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ME AND US: DIFFERENTIAL RELATIONSHIPS AMONG GOAL SETTING TRAINING, EFFICACY AND EFFECTIVENESS AT THE INDIVIDUAL AND TEAM LEVEL

CEO PUBLICATION
T 98-22 (350)

CRISTINA B. GIBSON
Center for Effective Organizations

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The author would like to thank Ray Aldag, Randy Dunham, Dov Eden, Chris Earley, Ingo Holzinger, Ed Locke, Terry Mitchell, Jone Pearce, Lyman Porter, and Don Schwab for their helpful comments on earlier drafts of this paper. Funding for the research was provided by the Center for Creative Leadership and the Graduate School of Management, University of California, Irvine. Administrative support and/or translations were provided by C.J. Farrar, Heather Conwell, Laura Durham, Stephen Gibson, Peter Gibson, Alison Roots, Demce Simanjuntak, and Cok Susila.

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Abstract

Efficacy-effectiveness relationships were examined for individual nurses and nursing teams who were either trained or untrained in goal-setting. At the individual level, positive direct relationships were demonstrated between self-efficacy and effectiveness, between training and subsequent self-efficacy, and between training and effectiveness. Initial self-efficacy also moderated the training-effectiveness relationship. Nurses low in initial self-efficacy realized greater effectiveness gains from the training than did nurses high in initial self-efficacy. At the team level, group efficacy was related to effectiveness, and training was related to subsequent group efficacy, but training was not related to effectiveness, and there were no moderation effects for initial group efficacy. Collective cognition and behavioral plasticity are potential explanations for different effects at the individual and team level and avenues for theory development and future research.

Drawing upon theories of collective cognition and behavioral plasticity, this investigation explores the mechanisms at the individual and group level that affect the impact of goal-setting training. Specifically, the focus is on goal setting training, and the differential impact it has at each level of analysis. The argument is that individuals and teams low in initial efficacy will respond more to goal setting training than those high in initial efficacy, and that goal-setting training will impact subsequent efficacy and effectiveness. Theory and research in this regard represent important next steps in the development of a comprehensive model of efficacy effects that encompasses multiple levels, organizational interventions, and a dynamic perspective for efficacy-effectiveness relationships.

Two decades of research have provided evidence that self-efficacy, a person's belief in his or her capability to perform, is related to an individual's task performance (Barling & Beattie, 1983; Campbell & Hackett, 1986; Cervone & Peake, 1986; Eden & Kinnar, 1991; Eden & Zuk, 1995; Gist, Stevens & Bavetta, 1991; Hill, Smith, & Mann, 1987; Saks, 1994; 1995; Stajkovic & Luthans, 1998; Wood & Locke, 1987). The combined effects of personal goal-setting and self-efficacy provide an inclination and a target, often motivating the individual to become better focused on what will be required in order to perform effectively, such that they eventually reach their goals (Bandura, 1997; Bandura & Jourden, 1991; Locke & Latham, 1990; Latham & Lee, 1986; Locke, 1982; Locke & Latham, 1990; Locke, Mento & Katcher, 1978; Stajkovic & Luthans, 1998).

However, increasingly teams, rather than individuals, are becoming a more dominant mode of organizing, motivating, and managing (Mohrman, Cohen, & Mohrman, 1995; Osterman, 1994). Previous research has supported the link between team goals and team effectiveness (for a review see O'Leary-Kelly, Martocchio, & Frink, 1994), however, intervening mechanisms are unclear. A relatively new, but growing body of research suggests that similar social cognitive processes that occur at the individual level also occur at the team level (Campion, Medsker, & Higgs, 1993; Gibson, 1999; Guzzo, Yost, Campbell & Shea, 1993; Klimoski & Mohammed, 1994; Lindsley, Brass & Thomas, 1993; Parker, 1994; Porter, 1992; Prussia & Kinicki, 1996). These researchers have argued that the concept of group-efficacy, defined as "a group's collective estimate regarding the group's ability to perform a task objective" (Gibson, 1995: 27), is a

potentially important collective cognition with explanatory power for team effectiveness. The handful of empirical investigations that have been conducted to date suggest that as with self-efficacy, the level of group-efficacy within a team is positively related to the level of effectiveness exhibited by the team (Earley, 1994; 1999; Gibson, 1999; Guzzo, Yost, Campbell & Shea, 1994; Prussia & Kinicki, 1996).

Much of the literature on self-efficacy indicates that it is an important construct for managers to understand because it is malleable and can be incorporated into training efforts (Gist & Mitchell, 1992; Gist et al., 1991). Evidence exists that self-efficacy is related to training effectiveness (Earley, 1994; Gist, 1987) and individual learning (Salomon, 1984). No such evidence exists yet for the relationship between group-efficacy and training effectiveness on the team level; however, in one notable study, Earley (1994) investigated the effects of different forms of training, self-focused and group-focused, on self-efficacy and performance. Although Earley did not address team level outcomes, there is reason to believe that analogous processes will occur on the team level (Bandura, 1997). This study examined this possibility. Specifically, changes in individual effectiveness and team effectiveness were investigated following a goal-setting training intervention conducted with nurses and nursing teams in three hospitals. Nurses and nursing teams that received the goal-setting training intervention were compared with controls that received no intervention. Self- and group-efficacy were predicted to moderate the relationship between the goal setting training intervention and subsequent effectiveness.

Theoretical Background and Hypotheses

The expectations regarding the changes in efficacy and effectiveness presented here were developed in accordance with social-cognitive theory (Bandura, 1986; 1997), theories of collective cognition (Corner, Kinicki & Keats, 1994; Hinsz, Tindale & Vollrath, 1997; House, Rousseau, & Thomas-Hunt, 1995; Klimoski & Mohammed, 1994; Langfield-Smith, 1992; Lindsley, Brass, & Thomas, 1995; Sandelands & Stablein, 1987), and behavioral plasticity theory (Brockner, 1988; Eden & Zuk, 1995; Pierce, Gardner, Dunham, & Cummings, 1993; Saks & Ashforth, 2000).

Self-efficacy

Self-efficacy is a key construct in Bandura's (1986) social-cognitive theory. A central tenant of social cognitive theory is that self-efficacy plays a critical role in the relationship between ability and performance. It is not ability per say that predicts performance, but an individual's self-referent thought that makes the critical difference between a high performer and a low performer. Specifically, Bandura's key argument is that an individual's task-specific beliefs in his or her ability to perform a given task determines subsequent performance on that task. Several decades of research have confirmed this argument (see Stajkovic & Luthans, 1998 for a review). Research has also demonstrated that several factors affect self-efficacy, including past performance, vicarious experience, verbal persuasion, physiological and affective arousal, and cognitive integration of various forms of information (Bandura, 1997). Thus, by stimulating change in any one of the factors in order to boost self-efficacy, performance is subsequently enhanced. Hence, based on social cognitive theory and preliminary empirical evidence, the following hypothesis is proposed:

Hypothesis 1: Self-efficacy is positively related to individual effectiveness.

Group-efficacy

Recent theorizing has suggested that a team's collective sense of capability may be an important determinant of its effectiveness (Bandura, 1986; Guzzo et al., 1993; Shamir, 1990). Although his focus was on self-efficacy, Bandura (1982; 1986; 1997) was among the first to suggest that performance beliefs exist at other levels of analysis. Following Bandura's initial conceptualization, researchers have empirically established that group-efficacy is a meaningful and measurable team attribute with important implications for team effectiveness (Campion, Medsker, & Higgs, 1993; Earley, 1993; Guzzo, Yost, Campbell & Shea, 1993; Zander & Medow, 1963). Several studies have demonstrated that group-efficacy is distinct from the individual beliefs group members hold about themselves or the group, because group-efficacy arises through group interaction and the process of collective cognition (Earley, 1999; Gibson, Randel & Earley, 2000; Parker, 1994). That is, group-efficacy forms as group members collectively acquire, store, manipulate, and exchange information about each other, their task, their context, process, and prior performance. These same

collective processes do not occur during self-efficacy formation or when members form individual beliefs about the group.

Levels of group-efficacy vary even among teams that appear to have equal skills, abilities and resources. For example, two teams of nurses who have equal training and supplies may hold very different beliefs about their team's ability to provide quality health care to the same patients. These beliefs may differ because the process of forming the beliefs is impacted by a variety of contextual factors, including the amount of information they have about their task, different processes of sharing this information and communicating, or because they may have different levels of commitment and identification among team members. Thus, teams that outwardly look similar in many respects, may form different beliefs about their teams' ability, due different team processes.

Because group-efficacy signals what a group thinks it can do, level of group-efficacy is likely related to how much effort the group expends. As previously mentioned, there is some evidence that these team beliefs about capabilities are related positively to team effectiveness (e.g., Campion, Medsker, & Higgs, 1993; Gibson, Randel, & Earley, 2000). Hence, based on theories of collective cognition and preliminary empirical evidence, the following hypothesis is proposed:

Hypothesis 2: Group-efficacy is positively related to team effectiveness.

Goal-setting Training

The second set of hypotheses proposed here addresses the impact of goal-setting training. A long line of research has investigated individual reactions to goal setting training, in which participants are actively involved in the process of setting goals, and given assistance in establishing those goals. This research provides evidence that such training impacts self-efficacy and individual effectiveness. First, with regard to self efficacy, research has indicated that the goal-setting training process clarifies performance expectations (Mitchell, 1973) and the link between actions and performance outcomes (Lawler, 1986; Schuler & Lee, 1982); allows for personal control over one's course of behavior (Erez & Kanfer, 1983; Staw, 1986); and in doing so, enhances one's sense of self-efficacy through verbal persuasion and vicarious

experiences such as the opportunity to see how similar others successfully develop strategies for goal attainment (Earley & Kanfer, 1985).

With regard to effectiveness, goal-setting interventions facilitate skill maintenance by encouraging trainees to set and meet goals for performance outcomes, and by impact the task strategies that increase effectiveness (Stevens and Gist, 1991: 958). The goals "energize performance by motivating people to exert effort in line with the difficulty of or demand of the goal or task..., goals motivate individuals to persist in their activities through time.." and "goals, especially if they are clear and specific, direct the individual's attention to relevant behaviors or outcomes and even affect how information is processed" (Locke & Latham, 1990: 94-5). Furthermore, positive evaluation of the goals and the goal-setting process leads to development of goal commitment and increases the value of goals to participants (Erez, Earley, & Hulin, 1985; Latham, Erez & Locke, 1988).

It should be recognized, however, that research also indicates that certain contextual factors may influence whether such training is experienced as positive (see Locke & Latham, 1990 for a review of this research). For example, Kanfer & Ackerman (1989) demonstrated that goal-setting can be detrimental for a complex task, and Shalley (1995) demonstrated conflicting results of goals on creativity and productivity outcomes. Conflict between personally set goals and externally directed goals produces less goal commitment (Erez, Earley & Hulin, 1985). Use of a "tell" style (direct, brief) during training, as opposed to a "tell and sell" style (polite, friendly, rational given), has been associated with less goal commitment (Latham, Erez, & Locke, 1988). Cultural differences in the level of power distance and individualism-collectivism has been shown to impact goal-setting processes (see Erez & Earley, 1993 for a review). Finally, recent research indicates that post training interventions can foster particular goal orientations in trainees (Gist et al., 1991; Stevens and Gist, 1997), which may or may not facilitate skill maintenance. Participative goal-setting post-training programs have demonstrated a positive impact on training transfer (Wexley & Baldwin, 1986).

In general, the preponderance of evidence illustrates mechanisms underlying a positive relationship between goal-setting training and subsequent self-efficacy and between goal-setting training and individual effectiveness, thus the following hypotheses are proposed:

Hypothesis 3: Individual goal-setting training positively affects self-efficacy (i.e., self-efficacy is higher for individuals who have received goal-setting training than for individuals that have not received the training).

Hypothesis 4: Individual goal-setting training positively affects individual effectiveness (i.e., individual effectiveness is higher for individuals who have received goal-setting training than for individuals that have not received the training).

Less research has been conducted to test the effects of goal-setting at the team level of analysis, however, preliminary evidence indicates positive effects for both group efficacy and group effectiveness. With regard to group efficacy, team-level goal setting can potentially increase cohesiveness, establishment of norms and routines, and increased efficiency of information processing. In support of this notion, team goals were found to positively affect outcomes such as satisfaction with the team process and cooperation among the members (Gowen, 1986; Matsui, Kakuyama, & Onglatco, 1987). All of these factors can potentially increase the level of group efficacy in the group. With regard to group effectiveness, studies have been generally demonstrated a positive impact of group goal-setting (Gowen, 1986; Matsui et al., 1987; Mesch, Farh, & Podsakoff, 1994; Mitchell & Silver, 1990; O'Leary-Kelly, Martocchio, & Frink, 1994; Mulvey & Ribbens, 1999). For example, in a meta-analysis of ten group goal-setting studies, O'Leary-Kelly et al. found that the effect size for group goals on group performance was large (d=.92). That is, groups that had goals performed about 1 standard deviation better than groups that did not have goals. In fact, in studies in which both individual goals and team goals were employed, team goals appeared to have stronger effects on performance. Based on the balance of the evidence, the following analogous relationships are predicted:

Hypothesis 5: Team goal-setting training positively affects group efficacy (i.e., group efficacy is higher for teams that have received goal setting training than for teams that have not received the training).

Hypothesis 6: Team goal-setting training positively affects team effectiveness (i.e., team effectiveness is higher for teams that have received goal setting training than for teams that have not received the training).

Moderation Effects

Much of the previous research would seem to suggest that both efficacy and training will have positive direct effects on effectiveness. However, a competing argument is that these effects are more complex, and may involve interaction effects. At the individual level, evidence that initial self-efficacy moderates the impact of interventions on skill acquisition and maintenance has been obtained by Gist and her colleagues in numerous studies (e.g., Gist, Stevens & Bavetta, 1991; Stevens & Gist, 1997). Self-efficacy is linked with task choices, effort, and persistence, as well as self-aiding or self-hindering thought patterns that accompany performance (Wood & Bandura, 1989). Self-efficacy facilitates learning and task performance, particularly early in the learning process (Mitchell et al. 1994 Gist & Stevens, 1997).

Behavioral plasticity theory offers a potential explanation for these effects. Behavioral plasticity refers to the extent to which an individual is affected by external factors (Brockner, 1988; Pierce et. al. 1993; Saks & Ashforth, 2000). According to the behavioral plasticity hypothesis, the attitudes and behaviors of individuals who have high self esteem are more susceptible to influence, external cues, environmental events, and social influences than those of persons with strong positive self esteem (Eden & Kinnar, 1991). Those with low self esteem are more malleable, or as Brockner has described, more 'behaviorally plastic' (Brockner, 1988).

Support for behavioral plasticity has most frequently involved comparisons of individuals with high and low self-esteem, which is a more stable personality characteristic than self-efficacy (Bandura, 1986) . However, many types of self-referent thoughts including self-efficacy and general self-efficacy demonstrate similar effects, leading Eden and Aviram (1993) to argue that either self-esteem or general self-efficacy can be used to test the behavioral plasticity hypothesis. Thus, general self-efficacy, defined as general self-referent expectations that individuals bring with them to new situations (Sherer et al., 1982), has also been included in numerous behavioral plasticity studies. Variables whose effects have been found to be stronger among workers with low self-referent thoughts have included peer group interaction (Mossholder, Bedian & Armenakis, 1982); role ambiguity and conflict (Mossholder, Bedian & Armenakis, 1981); performance feedback (Brockner, Derr, & Liang, 1987); lay offs (Brockner, Davy, & Carter, 1985); task performance

review (Pond & Hay, 1987); unemployment (Eden & Aviram, 1990); sea sickness (Eden & Zuk, 1995); volunteerism (Eden & Kinnar, 1991); and newcomers' adjustment to work (Saks & Ashforth, 2000).

Like self-esteem and general self-efficacy, task specific self-efficacy impacts how individuals respond to environment cues and performance feedback (Jex & Gudanowski, 1992). Thus, in line with the behavioral plasticity argument, individuals low in self-efficacy are likely to be more influenced by goal-setting training, since they have more to gain from the positive shift in attitude adjustment that often accompanies goal setting training. In addition, low self-efficacy individuals may realize greater performance benefits subsequent to training than those high in self-efficacy, because of their openness suggested changes in task strategies. Previous research supports this notion. For example, in a military setting, Eden & Zuk (1995) found that the effects of a training program were stronger among cadets with lower initial self-efficacy, than among those with high initial self-efficacy. The authors argued that results are suggestive of behavioral plasticity and demonstrate the ability to change behavior by verbally enhancing self-efficacy. A the same time, other research has failed to find a major benefit of goal setting training for low self-efficacy participants (Gist, et al, 1991), thus additional evidence is necessary to substantiate these relationships. Based on these arguments, the following hypothesis is proposed as a competing hypothesis for the direct effects:

Hypothesis 7: Initial self-efficacy moderates the impact of individual goal setting training on individual effectiveness, such that those with initial low self-efficacy respond more to the training than those high in self-efficacy.

There is also some evidence that efficacy acts as a catalyst or moderator for effects on group outcomes (Earley, 1994; Prussia & Kinicki, 1996; Riggs & Knight, 1994). For example, Riggs & Knight (1994) found that prior success and failure directly impacted satisfaction and commitment, and indirectly impacted these outcomes through a relationships with self-efficacy and collective efficacy. Likewise, Mulvey and Klein (1999: 84) found that although it did not completely mediate relationships among goal-setting and group performance, collective efficacy acts as a moderator and "is an important factor in getting groups to set and remain committed to difficult group goals which, in turn, are instrumental for improving group performance." As an alternative to the moderating role of group efficacy, Prussia & Kinicki (1996)

demonstrated a mediational effect of group efficacy. They found that group efficacy beliefs mediated the relationship between performance feedback and group effectiveness among their sample of brainstorming groups. However, full mediational effects for efficacy are rare, and partial mediation or moderation is more common.

At the team level, Fulton (1990) has provided initial evidence that behavioral plasticity may be an underlying mechanism for these effects. Following a training program that communicated guidelines for teacher evaluation methods, participants' team performance increased in the low group efficacy teams, but not in the high group efficacy teams. In a similar vein, Jex and Gudanowski (1992) predicted that individuals and teams with low efficacy would perceive organizational stressors as threatening, and would respond with more positive reactions to training than individuals and teams with high levels of efficacy. Their results supported this prediction for group efficacy, but not for self-efficacy.

In this study, the underlying rationale is that because low group efficacy teams are less certain and less confident about their own abilities to manage task-related factors, these teams will be more influenced by environmental cues, and are more likely to react positively to goal-setting training than teams high in group efficacy. Based on this argument and preliminary findings, the following hypothesis is proposed as a competing hypothesis for the direct effects at the group level:

Hypothesis 8: Initial group efficacy moderates the impact of team goal setting training on team effectiveness, such that teams with initial low in group efficacy respond more to the training than those high in group efficacy.

The proposed relationships were investigated in a field experiment conducted in three hospitals. Initial self-efficacy and group efficacy were measured, and then a subset of the nurses in each hospital participated in individual and team goal-setting training. This was followed by a second assessment of efficacy. Next, both individual and team effectiveness were observed by patients. The methods and results of this investigation are reported below.

Method

Sample

Nurses within hospitals provide a setting appropriate for this study. First, past research has indicated that variance could be obtained on the key variables of interest in this study (e.g., Asmos, McDaniel, & Duchon, 1990; Shortell & Zajac, 1990; Thomas, Clark, & Gioia, 1993). Second, the job of nurses working in teams requires them to work both interdependently and independently. Hence, nursing teams provide an opportunity to collect data on efficacy and effectiveness measures on both the individual and the team level. This study was part of a larger project investigating these factors over time using diverse methods and various hospital settings (see Note 1).

The three hospital sites selected were all mid-size (50-200 beds) and well matched in terms of facilities. A majority of the nurses at each site were employed in the in-patient general wards; the remaining nurses were employed in three additional types of wards: (1) out-patient wards, (2) emergency wards, and (3) obstetrics/maternity wards. Pre-assessment interviews were conducted with 5-10 nursing supervisors in each facility to: (1) identify teams, (2) develop the procedures, and (3) adapt effectiveness assessment techniques. All nurses within the hospitals were invited to participate. In all three hospitals, naturally occurring subsets of 4-6 nurses within a ward considered themselves permanent teams and shared the same schedule. Team members interacted regularly, frequently completing as a team tasks such as admitting and discharging patients, periodic recording of vital signs, and starting or changing an IV. The sampling strategy resulted in 43% participation at site #1, 55% participation at site #2, and 69% participation at site #3. Post-survey interviews confirmed that nurses who did not participate were unable to do so due to factors beyond their control such as scheduling conflicts (e.g., being called off duty due to low patient count, being scheduled off for vacations, or being absent due to illness). In both the individual level and team level analyses, each team was represented by the same 2-5 members with a mean representation of 2.7 nurses per team; actual team size varied from 4 to 6 nurses. Univariate analysis indicated that neither team representation nor team size predicted a statistically significant portion of the variance in either efficacy or effectiveness. Hence, size was not included in the subsequent analyses to test the hypotheses. The final

sample for both the individual and team level analysis in the treatment condition was 71 teams represented by 187 nurses.

For those participating, interviews with nursing supervisors indicated there were no organizational or team differences in resource availability, compensation structure, and human resource policies. Analyses of variance verified no systematic differences across organizations or wards in historical performance as measured by customer satisfaction surveys. Analyses of variance to responses to demographic surveys confirmed no statistically significant differences across organizations or teams in gender, age, years employed, education, or longevity of the team. In the final sample, 62 of the participants were male and 125 were female. They ranged in age from 22 to 63; the median age was 35 years. The average length of time employed was 12 years and the average length of education was 3 years. A majority of the teams had been intact for approximately four years. A series of univariate analyses of variance demonstrated that none of the demographic variables predicted a statistically significant portion of the variance in either efficacy or effectiveness. Hence, these demographic variables were not included in the subsequent analyses to test the hypotheses.

Design and Procedure

This study utilized a quasi-experimental design, involving one training and one control condition, with pre- (T1) and post-tests (T2) of efficacy and post-tests (T2) of effectiveness, at both the individual and team levels of analysis. Two thirds of the nursing teams were randomly assigned to the training condition and one third were assigned to the control condition. Nurses in the two conditions tended to be located on wards that were physically spread out over the entire hospital and therefore had minimal contact across conditions. This resulted in 120 nurses (representing 51 teams) in the training condition and 67 nurses (representing 20 teams) in the control condition. Post-survey interviews confirmed that nurses who did not participate were unable to do so due to factors beyond their control such as scheduling conflicts (e.g., being called off duty due to low patient count, being scheduled off for vacations, or being absent due to illness).

In the training condition, teams of nurses reported together to a conference room for a 1- day training session. Nurses were informed that the session was designed to improve quality of nursing care

through assessment, feedback, discussion of assessments, and action planning. Pre-session interviews indicated nurses were motivated to attend and interested in the results. Upon entering the room, they completed a short survey assessing baseline (T1) self-efficacy and group-efficacy and demographic characteristics. Next, a system for quality assurance was introduced by a researcher blind to the experimental conditions. The system was designed to assist the nurses in assessing their effectiveness in terms of quality of nursing care. As the system was introduced, it was emphasized that the nurses themselves would be involved in assessing quality of nursing care, and that the quality data would be distributed back to them for their own use in helping to improve quality. Nurses were guided through a goal-setting training program consisting of: (1) introduction to goal-setting and statement of values; (2) selection of individual goals and targets; (3) discussion of facilitators and impediments to individual effectiveness; (4) assessment of self-efficacy (T2). After a mid-day break, the nurses participated in: (1) selection of team goals and targets; (2) discussion of facilitators and impediments to team effectiveness; and (3) assessment of group-efficacy (T2).

This program was designed based on the guidelines developed by Locke and Latham (1990) and included a brief review of the basic principals of goal setting and an overview of research demonstrating the impact of goal setting. Next, the value-statement step helped nurses to develop a general mission. An example of a nursing value statement developed by one of the nurses is, *"Accurate and efficient care provided in a sensitive manner."* Nurses were they guided through the process of establishing a more specific "focal care goal." To facilitate this, they were encouraged to review the criteria by which they would be evaluated (i.e., the Quality of Care Assessments). They were then asked to prepare a statement of their focal care goal based on the aspects of care they wanted most to improve. A sample goal set by one of the nurses using this process is, *"Learn to adapt nursing procedures to meet needs of individual patients for daily medical treatment."* Next, nurses brainstormed facilitators and impediments to achievement of their goals. As a final step in the training, the nurses were asked to complete the efficacy surveys in which they anticipated what level of care they would be capable of providing (see below).

Two weeks following the training session, survey instruments designed to measure quality of care (described below) were randomly distributed by nursing supervisors to patients. Consultation with nursing supervisors indicated that this time period was optimal for purposes of monitoring quality of care and instituting subsequent changes. It allowed nurses enough time to institute behavioral changes, while still maintaining recency of the program and also fit well with the overall training efforts established at the hospitals.

The first meeting was conducted in a similar manner for the control condition, but without any goal-setting training. The nurses in this condition were also asked to report to a conference room where the project was introduced. Upon entering the room, they completed a short survey assessing baseline (T1) self-efficacy and group-efficacy and demographic characteristics. Next, the quality assessment process was described. After a short break, the nurses completed a second assessment of self-efficacy and group-efficacy (T2). They were not given goal-setting training, no attempt was made to explain the goal-setting process, and there was no discussion of facilitators and impediments. Two weeks following the session, survey instruments designed to measure quality of care (described below) were then distributed to patients.

All quality assessments were submitted to the researcher by the end of the third week of the program. The researchers compiled the assessments and created feedback reports for each individual and each team. During a final session at the end of the study, results were fed back to the participants and the researchers facilitated discussions of action plans for improving quality of care. At the end of this session, the researchers conducted post-assessment interviews. These interviews verified that participants were blind to the experimental conditions and were unaware of the hypotheses. When this had been confirmed, the researchers debriefed the participants as to the purpose of the study. Participants in the control (no training) condition then received the same goal-setting training as was delivered in the training condition.

Measures

Team effectiveness. Patients rated the dependent variable *quality of nursing care* using a modified 20-item version of the Quality of Patient Care Scale (Qualpac) (Wandelt & Ager, 1974). This instrument is in widespread use today (Harvey, 1991; Norman & Redfern, 1993) and is comparable to other measures of

service quality (e.g., Parasuraman, Zeithaml, & Berry, 1994). Sample items included: "*The team recognizes physical distress and uses technology to provide relief for the patient*" and "*The team creates an atmosphere of mutual trust, acceptance, and respect with patients*".

Each team was rated by 4-5 randomly selected patients using a 5-point scale (1=poorest care; 5=best care). The average James et al. (1993) within-group agreement (r_{wg}) of the ratings was .95. As a second test verifying the degree of agreement among raters, the average deviation index was computed for each team and for the sample as a whole (Burke & Dunlap, 2000; Burke, Finkelstein & Dusig, 1999). This index is a measure of inter-rater agreement for judges' ratings of a single target on a single occasion. The average absolute deviation is computed relative to the mean of each item (AD_M) and provides a direct assessment of inter-rater agreement in the units of the original measurement scale. The AD for each item can then be averaged across a scale to arrive at an overall assessment of agreement. For a 5-point Likert scale such as that utilized here, Burke & Dunlap (2000) recommended a 1.0 cut off for acceptable inter-rater agreement using the AD index. For the team effectiveness ratings in this study, the average deviation index for each team ranged from .05 to .92, with a mean of .49 and SD of .19 across teams. This indicates that that for most teams, scores provided by different raters were within half a point of each other on the 5-point scale. Given this, all raters scores on each item were averaged for each team.

Given that the survey is designed to measure a single underlying dimension, the items were then subjected to principal component analysis. Results confirmed all 20 items loaded on one factor, with an eigen value of 12.95 accounting for 64.7 percent of the variance. Based on these results, scores across the 20 items were averaged to arrive at a composite score for quality of care for each team.

Individual effectiveness. Individual quality of care was assessed using an adaptation of the instrument described above. Rather than referring to the team as a whole, items referred to care provided by an individual nurse. Again, a random selection of 3-4 patients completed the scale for each nurse. The average James et al. (1993) within-group agreement (r_{wg}) of the ratings was .96. The average deviation index for each individual ranged from .00 to .85, with a mean of .12 and SD of .16 across individuals. This indicates that for most individuals, average scores provided by different raters were within one-fourth a

point of each other on the 5-point scale. Given this, all raters scores on each item were averaged for each individual. A similar one-factor structure was obtained on the individual version of the instrument. Based on these results, scores across the 20 items were averaged to arrive at a composite score for individual effectiveness.

Self-efficacy. Task-specific self-efficacy was measured with a 5-item scale developed by Locke, Frederick, Lee, and Bobko (1984). Each item represented a different level of overall effectiveness (Item #1=lowest level of effectiveness; #5=highest level of effectiveness). The participants were asked to rate their self-efficacy for each level of effectiveness in terms of the quality of care they provide on a specific aspect of care using a 100-point certainty scale, where 0 = certain that the performance level cannot be achieved, and 100 = certain the performance level can be achieved. Participants were informed that ratings for their performance would be based on patients' responses to the quality of care scale. The quality of care scale was distributed to participants for their reference in formulating self-efficacy. After participants had completed their certainty for achieving each level of effectiveness, a composite measure of self-efficacy was computed by taking the average across the levels. As described above, each respondent completed this measure twice, once at the beginning of the first session (T1) and again at the end of the session (T2).

Group-efficacy. Group-efficacy was measured with a 5-item survey developed based on the recommendations provided by researchers constructing measures of group-efficacy (Gibson, Randel, & Earley, 2000; Gist, 1987; Guzzo et a. 1993; Zander & Medow, 1963). This measure is a true group-level index and best reflects the collaborative process through which group efficacy is formed and operates (see Note 2). Each team received one copy of the survey. Each item represented a different level of task-specific effectiveness (Item #1=lowest level of effectiveness; #5=highest level of effectiveness). The team was asked to discuss how certain it was that the team would achieve each level of effectiveness and indicate its certainty using a 100-point scale (0=certain the effectiveness level cannot be achieved;100=certain the effectiveness level can be achieved). Participants were informed that the team's performance would be based on patients' average ratings on the quality of care scale. The team quality of care scale was distributed for the teams' reference in formulating group-efficacy. The certainty scores for each level of effectiveness

were obtained through open discussion and interaction as team members reviewed previous experience, situational constraints, and factors expected to facilitate the team's effectiveness. One team member then recorded certainty scores for each of the five levels of effectiveness on the team's survey. A composite measure of group-efficacy was computed by taking the average across the performance levels for each team. As described above, each team completed this measure twice, once at the beginning of the first session (T1) and again at the end of the session (T2).

The differential validity of the self-efficacy and group-efficacy measures was assessed by conducting a confirmatory factor analysis in which items from both measures were combined. All items on the self-efficacy scale loaded on the first factor having an eigenvalue of 5.05 and accounting for 50.5% of the variance. All items on the group-efficacy scale loaded on a second factor having an eigenvalue of 2.63 and accounting for 26.3% of the variance. These results suggest the distinctiveness of the self-efficacy and group-efficacy measures.

Training. Training was measured as a dummy variable. A "1" was assigned to all members of teams that did not receive the training. A "2" was assigned to participants that did received the training.

Results

Overview of Analyses

Since this study addresses constructs on both the individual and the team level, analyses for the individual-level hypotheses were conducted using individual-level data. Analyses for the team-level hypotheses were conducted with the team-level data. Descriptive statistics and zero-order correlations were computed to test hypothesized bivariate relationships. To test the moderation hypotheses, hierarchical OLS regression analysis was employed.

Tests of Hypothesized Bivariate Relationships

Table 1 reports cell means for the training and no training conditions. Table 2 reports the descriptive statistics and zero-order correlations among all variables. In support of Hypothesis 1, initial self-efficacy (T1) was positively related to individual effectiveness ($r = .42$, $p < .001$). In support of Hypothesis 2, initial group-efficacy (T1) ($r=.33$, $p<.001$) was positively related to team effectiveness. Training was positively

related to T2 self-efficacy (r=.36, p<.001) and T2 group-efficacy (r=.24, p<.05), confirming Hypotheses 3 and 5 respectively. Independent t-tests support this finding. T2 self-efficacy was significantly higher in the training condition than in the no training condition (t=-5.57, df=185, p<.001) and T2 group-efficacy was significantly higher in the training condition than in the no training condition (t=-2.08. df=69, p<.05). The correlation matrix also supports Hypothesis 4 regarding the training-effectiveness relationship at the individual level (r=.41, p<.001). Independent t-tests provide additional evidence for this relationship. The mean level of effectiveness for nurses that attended the training was 4.58; the mean level of effectiveness for nurses that did not attend the training was 4.08 (mean difference =-.49, t=-6.43, df=185, p<.001). The training-effectiveness relationship was not significant at the team level. Teams that did not attend the training were equally as effective as teams that did, providing no support for Hypothesis 6.

Insert Table 1 and 2 about here

Tests of Moderation Hypotheses

The top half of Table 3 displays the results of the first regression model estimated. This first model was computed to estimate the effects of training, T1 self-efficacy and an interaction term representing the multiplicative interaction of training x T1 self-efficacy on individual effectiveness. In the first step, T1 self-efficacy predicted a significant portion of the variance in individual effectiveness (R^2 = .17, F=37.19 p<.001). In the second step, training (Beta = .30, t=4.27, p < .001) predicted a significant portion of the variance in individual effectiveness (ΔR^2 = .08, ΔF=18.24, p<.001). In the third step, the training x T1 self-efficacy interaction term was entered to test the moderating effect of initial self-efficacy on the relationship between training and individual effectiveness. In support of Hypothesis 7, including the interaction term (Beta=-.26, t=-2.29, p<.05) significantly improved the predictive power of the model (ΔR^2 = .02, ΔF=5.23, p<.05), indicating that initial self-efficacy moderated the impact of training.

To further investigate this interaction effect, subgroup analyses were conducted. Nurses were split into three equal sets based on their T1 self-efficacy score using the percentiles function in SPSS. The set lowest in T1 self-efficacy was then compared to the set highest in T1 self-efficacy. For the low self-efficacy

nurses, there was a significant difference in effectiveness between nurses that attended the training (mean effectiveness = 4.45) as compared to nurses that did not attend the training (mean effectiveness = 3.97) (mean difference=-.48, t=-3.77 df=49, p<.001) and the relationship between training and effectiveness was positive and significant (r=.47, p<.001). For the high self-efficacy set, nurses that did and did not attend the training were equally effective (training mean=4.79; no training mean=4.63; mean difference=-.16, t=-.94, df=61, ns) and there was no relationship between training and effectiveness. These results confirm Hypothesis 7.

Insert Table 3 about here

The team-level hypotheses were tested by performing a second stepwise regression estimating the effects of training, group-efficacy, and an interaction term representing the multiplicative interaction of training x group-efficacy on team effectiveness. The lower half of Table 3 displays the results of this model. In the first step, T1 group-efficacy predicted a significant portion of the variance in team effectiveness (R^2 = .11, F=8.68, p<.01). In the second step, training (Beta =-.16, t=-1.34, ns) failed to predict a significant portion of the variance in team effectiveness. In the third step, the training x T1 group-efficacy interaction term was entered to test the moderating effect of initial group-efficacy on the relationship between training and team effectiveness. Contrary to Hypothesis 8, including the interaction term (Beta=.16, t=.59, ns) did not improve the predictive power of the model (ΔR^2 = .004, ΔF=.35, ns), indicating that initial group efficacy did not moderate the impact of training.

Discussion

The purpose of this study was to analyze the relationships among goal-setting training, self- and group-efficacy beliefs, and individual and team effectiveness. It was predicted that efficacy and training would be positively related to effectiveness at both the individual and team level, and that training would be positively related to subsequent efficacy levels. Competing hypotheses for these direct effects were also

proposed. It was argued that initial self-efficacy would moderate the effect of training on individual effectiveness and that initial group efficacy would moderate the effect of training on team effectiveness.

At the individual level, in support of Hypothesis 1, self-efficacy was positively related to individual effectiveness. In support of Hypothesis 3 and 4, subsequent self-efficacy and individual effectiveness were higher for nurses who received training as opposed to those who did not receive the training. Support was also obtained for moderating effects of initial self-efficacy on the relationship between training and individual effectiveness (Hypothesis 7). Results were very different at the team level. In support of Hypothesis 2, group-efficacy was positively related to team effectiveness and in support of Hypothesis 5, training was positively related to subsequent group efficacy. However, no support was obtained for Hypothesis 6 regarding the relationship between training and team effectiveness, and there was no evidence of moderating effects of initial group efficacy on the relationship between training and team effectiveness (Hypothesis 8).

Theoretical Contributions

The findings obtained in this study at the individual level support claims made by social-cognitive theory (Bandura, 1986; 1989) that self-efficacy is related to effectiveness, and that training is related to subsequent self-efficacy. There were significant increases in self-efficacy in the training condition, but no such increases in the no training condition. In support of the behavioral plasticity argument, comparing nurses with the lowest self-efficacy to those nurses with the highest self-efficacy, it was those with the lowest self-efficacy that benefited the most from the training. At the individual level, training appears to influence self-efficacy and individual effectiveness through similar mechanisms. Social cognitive theory would predict that the primary training mechanism is a focusing effect in which individuals become more aware of facilitators and constraints on their individual performance. This helps individuals to calibrate their self-efficacy belief; it also likely leads to better strategizing and superior task performance.

At the team level, group efficacy was related to team effectiveness. Only a few studies have demonstrated such a relationship (Gibson, 1999; Guzzo, Yost, Campbell & Shea, 1993; Little & Madigan, 1994; Parker, 1994; Prussia & Kinicki, 1996). Training was also related to subsequent group efficacy.

There were significant increases in group efficacy in the training condition, but no such increases in the no training condition. Thus, the findings reported here provide additional evidence that efficacy effects occur at the team level, indicating that the basic tenants of social cognitive theory are applicable to the team level of analysis.

However, at the team level, the findings regarding training and effectiveness and the moderating effects of initial efficacy were very different from those obtained at the individual level. At the team level, training had no impact on team effectiveness. A possible explanation for this may pertain to the nature of the nurses' work tasks. Much of the work the nursing teams perform is collaborative; however, some components are performed individually. It may be that nurses have more control and adaptability in completing the individual components of their work which do not require coordination and integration (e.g., dispensing medication, checking vital statistics), than they do in completing those tasks that are performed collaboratively and thus require more coordination (e.g., joint administration of an IV or physical therapy). If this is true, then improving the individual components (i.e., individual effectiveness) may be much easier than improving the collaborative components of the job (i.e., team effectiveness). Goal-setting training might then have a greater impact on the individual components. Coordinative control may be an important boundary condition for the impact of goal-setting training at the team level. Future research should compare teams with low and high control over the collaborative components of their task in order to tease out whether or not goal-setting training has a differential impact based on the degree of control.

A second theoretical implication pertains to social cognitive theory and collective cognition. As described earlier, in conjunction with social cognitive theory, self-efficacy has been proposed as both a moderator and mediator in links between inputs and subsequent performance. Group efficacy has most often been investigated as a moderator, although Riggs and Knight's research is a notable exception that obtained mediating effects for group efficacy. In the current study, based on behavioral plasticity, it was proposed that group efficacy would act as a moderator, as opposed to a mediator. However, findings suggested that although training was not related to effectiveness, training *was* related to group efficacy, and group efficacy was related to subsequent effectiveness. Although this is not a definitive test, these findings

provide some preliminary evidence that group efficacy effects are more complex than self-efficacy effects. Future research should investigate this notion to determine specifically whether behavioral plasticity effects do indeed occur at the team level, given other types of interventions. In this research, it will be critical to focus on interventions that are uniquely team-based. For example, potential interventions that may be of interest include those designed to increase team cohesion, improve team conflict resolution, or increase team communication effectiveness.

Limitations and Additional Directions for Future Research

Despite the contributions of this study, some limitations must be noted. This study was part of a larger project examining efficacy and effectiveness at numerous points over time; however, due to the complexity of the design and constraints imposed by the nursing supervisors, only effectiveness data representing one point in time were sufficient in sample size to test differences in training and no training teams. Previous research has identified what Lindsley et al. (1995) refer to as efficacy-performance spirals. On the individual level, evidence has been found that links self-efficacy to the level of prior performance (e.g., Bandura & Jourden, 1991, Lindsley et al., 1995). A similar relationship has been proposed by Prussia and Kinicki (1996) on the team level of analysis. Therefore, pre- and post-intervention measures of individual and team effectiveness would have been optimal.

The one design feature that helped to ameliorate this limitation is random assignment. Since the teams were randomly assigned to the training versus no training conditions, we can be relatively confident that pre-existing differences in ability did not account for the results reported here. However, in future research, it would be desirable to control for previous levels of effectiveness and to measure subsequent levels of these variables at numerous points in time to determine if the goal-setting training has any effects over the longer term.

In addition, due to the field nature of this experiment, several potential additional limitations should be noted. First, there is the possibility that contamination effects may have occurred between the training and no training conditions (i.e., nurses in the no training condition may have discovered the different treatment and responded in such a manner that confounds the results). Post-study interviews did not indicate

any evidence that this occurred; indeed, the nurses were unaware of the purpose and hypotheses of the investigation. However, there may be some cause for concern regarding alternative explanations for the results obtained. Second, patients' ratings may have been skewed due to demand characteristics of the design. Several precautions helped to mitigate this concern, including the detailed instructions provided to both patients and nurses, the coding scheme, provision of envelopes in which to seal surveys, the discarding of any surveys that were not sealed, and the use of survey return containers located on the wards. Unfortunately, these procedures also had the negative side effect of reducing the sample size, which poses a threat to the validity of the results. At the same time, patients are an excellent independent source of data about nursing care, and the use of patients as opposed to nurses themselves helped to minimize same source bias. Finally, since this research was conducted in a single type of industry setting (i.e., nurses in hospitals) there may be limitations to the generalizability of this research. Future research should investigate these hypotheses in other settings with participants engaged in other occupations. In general, it should be noted that these four aforementioned factors represent risks in any field experiment; but the realism of the field context affords numerous benefits in terms of the generalizability of the results.

Conclusions

This study contributes to social cognitive theory and behavioral plasticity theory by providing preliminary evidence of differential effects at the individual and group levels. Future research should investigate these effects over time testing a variety of interventions to determine whether results hold as teams develop and across numerous types of team tasks. In addition, this study provides critical data on group efficacy, a relatively new construct in team research. Similar constructs have proved valuable for understanding motivational processes that occur on the individual level. Including group efficacy in subsequent studies of work teams appears important for understanding the complexity of team effectiveness.

Notes

1. In conjunction with the larger project, Gibson (1999) conducted managerial simulations and additional waves of survey data collection with the nursing teams to investigate the hypothesis that the relationship between group efficacy and group effectiveness is complex and moderated by several contingency factors. None of the data in the 1999 study were included here. Findings from the 1999 study supported the contingency approach. When task uncertainty was high, team members worked independently, and collectivism was low, group efficacy was not related to group effectiveness. In contrast, when groups knew what was required to perform a task, worked interdependently, and valued collectivism, the relationship between group efficacy and group effectiveness was positive.

2. Previous research (using an entirely different data set and different methodology) has demonstrated that the measure of group efficacy utilized in this study (group perceptions of group efficacy) is highly correlated (e.g., $r=.65$, $p<.001$) with measures of individual perceptions of group efficacy in which individual members rate the group's capability and the ratings are aggregated to the group level (Gibson, Randel & Earley, 2000). Because of this convergence, an additional criteria of construct validity suggested by Bar Tal (1982) was utilized to select the measure that would be utilized in testing the hypotheses in this study. Bar-Tal argued that in order to best represent an attribute of a group, the origin of the construct must reflect the processes of interaction within the group. The measure which records group perceptions of group efficacy fulfills this validity criteria in that it requires the group to interact and combine information as would be expected in the normal day-to-day routine of work groups. Since it best reflects the theoretical framework presented here which emphasizes collaborative group processes, this measure is best suited for this study. The group perceptions measure of group-efficacy was also chosen in order to reduce the potential bias associated with common method variance. Common method variance occurs when the independent variables and dependent variables in an analysis are both measured using the same method and/or same set of respondents. The shared group perception method of measuring group efficacy is distinct from the more individual-level method of measuring quality of care.

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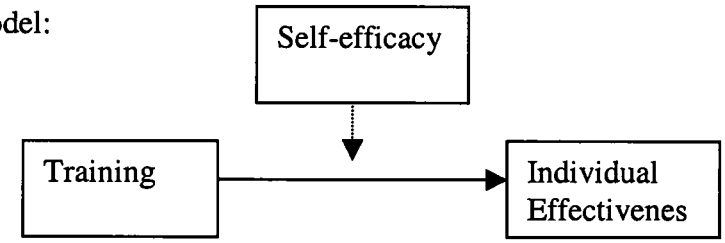
Figure 1.

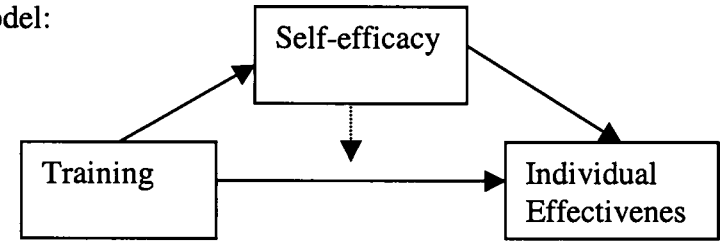
Proposed and resultant models

Individual Level of Analysis

Proposed Model:

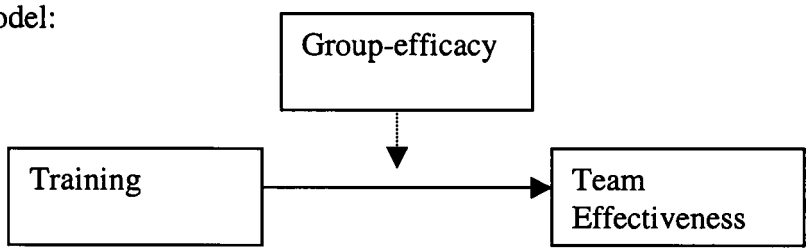


Resultant Model:



Group-level of Analysis

Proposed Model:



Resultant Model:

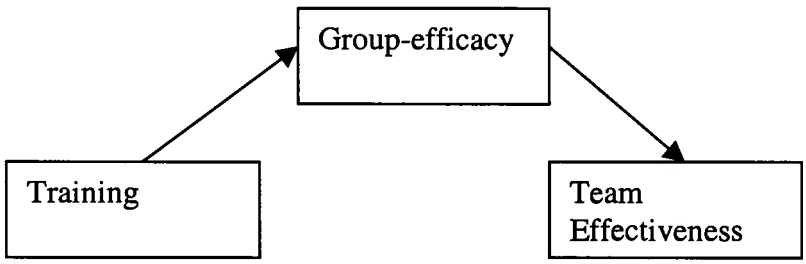


Table 1

Cell Means

	Training	No Training	Total
Individual Level	n=120	n=67	n=187
T1 self-efficacy	80.06	78.45	79.98
T2 self-efficacy	88.75	79.71	85.84
Individual effectiveness	4.58	4.08	4.39
Group Level	n=51	n=20	n=71
T1 group efficacy	68.02	67.03	67.95
T2 group efficacy	80.18	67.63	76.64
Team Effectiveness	4.14	4.19	4.15

Table 2

Descriptive Statistics and Zero-Order Correlations among all Variables

Individual Level (n=187)	M	s.d.	1	2	3	4
1.) Individual effectiveness	4.39	.56	1.00			
2.) T1 Self-efficacy	79.98	9.40	.42***	1.00		
3.) Attendance at training[a]	1.63	.48	.41***	-.04	1.00	
4.) T2 Self-efficacy	85.84	11.45	.23***	.78***	.36***	1.00

* p < .05; ** p < .01; *** p < .001
[a]1=no, 2=yes

Group Level (n=71)	M	s.d.	1	2	3	4
1.) Team effectiveness	4.15	.48	1.00			
2.) T1 Group-efficacy	67.95	19.87	.33**	1.00		
3.) Attendance at training[a]	1.72	.45	-.07	.14	1.00	
4.) T2 Group-efficacy	76.64	23.40	.27**	.89***	.24*	1.00

* p < .05; ** p < .01; *** p < .001
[a]1=no, 2=yes

Table 3

Multiple Regression Analysis of the Effects of Goal-Setting Training and Efficacy on Effectiveness

Individual Level Variables	Beta	t	Beta	t	Beta	t
T1 Self-efficacy	.42	6.10***	.31	4.43***	.40	5.02***
Goal-setting Training			.30	4.27***	.47	4.59***
Training x T1 Self-efficacy					-.26	-2.29*
df	(1,185)		(1,184)		(1,183)	
R^2	.17		.25		.27	
adj. R^2	.17		.24		.26	
F	37.19***		29.51***		21.89***	
ΔR^2			.08		.02	
ΔF			18.24***		5.23*	

Group Level Variables	Beta	t	Beta	t	Beta	t
T1 Group-efficacy	.33	2.95**	.37	3.20**	.28	1.40
Goal-setting Training			-.16	-1.34	-.24	-1.30
Training x T1 Group-efficacy					.16	.59
df	(1,69)		(1,68)		(1,67)	
R^2	.11		.13		.14	
adj. R^2	.10		.11		.10	
F	8.68**		5.28**		3.60*	
ΔR^2			.02		.004	
ΔF			1.79		.35	

Note. $^{\dagger}p<.10$; * $p < .05$; ** $p < .01$