by beliefs about coworkers. Under this model, trust would help channel the energy toward reaching alternative objectives (e.g., personal vs. group objectives) as it provides information about the advisability of engaging in particular courses of action (e.g., cooperating).

For example, distrusting one's coworkers may cause an individual to be anxious when working with them because of the risks involved in engaging in cooperative behavior. The anxiety, in turn, would likely cause the individual to lose focus on achieving the group outcome as he or she attempts to "protect their backside" by monitoring partners' actions, working to ensure personal success, and so on. If highly motivated to succeed, the individual may channel his or her effort toward personal goals, because fellow group members are likely to impede the achievement of group goals. Such behaviors create inefficiency for the group, because the individual only directs a fraction of his or her energies toward the group goal. In contrast, trusting one's coworkers allows one to apply all resources toward the group task, because the individual does not have to worry that partners will take advantage of them or let them down. In this case, trust facilitates the efficiency of the group because it allows the individual to focus all resources toward the group goal. When this occurs in a group where the individuals do not trust each other, the outcome is that group members are directing their efforts toward personal goals, coordination dissolves, and the group does not perform well. In sum, trust may be expected to facilitate the effects of motivational variables on group processes and group performance.

In this study, I used group members' task motivation as the independent variable. The dependent variables are group performance and two types of group processes most consistent with the argument in the prior paragraph: coordination (working as a single unit) and direction of effort (working toward group goals vs. individual goals).

Proposition 2a: Interpersonal trust will moderate the relationship between motivation and group performance (effectiveness and efficiency).

Proposition 2b: Interpersonal trust will moderate the relationship between motivation and group processes (coordination, direction of effort).

Method

The hypotheses were examined using an experimental method with a between-subjects design, and the unit of analysis being the work group. Trust, the focal variable, was the single factor examined at two treatment levels (high and low). In accordance with prior literature (e.g., Berkowitz & Donnerstein, 1982; Dobbins, Lane, & Steiner, 1988; Ilgen, 1986), I chose a laboratory setting as it improved the ability to (a) draw conclusions of causality and specific mediating variables, (b) use reliable measures from different sources and methods, (c) use hard performance measures, and (d) isolate trust.

Participants

Forty-two three-person work groups consisting of undergraduate students participated in the experiment. The students received extra-credit points in their class for participating. In addition, they could earn chances at winning one of three $40 prizes. Groups were randomly assigned to a treatment.

Task

The tower building task used by a number of researchers (e.g., Mitchell & Silver, 1990; Rosenbaum et al., 1980) to study group behavior and performance was adapted for this study. In the task, three individuals worked as a group to build a single tower out of wooden blocks. The participants stood around a table (1 person per side), each person having a pile of 14 wooden blocks in front of him or her. Each participant's blocks were of a different color so that his or her unique contribution to the tower could be assessed. The primary objective of the participants was to place as many blocks on the tower as possible—as a group and/or as an individual.

The task is well suited to examine the effects of trust on work group performance. First, the prior studies in which the task was used provide evidence that the task accommodates both cooperation and noncooperation, depending on the participant's motives (see Mitchell & Silver, 1990). Furthermore, it is a task involving a high degree of interdependence among participants. Both of these are important conditions for studying trust. Last, other variables in which mixed motives are operative have shown effects on group performance in prior research (Mitchell & Silver, 1990; Rosenbaum et al., 1980); this helps rule out the potential to attribute null results to the type of task used.

In this study, participants displayed physical, behavioral, and emotional indicators of being engaged in the task and wanting to perform well. For example, participants frequently hunched over the tower to perform better (physical); strategized to improve poor performance (behavioral); cooperated with, competed with, and/or cheated on their partners (behavioral); and showed anger and/or politely accosted each other when they felt that they were being

taken advantage of by their partners (emotional). These indicators, along with other signs (e.g., see manipulation check), also reveal participants' concerns about being vulnerable to their partners. Participant's engagement and their concerns of vulnerability provide evidence that this was a meaningful context for studying the role of trust in group performance.

Procedure

All sessions were conducted through the exact same procedure, with the exception of the manipulation of the independent variable. To ensure the consistency of the procedure, the researcher read from a script; participants received a copy of the script and were asked to follow along.

The session began by describing the task. After hearing the description, participants performed the task by themselves in three consecutive trials. Their performance was recorded on Trials 2 and 3; the first was considered a practice trial. These trials served two purposes: (a) they allowed the participants to familiarize themselves with the task, and (b) they provided data on individual ability in the task.

Next, the researcher provided the information for the manipulation of trust (see later section). To check the manipulation, I had each participant complete a short survey.

The next segment involved the performance of the task. On the command of the researcher, the group performed the first building trial. A digital timer was used to ensure that each group had exactly the same amount of time. When the trial was finished the researcher recorded the number of blocks each individual contributed to the tower and announced each individual's score and the group's score. The individual contributing the most blocks to the tower received an "individual ticket." In addition, each individual received a "group ticket" if the group included a total of 21 blocks in the tower. The tickets were the means by which competing motives, a key condition for studying trust, were introduced. Competing motives create a perception of risk and vulnerability in a situation, because each individual knows that their partners have reason to cooperate and to not cooperate. This allows trust to vary to a greater degree. After the group disassembled the tower, they were given a break in which they could talk about performing the task, make plans, and so on. Participants were told they could remain silent if they wished. The group repeated this sequence until it completed eight building trials, each one followed by a discussion period. The final trial was not followed by a discussion period.

Manipulation

The problem of manipulating trust in this situation involves instilling a belief in each individual regarding the extent to which their partners (a) were reliable and (b) would sacrifice personal goals for group goals. This was intended to isolate key components of trust, as articulated in prior research.

To instill these beliefs, participants were told that they would be engaging in a scenario where they each played a character. The participants were led to believe that each character possessed a unique disposition, and therefore had a tendency to behave in a particular manner. The researcher randomly assigned characters to the participants and gave each person a handout describing (a)

their character, (b) their perceptions of their partner's characters, and (c) the incentive (ticket) system. Trust was manipulated by providing participants with differing perceptions about their partners. In the high-trust condition, the information indicated that both partners are (a) reliable and (b) will not take advantage of you. In the low-trust condition, the information indicated that both partners are (a) unreliable and (b) will take advantage of you. The manipulation rests on the idea that insight into an individual's disposition and motives, provides the basis for trust—a belief about future behavior (e.g., see Holmes & Rempel, 1989).

I took several precautions to remove possible confounds. First, the information on the perceptions of partners was the single difference between experimental conditions; the other information (e.g., personal profile) was the same. Second, within condition, every participant unknowingly received the same information about the perceptions of partners—only the names were changed to fit the characters. In other words, every participant assigned to the low-trust condition received the same description of his or her partners, and every participant assigned to the high-trust condition received the same description of his or her partners. Third, the character profile was constructed to not prompt participants to behave in a trustworthy or untrustworthy manner. The profile was ambiguous, thus creating a "weak situation" (Mischel, 1977), whereby individuals' dispositions could operate.

The idea of asking participants to engage in a role-play to manipulate and study trust has several precedents (e.g., O'Reilly & Roberts, 1974; Schurr & Ozanne, 1985; Zand, 1972). One value of this type of manipulation is that it isolates the belief (of trust) from other factors that can co-occur with it, such as liking,[2] cohesion, familiarity, and reciprocating behaviors. Hence, the manipulation allows for a more pure test of the hypotheses than is possible when these other factors are confounded with trust. This is important because many of these factors have been previously linked to group performance.

Measures

Manipulation check. The manipulation was checked by having participants complete a 10-item survey instrument validated by McAllister (1995). A 7-point Likert scale was used (7 = high trust, 1 = low trust). I adapted the instrument by changing the wording to reflect the context—for example, *individual* was changed to *teammates*. The alpha for the scale, in this data, was extremely high at .98. Model comparison using confirmatory factor analysis suggested that all items loaded onto a single factor.

Performance variables. In this study, the group's task was to place as many blocks on the tower as possible. Hence, effectiveness could be measured by the number of blocks in the tower, summed across trials. To measure this variable, the researcher counted the number of blocks in the tower immediately after the group performed each trial. A second indicator for effectiveness was the number of times the tower fell—that is, the number of times the group failed. A tower fall was considered to be three or more blocks falling off the tower. This was measured by reviewing the videotapes of each group and counting the number of falls that occurred. I computed the variable by summing the number of falls across trials. An efficiency measure was computed as a ratio of the group's actual performance to its expected performance. The group's expected performance was calculated by summing group

member ability, that is, taking each individual's best performance in the individual trials, and summing these scores. Actual performance was the average number of blocks a group included in the tower, per trial. Hence, group efficiency = (total blocks across eight trials ÷ 8) ÷ Σ of group member ability. This formula was designed to make the score more interpretable. For example, a score of .5 would be interpreted as being 50% efficient.

Group process variables. The behavioral group process variables (coordination, helping, intensity of effort, direction of effort) were measured by scoring each group on the processes observed in videotapes. For the decision-making variables (diagnosis of performance, expression and development of ideas, commitment to a plan) transcripts of the groups' discussions were scored. As is frequently done in the study of group process, the unit of analysis was the group (e.g., see Weingart, 1997).

To score the group behaviors, two judges (industrial/organizational psychology professionals trained in assessing behaviors) used behavioral rating scales developed for this study. Behavioral scales are predicated on the notion that the behavioral anchors provide a clear, unambiguous means through which an individual can report his or her observations of behavior (e.g., Campbell, Dunnette, Arvey, & Hellervik, 1973; Schwab, Heneman, & DeCotiis, 1975). Because individuals report observations instead of judgments, behavioral scales are intended to be resistant to rating errors and are expected to have high reliability and validity. The scales were developed using a technique derived from the process outlined by Schwab et al. (1975). The final product of the process was one scale for each behavior (e.g., coordination). The scales were 10 cm thermometer-type scales, with behavioral anchors placed at appropriate spots. Judges placed a hash mark on the scale to report their score for the group. To determine the exact score, a ruler was used to measure the placement of the hash mark to the nearest millimeter. Scores could range from 1 to 100. The judges received a scoring key and were trained on how to use the scales.

I computed indices of interrater reliability and interrater agreement for the data using formulas provided in McGraw and Wong (1996) and Tinsley and Weiss (1975). Both indices were high for every variable. Interrater reliability estimates ranged from .84 to .92, and interrater agreement estimates ranged from .83 to .92.

Direction of effort was the single group process variable not measured with behavioral scales. To measure this variable, I used turn-taking as an indicator of the extent to which group members were striving for group versus individual goals. The variable was a ratio of the number of times a group member went out of turn in placing blocks on the tower; hence, the variable score had to be reversed for interpretation. The measure was adapted from Mitchell and Silver (1990).

Task motivation. Data on task motivation were collected by self-report survey. The measure was based on research on individual differences in task motivation that operate in mixed-motive situations (cf. Kuhlman & Marshello, 1975; Messick & Mc-

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[2] In a supplementary analysis, two judges coded the groups for the affect that teammates displayed toward each other. The level of affect displayed could be considered an indicator of liking or cohesion. The high- and low-trust conditions did not differ in the amount of affect teammates displayed toward each other.

Table 1

Means, Standard Deviations, and Correlations

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Trust	.50	.50	—											
2. Effectiveness	113.21	25.70	−.20	—										
3. Efficiency	.40	.09	.00	.90*	—									
4. Falls (effectiveness)	3.37	2.70	.21	−.75*	−.71*	—								
5. Coordination	76.28	14.89	.02	.29	.38	−.46*	—							
6. Helping	41.46	17.06	−.02	−.13	−.10	−.27	.02	—						
7. Intensity of effort	73.19	15.86	.21	.04	.00	.18	.25	−.02	—					
8. Direction of effort	.99	.86	.02	−.20	−.31	.32	−.79*	.09	−.10	—				
9. Diagnosing perf.	45.52	24.42	.00	−.03	−.03	−.20	−.06	.22	−.08	−.07	—			
10. Expressing ideas	53.93	25.10	.00	−.05	−.10	−.33*	−.04	.49*	−.11	−.06	.63*	—		
11. Committing	52.44	21.53	−.15	.20	.25	−.47*	.32*	.43*	−.12	−.39*	.27	.55*	—	
12. Motivation	14.25	2.83	.01	.40*	.44*	−.30	−.02	−.10	−.05	−.02	−.06	−.13	.00	—

Note. N_{groups} = 42. Perf. = performance.
* $p < .05$.

Clintock, 1968). Participants were asked to respond to a statement, on a 7-point Likert scale, that they "attempt to maximize personal gains" while working in groups. The anchors on the scale were *strongly agree* and *strongly disagree.* I examined the validity of the measure by computing the partial correlation between each individual's task motivation score and his or her individual performance in the group task (i.e., a manifestation of the motivation), controlling for the level of trust. The coefficient of .27 was significant ($p < .001$) and was interpreted as being sufficiently large given the highly interdependent nature of the task. The score for the group level of motivation was computed by summing individual scores. To determine if it was appropriate to aggregate the data to the group level of analyses, I performed the eta-squared test (Georgopolous, 1986, pp. 39–40; Jehn & Shah, 1997). The analysis yielded an eta-squared of .31, which exceeds the .20 hurdle used by these researchers, thus indicating that it was appropriate to aggregate the data.

Results

Manipulation Check

The effectiveness of the manipulation was examined by having participants complete the survey prior to performing the group task. The results from a one-way analysis of variance indicate that the manipulation was highly effective, as the difference in scores between the high and low trust conditions was substantial and significant ($p < .000$). The mean score reported in the low trust groups was 2.5 and in the high trust groups the mean score reported was 5.7. The data gathered through open-ended questions at the end of the experiment supported the survey results. For example, in groups in the high-trust treatment, participants made remarks such as "I trusted the other group members . . . " and "Going into it, [I trusted my coworkers]. I felt from reading their descriptions that they were team players and that I could depend on them to work for the team as a whole." Sample statements taken from individuals in the low-trust groups included "I did not trust either of [my partners], as

their description indicated that . . . " and "After reading the bios I was hesitant to work with my coworkers. I had come away with a feeling that my coworkers were interested only in personal gain." In sum, the data indicate that the manipulation was effective in creating differential levels of trust.

Hypothesis Testing

A hierarchical regression analysis was used to examine if the data provide evidence for a main effect of trust (P1) or a moderating effect (P2). Descriptive statistics are provided in Table 1. The regression estimates based on standardized variables (Aiken & West, 1991) are provided in Tables 2 and 3 for group performance and group process, respectively.

The data provide no support for a main effect of trust. None of the coefficients for trust were significant in the first step. In contrast, the data provide moderate support for a moderating effect of trust. For the performance variables, the interaction term was significant ($p < .05$) in the case of efficiency (β = .37) and falls (β = .31), and it was just short of significance for

Table 2

Regression Estimates for Interpersonal Trust and Motivation on Group Performance

Variable	Efficiency	Effectiveness (no. of blocks)	Falls
Step 1			
Trust	.004	−.196	.210
Motivation	.435*	.399*	−.301*
R^2	.189	.199	.135
Step 2			
Trust	.004	−.195	.206
Motivation	.444*	.406*	−.308*
Trust × Motivation	.372*	.268	−.307*
R^2	.327	.271	.229

Note. Regression coefficients are standardized; N_{groups} = 42.
* $p < .05$.

Table 3
Regression Estimates for Interpersonal Trust and Motivation on Group Processes

Variable	Coordination	Helping	Dir. of effort	Int. of effort	Diagnose perf.	Express ideas	Commit to dec.
Step 1							
Trust	.024	−.024	.018	.207	−.153	−.002	.001
Motivation	−.019	−.097	−.025	−.051	−.010	−.128	−.062
R^2	.001	.010	.001	.046	.023	.016	.004
Step 2							
Trust	.024	−.024	−.003	.207	−.153	−.002	.001
Motivation	−.009	−.104	−.005	−.054	−.007	−.131	−.062
Trust × Motivation	.378*	−.276	−.340*	−.118	.100	−.109	.004
R^2	.144	.086	.116	.060	.034	.028	.004

Note. Regression coefficients are standardized. N_{groups} = 42. Dir. = direction; Int. = intensity; perf. = performance; dec. = decision.
* $p < .05$.

effectiveness (β = .27, $p < .06$). In the case of the process variables, the interaction term was significant ($p < .05$) for coordination (β = .38) and for direction of effort (β = −.34). It approached significance in the case of helping (β = −.28, $p < .10$). The interaction terms were not significant for the decision-making variables or intensity of effort.

Next, I plotted the data by experimental condition to obtain a better understanding of the relationships (see Figures 1 and 2). The results are striking. Groups with high levels of motivation tended to work as a single unit (i.e., high coordination) in the high-trust condition, but they tended to work as separate individuals (i.e., low coordination) in the low-trust condition. Consistent with this finding, groups with high levels of motivation tended to direct their effort toward group goals in the high-trust condition, but they directed their effort toward individual goals in the low-trust condition (graph not shown). With regard to efficiency, motivation had significant, positive effects on effi-

ciency in the high-trust condition, but motivation had no effect in the low-trust condition. The graphs for falls and effectiveness (not shown) revealed the same pattern. In sum, trust appeared to effect (a) how group member's motivation was channeled into cooperative behavior, and (b) the ability of motivation to be transformed in higher levels of performance. The analyses are consistent with a moderating role of trust. The data were most supportive for those variables that were expected to best demonstrate the idea that trust helps channel group members' energy toward reaching alternative objectives.

Given the null results found for the direct relationship between trust and group process and trust and group performance, the mediating relationships become less meaningful as these are conditions for most tests of mediation (Baron & Kenny, 1986). Hence, that analysis is not reported here. Estimates of the relationships between variables can be derived from Table 1.
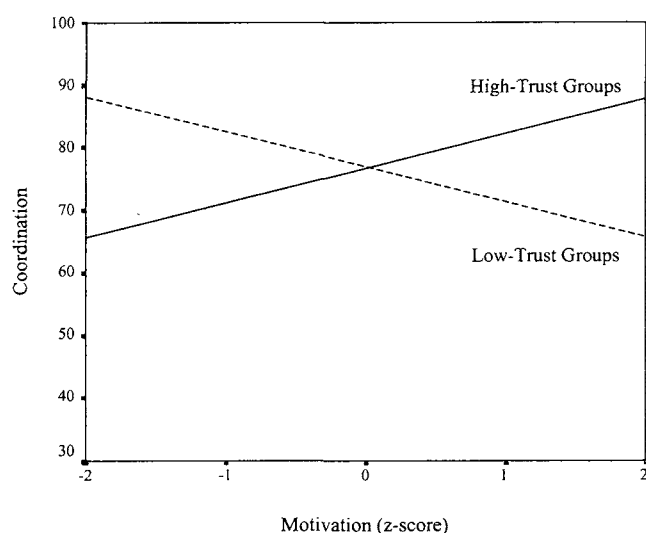

Figure 1. Graphic representation of moderating effect of trust on the relationship between motivation and coordination.
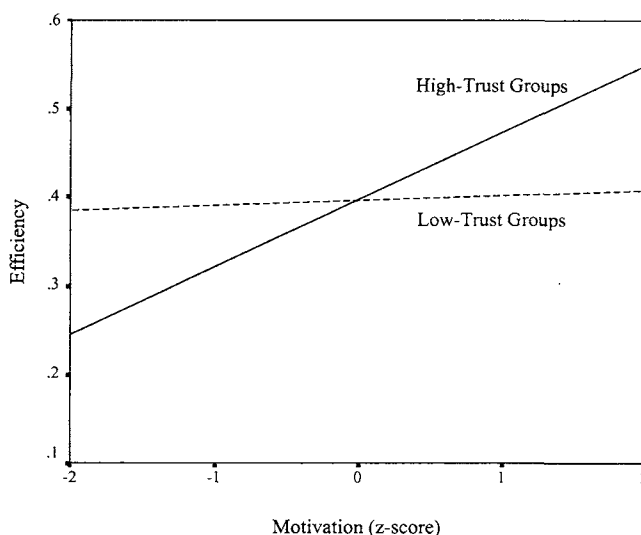

Figure 2. Graphic representation of moderating effect of trust on the relationship between motivation and efficiency.

Discussion

This study was intended to empirically explore two questions: Does the level of trust within a group affect group performance? If so, how does this relationship operate? In this study, trust did influence group process and performance—but did so indirectly. Groups with higher levels of trust did not necessarily have better processes and better performance than groups with low levels of trust. Instead, trust appeared to influence how motivation was translated into group process and performance. That is, in high-trust groups, motivation was transformed into joint efforts and hence higher performance, in low-trust groups, motivation was transformed into individual efforts. Therefore, this finding provides tentative evidence that instead of perceiving trust as a variable that directly affects group performance, researchers should consider trust as a concept that indirectly influences group performance by moderating the relationship between inputs (e.g., motivation) and group process and performance.

The results of this study provide an interesting comparison with earlier research studying different independent variables with the same task. In these studies, goals (Mitchell & Silver, 1990) and reward systems (Rosenbaum et al., 1980) had substantial direct effects on group process and performance. As discussed earlier, although goals and rewards are central concepts in motivation (Kanfer, 1990), beliefs about coworkers (e.g., trust) are not. Hence, perhaps one should not expect group members to produce more simply because they trust each other. Metaphorically, this fits with the idea that motivational factors provide the energy to produce more and trust helps channel that energy toward collective goals.

The present study was focused on advancing understanding of if, and how, trust might affect group performance. Given the results, researchers and practitioners may benefit from gaining a better understanding of how trust can be developed and how it changes over time. This may be done by turning to theoretical models of trust development as described by Lewicki and Bunker (1996), Holmes and Rempel (1989), and Butler (1995) in work relationships, personal relationships, and negotiations, respectively. These models pose dynamic relationships between trust and group processes, which have yet to be empirically examined. Researchers should also consider other factors that may foster the development of trust such as shared mental models (Cannon-Bowers, Salas, & Converse, 1993) and cooperative systems (Tjosvold, 1984).

As is the case with all studies, this one has certain limitations derived from choices made by the researcher. This study has two concerns arising from these decisions. First, to increase the ability to draw conclusions of causality and facilitate measurement, an experimental method and setting were used. Is this situation meaningful for studying trust? The situation seemed to have the essential elements (Locke, 1986). Participants were engaged in the task and concerned about performing well. Furthermore, participants, particularly those in the low-trust condition, had feelings of vulnerability arising from the normal elements of a work environment—being concerned that their coworkers might let them down or take advantage of them as they try to perform their job. The feeling of vulnerability, a key condition for studying trust, was evidenced in the behaviors they displayed, as well as in the data from the manipulation check. And, all of this occurred using a task that has shown good results in past research.

Second, to attempt to isolate the belief of trust (from concomitant variables associated with work history), I chose to bring unacquainted individuals together to perform the task. To be conservative, this may suggest that the conclusions of the study are most meaningful to understanding the role of trust in temporary work groups or task forces—that is, work groups where unacquainted individuals are brought together for a short period of time to perform a task. These types of groups are now widely used and can be found in a variety of contexts ranging from investment banking to airplane cockpit crews to juries (Meyerson et al., 1996; Peters, 1992). Similarly to the study, individuals in these groups are brought together for a limited period of time in which they work together, but may not do so again. Hence, the conclusions from this study may be most readily applied to temporary work groups.

The need to be cautious in drawing strong conclusions based on the results of a single study has been well-documented, and clearly applies in this case. This study does, however, reflect an attempt to build on trust research both theoretically and empirically. The results suggest that perhaps researchers should give further consideration to how they position theoretically, study empirically, and use practically, the concept of trust. Trust may be best understood as a construct that influences group performance by channeling group members' energy toward reaching alternative goals.

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