The effects of collective interdependence efficacy on the difficulty of self-chosen group goals

Shannon Christy Sowers

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THE EFFECTS OF COLLECTIVE INTERDEPENDENCE EFFICACY ON THE DIFFICULTY OF SELF-CHOOSEN GROUP GOALS

A Thesis
Presented to the Faculty of California State University, San Bernardino

In Partial Fulfillment of the Requirements for the Degree Master of Science in Psychology: Industrial/Organizational

by Shannon Christy Sowers
June 2000
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ABSTRACT

This study examined the effects of collective interdependence efficacy on the difficulty of self-chosen group goals and performance levels. Teamwork interdependence KSAs were manipulated by false feedback in an experimental setting. Groups of three participants did a group task and then rated their collective efficacy perceptions. Performance measures were collected and goals were set for a second task. The manipulation of collective interdependence efficacy had the desired effect, those participants in the positive condition reported higher levels of collective interdependence efficacy than those in the negative condition. These findings give support to the importance of teamwork interdependence KSAs in the development of collective interdependence efficacy perceptions. This is an especially potent finding because no task related feedback was given. In addition, a positive relationship between collective interdependence efficacy and performance resulted. This was a surprising finding, not often found in the laboratory. There were difficulties in the interpretation of the goal measures. As a result, partial support was found for the relationship between collective interdependence efficacy and goals, and goals to performance. This study adds evidence to the importance of teamwork interdependence KSAs in the development of
collective interdependence efficacy perceptions and gives partial support for the relationship between collective interdependence efficacy and self-set goals.
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INTRODUCTION

In the last 25 years, there has been an increase in the use of teams and groups in the workplace. This has created interest in the factors that help a group to function effectively. A group's expectancy for success has been the focus of many studies (Parker, 1994), with group efficacy emerging as a meaningful group construct (Gibson, 1999). Underlying a group's expectancy beliefs, are Bandura's self-efficacy beliefs, which are built on the capacity to exercise control over one's own thought processes, motivation, and action (Bandura, 1989). Knowledge of the task and the ability of the group to coordinate tasks have been identified as contributing to group efficacy beliefs (Mischel & Northcraft, 1997). In the team literature, the importance of goal choice on group member's behavior has also received increased attention (Matsui & Kakuyama & Uy Onglatco, 1987). Finally, proponents of efficacy theory and goal setting theory have proposed a relationship between efficacy beliefs and goal setting (Bandura, 1989; Locke, Frederick, Lee & Bobko, 1984). The present study seeks to examine the relationship between group efficacy levels and the difficulty of self-chosen group goals.

Work Groups and Teams

In organizations today, a large portion of work is accomplished by teams or groups of people. In the last twenty years, work centered around the individual job has
shifted toward work that is organized around larger units of tasks, more suited to team functioning (Hollenbeck, Ilgen, Sego, Hedlund, Major, & Phillips, 1995). A group has been defined as three or more interdependent people who can mutually influence one another through social interaction (Forsyth, 1990). A team has been defined in much the same way, with more of an emphasis on the interdependence between members. Dyer (1987) defined teams as a collection of people who must collaborate, to some degree, to achieve common goals. The terms team and group have been used interchangeably in the literature. In this paper, they will be used in the same manner.

There appears to be a continuum of the amount of collaboration required by teams to function effectively. A team low on the continuum of teamwork would be a golf team. This team is not required by the nature of the task to work closely at all times. A golf team may engage in general strategy planning and they might share task-related information, but performance is assessed at the individual level. A team high on the teamwork continuum would be a hockey team, whose members need to interact constantly and rely on each other for plays and strategies. Many types of teams have been identified in the area of group processes. A self-managing work team is a group of interdependent individuals that can self-regulate their behavior on relatively whole tasks (Cummings, 1978). Other teams that
have been identified in the workplace include problem-solving teams, and special-purpose teams (Hoerr, 1989). The positive outcomes that have resulted from the use of groups and teams in organizations have been quite promising.

Hoerr (1989) states that in some cases, self-managing teams can increase productivity by 30% or more and substantially raise quality. Other positive outcomes include the team taking over managerial duties, such as work and vacation scheduling, and ordering materials. Team members can be trained to be multi-skilled and produce an entire product or service with only minimum supervision (Hoerr, 1989). There are also positive outcomes for employees. The use of teams can increase employee voice in the process, and increase worker motivation, energy and creativity. These positive benefits can lead to feelings of self-worth once the task is completed. A General Electric Company plant in Salisbury, N.C. has increased productivity by a remarkable 250% by using a team system to produce lighting panel boards (Hoerr, 1989).

Team Effectiveness

Many authors claim that team-work is the key to improving the implementation of decisions (Leavitt, 1975). Teamwork is also thought to increase commitment and motivation in workers (Leavitt). Despite all of the literature promoting the successes to be gained from teamwork, many teams do not live up to expectations. They
can waste time and energy of members, rather than use them well (Hackman, 1987). They can also make notoriously bad decisions (Janis, 1982). Therefore, it is important to identify what factors contribute to the success and effectiveness of a team.

There is support for the proposition that team members who are highly interdependent on each other are effective in team processes, influencing group performance positively (Saavedra, Earley, & Van Dyne, 1993). Interdependence is the level of group interaction. It can define how closely members work on a task, how they set their goals, and the level that feedback and rewards are dispersed. Hackman (1987) suggests that a group's interaction process can serve as an indicator of how, and how well, a group is proceeding with work on a task. Campion, Medsker, and Higgs (1993) found that interdependent feedback and rewards were related to employee satisfaction in groups. Interdependent feedback and rewards increased group-based behavior instead of individually based behavior, thereby resulting in higher team outcomes. These results are consistent with other findings that interdependent feedback and rewards are important for group effectiveness (Shea & Guzzo, 1987).

These findings suggest that there are aspects about being on a team that make a group effective. Groups that work closely together may experience many positive outcomes such as feelings of cooperation, positive feelings toward
other group members, and feelings of trust. The goal processes of a group can also affect a team’s effectiveness. Larson and LaFasto (1989) have characterized effectively functioning teams as having a clear understanding of the goal to be achieved and a belief that the goal embodies a worthwhile or important result.

In a review by Shea and Guzzo (1987), potency, a group member’s belief that the group can be effective, is an important determinant of group effectiveness. This group level belief depends on group members’ sense that they have what they need to succeed. Factors that might influence potency beliefs include training, skills, talented members, money, access to key organizational members, time, and feedback of the group’s performance. Other authors have also claimed that team members must be confident about the group’s prospects of success for the group to be effective (Larson & LaFasto, 1989).

Self-Efficacy

In several publications Bandura (1977, 1982, 1989) has developed the concept of self-efficacy, which is a key concept in his Social Learning Theory. The term self-efficacy refers to the expectancy of succeeding at a task, which results from a belief in one’s overall performance competence. Bandura (1982) states that judgments of self-efficacy are motivational in nature and determine how much effort people will expend and how long they will persist in
the face of obstacles or aversive experiences. Bandura (1982) has found that self-efficacy is strongly related to actual (future) task performance. Judgments of self-efficacy, whether accurate or faulty, are based on four principal sources of information. These include performance attainments; vicarious experiences of observing the performances of others; verbal persuasion; and physiological states from which people judge their capability, strength, and vulnerability (Bandura, 1982). Enactive attainments (or enactive mastery) provide the most influential source of efficacy information because they are based on authentic mastery experiences (Bandura).

Self-efficacy is similar to, but not identical to that of expectancy, which is a key concept in Vroom's valence-instrumentality-expectancy theory (Vroom, 1964). Expectancy refers to the probability of performing at a given level on a given task. Expectancy theory is more comprehensive than self-efficacy in explaining an individual's beliefs about their capacity to perform. Expectancy theory incorporates two other components, the belief about the relationship between performance and rewards (instrumentalities) and the beliefs about the attractiveness of rewards (valences). Self-efficacy describes an individual's beliefs about their ability to execute tasks alone, not whether those tasks will lead to desired levels of performance.
Bandura asserts that a major function of thought is to enable people to predict the occurrence of events and to create the means for exercising control over those events (1989). People must draw on their state of knowledge to generate hypotheses about predictive factors. People’s perceptions of their efficacy influence the types of anticipatory scenarios they construct. Those who have a high sense of efficacy visualize success scenarios. Those who judge themselves as inefficacious are more inclined to visualize failure scenarios. These scenarios undermine performance by focusing on how things will go wrong. Bandura states that human attainments and a positive well-being require an optimistic sense of personal efficacy (Bandura). People must have a robust sense of personal efficacy to sustain the effort that is needed to persevere in the face of obstacles that are part of daily life.

Self-efficacy has been related to many positive outcomes. Trainees who completed training demonstrated improvements in self-efficacy over those that did not complete the training (Tannenbaum, Mathieu, Salas, & Cannon-Bower, 1991). Self-efficacy has been found to be directly related to research productivity in university faculty members (Taylor, Locke, Lee, & Gist, 1984). Perceived self-efficacy has also been positively related to the accuracy of mathematical performance and to children’s intrinsic interest in arithmetic activities (Bandura & Schunk, 1981).
**Group/Collective Efficacy**

Researchers have increased their interest in a group-level elaboration of the self-efficacy concept following the positive outcomes that have resulted in the self-efficacy research (Gist, 1987; Bandura, 1977; Wood & Bandura, 1989). The increased emphasis on teams in the workplace has also fueled interest in a group level efficacy construct (Kirkman & Rosen, 1999; Saavedra et al. 1993). Group efficacy is an individual’s judgment of how well the group can execute actions required to perform the task (Bandura, 1988; Weldon & Weingart, 1993; Shea & Guzzo, 1987). Group efficacy signals what a group thinks it can do, with the level of group efficacy being related to how much effort the group expends. Group efficacy has been found to be a determinant of group effectiveness (Campion et al. 1993). Focusing on group level processes, the efficacy cognition shifts from ‘Can I do this task?’ to ‘Can we do this task?’ (Mischel & Northcraft, 1997).

Research has established that group efficacy is a meaningful and measurable group construct, with levels of group efficacy varying among groups that appear to have equal skills, abilities and resources (Early, 1993; Guzzo, Yost, Campbell & Shea, 1993). Findings from the Earley study suggest that group efficacy expectations could influence an individual’s performance in a group context. In a study of group efficacy across tasks and cultures,
Gibson (1999) found a significant and positive correlation between group efficacy and group effectiveness. Riggs and Knight (1994) found that the experience of success or failure in one's work group contributed to beliefs about the ability of one's work group. These results do generalize to field settings as data was collected in the field as well as the laboratory. Other findings suggest that self-efficacy and collective efficacy are related but are independent constructs (Parker, 1994).

Researchers have explored many terms and concepts in the attempt to capture the fundamental efficacy cognition in a group setting. These include: team spirit (Hackman, 1987), collective control (Zaccaro, Blair, Peterson, & Zazanis, 1995), group potential (Hackman, 1990), group potency (Thomas & Velthouse, 1990; Guzzo et al. 1993), group efficacy (Gibson, 1999), and collective efficacy (Parker, 1994). Hackman (1987) argues that groups with team spirit (potency) are willing to work hard for the group and are more committed to the group than those groups with no team spirit. Group potential and group potency are the generalized belief of the group that it can be effective (Guzzo et al. 1993). Potency refers to team performance, and is experienced, developed and rated collectively (Kirkman & Rosen, 1999). A team that believes it will be successful behaves in ways that make it so (Hackman, 1990). Group efficacy is a group's belief in its ability to perform
effectively (Lindsley, Brass, & Thomas, 1995). Collective
efficacy concerns judgments that people make about a group’s
level of competency (Bandura, 1986). Group and collective
efficacy have interchangeable definitions in the literature,
and appear to be the same construct. They will be used
interchangeably in this paper.

Lindsley et al. (1995) consider that group members have
cognitions that are quite different from the beliefs that
they experience as individuals. These cognitions are
collective, and are based on the group to which they are a
member. These collective cognitions arise from the
individual’s ability to consider social entities larger than
his or herself. Collective efficacy perceptions emerge as
people interact with others to test and confirm their own
perceptions of the team’s performance and competency levels.
These perceptions, although not always consistent, have been
 theorized to lead to a consensual version of collective
efficacy (Lindsey et al.).

There is some confusion over the precise definitions of
collective efficacy and potency in the literature.
Following the definitions given by Guzzo et al. (1993),
collective efficacy refers to an individual’s belief in the
group’s ability to perform successfully. Potency refers to
the efficacy belief shared by the group. There has been
little research on potency, group efficacy and collective
efficacy, thus far (Guzzo et al.). The present research
seeks to add evidence to the few findings that have focused on the collective efficacy beliefs that individuals hold for the group.

Hackman (1990) has provided examples of groups that were characterized by either strong or weak beliefs in their potential for effectiveness. He found that members in a group that performed effectively possessed a strong belief that their group could perform effectively. Other group members that did not perform as well held no such belief. Group efficacy is complex because it forms as members collectively acquire, process, and exchange information about each other, prior performance, the task, and the context. As a result, group efficacy forms through a process of integration and is affected by many sources of information.

In attempting to understand the factors that contribute to the levels of collective efficacy in a group, it is unclear which characteristics of a group’s task, members, or interaction processes are influential to positive workgroup outcomes. Each work group studied might have very different tasks, different levels of information and knowledge, or different levels of commitment among group members. Shea and Guzzo (1987) focused on the group’s task characteristics and member’s technical skills in relation to the group’s belief in their ability. Others have focused on the ongoing
interaction processes that take place among group members as the key determinant of group effectiveness (Hackman, 1990).

Mischel and Northcraft (1997) have theorized that collective efficacy is composed of both collective task efficacy and collective interdependence efficacy. They suggest that team member’s knowledge of the task alone is not sufficient to explain collective efficacy. When a group is the basic unit of analysis, the abilities and behaviors of fellow team members become an important input to competency beliefs (Mischel & Northcraft). Mischel and Northcraft suggest that a combination of group member’s task skills and interaction processes affect collective efficacy perceptions and therefore group performance levels.

The Mischel and Northcraft model follows work done by Stevens and Campion (1994). Stevens and Campion (1994a) have identified the knowledge, skills, and abilities (KSAs) required for teamwork to be effective. They propose that interpersonal and self-management KSAs are necessary for effective team functioning. The present study seeks to isolate the effects of the interdependence processes that a group utilizes to accomplish a group-based task. A review of collective task efficacy and collective interdependence efficacy will follow in order to give a more complete understanding of the Mischel and Northcraft model.
Collective Task Efficacy

As individuals gain experience from performing a task, they increase their feelings that they can be more effective in performing similar tasks in the future. In effect, the experience of performing the task has increased their confidence in their abilities. Following Bandura's self-efficacy construct, enactive mastery (personal attainments) has been shown to be the most influential cue in efficacious beliefs (Bandura, 1982). Enactive mastery refers to group members forming efficacious beliefs through an assessment of their team members' skills and experience (Bandura). Focusing on the task, it has been proposed that overall effectiveness of work groups is a function of: the level of effort that group members collectively expend, the amount of knowledge and skill that members have, and the appropriateness of the performance strategies used by the group (Hackman, 1987).

Several organizational outcomes have been studied to capture the level of task competence present in a group. Training fulfillment and organizational tenure have been found to reflect members' task-related knowledge (Jackson, 1992). These studies suggest that task-related experience, training, and tenure reflect the presence of task related KSAs. When these task related KSA's are present in a group, the members' collective task efficacy perceptions should be heightened. When group members are forming collective
efficacy beliefs, they look at the task related knowledge and experience that the team members can contribute.

**Collective Interdependence Efficacy**

When interacting with a group, interdependence KSAs include the ability to resolve conflicts, solve problems in a collaborative manner, communicate effectively, set goals and coordinate tasks (Stevens & Campion, 1994a). Group members who cooperate with each other have been shown to share more task relevant information. They have been found to be friendlier with one another, they pay more attention to the ideas of others, and they experience fewer communication difficulties (Slavin, 1980). Interdependence KSAs enable group members to access and share information. A team that can effectively coordinate their actions will, in turn, gain confidence in their ability to perform a task (Stevens & Campion, 1994a). As a result, a group will have higher collective interdependence efficacy when the group members perceive that the group is high on interdependence KSAs.

The correct mix of people for a team requires weighting individual inputs according to the knowledge and skills that team members bring to the group (Gladstein, 1984). Larson and LaFasto (1989) identified factors that are important for competent team members to possess. Effective team members should have the essential skills and abilities that are relevant to the team’s objectives. They should also possess
the capability to collaborate effectively, and they should have a strong desire to contribute (Larson & LaFasto). Team members cannot simply possess the task related knowledge. They need to be able to communicate and coordinate actions. Strong interdependence KSAs are critical to a team’s success.

It is important to note that collective efficacy beliefs are just that, beliefs. Members of a group may perceive that group members have the task related or interdependence skills necessary to perform the task, regardless of the actual level of the skill. The beliefs that affect a group member’s sense of collective efficacy influence the amount of effort the person is willing to expend.

Task efficacy and interdependence efficacy are relatively independent constructs. For example, a group may have the relevant task based knowledge and skills, but not possess the ability to interact effectively. This would decrease their effectiveness and, in turn, decrease the group’s collective efficacy beliefs. On the other hand, a group might experience high collective interdependence efficacy due to good communication skills and problem solving abilities, but have low task knowledge. In this case, the group would have a lower overall collective efficacy perception because they lacked the technical skills to perform the task.
The present research seeks to give support to the construct of collective interdependence efficacy on its own by illuminating the complexities of interdependence team skills to group goal setting. This does not mean that collective task efficacy is not an important piece. This line of research is new, and it is important to discover the complexities of collective interdependence efficacy before examining the full effects of the task and interdependence pieces that make up collective efficacy in the Mischel and Northcraft model (1997). To gain a further understanding of the complexities of the collective efficacy construct, goal attainment will be explored as it relates to collective efficacy.

**Goal Attainment at the Individual Level**

Goals have been proposed to be important regulators of human action because they energize and direct behavior (Locke et al. 1984). Goal directed people focus on behaviors that will lead to goal attainment, while they ignore irrelevant activities not associated with that goal. Research has consistently found that performance has improved upon the assignment of goals that are hard and specific (Latham & Baltes, 1975). Locke, Shaw, Saari and Latham (1981) view goal setting as primarily a motivational phenomenon, but acknowledge that cognitive processes are involved as well. They theorize that goal setting affects the direction, amplitude (effort), and duration
(persistence) of action. Further, goal setting is thought to affect strategy development (Locke et al. 1981). It has also been found that performance increases with goal difficulty, up to the limit of the worker's ability, as long as the worker is committed to the goal (Weldon & Weingart, 1993).

Goal commitment has been described as an attachment to, or a determination to reach a goal that is crucial to the success of the goal intervention (Weldon & Weingart, 1993). Locke, Latham and Erez (1988) propose that there are three major determinants of commitment: external influences (authority, peer group influence, rewards and incentives), interactive factors (participation in setting goals) and internal factors (expectancy and self-efficacy). Focusing on the internal factors that influence commitment levels, these authors have predicted that the chances of accepting a hard goal would be higher when self-efficacy for a task was high as opposed to low. Locke et al. (1984) found that self-efficacy was significantly related to commitment to self-set goals, but not to assigned goals. The present study seeks to add support for the efficacy to self-set goals link at the group level of the constructs.

Goal Attainment at the Group Level

Research conducted on group goals has found similar results to those found at the individual level. Weldon and Weingart (1993) give an excellent review of the group goal
literature. These studies have found that groups working toward specific, difficult goals performed better than those working without a specific goal. Group performance was found to increase with goal difficulty. The group goal effect was found to be robust across tasks, settings, the method used to set the goal, and for goals set in quantity, quality, and speed (Weldon & Weingart). Effectively functioning teams have consistently been found to have a clear understanding of their goal to be achieved and a belief that the goal embodies a worthwhile or important result (Larson & LaFasto, 1989).

In a study by Matsui et al. (1987), pairs of participants set group goals and individual goals, while the individuals set only individual goals. Goal acceptance and performance were significantly higher for the pairs than for the individuals. This suggests that goals set by the group at the group level will result in higher acceptance of the goal by group members. Group goal setting led to higher performance than did individual goal setting. Group goal subjects exceeded their individual goal levels, while those with only individual goals simply aspired to their individual goal levels (Matsui et al. 1987). This suggests that in a group setting, the presence of others in the goal setting process can motivate an individual to strive for higher levels of performance. Following this, for goals to be maximally effective in groups, individual goals should be
linked to the group’s goal. It appears that there is an increase in motivation from group processes in the goal setting process. Other findings suggest that individual goal setting in a group can negatively affect group functioning. People in the individual goal condition tended to be more competitive and less cooperative than those in the group goal conditions (Mitchell & Silver, 1990). In this study, turn taking was significantly lower, $F(1, 94) = 7.91$, $p < .05$, in the independent goal condition than in the group goal condition.

**Relationship of Self-Efficacy and the Difficulty of Self-Chosen Goals**

The positive effects of goals on task performance have been established in the research literature (Locke, 1982; Locke et al. 1981; Latham & Baldes, 1975). Research has also questioned how goals combine with other factors to determine performance. Locke and Latham (1984) found that introducing a feedback system in work groups created spontaneous goal setting. Other research has addressed the procedures used to set the goal. Voice in setting the goal has been shown to influence goal acceptance and performance when individual goals are involved (Lind & Kanfer & Earley, 1990).

Studies have begun to address the relationship between self-efficacy and goal systems with many questions remaining to be answered. Research by Locke et al. (1984) found that ability, past performance, and self-efficacy were the major
predictors of goal choice. A pertinent question in this area at this time is: Does self-efficacy affect performance through its effects on goal choice, by affecting the goal level chosen by the subject, or through its direct effect on performance, or both (Locke et al.)?

Locke et al. (1984) found that self-efficacy affected goal level chosen, goal commitment, the choice to set a specific rather than nonspecific goal, and task performance. Specifically, the magnitude of self-efficacy was positively related to goal level chosen in two out of three trials and was positively related to task performance in all three trials. The authors concluded that self-efficacy mediated the effects of goal setting on performance. It appears that self-efficacy affected performance both directly and indirectly. Indirectly, through its effects on goal choice and, directly, on its effects on task performance. These findings give strong support to Bandura's (1982) claim that self-efficacy is a key causal variable in performance and that its effects can be seen directly and indirectly. The Locke et al. (1984) study gave support for the theory that self-efficacy and performance are reciprocally related. Locke et al. (1984) suggests that self-efficacy might provide the integrating mechanism between goal setting and social learning approaches to task performance. Self-efficacy is developed through social learning processes, and this in turn leads to more productive goal setting.
Bandura & Cervone (1983) have addressed the psychological mechanism through which personal standards create motivational effects to achieve goals. They found support for the proposition that goal systems affect performance motivation through self-evaluative and self-efficacy mechanisms. Specifically, goals enhanced performance effort under conditions combining a personal standard with performance feedback of progress toward it (Bandura & Cervone, 1983). Feedback appears to be important in formulating efficacy perceptions that interact with goal setting, which in turn enhance performance motivation. In this process, self-evaluative processes are at work. A person anticipates satisfaction for matching accomplishments and anticipates dissatisfaction with substandard performance. Bandura & Cervone (1983) found that when subjects were given feedback indicating performance was below the level of the assigned goal, subsequent effort was higher for those with high self-efficacy than for those with low self-efficacy. In this study, the self-evaluative and the self-efficacy influences predicted the magnitude of motivational enhancement. These findings further suggest that a negative goal discrepancy in the self-evaluation process is needed for feedback to improve performance. As Bandura (1977) postulates, it is partly on the basis of self-precepts of efficacy that people choose what to do, how much effort to mobilize for those activities, and how long
to persevere at them. The Bandura and Cervone (1983) study supports the idea that people with a low sense of self-efficacy may be easily discouraged by failure, while people with high efficacy cognitions for goal attainment intensify their efforts in the face of obstacles until they succeed. This study gives further evidence for the link between efficacy perceptions and goal systems.

Self-efficacy has also been linked to increased interest and achievement motivation (Bandura & Schunk, 1981). Perceived self-efficacy was positively related to the accuracy of mathematical performance in children (Bandura & Schunk, 1981). Under proximal sub-goals, instead of distal sub-goals or no goals, children progressed rapidly in self-directed learning experiences. They achieved a substantial improvement in knowledge of mathematical operations, and developed a sense of personal efficacy and intrinsic value in activities that were initially not attractive to them. Bandura & Schunk (1981) propose that interest is developed by satisfaction from success, and an increase in self-efficacy results from a sense of personal causation. Gist (1987) posits that short-term goals combined with a manipulation of efficacy, through mastery or modeling, may facilitate interest development.

Another study has found a relationship between self-efficacy and self-set goals as well (Wood & Locke, 1987). This study focused on grade goals and performance and found
that self-efficacy had a significant relationship to academic performance, even with ability controlled (Wood & Locke). These findings are in agreement with the Locke et al. (1984) findings that the effects of self-efficacy were manifested in two ways. First, as a direct effect on performance and, secondly, as an indirect effect through it’s effects on grade goals which in turn affected academic performance. These results add support to findings obtained in laboratory settings (Locke et al. 1984) and with those obtained in field settings (Taylor et al. 1984).

These results for both goals and self-efficacy show an encouraging convergence of findings that support the hypothesis that high perceived efficacy is positively related to higher levels of self-set goals and higher levels of performance. Locke, Latham, and Erez (1988) propose that self-efficacy ratings are performance based, and thus do not directly apply to goals as such. Bandura’s writings speak of a variety of determinants of self-efficacy besides past performance. These include verbal persuasion, modeling, and psychological state (Bandura, 1982). Due to the complexity of factors that contribute to perceived self-efficacy, it is argued here that self-efficacy does apply to goal setting. Locke et al. (1988) predict that the chances of accepting a hard goal would be higher when self-efficacy for a task is high as opposed to low. Findings in this area are
supporting this proposition (Locke et al. 1984; Wood & Locke, 1987).

**Group Efficacy as it relates to Goal Systems at the Group Level**

Group efficacy signals what group members think they can do and has been found to be related to how much effort the group expends (Earley, 1993). Unfortunately, results from group efficacy research have not been as straightforward as those found with the self-efficacy research. As a result, one cannot simply take self-efficacy findings and generalize them to group processes. Group variables need to be considered and explored as they relate to efficacy and goal setting. Most group efficacy research has been performed in the last 13 years. The research, thus far, has attempted to link efficacy to goals and performance at only the individual level of analysis. Research in this area is needed at the group level. The present study seeks to link a group's collective interdependence efficacy beliefs to individually set group goals and group performance levels.

**Hypothesis 1:** It is proposed that participants receiving positive feedback on their group's interdependence Teamwork KSAs will report higher levels of collective efficacy than participants receiving negative interdependence feedback about their Teamwork KSAs.
Hypothesis 2: It is proposed that self-set group goals will be positively related to collective efficacy levels, with harder goals being related to high levels of efficacy, and easier goals being related to lower levels of efficacy.

Hypothesis 3: Difficult self-set goals will be positively related to group performance levels, with harder goals corresponding with higher group performance, and easier goals being correlated with lower group performance.
METHODS

Subjects
A sample of 108 university students from a California State University in southern California were randomly assigned to 3 person work groups. 18 groups of three persons were run in the positive interdependence efficacy condition and 18 groups of three persons were run in the negative interdependence efficacy condition. 78.4% of participants reported being female and 18.9% reported being male. Participants ranged in age from 18 to 62, with a mean age of 25.2. The great majority of the participants (98) were undergraduates, with only 10 participants reporting a bachelor’s degree or higher. 45% of the participants reported being caucasian, 21.6% were mexican, 14.4% were asian, 11.7% were african, and 1.8% reported being ‘other’. 53.2% of the participants reported working as hourly employees while 10.8% reported ‘student’ as their occupation. The remaining 32.4% participants reported being managers or working in the ‘other’ category. Cohen (1992) has suggested a sample size of at least 85 to attain a power level of .80 for correlational analyses at the .05 alpha level. This was the most rigorous power requirement for the analyses that were run in this study. A sample of 108 adequately fulfilled this power requirement.
Design

This was a between subjects experimental design with random assignment of subjects to conditions. Every attempt was made to insure that all participants were treated in the same way, except for the experimental manipulation. There were two conditions of collective interdependence efficacy, positive and negative. The independent variable in this study was the group efficacy ratings given by group members. The dependent variables were the amount of planning and production dollars spent by the group while performing the task, the time it took to complete the task and the level of group goals set individually by the participants. The group efficacy ratings that the participants reported were also used as a manipulation check.

Manipulation Issues

In this study, feedback served as the manipulation of collective interdependence efficacy. As a result, it is important to look at the relationship between feedback and efficacy perceptions. In previous studies measuring self-efficacy, subjects were given a task to perform. Before the task was given a second time, feedback was provided about their success (which could be real or fabricated by the researcher). Efficacy beliefs were then measured. Participants who were given feedback demonstrating their success typically reported significantly higher self-efficacy and subsequent performance than those given
feedback detailing their failures (Gonzales & Dowrick, 1982). In this study, the feedback detailed how well their Teamwork KSAs complemented the other team members KSAs and made no reference to their success or failure on the task.

The conceptions of ability that people hold have an impact on the self-regulatory mechanisms that govern motivation and performance accomplishments. Ability has been considered as an incremental skill that can be continually enhanced by learning. It has also been viewed as a fixed entity, with performance levels indicating intellectual ability that is stable. It was proposed that ability would be perceived as a fixed entity in this laboratory setting. Due to time restraints and the use of individuals joined as a team for the short duration of the experiment, it was proposed that participants would not use the feedback to improve their performance. Participant’s level of competence was proposed to be a fixed entity that would be unchangeable for the length of the manipulation. Following this proposition, it was proposed that feedback would provide information for their efficacy beliefs alone.

Mischel & Northcraft (1997) give evidence to the fact that group member’s competency levels are fixed in the laboratory.

**Procedures**

Participants were informed at the time they signed up that the experiment would be composed of two sections,
taking approximately 45-55 minutes for both sections. In the first section, participants filled out the Teamwork KSA test (Stevens & Campion, 1994b). The second section consisted of the manipulation, the group task and completion of the efficacy and goal scales. Participants were offered 5 points of extra credit to participate in this experiment. Subjects were recruited using a sign up sheet that was on the Psychology board. Sign up sheets were also sent around to pre-selected classes. Classes were chosen based on the instructor’s agreement to offer extra credit.

Those students wishing to participate were asked to read and indicate their consent to participate on an informed consent form. They then filled out the Teamwork KSA test (Stevens & Campion, 1994b). This Inventory was an abbreviated version of the original Teamwork KSAs test. The original scale had been found to show criterion-related validity and a large correlation was found with employment aptitude tests. This suggested that the Teamwork KSA test had a significant general mental ability component to it (Stevens & Campion). The reliability and validity of the abbreviated version is not yet known. This shortened version was more appropriate for use in this study, as it was important to gather this information quickly. Subjects might have been lost if the experiment would have taken more than an hour of their time. Permission was granted by the authors of this scale with the understanding that the
results obtained from this study would be shared with them. This scale was used for face validity only during the manipulation and was not scored. This scale asked for demographic information at the end. A pilot study manipulating collective interdependence efficacy was done at an earlier date. These findings are now discussed because valuable insights resulted from the pilot study.

The false feedback given to participants based on their Teamwork KSAs significantly affected their interdependence efficacy levels. The results of the pilot study were very valuable in identifying that the false feedback given to participants needed to be more realistic and it needed to sound as if it was suited to the particular group being tested. In the pilot study, when asked, some participants commented that the feedback seemed false and predetermined. Some participants also thought that the experimenter did not have enough time to score their Teamwork KSA test. To rectify these issues, the use of scantrons for quick scoring resulted. It was also decided to make the feedback more realistic by showing participants a norming scale. The participants could then see where their group’s score fell on the teamwork dimension in comparison to other groups. The research assistants practiced the false feedback for consistency and realism. It was important that the feedback sounded relaxed and unrehearsed. The findings of this pilot study supported the ability to manipulate and test
collective interdependence efficacy in a laboratory setting. Using the pilot study as a guide, several procedures were modified for the present research.

In the current experiment, participants in the first section filled out a scantron in response to the Teamwork KSA test. The researcher then took the scantrons out of the room to appear as if she/he were scoring them quickly. Participants were asked not to talk for the 5-minute break. As each participant began the second section of the experiment, they were randomly assigned to one of the two conditions. In the second section of the experiment, the results from the Teamwork KSA test were shared visually and orally with the participants. This feedback was not based on their answers to the Teamwork KSA test and was completely false. Subjects were shown a fake norming scale, which indicated where their team fell in relation to other teams that had completed the measure. The research assistant gave the efficacy manipulation by verbally providing false feedback to the team about their ability to interact and work as a well functioning team based on the fake computer results.

In the positive interdependence efficacy condition, the groups received the positive feedback that their group had scored a 42 out of 50 on the Teamwork Compatibility Index Score, putting them in the 95th percentile of teams sampled. The negative interdependence efficacy groups
received negative feedback that their group had scored a 20 out of 50, putting them in the 16th percentile of teams sampled.

This feedback was completely false and served as the manipulation of collective interdependence efficacy. The research assistant then proceeded to give each group the broken squares task. Each group member got an envelope filled with one-third of the pieces to the puzzle. The research assistant gave verbal instructions on how to complete the task and how they would be evaluated. The participants were then told that their progress would be timed. At the completion of the task, the research assistant told the participants how much time they took to complete the task. No false feedback indicating good or bad performance was given at this time.

Participants then got the collective interdependence efficacy scale. After they completed these scales, participants were given feedback as to how much money they spent completing the task. They were told that they would then do another similar puzzle task. The researcher then asked them to individually set group goals targeting how well they thought their group could perform the next task. They received instructions to fill out all scales individually.

The research assistant then announced that time was running short and the group would not have time to do the
second task. There was no second task planned. Finally, participants were debriefed as to the real objectives of the study and any questions or concerns were addressed at that time. Participants were treated according to the APA ethical guidelines. Subjects participating appeared to understand all directions given and no special concerns about the deception that they had experienced were offered when asked in the debriefing session. Approval to deceive subjects was given from the Institutional Review Board at the University.

Task

The broken squares task used in this experiment originated in a reputable team based activities handbook (Williams-Pfeiffer & Jones, 1974). In the original version of the task, instructions specified that group members should not orally communicate during the task. In this experiment, participants were encouraged to verbally communicate so that interpersonal teamwork skills were encouraged. This task was considered to require interdependent teamwork skills as each participant must contribute their pieces in order to complete the task.

This puzzle like task had been used previously in a pilot study designed as a manipulation check. In the pilot study, the appropriateness of the task was assessed. Participants asked about the difficulty of the task in the team setting reported that it was challenging and difficult.
The task was broken up into two modes of operation, planning and production. Planning and Production modes cost team members $10 and $100, respectively. Team members were instructed to complete the task with the lowest amount of expenses possible. This enabled experimenters to gain an objective measure of group performance and further added to the complexity and challenge of the task.

Measures

Group efficacy had been previously measured by open discussion and interaction of the group to come up with a single score of the group’s efficacy beliefs (Gibson, 1999). Group efficacy scores have also been aggregated by averaging individual responses into a group-level measure. However, a simple mean may not adequately characterize a group’s collective efficacy beliefs (Mischel & Northcraft, 1997). Following Mischel & Northcraft’s suggestion, a collective efficacy measure, focusing on the individual’s belief that his/her team can execute a task successfully is a more appropriate measure. Team members can influence an individual’s collective efficacy beliefs, but it is the individuals’ beliefs that drive and direct individual effort (Ajzen & Fishbein, 1980).

For this reason, each team member’s efficacy beliefs were assessed individually. Collective interdependence efficacy was measured with a 12-item survey developed for this research. The scale was constructed based on the team
interdependence dimensions described in Stevens & Campion (1994a). The last six questions were modified from an existing collective control scale (Gilbert, Zaccaro, Zazanis, & DiMiranda, 1992). No current measures of collective interdependence efficacy could be found in the literature that would fit the task and manipulation done in this experiment. Results support the notion that this scale is a reliable measure of collective interdependence efficacy. Alpha reliability scores and average inter-item correlations were examined to determine the internal consistency of the scale. The Cronbach's alpha was .92, and the average inter-item correlations were .50 (See Appendix 1).

A shortened version of the Teamwork KSA test developed by the authors of the original scale was used to initially assess teamwork skills (Stevens & Campion, 1994a). This scale was the basis for the false feedback. The Teamwork KSA test was used for face validity so that participants would believe the feedback stating how well they would work together on a team. No statistics were computed using this scale. This measure was not included in the Appendix based on a proprietary agreement with the authors.

The goal setting measures developed for this study asked for individual level input in the setting of group goals. A self-set goal measure was used to increase participant's sense of commitment to the goal (Langer,
Goal effort questions were modeled from those used in other goal research (Locke et al. 1984, Matsui et al. 1987). Several items were written to capture the goal construct. However, after psychometric analysis of the items, different goal domains resulted. It was decided that these different domains of goals could not be appropriately combined. Three goal domains resulted: the amount that participants felt they could improve their performance from the last task, the effort that they were planning to expend, and an estimation of the amount of time and money it would take them to complete the second task.

Five goal variables resulted from the analyses of the three domains. The first goal variable was labeled as the 'Effort Goal' (Goal 2). The second goal variable was labeled as the 'Extent Will Try' (Goal 4). The third goal variable was labeled as 'Next Performance Level' (Goal 6). The forth goal variable was labeled as the 'Minute Goal' (Goal 7), and the last goal variable was labeled as the 'Cost Goal' (Goal 8). Further reference to these goal variables will use these labels. This goal measure was pilot tested on graduate students who proofread the questions for clarity and proper word choice (See Appendix 2). Three goal questions were taken out due to restriction of range problems and exploratory analyses that didn't offer coherent outcomes.
RESULTS

Analyses to test the three hypotheses were performed using SPSS 7.5. Table 1 presents a summary of the means, standard deviations, and minimum and maximum scores for each variable. A closer inspection of the means and standard deviations on the collective efficacy scale revealed that the mean was quite high, indicating that group members reported high levels of collective efficacy. The 'Effort Goal', 'Extent Will Try', and the 'Next Performance Level' goals also had very high means, suggesting that these goals were set at the top end of the scale. The 'Minute Goal' and 'Cost Goal' were tied into the performance level that they had just attained in the task. However, the minimum and maximum scores indicated that there was a great amount of variability between low and high performing teams. The performance measures of costs and time also indicated a great amount of variability between teams. Finally, the time that teams spent in production verses planning modes showed a great amount of variability.
Table 1.
Summary of Means, Standard Deviations, Minimum and Maximum Scores for Collective Efficacy, Goals, and Performance Measures

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective Efficacy</td>
<td>4.28</td>
<td>.70</td>
<td>1.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Goals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort Goal</td>
<td>3.94</td>
<td>1.10</td>
<td>1.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Extent Will Try</td>
<td>4.80</td>
<td>.45</td>
<td>1.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Next Performance Level</td>
<td>4.15</td>
<td>.64</td>
<td>1.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Minute Goal</td>
<td>5.33</td>
<td>2.80</td>
<td>.50</td>
<td>15.00</td>
</tr>
<tr>
<td>Cost Goal</td>
<td>346.50$^b$</td>
<td>299.13</td>
<td>25.00</td>
<td>1500.00$^b$</td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Costs</td>
<td>473.31$^b$</td>
<td>374.20</td>
<td>50.00</td>
<td>1176.00$^b$</td>
</tr>
<tr>
<td>Time</td>
<td>7.65$^c$</td>
<td>4.03</td>
<td>.55</td>
<td>16.26</td>
</tr>
<tr>
<td>Planning Costs</td>
<td>34.00$^b$</td>
<td>20.32</td>
<td>3.00</td>
<td>81.00</td>
</tr>
<tr>
<td>Production Costs</td>
<td>444.37$^b$</td>
<td>370.66</td>
<td>10.00</td>
<td>1126.00$^b$</td>
</tr>
</tbody>
</table>

Note. $^*$Means in minutes, $^b$Means in dollars.

The assumptions of the analyses were met. There was evidence of normality. The collective interdependence efficacy scale, and the first three goal variables in Table 1 were moderately positively skewed. The 'Minute Goal' and
the 'Cost Goal' were slightly negatively skewed. Transformation of these scales was not warranted as their slight level of skewness was acceptable for the correlational and regressional analyses that were run. There were three cases of missing data. Three participants either did not see the 'Cost Goal' or chose not to fill it out. This missing data did not follow any pattern and was proposed to be random.

Hypothesis 1 was supported. An independent samples t test was used to analyze group differences in collective interdependence efficacy perceptions based on the negative or positive feedback conditions. For the positive efficacy condition, participants reported significantly higher levels of efficacy ($M=4.60$, $SD=.46$), than did participants in the negative efficacy condition ($M=3.97$, $SD=.76$), $t(106) = 5.23$, $p<.01$, $\eta^2=.20$ (See Figure 1). There was more variability in efficacy perceptions of those in the negative condition. Participants in the positive efficacy condition were quite consistently high in their efficacy ratings. These findings give evidence to the strength of the manipulation.

A second independent samples t test was run without the subjects who appeared not to be influenced by the manipulation. Thirteen subjects in the negative condition reported high efficacy, while seven subjects in the positive
condition reported low efficacy levels. These twenty subjects were taken out of the analysis. The second t-test revealed a stronger mean difference between the positive (M= 4.73, SD=.25), and negative feedback conditions (M= 3.68, SD=.64), t(50) = 9.79, p<.01, η²=.55, than the first analysis revealed.

Figure 1.
Collective Interdependence Efficacy based on Positive and Negative Conditions.
Hypothesis 2, assessing the relationship between levels of collective interdependence efficacy and self-set group goals was tested with bivariate correlations. Partial support was found for this hypothesis. It was proposed that participants high in collective interdependence efficacy would set harder goals than those participants low in collective interdependence efficacy. This was found in three out of the five goal variables utilized. A significant bivariate correlation was found between the ‘Extent Will Try’ goal and their collective interdependent efficacy perceptions, $r = .43$, $p = .01$, $r^2 = .18$. A significant negative bivariate correlation was found between collective interdependence efficacy and the ‘Minute Goal’ set for the second task, $r = -.25$, $p = .01$, $r^2 = .06$. This is in the direction proposed. As efficacy levels increased, harder or shorter goals were set for the second puzzle task. Another significant negative correlation was found between collective interdependence efficacy and the ‘Cost Goal’ set for the second task, $r = -.48$, $p = .01$, $r^2 = .23$. This correlation is also in the direction that was predicted, and indicates a strong relationship. The other two goal variables did not significantly correlate to collective interdependence efficacy (See Table 2). It is important to interpret these findings with caution as different dimensions of goals were assessed by the goal variables.
Table 2.

Correlations of Collective Interdependence Efficacy by Self-Set Group Goals

<table>
<thead>
<tr>
<th>Goal</th>
<th>Collective Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort Goal</td>
<td>.014</td>
</tr>
<tr>
<td>Extent Will Try</td>
<td>.430**</td>
</tr>
<tr>
<td>Next Performance Level</td>
<td>.122</td>
</tr>
<tr>
<td>Minute Goal</td>
<td>-.248**</td>
</tr>
<tr>
<td>Cost Goal</td>
<td>-.478**</td>
</tr>
</tbody>
</table>

Note. **p=.01, one tailed. *p=.05, one tailed.

The third hypothesis proposed a relationship between the difficulty of self-set goals and group performance levels. The five goal variables, as they predicted performance measures of time and costs, were examined using correlational analyses. Two regression analyses were also run with the goal variables entered in the same step. The hypothesized relationship received limited support. The time and the costs that groups took to complete the puzzle task were significantly correlated to only a few of the goal variables that were set for performance in the second task (See Table 3).
Table 3.

Correlations of the Difficulty of Self-Set Goals by the Performance Measures of Time and Costs to Complete the Task

<table>
<thead>
<tr>
<th></th>
<th>Team Performance</th>
<th>Time</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effort Goal</td>
<td>.169</td>
<td>.202*</td>
<td></td>
</tr>
<tr>
<td>Extent Will Try</td>
<td>-.143</td>
<td>-.137</td>
<td></td>
</tr>
<tr>
<td>Next Performance Level</td>
<td>.283**</td>
<td>.175</td>
<td></td>
</tr>
<tr>
<td>Minute Goal</td>
<td>.761**</td>
<td>.621**</td>
<td></td>
</tr>
<tr>
<td>Cost Goal</td>
<td>.734**</td>
<td>.826**</td>
<td></td>
</tr>
</tbody>
</table>

Note. **p=.01, one tailed. *p=.05, one tailed.

Bivariate correlations revealed that the actual time taken to complete the task was significantly correlated to the 'Next Performance Level' goal variable, r=.28, p<.01, r^2=.07. The actual costs were significantly correlated to the 'Effort Goal' variable, r=.20, p=.05, r^2=.04. Performance measures from the task were significantly related to the minute and cost goals set for the second task. Specifically, actual costs were significantly related to the 'Minute Goal', r=.62, p<.01, and the 'Cost Goal' for the next task, r=.83, p<.01. Actual time taken to complete the task was significantly related to their 'Cost Goal' for the second task, r=.73, p<.01, and their 'Minute Goal' for the second task, r=.76, p<.01. The 'Minute Goal' and 'Cost
Goal' correlations with performance should be interpreted cautiously because the minute and cost goals were based on how well the teams did on the first task. These correlations were thought to be artificially inflated because participants set these goals based on how well they had just done on the task.

Due to these inflated correlations, it was decided to only enter the first three goal variables into two regressions predicting the performance measures of time and costs. This would avoid the over prediction of performance from the goal measure. The three goal variables were entered at the same step, and they significantly predicted the performance measure of time, $F(3, 104)= 6.29$, $p=.001$, $R^2=.13$. This is a moderate effect. The standardized beta for the 'Effort Goal' was low, $\beta=.16$, $p=.07$, indicating a weak prediction. The beta weight for the 'Extent Will Try' goal was high, $\beta=.23$, $p=.01$, indicating a strong prediction. The 'Next Performance Level' goal's beta weight also significantly added to the prediction, $\beta=.33$, $p=.001$. These findings give partial support to the relationship between self-set goals and the performance measure of time.

The three goal variables entered into a regression also significantly predicted the performance measure of costs, $F(3, 104)= 4.06$, $p=.009$, $R^2=.08$. The 'Next Performance Level' was a significant predictor of performance, $\beta=.21$, $p=$
.03. The 'Effort Goal' was a significant predictor of performance, $\beta=.20$, $p=.03$, as was the 'Extent Will Try' goal, $\beta=.20$, $p=.04$.

In addition to the analyses that were run to test the hypotheses, further analyses were run to illuminate the complexities of the efficacy and performance relationship. The amount of time that groups spent in planning and production was analyzed as an additional measure of group performance. A paired sample t-test comparing the amount of time that each group spent in planning ($M = 34$, $SD = 20.32$) verses production ($M = 444.37$, $SD = 370.66$) revealed a significant difference between modes of work, $t(104)= 11.36$, $p<.01$, $\eta^2 = .55$ (See Figure 2).
Additional analyses were performed on the relationship between collective interdependence efficacy and performance. This relationship was analyzed with bivariate correlations. A significant negative correlation between collective interdependence efficacy levels and actual performance costs was found, \( r = -0.49, p = 0.01, r^2 = 0.24 \). Collective interdependence efficacy levels were also significantly negatively correlated with the time they took to complete the task, \( r = -0.43, p < 0.01, r^2 = 0.18 \). The magnitude of these relationships is quite strong.

Intra-class correlations were run to find if there was consistency within groups in goal setting. The 'Effort Goal' resulted in an intra-class correlation of \( 0.06, p = 0.24, \)
the 'Extent Will Try' goal resulted in an intra-class correlation of .03, \( p = .35 \), and the 'Next Performance Level' resulted in an intra-class correlation of .12, \( p = .19 \). The lack of significance of these intra-class correlations indicated that no group level effects were present in the setting of group goals. Aggregation of the goal data was not warranted.
DISCUSSION

Group members in the positive interdependence efficacy feedback condition reported significantly higher levels of collective efficacy than the group members in the negative efficacy condition. These findings provide support for the construct of collective interdependence efficacy outlined in the Mischel and Northcraft (1997) model. Participants in the different conditions of collective interdependence efficacy had significantly different perceptions about their abilities to succeed in the next task. These findings are in accord with findings from Gonzales and Dowrick (1982) who found that positive efficacy feedback resulted in higher levels of efficacy and subsequent performance than those given feedback detailing their failures. These results give evidence that participants did believe the false feedback manipulation of collective interdependence efficacy. These findings also support that this construct can be measured in a laboratory setting.

The second t test was run removing subjects that didn’t believe the manipulation of collective interdependence efficacy. Some participants had strong beliefs in their abilities. The false feedback did little to change these perceptions. The twenty participants that were removed from this analysis were thought to create extraneous noise, which detracted from the strength of the findings. The detraction of these cases eliminated unwanted individual variability,
producing a very high eta squared ($\eta^2=.55$). This indicated that collective interdependence efficacy accounted for a great amount of the variability found between groups.

The hypothesized relationship between collective interdependence efficacy and self-set group goals was only partially supported. This partial support was due, in part, to problems associated with the measurement of the goals. The goal measure was composed of items that attempted to assess different dimensions of goal setting. As a result, five goal variables were used as separate measures of goals because a global measure could not be reliably formed. This goal measure was created for this study because no other goal measures could be found that would appropriately fit with the manipulation of efficacy and the methods employed here. The lack of strong findings for the second hypothesis can be attributed to inconsistencies in the goal measure.

Locke et al. (1984) used goal setting as it was related to self-efficacy and strategy training. They had repeated trials of a task and asked participants to set goals in between the trials. Some participants were assigned a goal, while others set their own goals. They found that those participants who were given a difficult goal in one trial, set a harder goal in the next trial, when compared to those who set their own goals on both trials. Participants in the Locke et al. study had an indication of what a difficult
goal was. Participants knowledgeable about goal levels and difficulty levels could make an informed goal choice.

In the present study, an effort was made to motivate participants to set goals based on their collective interdependence efficacy perceptions. Participants were given a baseline measure of their performance in minutes and costs so that they would have a relative starting point on which to base their level of goal setting. However, participants were not told that they should set difficult goals. The motivation to set the goals was proposed to originate in their feelings of collective interdependence efficacy. If participants had been told what a difficult goal would have been, the collective efficacy to goal setting relationship would have been distorted.

The methods used in the Locke et al. (1984) study might be a more appropriate way to assess goals at the group level. Future research needs to manipulate self-set goals and assigned goals to extend Locke et al.'s findings to a group setting. Groups should be given two or more trials of a task, perhaps similar forms, and then goal setting can be analyzed more clearly.

Individual verses Group Level Data

Interpretation of findings was also difficult because efficacy perceptions and goal setting measures were collected at the individual level, while the performance measures were collected at the group level. Kenny & La Voie
(1985) suggests that if there is a group level effect, individual data should be aggregated to avoid violating statistical assumptions of response independence. However, aggregation is only appropriate when there are group level effects present.

Intra-class correlations revealed that team members set individually based goals. As a result, data aggregation was not appropriate. It should be noted that the 'Minute Goal' and the 'Cost Goal' did result in significant intra-class correlations. The 'Minute Goal' resulted in an intra-class correlation of .65, p<.01, and 'Cost Goal' resulted in an intra-class correlation of .65, p<.01 as well. However, these responses were based on previous performance in which feedback was given at the group level. It follows that feedback given at the group level will produce similar group level goal setting.

The different levels found in the nature of the variables also posed problems with the interpretation of the efficacy to goal setting relationship. Team members varied within groups as to what their goals were. The different levels of support found in the separate goal dimensions does indicates that a relationship exists, but that the goal measures need to be refined in order to find that relationship. To address this, the process of planning in the goal setting process needs to be further assessed.
The individual effect found in goal setting can be traced back to the group process of planning, which participants were asked to do in the task. At the beginning of the task, teams received information that their goal was to complete the puzzle task in the shortest amount of time and with the lowest costs possible. The planning mode cost the groups $10 a minute, while the production mode cost them $100 a minute. There was less expense if groups spent more time in the planning phase. As a result, teams were thought to perform at a higher standard when they spent more time in planning versus production.

A paired samples t test revealed that groups spent significantly less time in planning than in production. The lack of time that groups spent in planning suggests that they didn’t plan out their puzzle task construction and thus didn’t have the interaction needed to set group level goals for the next task. Future research should address this issue by the manipulation of the planning phase. Groups that are required to go through planning versus those that are not required to go through planning might show differences in goal setting.

Another explanation for the weak efficacy to goal setting relationship is the lack of commitment to goals (Locke, Latham, & Erez, 1988). Goal Commitment refers to one’s attachment to or determination to reach a goal, regardless of the goal’s origin. Locke et al. (1988)
proposed that it is virtually axiomatic that if there is no commitment to goals, then goal setting does not work. Other authors have proposed that when group goals are involved, commitment means that group members feel an attachment to the goal and members of the group are determined to reach the goal (Weldon & Weingart, 1993). It is argued that the university participants used in this experiment felt little attachment to the other group members and, therefore, experienced low levels of goal commitment which led to inconsistencies in goal setting.

In future research, team members who are required to go through a planning phase might communicate more and thus gain more of the characteristics of a team. An increase in interaction among team members might lead to more commitment to the group and thus, more commitment to goals. This, in turn, could lead to a stronger feeling that setting harder goals is appropriate for the group. Larson and LaFasto (1989) state that effective team members should have a strong desire to contribute. In this experiment, subjects were participating for extra credit and did not put in the effort or commitment to the task and the goal setting measures as organizational team members might have done.

Hypothesis 3 proposing a relationship between the difficulty of self set goals and group performance levels received partial support. The three goal variables did significantly predict performance measures of time and
costs. This indicated that a linear relationship exists. The harder the goals were, the lower the costs and the time to complete the task. Several of the correlations, however, were not significant. Complete support was not found for this relationship due to inconsistencies found in the goal measure, as was seen in Hypothesis 2.

Giving further evidence to the research linking collective efficacy and performance (Gibson, 1999), a significant negative correlation was found between collective efficacy levels and actual performance costs. Collective efficacy levels were also significantly negatively correlated with the time they took to complete the broken squares task. The coefficients of determination for these two correlations were $r^2 = .19$ and $r^2 = .24$ respectively, indicating a strong effect. These relationships indicate that the higher the collective interdependence efficacy perceptions, the less money and time they spent on the task.

This is an especially promising finding because no feedback was given based on their task related knowledge. It follows that the existence of teamwork interdependence KSAs were sufficient to increase performance levels alone. This gives strong evidence to the fact that teamwork skills are a critical component to effective team functioning.

A pertinent question raised earlier was, Does self-efficacy affect performance through its effects on goal
choice, by affecting the goal level chosen by the subject, or through its direct effect on performance, or both (Locke et al., 1984)? These findings give evidence to the direct link of collective interdependence efficacy to performance, and give partial support for the indirect effect of collective efficacy to goal setting. Partial support for the third hypothesis also indicates that a relationship exists between performance and goal setting as well. These findings are consistent with Locke et al.'s (1984) findings that self-efficacy affects goal level chosen, and task performance.
Implications for Organizations

The surprising effects found between collective interdependence efficacy levels and performance levels indicates that Teamwork KSAs are very important to effective team performance. Team members need to have good communication skills, problem solving skills, planning and coordination strategies and the ability to set appropriate goals. Organizations should hire team members with these interdependence teamwork KSAs. If these KSAs are lacking, then team training and monitoring should be implemented. To insure that the correct teamwork behaviors continue, teams should receive regular team level feedback and rewards based on their interdependence teamwork KSAs.

The collective interdependence efficacy to performance link shown here and in the literature (Wood & Bandura, 1989; Gibson, 1999) also indicates that this phenomena will occur when there is a strong sense of efficacy. If efficacy perceptions are low, however, negative evaluations of team performance might serve to reinforce existing perceptions resulting in decreases in effort and performance. In an organizational setting, low collective efficacy perceptions should be heightened. Riggs and Knight (1994) suggest the benefits of cultivating experiences and perceptions of group success among employees. Managers should work to recognize and reward positive outcomes, carefully plan, and establish realistic goals that enable the group to experience success.
Hackman (1990) in a discussion of what makes effective and ineffective teams, points to the early histories of a team. Early experiences that team members share can start either a positive or negative spiral toward success or failure. Hackman suggests that it should be demonstrated that extra effort will be rewarded. Team members should be filled with hopes and expectations, not a feeling that a lack of opportunities exists in their work situation. As a team is developed or as new members are added to an existing team, positive outcomes should be carefully planned and management needs to foster the efficacy to be gained from early success. Once collective efficacy perceptions have been developed, those team members will set more difficult goals, and performance will be likely to increase.

This experiment did have limitations in the strength and clarity of the goal measures. This limited the support for the second and third hypotheses. Another limitation was the use of university students instead of organizational team members. Individual participants put together on a team for 20 minutes probably lacked the motivation, group cohesiveness, and knowledge of goal levels needed to find strong effects in goal setting.

Despite these problems, this study did find a strong relationship between collective interdependence efficacy and performance, and differences in collective efficacy perceptions based on the manipulation. Partial support for
the relationship of collective interdependence efficacy to goal setting was found, and moderate support for the goal setting to performance link resulted. Despite different goal dimensions, significant correlations and regressions were found in the directions predicted. This indicates that the constructs of collective interdependence efficacy and group self-set goals are still exerting their effects despite limitations. Correlational analyses were utilized, resulting in no causal information about the relationships. However, it is clear that collective interdependence efficacy, goals and performance are related in some way. This study gives evidence to the construct of collective interdependence efficacy as outlined in the Mischel and Northcraft model (1997). Future research needs to incorporate the collective task efficacy piece so that their entire model is tested. It is clear that this is a new area of research, and many replications in the field and laboratory should be done.
APPENDIX A: Collective Efficacy Scale

Please respond to the following questions by rating your response on a 5 point Likert scale. (Circle the number of the item you choose)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly Disagree</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Disagree to a small extent</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Neither agree nor disagree</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Agree to a small extent</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Strongly agree</td>
<td>5</td>
</tr>
</tbody>
</table>

1) We believe that our team has the ability to resolve a conflict that might arise in the next task.

2) Our team can coordinate actions to accomplish a difficult task.

3) Our team does not have the skills necessary to solve a problem that might be confronted in the next task.

4) Our team can set effective goals to accomplish a difficult task.

5) Members of our team share information and knowledge effectively.

6) Our team does not have the communication skills needed to tackle a difficult task.

7) I feel confident that our team can cooperate to achieve a difficult task.

8) My group has the ability and resources to handle challenges or demands that we may confront.

Please respond to the following questions with the following Likert Scale. (Circle the number of the item that you choose):

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not at all</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Small extent</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Moderate extent</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>High extent</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Completely</td>
<td>5</td>
</tr>
</tbody>
</table>

9) To what degree can your group do what is necessary to complete a difficult assignment successfully?

10) To what degree are you confident in your group’s overall ability?

11) To what degree can your group respond successfully to any task required of it?

12) To what degree is your group able to respond to unusual demands placed upon it?

Note: #3 and #6 were reversed scored
APPENDIX B: Goal Scale

1. In the next puzzle task, the goal of our group is to: (Circle the number of the response that corresponds to your answer)
   1. Complete the second puzzle 5-6 minutes slower than the first puzzle
   2. Complete the second puzzle 3-4 minutes slower than the first puzzle
   3. Complete the second puzzle 1-2 minutes slower than the first puzzle
   4. Complete the second puzzle in the same amount of time as the first puzzle
   5. Complete the second puzzle 1-2 minutes faster than the first puzzle
   6. Complete the second puzzle 3-4 minutes faster than the first puzzle
   7. Complete the second puzzle 5-6 minutes faster than the first puzzle

2. In the next task, the goal of our group is to: (Circle the number of the response that corresponds to your answer)
   1. Decrease our level of effort
   2. Put the same amount of effort in as we did in the last task
   3. Put a bit more effort in than we did on the last task
   4. Put a lot more effort than we did on the last task
   5. Work to this group's maximum potential

3. The goal of the group is to complete the next similar task (planning & production combined) in less than: (Circle the appropriate response)

   10 minutes  8 minutes  6 minutes  4 minutes  2 minutes

4. Please indicate the extent to which your group will try to attain the goal just indicated in question #3: (Circle the number of the response that corresponds to your answer)

   Will  Will  Will  Will  Will
   not try try try try try
   a little a medium a lot best
   bit amount

5. In the next task, will you try to: (Circle the number of the response that corresponds to your answer)

   1. Engage in the task with an emphasis on doing your personal best
   2. Engage in the task because the bottom line is doing it quickly
   3. Focus on the task with a little emphasis on team relations
   4. Pay attention to group members preferences and welfare while engaging in the task

6. In the next puzzle task, how much do you think your team can improve its performance level? (Circle the number of the response that corresponds to your answer)

   1. Performance will decrease a great amount
   2. Performance will decrease a little bit
   3. Performance will stay the same
   4. Performance will improve a little bit
   5. Performance will improve a great amount

7. The goal of my group is to complete the next puzzle task in:

   ____________ minutes.

8. Please estimate how many dollars (planning and production combined) you hope to spend in the completion of the second task. $ ____________.
REFERENCES


Development and validation of the Teamwork-KSA test. Paper presented at the annual meeting of the Society of Industrial and Organizational Psychology, Nashville, TN.


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