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**THE EFFICACY ADVANTAGE: FACTORS
RELATED TO THE FORMATION OF
GROUP EFFICACY IN WORK GROUPS
ACROSS CULTURES**

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ABSTRACT

Extending previous research investigating factors related to the formation of group efficacy, this research examined predictors across cultures and groups of various types. Based on theories of collective cognition, hypothesized predictors included self-efficacy, group affect, status differential, and collectivism; these were investigated using two methodologies (simulation and field study) each conducted in two cultural contexts. Self-efficacy, group affect, and collectivism were significant predictors, explaining between 27 and 49 percent of the variance in group efficacy across the studies. Implications for theory and research are discussed.

Key Words: group efficacy, self-efficacy, collective cognition, group information processing, social cognitive theory, affect, status, collectivism, culture

A group's belief in its ability to perform, alternately referred to as group efficacy (Gibson, 1999; Gibson, Randel & Earley, 2000), group potency (Guzzo, Yost, Campbell, & Shea, 1993), and collective efficacy (Bandura, 1997), has a demonstrated impact on group effectiveness, yet we know very little about how group efficacy forms and operates. Just as self-efficacy is a product of individual social cognition (Bandura, 1997), group efficacy is a product of collective cognition. Drawing upon theories of collective cognitive processes, it is argued here that group efficacy beliefs vary across groups because the configuration of factors that impact the cognitive process differs from group to group. Given the predictive value of group efficacy for group effectiveness, gaining insight into this variance in the formation of group efficacy is important for predicting and improving the effectiveness of collaborative group-based approaches to work.

This paper begins with a brief review of research which has addressed efficacy beliefs at the individual level. Next, factors that play a role in collective cognition important for group efficacy are delineated based on research presented in the social psychology, organizational behavior, and communication literature. Hypotheses regarding factors are developed. This framework is then tested in two empirical studies using distinct methods and conducted in different cultural and group contexts with large samples of groups. Results are discussed in terms of implications for collective cognition theory and research.

Self-efficacy

Social Cognitive Theory (Bandura, 1986; 1997) has proven to be a useful framework for predicting and directing individual work behavior. The social portion of this theory acknowledges that the origins of human thought and action often lie outside the individual. The cognitive portion recognizes the influential causal contribution of thought processes to human motivation, affect, and action. Social Cognitive Theory focuses primarily on the individual, and

a major underlying assumption of the theory is that self-referent thought mediates the relationship between knowledge and action. In other words, even though a person may possess certain skills, whether they will use them well under diverse circumstances is dependent upon the person's thought processes as he or she approaches tasks. It is for this reason that different people with similar skills, or the same person on different occasions, may perform poorly, adequately, or extraordinarily (Bandura, 1986: 391).

Self-efficacy, an individual's belief in their own capability to perform a task, is a major component of Social Cognitive Theory. Research investigating individual work behavior has demonstrated that the higher the level of self-efficacy, the better an individual performs (Barling & Beattie, 1983; Campbell & Hackett, 1986; Cervone & Peake, 1986; Earley, 1993; Eden & Aviram, 1993; Gist, Stevens & Bavetta, 1991; Hill, Smith, & Mann, 1987; Stajkovic & Luthans, 1998; Wood & Locke, 1987). It is important to note that previous theoretical and empirical research on efficacy has placed a central emphasis on the *cognitive components* of such beliefs. Formation of self-efficacy is viewed as a result of thinking through the task at hand, past performance, and factors associated with the current situation. Subsequently, the belief then influences individual thought, behavior and action. Key factors with a demonstrated influence on the formation of self-efficacy beliefs include: previous performance, vicarious learning, social persuasion, and physiological or psychological arousal (Bandura, 1997).

Numerous theorists have proposed that the similar phenomena predicted and observed in accordance with self-efficacy are also applicable at the group level (Bandura, 1997; Guzzo, 1986; Klimoski & Mohammed, 1994; Lindsley, Brass & Thomas, 1995; Zaccaro, Blair, Peterson & Zazanis, 1995). Much of this research has investigated group efficacy as one type of group-level cognitive product. Group efficacy represents a group's belief in its capability to perform

effectively, and is analogous to self-efficacy at the individual level. The empirical studies that have been conducted at the group level to date indicate modest relationships between group beliefs and group performance (Campion, Medsker, & Higgs, 1993; Earley, 1993; Gibson, 1999; Guzzo, Yost, Campbell, & Shea, 1993; Hackman, 1990; Larson and LaFasto, 1989; Little & Madigan, 1994; Parker, 1994; Prussia & Kinicki, 1996; Sayles, 1958; Guzzo & Shea, 1992; Zander & Medow, 1963), although there is some evidence that this relationship is more complex at the group level than at the individual level (Gibson, 1999). Gibson (1999) demonstrated that group efficacy can sometimes have a positive, neutral, or even detrimental impact on team effectiveness, depending upon several internal contingencies related to the group's task and external contingencies related to the group context. These factors moderated the relationship between group efficacy and group effectiveness. Thus, in order to fully understand the impact of group efficacy, we need a theory that captures potentially unique factors at the group level that determine variance in group efficacy across groups. As argued below, these factors are likely somewhat different from those that predict self-efficacy, although they are analogous in important ways (Prussia & Kinicki, 1996).

Collective Cognition

Collective cognition is the process of accumulation, interaction, examination, and accommodation of information in a collective (Gibson, 2001). Just as self-efficacy results from the process of individual social cognition, group efficacy results from the process of collective cognition, and group efficacy is one type of cognitive product that results from this process. The paragraphs that follow present a brief overview of the process of collective cognition, drawing upon group efficacy as an illustrative cognitive product.

During the accumulation phase of collective cognition, new incoming information is acquired, filtered, and then stored for processing (Gibson, 2001). It is in this phase that the "raw material"-- that is, the bits of evidence and information from which group efficacy will be formed --comes into the group's awareness. During the interaction phase of collective cognition, information is retrieved, exchanged and structured (Gibson, 2001). Several theorists have suggested that the extent to which groups exhibit this characteristic of information processing will depend on whether they maintain some sort of long-term memory; these theorists are quick to point out, however, that group memory may not necessarily resemble human memory (Roberts, 1964; Sandelands & Stablein, 1987; Walsh & Ungson, 1991). Long term group memory systems probably consist of a store of ideas about a group codified by patterns of communication and sustained despite turnover in the group. Information is likely contained in "bundles" alternatively referred to as frames (Shirvastava & Schneider, 1984), team schema (Rentsch, Hefner, & Duffy, 1994), and team mental models (Klimoski & Mohammed, 1994). These structures allow members to create shared representations, that can then be used to visualize, articulate and use stored knowledge collectively to assign meaning to new incoming information (Corner et al., 1994). In other words, members share subjective impressions of what has occurred or what may occur based on what has been stored, and these impressions are utilized to form group efficacy (Gibson, 2001). This integrated body of knowledge is then used in subsequent stages as the group efficacy belief takes shape and processing continues.

During the examination phases of collective cognition, group members negotiate, interpret, and evaluate the knowledge available to them. This process is similar to that referred to as "attribution" at the individual level of analysis (Gist & Mitchell, 1992). At the group level, however, the assessment is arrived at through collective interpretations that arise out of

interactions among members, rather than any one individual's interpretation (Leary & Forsyth, 1987). Through processes of communication and discussion, information is combined and weighted as more or less important for group efficacy belief. These same collective processes do not occur during self-efficacy formation or when members form individual beliefs about the group. These processes are unique to collective cognition. Note that with time, group efficacy for a given objective probably becomes a relatively stable formulation and is only reformulated when corresponding changes occur in the factors associated with efficacy beliefs. This stable, quick, and superficial estimate is analogous to automatic information processing at the individual level of analysis (Earley & Shalley, 1991; Gist & Mitchell, 1992).

The final phase of collective cognition can be thought of as accommodation (Gibson, 2001) and involves integrating, deciding, and acting on the information processed in previous phases. Members share meaning systems and make relevant comparisons. The group discusses implications of cognitive products, such as group efficacy, that have been created and initiate corresponding action. Previous research indicates that high levels of group efficacy are related to persistence, choice of activities, and overall levels of task effectiveness (e.g., Campion, Medsker & Higgs, 1993; Durham, Knight, & Locke, 1997; Gibson, 1999; Fernandez-Ballesteros et al. 2001; Lee, Tinsley & Bobko, 2001; Parker, 1994; Prussia & Knicki, 1996; Tesluk & Mathieu, 1999; see Gully, Beaubien, Incalcaterra, & Joshi, 2000 for a review).

Predictors of Group efficacy

Although substantial previous research has investigated the consequences of group efficacy, predictors of such beliefs have been less frequently studied. One important recent effort identified group cohesion and group norms (Lee et al., 2001) as predictors of generalized positive thinking in groups, but failed to uncover equally as plausible effects for the more task specific

beliefs captured by group efficacy. Similarly, Fernandez-Ballesteros et al. (2001) determined that individual efficacy contributed to a more generalized sense of efficacy to effect social change through unified action, but did not investigate group efficacy per say. Thus, we know very little about the factor that contribute to group efficacy across a variety of group and cultural contexts.

As discussed in the preceding section, theories of collective cognition suggest an array of processes and elements that can potentially impact group efficacy formation. As an initial attempt to integrate related literature and develop a theoretical framework for group efficacy formation, a key variable at each phase of the process of collective cognition was delineated using previous research as a guide (e.g., Corner et al., 1994; Gibson, 2001; Hinsz et al., 1997; Prussia & Knicki, 1996). Hypotheses regarding these relationships are developed below and graphically depicted in Figure 1.

Insert Figure 1 About Here

Accumulation: The Role of Self-efficacy

An important piece of information that comes into awareness of the group during the accumulation phase of collective cognition is each members' degree of confidence in their own ability to accomplish their component of the group task, that is their individual self-efficacy. Over time these levels of self-efficacy among members become a component of long-term group memory that is drawn upon as the group formulates a collective group efficacy belief. Bandura (1986) speculated that "collective efficacy is rooted in self-efficacy" and recently he and his colleagues demonstrated a link between personal efficacy and efficacy to affect social change (Fernandez-Ballesteros et al., 2001). Others have noted the importance of investigating the embeddedness of phenomenon at different levels of analysis (Mossholder & Bedian, 1983).

Lindsley et al. (1995) for example, proposed several factors that might encourage "efficacy performance spirals" among beliefs at an individual, group, and organizational level; but these propositions have not yet been empirically addressed.

Theories of polarization and social influence (Moscovici & Zavalloni, 1969) would suggest that in general, if group members believe that they can perform their own component of the group task (i.e., if members have high self-efficacy), then the group as a whole will likely believe it can perform together as a group. Thus, a norm for high efficacy beliefs will exist at both the individual and group level. Likewise, low member self-efficacy can potentially result in low group efficacy as that member discusses the reasons why he or she cannot perform his or her component of the group task. In this manner, self-efficacy beliefs influence group efficacy through mechanisms similar to social persuasion and vicarious learning. The following hypothesis expresses this notion:

H1: The higher the average level of self-efficacy within the group, the higher the subsequent level of group efficacy.

Interaction: The Importance of Group Affect

As the group retrieves information from long term memory, exchange and structures that information during the second phase of collective cognition, a critical group attribute expected to impact group efficacy formation is the affective tone of the group. Similar to individual affect, group affect represents the general mood or climate of the group as a whole and can be observed by outsiders as a characteristic of the group (George, 1990). By interacting with one another, the group exchanges knowledge about the general group affect and this knowledge can be directly related to subsequent cycles of collective cognition.

For example, evidence from information processing research indicates that people who feel good tend to have positive material more accessible in memory (Nasby & Yando, 1982; Teasdale & Russel, 1983). Furthermore, having a positive affective state at the time of encoding information has been found to be associated with superior memory for compatible information (Bower, Monterio, & Gilligan, 1978). This research suggests that a positive affective state when forming an efficacy belief will be associated with a high degree of efficacy. In support of this notion, Kavanagh and Bower (1985) demonstrated that a positive mood manipulation resulted in higher self-efficacy scores and a negative mood resulted in lower self-efficacy scores.

At the group level, it is expected that positive group affect will be associated with an information search from long term memory that is limited to positive information, such as evidence regarding factors that will facilitate group performance, or positive past experiences. Drawing upon this positive information during the interaction phase, it is expected that group efficacy will be higher than if the group is characterized by neutral or negative affective tone. In this manner, group affect functions to impact group efficacy much like physiological and psychological arousal impact self-efficacy. The following hypothesis summarizes this:

H2: The higher the level of positive affect within the group, the higher the subsequent level of group efficacy.

Examination: The Role of Status Differential

A critical element relevant for group efficacy during the examination phase of collective cognition are the status differences within the group. Status can be defined as the formal level of authority obtained within an organization (Wiersema & Bird, 1993). Groups are often embedded within organizations and work is structured and designed based on status levels. By design, groups often vary in terms of the number of status levels members represent, and this impacts the

negotiation, interpretation and evaluation of information during the examination phase of collective cognition.

Specifically, teams in which one or two key individuals have high status can be contrasted with teams in which status is more evenly disbursed. Efficient information exchange and strategy formulation may be impeded in the teams with low status differentials (Finkelstein, 1992) and perceptions regarding authority structure in a group shape participation, type and amount of effort, roles, and strategies for participating (Kahn & Kram, 1994). Investigating this phenomenon empirically, Walsh, Henderson, & Deighton (1988: 194) found that as a group attempts to come to a consensus with regard to a particular decision or estimate, a "negotiated belief structure" arises within the group representing the "politically enacted collection of schemata employed by the group in their deliberations." In high status differential groups (groups in which one or two members have greater status), discussion is dominated by the high status member(s). Examining status characteristics and group efficacy estimations of 288 managers across four countries, Earley (1999a) also demonstrated differential contributions to estimates of collective capability based on status. Although he was specifically concerned with the absolute status of a given member and his or her corresponding contributions to the formation of group efficacy, rather than overall status differential in the team, Earley (1999a) demonstrated that particularly in high power distance cultures, group efficacy is more strongly tied to higher rather than lower status group members' personal judgments.

Thus, status is important because it may serve a "weighting" function. Both Bandura (1982; 1986) and Gist and Mitchell (1992) suggested that in the formation of self-efficacy beliefs, individuals "weight" information as to its importance in determining performance. At the group level of analysis, information and experiences contributed to group interactions by

individuals with high status (e.g., a facilitator or a member with more tenure in the group) may be weighted more heavily than information contributed by other individuals. That is, by highlighting certain items of information, drawing attention to faulty logic, and presenting arguments in support of particular conclusions, group members can affect one another's perceptions, judgments, and opinions (Stasser & Davis, 1981). Several theorists have noted the intimate connection between patterning of interaction in groups based on roles and status, and the interpretation given to group events by group members (Sandlelands & Stablein, 1987; Bartunek, 1984; Ranson, Hinings & Greenwood, 1980). In essence, high status individuals in a group often perform the "verbal persuasion" role often cited as a critical factor influencing self-efficacy.

Furthermore, without status differentials, roles regarding leadership are often ambiguous. Role ambiguity is a condition in which members lack a basic understanding of either the function they play in the group, the activities they are responsible for, or potentially how the group fits into the larger organizational context (Rizzo, House, & Lirtzman, 1970). Status can thus serve an essential guiding function that enables members to make more efficient use of each other's personal store of problem-relevant information. Preliminary evidence suggests that when members know which other members of the group have expertise in which specific knowledge domains, the amount of unshared information they actually discuss increases significantly (Stasser, 1991). Clearly defined status differentials enable this sharing.

Finally, those in high status roles may often perform the function of "encoding" or "organizing" information, acting as catalysts that guide the group from accumulation and interaction around group knowledge to active consideration of that knowledge. These individuals are often engaged in assigning information gathering activities among team members,

interpreting information, and resolving disagreements and/or directing individual team members into action, thus facilitating examination of information (Gersick, 1988).

Based on these factors, it is expected that high status differential groups will generally have higher group efficacy. The person with the greatest status "takes charge," acts as a team leader, and facilitates interaction, thereby increasing the extent to which the group feels as though it will be able to accomplish its task objectives. By organizing and encoding information, the high status individual helps the group to process information. This role clarity instill a belief the group can coordinate effectively and perform well. The following hypothesis captures this idea:

H3: The higher the status differential within the group, the higher the subsequent level of group efficacy.

Accommodation: The Importance of Cultural Values

During the final phase of collective cognition, as information is integrated and compared and action is initiated, cultural values serve as criteria which guide social comparisons, integration of information, and decisions (Erez & Earley, 1993). The cultural value that has received the most attention in the organizational literature and is most pertinent for group efficacy is the value of collectivism. Collectivism is a multi-faceted value construct; however at a general level, in societies low on collectivism, the self-concept tends to be defined in individual or trait terms, whereas in highly collectivistic societies, the self-concept is defined with reference to a societal or cultural group (Earley & Gibson, 1998; Hofstede, 1980; Triandis, 1989). Furthermore, in a collectivistic society, the success of the collective is assumed to ensure the well-being of the individual and an individual's feelings of success are derived from the group (Erez & Earley, 1993).

Particularly in a collectivistic society, self-evaluations will depend on evaluations of the group to which they belong (Tajfel & Turner, 1986). Therefore, in collectivistic societies, group members are motivated to perceive their own group (or in-group) in positive terms and other groups (out-groups) in negative terms (Ashforth & Mael, 1989; Erez & Earley, 1993; Triandis, 1989). Indeed, evidence suggests that for collectivists, once the self and others are perceived as members of a distinct social group, the group is seen as more homogeneous and as more extreme than it actually is (Allen & Wilder, 1979; Doise, Deschamps, & Meyer, 1979; Mackie, 1986; Rothbart, Fulero, Jenson, Howard, & Birrell, 1978).

Individuals differ with respect to the values they hold or consider important; however, beyond the individual differences, it is possible to characterize groups by the values that are prevalent within that context (Earley, 1993; Gibson, 1999; Kluckhohn, 1951; Parsons, 1968). The distribution of collectivism contrasts most of the Latin American, Asia, and African cultures, which tend to be high on collectivism with most of the North American and Northern and Western European cultures, which tend to be low in collectivism (Triandis, 1989: 510).

In terms of group efficacy formation, it is expected that collectivists will naturally retain and act more frequently based on positive, rather than negative, information about the group, because viewing their group in a positive light affords collectivists a strong sense of self-fulfillment. In a cyclical fashion, the sense of fulfillment collectivists feel encourages the maintenance of high group efficacy so as to bolster the individual members' self-concepts (Erez & Earley, 1993). Through mechanisms similar to the psychological arousal mentioned by Bandura (1997) as a predictor of self-efficacy then, collectivism is therefore likely to result in high group efficacy beliefs. The following hypothesis summarizes this notion:

H4: The higher the level of collectivism in the group, the higher the subsequent level of group efficacy.

Having identified several important factors in the process of group efficacy formation, the hypotheses outlined above were tested in two intercultural empirical studies that were part of a larger project investigating teams across cultures (other topics investigated in conjunction with this project have been described elsewhere; see Note 1). The first study utilized an experimental design involving a complex business simulation conducted in the U.S. and Hong Kong. The second study investigated efficacy correlates and efficacy beliefs among teams of nurses over an 8-week period in matched hospitals located in the U.S. and Indonesia.

SIMULATION STUDY

The design of the first study was intended to maximize organizational realism, while minimizing same source bias, and controlling for potentially confounding variables. An experimental approach allowed direct manipulation of status differential. Manipulating status provided a realistic approximation of the conditions in most organizations, given that work group composition and the number of status levels represented in a group are often determined by decision-makers outside the group. A survey measure of group efficacy was completed by each group. Group affect was measured by external raters. Survey measures of self-efficacy and collectivism were obtained from individual group members and aggregated to the group level (see below). Variation on collectivism was attained by sampling across countries; based on previous research U.S. groups were expected to be less collectivistic than Hong Kong groups (Erez & Earley, 1993).

Method

Sample. A sample of 294 U.S. and Hong Kong university students was randomly divided into 30 groups in each country (for a total of 60 groups); group size ranged from 4 to 5 members with a mean of 4.90 members. Participants were undergraduate (52%), masters' (28%) and executive (20%) business students who received partial course credit for participation. Approximately half the sample were women. A series of ANOVA's revealed no significant differences across countries or groups in terms of group size, education level, gender, age, and socio-economic status. Furthermore, none of these variables were significantly related to the key variables of interest in this study. The U.S. sample represented an ethnic and cultural mix, consisting of 47% Asians, 30% White, 15% Latino, 5% Pacific Islanders, and 2% Black participants; the Hong Kong sample was 91% Asian and 8% White.

Task. "Looking Glass Inc." (Lombardo, McCall & DeVries, 1989), an elaborate business simulation, was modified to test the hypotheses. Looking Glass is a flexible, realistic, and engaging way of assessing managerial behavior. Previous research indicates that the simulation is sufficiently engaging to develop group identity and to study collective cognitive processes (Chatman & Barsade, 1995; Lombardo et al., 1989). Each division of the Looking Glass company consisted of five managers who interacted with each other collectively as a group for a two-hour period.

All participants were fluent in English. Even so, precautions were taken to ensure that the underlying meaning of the materials would be the same in Hong Kong and the U.S. A Hong Kong Chinese research assistant and an American research assistant reviewed the experimental materials and the instructions to identify vocabulary (i.e., American colloquialisms) and procedures that might have been unclear. The materials and procedures were then edited using

their suggestions. Assistants were trained to interact with the groups to ensure consistency and were blind to the experimental conditions.

Procedure. Participants were randomly assigned to groups to help prevent internal validity threats, such as selection bias, as well as pre-existing differences in skills, abilities or prior effectiveness on similar tasks (Cook & Campbell, 1979). Groups were randomly assigned to either the Advanced Products Division (“APD”) or the Commercial Glass Division (“CGD”). The experimental setting was arranged to resemble an executive board room with a table, chair, and office supplies. Each division interacted in a separate room (their "division headquarters") to emphasize their "groupness."

Participants were then randomly assigned a role (i.e., plant manager, director, or vice president). The process of assigning roles varied depending on the status differential condition. In the high status differential condition, all three position levels were represented, and status differences were emphasized in the introductory memo found in participant's in-box. In the low status differential condition, only two levels (i.e., directors and vice president) were represented. The relatively equal status among participants was emphasized in the introductory memo.

Following a brief introduction to the study, participants were given a file folder containing a set of 5 -10 memos (their "in-basket"). The first memo described their role, their division, and corporate objectives. The other memos provided information and suggested the group discuss and decide on actions the division should take. The final memo in the in-basket instructed participants to develop an “outcome memo” containing the basic elements of a strategic plan for their division.

Participants were then informed that their sessions would be videotaped for review by a panel of experts and that these experts would rate the effectiveness of their individual

contributions to the group, the group process, the quality of their outcome memo, and the overall effectiveness of their group. The researcher further explained that the experts would specifically evaluate communication and information-sharing processes, and whether the strategic plan developed in the memo addressed key issues in a feasible and cost efficient manner. Finally, before participants began working together as a group, they individually completed surveys assessing demographic characteristics and collectivism.

Next, participants read through their in-basket materials and began interacting as a group, collectively identifying problems, sharing information, analyzing this information, discussing courses of action, and developing solutions. After interacting in the simulation for ninety minutes, individuals completed the survey assessing self-efficacy and a preliminary individual measure of group efficacy, and each group collectively completed a collective measure of group efficacy. Completing the efficacy measures at this time allowed group members to gain experience with each other to help inform their group efficacy beliefs. At the end of the simulation, each group drafted its "outcome memo." Last, participants completed a post-experimental survey assessing the status manipulation. Post-experimental interviews indicated that participants were blind to experimental conditions and had no indication as to the hypotheses being investigated.

Measures

Status differential was experimentally manipulated. A dummy variable with 1=high status differential and 0=low status differential was assigned to each group based on experimental condition. As a manipulation check, at the end of the simulation, participants were asked to respond to five items measuring the degree to which status differences existed within their group using a five-point scale in which 1=strongly disagree and 5=strongly disagree.

Responses to these five items were then averaged to arrive at the respondent's overall perception of status differences. In the high status differential condition, the mean perception of status differences was 3.26; in the low status differential condition, the mean perception was 2.83 ($t=5.15$, $df=291$, $p<.001$) indicating that this manipulation was effective.

Self-efficacy was measured with a 5-item scale developed by Locke et al. (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 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 individual performance would be based on observers' ratings of effectiveness, specifically, the degree to which they performed their individual components of their task effectively. 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.

Group affect was assessed using one U.S. and one Hong Kong Chinese observer who viewed videotapes of the groups' interactions. These expert observers were blind to the experimental conditions and were extensively trained. The observers viewed the videotapes in separate rooms over a six-week period. After viewing the video-tapes of the group interaction, two outside observers responded to six indicators of mood within each group during the simulation using a modified six-item version of the Job Affect Scale (Brief, Burke, George, Robinson, & Webster, 1988) and a 5-point scale for each item (1=not at all and 5=very much). The reliability of this measure was estimated at .94 using the inter-rater reliability procedure described by Tinsley and Weiss (1975). Based on these estimates, the two observers' scores were

averaged on each item for each group. A principal component analysis demonstrated that all six items loaded on a single factor having an eigen value of 6.41 and accounting for 64.1% of the variance. Factor loadings ranged from .85 to .75. Based on these estimates, a composite rating of group affect was created for each group by averaging across the six items.

Collectivism was measured on a 5-point scale (1=strongly disagree, 5=strongly agree) using three items from a questionnaire developed by Earley (1993). Items focus on collectivism in the workplace, asking respondents if they agree with statements such as, “*Problem solving by groups gives better results than problem solving by individuals.*” Higher scores reflect greater collectivism. The reliability of this scale (Cronbach's Alpha) was .87. A principal component analysis demonstrated that the items loaded on a single factor having an eigen value of 4.19 and accounting for 52.3% of the variance. Factor loadings ranged from .65 to .81. Based on these analyses, a collectivism score was created for each individual by taking the mean of his or her responses across the three items.

Group efficacy was measured with a 5-item survey. The instrument and technique were developed by incorporating the recommendations of Locke et al. (1984) and other research on constructing measures of group efficacy (Gibson, 1999; Gibson, Randel, & Earley, 2000; Gist, 1987; Guzzo et al. 1993; Zander & Medow, 1963) and have been used effectively with large samples of groups (Gibson, et al. 2000). As per Gibson et al (2000), the measure is designed to best capture collective cognitions such as group efficacy that are arrived at through collaborative information processing. Each group received one copy of the survey. Each item represented a different level of overall effectiveness on the simulation task (Item #1=lowest level of effectiveness; #5=highest level of effectiveness). The group was asked to discuss how certain it was that the group 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). The certainty scores were obtained through open discussion and interaction as group members reviewed previous experience, situational constraints, and factors expected to facilitate the group's effectiveness. One group member then recorded certainty scores for each of the five levels of effectiveness on the group's survey, and these scores were then averaged across levels to arrive at a composite score for group efficacy (see Note 2).

Aggregation Issues. All variables in this study were conceptualized as group-level attributes; however, individual group members were viewed as the best informants for the average level of self-efficacy and collectivism in each group. Thus, individual scores on self-efficacy and collectivism were aggregated to the group level by taking the average of group members' scores. To justify aggregation, both between-group differences and within-group agreement on a measure must be demonstrated (Goodman et al., 1990). At a minimum, evidence for differences across groups is provided when between-group variance is greater than within-group variance and the ANOVA F-ratio comparing these variances exceeds 1.00 (Hays, 1981). Both self-efficacy ($F=1.55$, $df= 59$, $p<.01$) and collectivism ($F=2.16$, $df=59$, $p<.05$) met these requirements.

Within-group agreement was estimated using the method (r_{wg}) developed by James, Demaree, and Wolf (1993). This technique estimates the consistency within a group with respect to ratings of a common target (e.g., group members' ratings of the group). The average r_{wg} coefficient across groups was .65 for self-efficacy and .82 for collectivism. Although referring to traditional estimates of reliability, Nunnally (1967: 226) suggested the following rule of thumb: "In the early stages of research on predictor tests or hypothesized measures of a construct, one saves time and energy by working with instruments that have only modest reliability, for which

purposes reliabilities of .60 or .50 will suffice." Based on this recommendation, these analyses demonstrated appropriate within-group agreement.

To verify between-group differences, WABA I was conducted as suggested by Dansereau, Alutto, and Yammarino (1984). This test compares the between-group eta to the within-group eta by computing an E ratio that can be tested for both statistical and practical significance. Dansereau et al. (1984: 169) provided a test of the practical significance of an E ratio (the ratio of between-group to within-group etas). Since an E ratio is a cotangent of an angle between 0 degrees to 90 degrees, they defined three intervals, 0 degrees, 15 degrees, and 30 degrees, with 30 degrees being the most stringent test. To meet the 0 degree test for inferring group-level constructs, the E ratio must simply be greater than 1. To meet the 15 degree test, the E ratio must be greater than 1.30. To meet the 30 degree test, the E ratio must be greater than 1.73. Used in conjunction with the tests of statistical significance, these intervals provide additional evidence about whether an obtained E ratio indicates a group-level construct. When results of statistical and practical tests differ, results of statistical significance are given more weight in making decisions about whether a construct is indeed group-level. The self-efficacy E ratio met tests of statistical significance ($F=1.51$, $df=(59, 234)$, $p<.05$), but not practical significance. The collectivism E ratio was both statistically ($F=2.21$, $df=(59, 234)$, $p<.01$) and practically (0 degree test) significant. Overall, these analyses suggest it was appropriate to infer group-level constructs.

Analysis Overview

Descriptive analyses were run on all variables to check for non-normal distributions. Multiple regression models were used to test the hypotheses. Group efficacy was the dependent

variable. Significance of t for betas for each term was examined to determine which variables were significant predictors.

Results

Preliminary results. Examination of residuals from the regression models did not reveal any indications of non-linearity or heteroscedasticity. A t test indicated statistically significant country differences for collectivism ($t = -6.98$, $df = 292$, $p < .001$). Those in Hong Kong had higher collectivism than in the U.S. These country differences confirm that sampling in the U.S. and Hong Kong increased variance on the collectivism. The means, standard deviations and intercorrelations of the variables in the regression models are shown in Table 1.

Insert Table 1 About Here

Tests of hypotheses. Results obtained in the multiple regression model appear in Table 2. Standardized partial regression coefficients are listed for each predictor. Self-efficacy (beta=.49, $t = 4.78$, $p < .001$), group affect (beta=.25, $t = 2.46$, $p < .05$), and collectivism (beta=-.24, $t = -2.53$, $p < .01$) were significant predictors of group efficacy. Altogether 49% of the variance in group efficacy was predicted ($R^2 = .49$, $F = 13.29$ (4,55), $p < .001$). These findings support H1 concerning the positive relationship between self-efficacy and group efficacy and H2 concerning the positive relationship between group affect and group efficacy. Although significant, the relationship between collectivism and group efficacy was in a direction opposite to what was predicted, thus providing no support for H4. No support was obtained for H3 concerning the relationship between status differential and group efficacy.

Insert Table 2 About Here

FIELD STUDY

Field studies in the U.S. and Indonesia were designed to confirm the results obtained in the simulations. To increase the external validity of the findings, it was important to confirm the predictors of group efficacy among on-going groups in a natural setting. This design also addressed a potential limitation of the simulations—lack of representativeness of the samples. The field study incorporated cultural contexts identified in prior research as having greater variance in collectivism. Indonesians often rate at the most collectivistic extreme, whereas Americans rate at the extreme opposite end of the continuum (Hofstede, 1980). Further, Indonesian official state ideology (*Pancasila*) reinforces the collectivistic culture among members of the society and may serve to amplify the expected impact of variables associated with the cultural context (McBeth, 1994).

Method

Sample. Previous research indicated that variance could be obtained on status differential within the healthcare industry, especially for nursing teams within hospitals (Argote, 1982). Eight hospitals in the U.S. and Indonesia were invited to participate based on similarities in size (50-200 beds), technical domain (general), and access (public). Discussions with administrators also indicated that similarity of facilities (wards) was necessary to control for potential confounds associated with day-to-day operations. Only sites with four types of wards (in-patient, out-patient, emergency, and obstetrics) were invited.

Directors representing two hospitals in the U.S. and one hospital in Indonesia agreed to participate. 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 both the U.S. and Indonesia naturally occurring subsets of nurses within a ward considered themselves permanent teams (three to six nurses per team) and shared the same schedule. Team members worked interdependently on a regular basis; the core of their jobs involved completing *as a team* tasks such as admitting and discharging patients, periodic recording of vital signs, and starting or changing IV. The sampling strategy resulted in 43% participation at U.S. site #1 and 55% participation at U.S. site #2. At the Indonesian site, 69% participated. The final sample across the two countries was 71 teams (36 U.S. and 35 Indonesian) represented by 185 nurses (94 U.S. and 91 Indonesian). Each team was represented by two to five members of the team (i.e. not all members of every team were available to participate) with mean participation of three nurses per team. 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).

Interviews with the nursing administration in each organization ensured that there were no country, organizational, or team differences in resource availability, compensation structure, or human resource policies. Analyses of variance verified no systematic differences across countries, organizations, or teams in prior team performance as measured by quality of patient care (see below). A second series of analyses of variance confirmed no statistically significant differences across countries, organizations, units, or teams in gender, age, years employed, education, or longevity of the team; a majority of the teams had been intact for approximately four years.

Procedure. In Indonesia, all project sessions were conducted with the aid of an interpreter. All English-version materials were reviewed by U.S. and Indonesian nursing

supervisors who recommended changes in the content, design, and presentation of the instruments. The materials were then given to an interpreter to be translated into *Bahasa Indonesian*. The Indonesian version was given to a bilingual nurse to translate back into English. These back-translations were reviewed by the researcher and the nursing administrators to ensure the intended meaning remained consistent across the translations. Discrepancies were resolved by discussing the intended meaning and modifying both the English and translated materials.

In both countries, teams reported to a conference room for a 45-minute introductory session. Objectives of the project were introduced and it was explained that quality of care for each team would be assessed by patients and data would be distributed back to them to improve their effectiveness. Next, nurses were asked to complete surveys assessing self-efficacy and collectivism. After four weeks, all teams met with the researcher for a 45-minute feedback session. At the beginning of the session, each team completed a measure of group efficacy.

Measures. *Group efficacy* was measured with the same group-level technique used in the simulation study. The team was asked to discuss how certain it was that the team would achieve five levels of effectiveness using a 100-point scale (0=certain the effectiveness level cannot be achieved; 100=certain the effectiveness level can be achieved). The certainty scores were obtained through open discussion and interaction as group members reviewed previous experience, situational constraints, and factors expected to facilitate the group's effectiveness. One group member recorded certainty scores for each level of effectiveness on the group's survey, and these scores averaged across levels to arrive at a composite score for group efficacy.

Self-efficacy and *collectivism* were measured with the same instruments used in the simulation study; similar factor structures and reliability were obtained. Aggregate, group-level indices of self-efficacy and collectivism were created by averaging individual scores. Self-

efficacy ($F=2.28$ $df=67$, $p<.001$) and collectivism ($F=1.33$ $df=67$, $p<.10$) met the requirements for between-group differences; adequate within group agreement was also demonstrated ($r_{wg}=.84$ for self-efficacy; $r_{wg}=.70$ for collectivism). The self-efficacy E ratio met tests of both statistical significance ($F=2.42$, $df=(70, 116)$, $p<.01$) and practical significance (0 degree test).

Collectivism E-ratios also indicated statistical ($F=1.36$, $df=(70, 116)$, $p<.05$) and practical (0 degree test) significance. Overall, these analyses provide adequate evidence for inferring group-level constructs.

Status differential was measured by assessing the number of different hierarchical levels (e.g., nurses aid, nursing assistant, head nurse, or ward director) represented in each team (1=only one level represented, 2=two levels represented, etc.).

Group affect was measured with three items that assessed the atmosphere and mood within the team. Each team was rated by 2-3 nurses outside the team (i.e., other nurses on the ward and a supervisor), using a 5-point scale (1=extremely negative affect; 5=extremely positive affect). The James et al. (1993) within-group agreement (r_{wg}) of the ratings was .95. Given this, ratings on each item were averaged across raters for each team and subjected to principal component analysis. Results indicated all 3 items loaded on one factor, with an eigen value of 2.13 accounting for 71.15 percent of the variance. Based on these results, scores across the 3 items were averaged to arrive at a composite score for group affect.

Overview of Analyses

Analyses were conducted as in the simulation study. Multiple regression was used to test the hypotheses. Significance of t for betas for each term was examined to determine which variables were predictors of group efficacy.

Results

Preliminary results. Examination of residuals from the regression models did not reveal any indications of non-linearity or heteroscedasticity. A series of t tests indicated statistically significant country differences for collectivism ($t=-6.91$, $df=183$, $p < .001$). Indonesians had higher levels of collectivism than U.S. participants. These differences confirm that sampling in the U.S. and Indonesia increased variance on the cultural constructs. Means, standard deviations and intercorrelations of the variables are shown in Table 3.

Insert Table 3 About Here

Tests of hypotheses. Results obtained in the multiple regression models appear in Table 4. Standardized partial regression coefficients are listed for each predictor. As in the simulation study, self-efficacy ($\beta=.45$, $t=4.10$, $p<.001$), group affect ($\beta=.20$, $t=1.78$, $p<.05$) and collectivism ($\beta=-.19$, $t=-1.72$, $p<.05$) were significant predictors of group efficacy. Altogether 27% of the variance in group efficacy was predicted ($R^2 = .27$, $F=5.94$ (4,66), $p<.001$). These findings support H1 concerning the positive relationship between self-efficacy and group efficacy and H2 concerning the positive relationship between group affect and group efficacy. Again, although significant, the relationship between collectivism and group efficacy was opposite to what was predicted, offering no support for H4. And again, no support was obtained for H3 concerning the relationship between status differential and group efficacy.

Insert Table 4 About Here

DISCUSSION

This study investigated collective cognitive products by examining potential predictors of group efficacy, a group's belief in its ability to perform a task objective. Based on both existing studies of Social Cognitive Theory at the individual level and theories of group information processing, hypothesized predictors included self-efficacy, group affect, status differential, and collectivism. These factors were investigated using two methodologies (simulation and field study); each of these studies was conducted in two distinct cultural contexts.

Summary of Findings and Implications for Theory and Research

In answer to the question "What factors contribute to variability in group efficacy?" the findings suggest that self-efficacy, group affect, and collectivism are significant predictors. Across the studies, these three factors combined explained between 27 and 49 percent of the variance in group efficacy.

As proposed, group efficacy was higher the higher the average level of self-efficacy, thus confirming Bandura's (1997) speculation that group efficacy is rooted in self-efficacy and that member attributes are related to collective cognitive products. The relationship was strong and positive in both studies, and the perceiving, filtering and storing capacity of the group during the accumulation phase of collective cognitive may describe the process by which these individual beliefs are incorporated into collective cognitive products. However, the underlying mechanism for the relationship was likely different in the simulation than in the field study. In the simulation study, group members had no discretion in group membership. They were randomly assigned a group by the researcher. Thus, self-selection mechanisms cannot explain this finding. Instead, the high level of group efficacy in these groups probably stemmed from the cognitive tendency for members high in self-efficacy to accentuate the positive attributes of their group and derogate the

negative during the process of collective cognition, thus resulting in a negotiated group level belief that was strong and confident (Erez & Earley, 1993; Tajfel, 1982). This provides some preliminary support for a social persuasion mechanism in the formation of group efficacy.

In the field study, this same explanation may have also been true. However, in addition, nurses had more discretion over group membership (e.g., they could request to be assigned to certain teams and requests were often granted). Furthermore, groups were ongoing, allowing them time to establish a history and reputation for performance which become part of the collective long term group memory. Thus, high self-efficacy nurses may have self-selected high group efficacy groups to join. This makes sense, given the basic human need for self-consistency (Markus & Wurf, 1987). High self-efficacy nurses may have sought out groups with high group efficacy in order to maintain a certain stability and continuity in life (Erez & Earley, 1993) and to maintain collective cognition consistent with their own individual cognitive processes. This suggests a various learning mechanism in the formation of group efficacy.

To investigate these mechanisms further, it is important that future research examine collective cognition over time, beginning with group formation and extending over the lifecycle. Following changes in group membership, attributes of members who come and go (and of those who come and stay) and corresponding changes in group attributes such as group efficacy will shed more light onto the relationships between member attributes and collective cognition. It is anticipated that these relationships have important implications for group outcomes. Specifically, that groups with certain configurations of member attributes and collective cognition will be more effective than other configurations. The notion of “fit” between group members and groups is analogous to the person-organization fit theory that has received some support in the organizational literature (Chatman & Barsade, 1995). Investigations at the group level would

extend this theory to help explain relationships between individual and group attributes. It will also provide guidance for managers hoping to compose groups in such a manner to maximize group efficacy.

In addition to self-efficacy, group affect was also a significant predictor of group efficacy. The higher the level of positive affect within a group, the higher the level of group efficacy. In accordance with an information-processing view, it is expected that this relationship occurs because groups experiencing a positive affective state often limit their search in long term memory to positive information about their capabilities, progress and performance. Thus, with only positive information accessible, the group believes it can perform well, and the group efficacy belief are higher. This provides support for a physiological and psychological arousal mechanism in conjunction with the formation of group efficacy. The finding also implies the importance of managing affect in groups, potentially through team building, assessment, and interpersonal relationships, or strengthening the organizational context so as to improve the affective experience in teams (Mohrman, Cohen & Mohrman, 1995). Future research might investigate this causal sequence by examining the information retrieval, exchange, and structuring processes (Gibson, 2001) in positive affective groups as opposed to negative affective groups.

Finally, group efficacy was higher the lower the level of collectivism within a group. This finding is opposite to what was predicted, given that group members in collectivistic societies are often motivated to perceive their own group (or in-group) in positive terms. Instead, collectivists had lower levels of group efficacy. One possible explanation for this finding may pertain to the concept of “face.” Face refers to the evaluation of a person based on internal and external social judgments (Earley, 1999b). A person’s behavior in organizations reflects, in part, his or her attempt to establish and maintain face across a range of social settings (Earley &

Randel, 1997). Research suggests that people high and low in collectivism behave differently to maintain face (Erez & Earley, 1987). Collectivists (e.g., members of a kibbutz in the Erez & Earley study) often establish goals sufficiently low enough to ensure that all group members achieve them, thus ensuring that face would not be threatened. Similarly, collectivists also tend to exhibit greater humility (Earley & Gibson, 1998). In contrast those low in collectivism (members of U.S. work teams in the Erez & Earley study), set quite high goals for themselves, in part due to a desire to appear competent in front of others. For the latter, face was maintained and strengthened by stretching and challenging the group, invoking competition.

Based on these findings, it is plausible that collectivists have modest performance beliefs in order to maintain face or as an expression of humility. For these groups, to have high efficacy and then perform less than expected would be a threat to face and humility. On the other hand, for those low in collectivism, expecting the highest levels of performance, expressed as high group efficacy beliefs helps to maintain face. This finding should be investigated further, in terms of potential outcomes of group efficacy. Gibson (1999) demonstrated that group efficacy is related to group effectiveness. However, group efficacy likely produces other desired outcomes, such as face, reputation, or commitment; and these outcomes, in turn, may subsequently interact with cultural characteristics or task characteristics, motivating groups to form different levels of group efficacy beliefs in future cycles of behavior. Investigations such as these would provide additional guidance to managers attempting to implement teams across cultures.

Limitations

The conceptual framework offered here implies a causal relationship in which specific variables cause changes in the level of group efficacy. Yet, due to the experimental design only

the findings from the simulation study involving the manipulated variable (status differential) allow for causal claims. Therefore, alternative explanations for the relationships between the correlates and group efficacy should be explored.

A key potential threat to the validity of these studies is that use of the group discussion method for measuring group efficacy may actually be *creating* the phenomenon of group efficacy rather than simply measuring it. Analyses of various approaches to measuring group efficacy has demonstrated consistency across techniques, including both the group discussion approach (collective measure) and aggregating individual members' ratings (individual measure) (Gibson et al. 2000). Furthermore, one might argue that rather than creating the phenomenon, the group discussion method simply causes the group belief to come to the consciousness of the members, and does so in a manner that mimics actual group collaboration.

A stringent test of the notion that the group discussion method actually creates the efficacy belief where none existed would involve investigating other, less obtrusive measures of efficacy beliefs. For example, normal daily work group conversations should be analyzed in an attempt to trace the development of expectations concerning group efficacy. The phrases and norms recorded in these conversations may better capture the emergent aspects of group beliefs. Furthermore, applying techniques from social network analysis to these conversations would shed light on the patterns of inter-connections between members and the factors influencing the way in which information is "retrieved", weighted, and combined.

Finally, also of concern with regard to internal validity, was the strength of the status differential manipulation in the simulation study. The manipulation check suggests that although statistically significant, the difference in perceptions across the high and low status conditions was small (*mean difference*=.43). It is likely that the null findings regarding status differential are

due to this small difference. Reviewing the video-taped interactions of the simulation teams suggested that the proposed mechanisms for status differential did indeed occur. The participant playing the vice president role in the high status differential groups tended to dominate the conversations and tended to function as a "time keeper," keeping the group on track and ensuring that the group made progress toward accomplishing the assigned task objectives. This seemed to result in a greater belief within the group that indeed, the objectives would be accomplished. However, the measures were apparently not sensitive enough to detect this qualitative finding.

On a practical note, it should be noted that under some circumstances, having a strong group leader or facilitator (e.g., a high status differential) could have detrimental effects on groups' expectations. Empirical research suggests that if strong identification with a leader produces dependent, immature followers, then the early successes of the group nourish unrealistic expectations, both within the leader and within the followers (Musser, 1987). If the problems become too great, the group's expectations may eventually surpass the leader's own beliefs, resulting in unrealistic expectations, groupthink symptoms, and ultimately causing the group's downfall (Heifetz & Sinder, 1987).

It is also expected that the relationship between status differential and group efficacy is moderated by cultural variables not addressed in this study. In addition to individualism-collectivism, Hofstede (1980) suggests that "power-distance" is an important cultural value orientation that influences organizational behavior. Power distance measures the degree to which members of a culture accept and expect that power in society is distributed unequally. Cultures high in power distance will be characterized by greater acceptance of inequalities, more autocratic leadership, and greater centralization of authority. Cultures low in power distance will

try to minimize inequalities, favor less autocratic leadership, and favor less centralization of authority.

It is expected that a high status differential within a group will increase group efficacy in groups that operate in high power distance contexts; whereas a high status differential will decrease group efficacy in low power distance contexts. Asian cultures are typically characterized as high in power distance and U.S. culture is characterized as low to moderate in power distance (Hofstede, 1980). As previously discussed, preliminary evidence related to this effect was demonstrated by Earley (1999a), who examined the relationship between the status of a given member and his or her contributions to the formation of group efficacy. In high power distance cultures, group efficacy was more strongly tied to higher rather than lower status group members' personal judgments. In low power distance cultures, members appear to contribute comparably to collective efficacy judgments. Of course, to truly test the proposition that power distance moderates the impact of *status differential* (as opposed to individual member status) on group efficacy, one would need to directly measure power distance and investigate status differential and group efficacy in cultures that vary with regard to this value orientation. This suggests several avenues for future research.

Conclusion

Understanding the formation of group efficacy formation over the life cycle of groups is importantly specifically due to three business trends: (a) the movement toward the formation of temporary consortia among organizations in order to share product development or distribution concerns, (b) the onset of matrix-type organizational structures that allow workers to join teams temporarily in order to complete particular projects, and (c) an increased reliance on part-time workers, temporary workers, and subcontractors. Each of these trends has resulted in a much

more dynamic conceptualization of what constitutes a team. Whether we refer to a task force, a cross-departmental work group, or a semi-permanent collective effort, it is becoming more common place to see teams and groups with shorter life cycles.

We know very little about how these trends will impact work group performance, collective cognition, and the group members within groups. In order to further investigate these phenomena, a cross-sectional study might be conducted within an organization that contains both temporary project task forces as well as on-going teams to determine whether the determinants of cognitive products such as group efficacy vary by type of team. Longitudinal studies are also crucial in this regard in that they would allow us to monitor the determinants of group efficacy throughout the life cycles of groups, whether these life cycles be short or long. Although challenging, a longitudinal comparison of efficacy formation in temporary versus on-going groups would most clearly reveal whether the formation processes are different. Such studies would also help to highlight which variables are key determinants of collective cognition in each type of group.

Overall, the findings of the two studies conducted here indicate that group efficacy formation is an intriguing aspect of groups, albeit difficult to capture using common research methods, and indeed may be heavily dependent upon the composition of the group and several additional characteristics of the cultural context in which the team operates. Furthermore, the correlates of group efficacy may interact in complex ways. These findings call for subsequent research that investigates the collective cognition involved in group efficacy formation using creative and novel approaches in order to fully capture the determinants and consequences of the construct.

NOTES

1. In conjunction with the larger project, Gibson (1999) investigated the hypothesis that the relationship between group efficacy and group effectiveness is complex and moderated by several contingency factors. Findings 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. As a preliminary measure of group efficacy, participants completed an individual survey patterned after the survey used to measure self-efficacy. In this survey, the group was the referent, and each individual rated their certainty that the group could achieve five levels of performance. Scores on this survey were averaged across levels, and then averaged across individuals within groups to arrive one a score for the group. This measure was used as a second test of the hypotheses. That is, all analyses were conducted using both the collective group efficacy survey in which group discussion was used to arrive at a collective estimate and the individual group efficacy survey. Coinciding with the findings of Gibson, Randel and Earley (2000), results were essentially identical. Because it best reflects collective cognition, results of analyses reported here used the collective group efficacy measure.

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FIGURE 1
HYPOTHESIZED MODEL

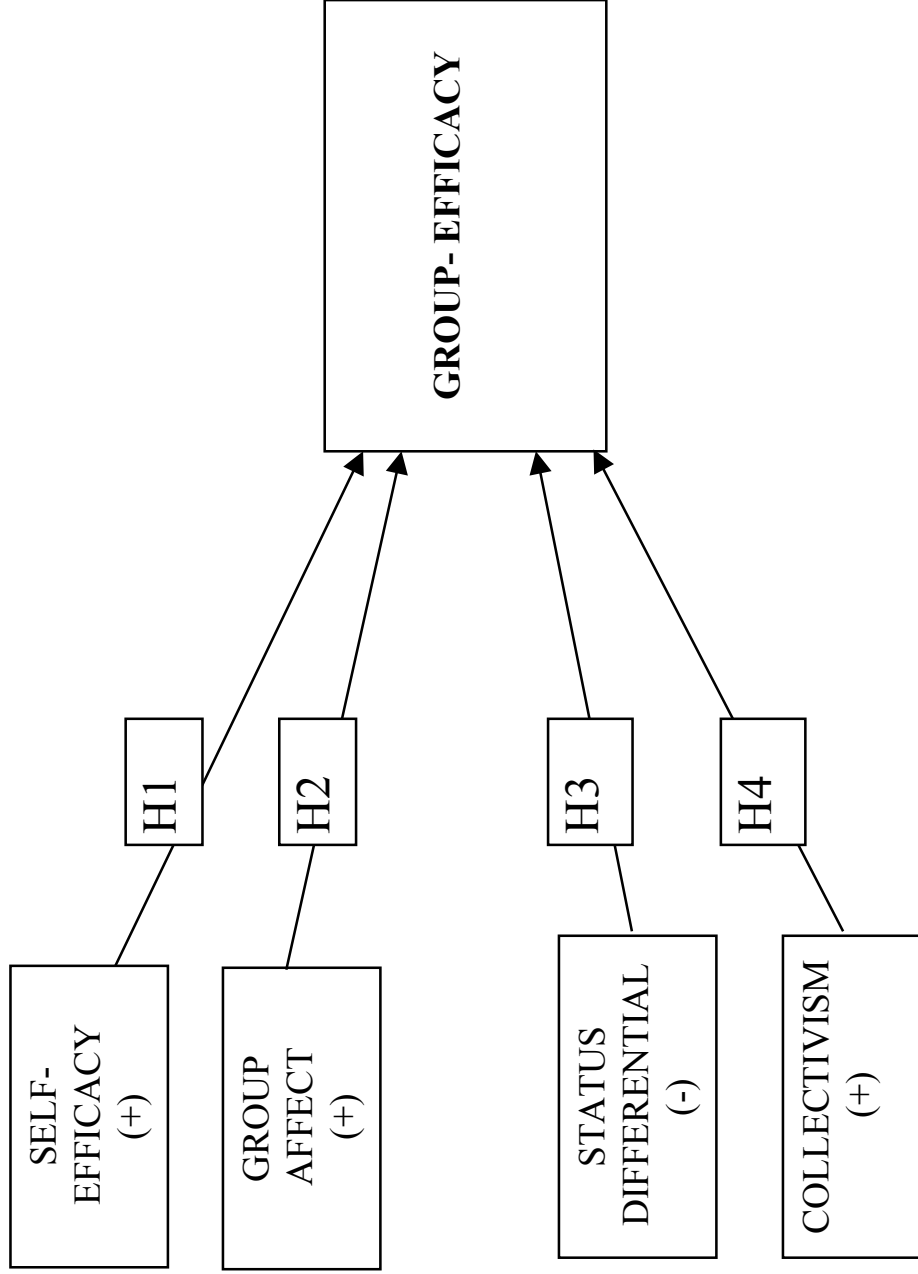


TABLE 1
CORRELATION MATRIX FOR SIMULATION STUDY

Group Level (<i>n</i> =60)	Mean	S.D.	1	2	3	4	5
1. Group efficacy	57.77	26.33	1.00				
2. Self-efficacy	72.37	9.10	.59***	1.00			
3. Group affect	3.72	.67	.45***	.35	1.00		
4. Status differential ^a	.50	.50	.18 [†]	.06	.05	1.00	
5. Collectivism	2.93	.53	-.28*	-.01	-.07	.04	1.00

[†] *p*<.10 * *p*<.05 ** *p*<.01 *** *p*<.001

^aNote this variable is dichotomous; 1=high and 0=low. Correlation coefficients for this variable are point biserial.

TABLE 2
REGRESSION ANALYSES FOR GROUP EFFICACY
SIMULATION STUDY

N=60 groups	
	<i>Beta</i> <i>t for beta^a</i>
Self-efficacy	.49 4.78***
Group affect	.25 2.46*
Status differential	.15 1.56
Collectivism	-.24 -2.53*
<i>R</i> ² .49	
<i>F</i> 13.29***	
<i>df</i> 4,55	

* $p < .05$ ** $p < .01$ *** $p < .001$

^aOne-tailed tests were utilized to test the specific directionality proposed in the hypotheses.

TABLE 3
CORRELATION MATRIX FOR FIELD STUDY

Group Level (n=71)	Mean	S.D.	1	2	3	4	5
1. Group efficacy	75.23	24.94	1.00				
2. Self-efficacy	84.69	9.70	.40***	1.00			
3. Group affect	4.07	.55	.24	.02	1.00		
4. Status differential	1.63	.61	-.05	.21	.13	1.00	
5. Collectivism	3.02	.71	-.19*	.10	-.23	.04	1.00

* p<.05 ** p<.01 *** p<.001

TABLE 4
REGRESSION ANALYSES FOR GROUP EFFICACY
FIELD STUDY

N=71 groups	
	<i>Beta</i> <i>t for beta</i> ^a
Self-efficacy	.45 4.10***
Group affect	.20 1.78*
Status differential	-.16 -1.48
Collectivism	-.19 -1.72*
<i>R</i> ² .27	
<i>F</i> 5.94***	
<i>df</i> 4,66	

* $p < .05$ ** $p < .01$ *** $p < .001$

^aOne-tailed tests were utilized to test the specific directionality proposed in the hypotheses.