This is to certify that the

dissertation entitled

THE EFFECT OF TASK TYPE ON THE RELATIONSHIP BETWEEN EFFICACY BELIEFS AND PERFORMANCE

presented by

Sandra Elaine Moritz

has been accepted towards fulfillment of the requirements for

Ph.D. degree in Kinesiology

Deborah L. Feltz
Major professor

Date May 13, 1998

THE EFFECT OF TASK TYPE ON THE RELATIONSHIP BETWEEN

EFFICACY BELIEFS AND PERFORMANCE

By

Sandra Elaine Moritz

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Kinesiology

1998

ABSTRACT

THE EFFECT OF TASK TYPE ON THE RELATIONSHIP BETWEEN EFFICACY BELIEFS AND PERFORMANCE

By

Sandra Elaine Moritz

In sport, efficacy beliefs are regarded as one of the more important factors affecting an individual's motivation and performance. The purpose of this dissertation was to examine the relationships among self-efficacy, collective efficacy, and individual and team performance in a less interdependent (additive) versus a more interdependent bowling task. A second purpose of the dissertation was to determine if the relationships between efficacy and performance differed according to the level of analysis (i.e., individual vs team). The participants comprised 250 students who were enrolled in bowling classes. They were randomly assigned to two person teams. As expected, task type moderated the relationship between collective efficacy and performance, whereby collective efficacy was a significant predictor of performance in the interdependent condition but not for the additive condition. This finding, however, was dependent on the efficacy and performance measures used, and was only evident for the first time period. The results were the same for both levels of analysis. Task type did not moderate the relationship between self-efficacy and performance at either level of analysis.

To my family:

Mom, Dad, Leslie, Brother Dean, Brother-In-Law Dean, Krista, Stephanie and Darren

"Only one thing is ever guaranteed,

that is you will definitely not achieve the goal if you don't take the shot."

Wayne Gretzky

ACKNOWLEDGMENTS

I owe my efficacy to a number of people...

To Deb Feltz. As my program director, and the chair of my dissertation committee, you brought out the best in me. Thank you for your influence, and your example. I see you in myself and in my ways. I appreciate the positive characteristics you passed on to me.

To Dan Ilgen, Steve Kozlowski, and Steve Raudenbush. When I put my dissertation committee together, I *shot for the stars.* I am pleased that you all agreed to help me through this process, and this dissertation benefited from your thoughtful comments and suggestions. I never thought about "Levels of Analysis" issues until I took Dan and Steve K.'s class. And look what happened! Thank you all so much.

To Eva. We made it through yet another degree! We are finally graduating -- Grade 21 in Gym! Over the past 5 years, our relationship has evolved personally, and academically. I truly love you like a sister.

To Victoria. I am so happy that we met! Its not often that you met a person and you know that you will be friends with that person forever. I feel that way with you. Keep singing our favorite Billy Joel tune.

To Shannon. I don't think that there is anything that you don't know about me. One of the best qualities of our friendship is the unconditional support that we gave, and will keep giving to each other.

To Martin. Based on the way our relationship started in Denver, I never expected that we would be where we are today. Your wit, charm, and other "things" and "stuff" are incomparable. You've proven that "regression to the mean" is just a statistical term.

To My Grad School Friends -- Kelly, Karin, Roop, Barry and Geffrey -- thanks for the GrEaT times. I will miss you guys.

To Verna and Jan. Thanks so much for all your help over the years. Both of you made alot of things easy for me.

There are so many other people who deserve recognition: Bob Malina, Craig Hall, John Haubenstricker, Paul Vogel, Ralph Levine, and Kathleen Martin, and Carl Watson have all influenced me in ways that can only make me a better person, teacher and researcher.

And To My Family. I've always done my own thing, and you have always been there for me. It was hard for me to move to the "other side" of the world; I thought that I would miss out on so much. I know now that wherever I go, I am never too far away from any of you. I thank you all for talking to me when I was down, and celebrating with me when I was happy. And for loving me in the special ways that only you do.

TABLE OF CONTENTS

LIST OF TABLES

TABLE

LIST OF FIGURES

FIGURE

CHAPTER I

INTRODUCTION

Statement of the Problem

To date, no research has investigated the relationships among aggregated self-efficacy, collective efficacy and performance with independent-type sports (e.g., bowling, golf, gymnastics) or compared interdependent and independent-type activities in terms of these relationships (Little & Madigan, 1997). Therefore, the purpose of this dissertation was to examine the relationships among aggregated self-efficacy, collective efficacy, and team performance in a less interdependent (additive) versus a more interdependent task. Based upon theory and past research, it was hypothesized that task type would moderate the relationship between efficacy beliefs and performance.

The second purpose of this study was to determine if the relationships among efficacy and performance differed according to the level of analysis. Researchers have suggested that self-efficacy, collective efficacy and performance may comprise a multi-level model (e.g., Lindsley, Brass, & Thomas, 1995, Prussia & Kinicki, 1996; Silver & Bufanio, 1996). At the individual level of analysis, the relationships among self-efficacy, (disaggregated) collective efficacy and individual performance were examined. At the team level of analysis, the relationships among aggregated self-efficacy, collective efficacy, and team performance were considered

Nature of the Problem

Self-efficacy theory has provided the impetus for a number of research studies across psychological domains due primarily to its significance in affecting people's motivation and performance (Bandura, 1986, 1997; Feltz, 1988, 1992; Gist & Mitchell, 1992; Maddux, 1995). Self-efficacy is defined as one's belief in one's ability to successfully perform a specific behavior or set of behaviors which are required to obtain a certain outcome (Bandura, 1977, 1986). Thus, self-efficacy is a belief in one's capabilities to produce given levels of performance rather than a global trait that accounts for overall performance optimism (Bandura, 1997).

The relationship between self-efficacy and performance has been studied almost exclusively at the individual level despite the fact that in many sports, individuals perform as members of a team rather than as individual competitors (Feltz, 1992). Researchers have suggested that the self-efficacy and performance relationship can be extended from the individual level to the team (or group) level where collective efficacy is recognised as an important determinant of team performance (Bandura, 1986, 1997).

There has been little development of collective efficacy, and much less is known about the relationship between collective efficacy and performance. Only recently has Bandura elaborated upon the collective efficacy construct, and more fully defined it as "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments" (Bandura, 1997, p.477). The most obvious difference between self-efficacy and collective efficacy is that the former refers to people's judgments of individual capabilities and effort; whereas the latter refers to people's judgments of team capabilities (Feltz & Chase, 1998). That is, self-efficacy is an individual level phenomena, while collective efficacy is conceptualized as a team level attribute.

Although Bandura (1997) asserted that collective efficacy is rooted in self-efficacy, research has shown that the relationship is modest (cf Watson & Chemers, 1998). That self-efficacy and collective efficacy are related, but are also distinct judgments, has implications for researchers interested in these constructs. Most of the self-efficacy research has focused primarily on an individual level, and as such, it can provide only a partial guide to the antecedents and consequences of collective efficacy. Collective efficacy is a team based construct, and therefore, must be considered on the team level. The issue of what differences might occur at the team level has not been resolved (Porter, 1992).

The conceptualization of efficacy as a team based construct raises a number of methodological and measurement issues. In the past, researchers generally accepted that collective efficacy referred to people's perceptions about the collective as a whole, but it was not clear whether these beliefs were shared, and therefore represented a team level rather than an individual level phenomenon (Zaccaro, Blair, Peterson, & Zazanis, 1995). Recently, however, Bandura (1997) has clearly stated that collective efficacy refers to shared beliefs and is a team level attribute. Thus, researchers should measure this construct in accordance with this conceptualization.

There are a number of ways to assess collective efficacy at the team level. For example, individuals can make ratings of the team's collective efficacy, or the team can make collective efficacy judgments together. When the former method is used, researchers typically aggregate individual level perceptions to represent the higher level construct. However, in order to justify the aggregation, it is first necessary to examine the degree of consensus (or agreement) at the individual level (Feltz & Lirgg, in press; Gully, Devine, & Whitney, 1995; James, Demaree, & Wolf, 1984; Kozlowski & Hattrup, 1992). Only when there exists an acceptable level of consensus can individual data be aggregated to form a team level construct. Failure to consider consensus when aggregating data on one level to represent a higher level of analysis may result in an aggregation bias (James, 1982).

The second method that can be used to assess collective efficacy requires that the team members make the judgment together. This approach eliminates the calculation of statistical indicators of agreement thereby avoiding aggregation issues. It is believed by some (e.g., Guzzo et al., 1993) to be an acceptable way of measuring a team's collective belief. However, this method also has serious drawbacks. For example, according to Bandura (1997), team members are rarely of one mind in their appraisals of matters. He pointed out that forming a consensual judgment of a team's efficacy by team discussion is subject to social persuasion and conformity pressures. For example, it may be possible that a more prestigious team member could influence the judgment in such a way that it does not accurately represent the views of many of its members. Thus, team members may publicly consent to a response without truly believing it (Guzzo et al., 1993). Forced consensus may also be highly misleading, especially with a large collective.

In accordance with other researchers (e.g., Prussia & Kinicki, 1996), the teams in this dissertation completed the collective efficacy measures together, rather than individually. The teams in this dissertation were dyads, and therefore social persuasion issues and conformity pressures were likely very minimal. Using this method also eliminated the need for a consensus analysis for the collective efficacy measures. However, it created the need to demonstrate that the dyads functioned as a team. More specifically, measures were constructed to assess each team members' perceptions that they felt they were a team, that they thought they worked together, and that they thought they were coordinating their efforts. Furthermore, in order to investigate collective efficacy at the individual level of analysis, the collective efficacy scores needed to be "disaggregated." To disaggregate team level collective efficacy scores, the individuals comprising a team are assigned the same score.

Levels of analysis issues have been ignored in sport psychology research. Most researchers have focused either on the individual athlete or the sport team, seldom on both. Although relationships between individual level variables may differ from team level processes, it is likely that some individual relationships can be generalized to the team level. It is important to note that hypothesized relationships at the team level of analysis are not intended to replace individual level findings (George, 1990). More specifically, George stated that team level relations are not necessarily more important than those found at the individual level of analysis, but rather represent a different way of looking at the same constructs.

Research in sport has demonstrated the existence of a relationship between self-efficacy and individual performance, and between collective efficacy and team performance. A recent meta-analysis that investigated the relationship between self-efficacy and performance in sport settings found that the correlation between these constructs was positive and moderate in size ($\underline{r}$ = .37) (Moritz, Mack, & Feltz, 1996). In addition, although considerably less research has been conducted on collective efficacy beliefs as they relate to team performance in sport, a positive relationship generally has been found in both field and laboratory settings (Feltz & Lirgg, in press; Hodges &

Carron, 1992; Lichacz & Partington, 1996; Paskevich, 1995; Spink, 1990; Watson & Chemers, 1998). Research from other psychological domains has also demonstrated that a relationship exists between collective efficacy and performance (e.g., Kerr, 1989; Parker, 1994; Prussia & Kinicki, 1996; Riggs & Knight, 1994; Silver & Bufanio, 1996).

A number of researchers, in domains other than sport, have suggested that self-efficacy, collective efficacy and performance may comprise a multi-level model (e.g., Lindsley et al., 1995, Prussia & Kinicki, 1996; Silver & Bufanio, 1996). A multi-level conception of efficacy does not simply identify self-efficacy as an individual level phenomenon and collective efficacy as a group level attribute (Moritz & Watson, 1998). Rather, a multi-level model postulates the relationship between context, efficacy and behavior within and across levels.

To date, only two, unpublished studies have simultaneously explored self-efficacy, collective efficacy and performance. In their multi-level analysis of collective efficacy, Watson and Chemers (1998) investigated the antecedents and consequences of collective efficacy in college basketball teams. Twenty-eight teams participated in the study (336 individuals). Collective efficacy and self-efficacy were assessed twice during the season. In order to demonstrate that collective efficacy was a shared belief, the degree of consensus was examined for each team. Data were subsequently analyzed using Hierarchical Linear Modeling (HLM) techniques. HLM allows for the testing of data with a hierarchically nested structure (i.e., individuals nested within teams). Only the results related to efficacy and performance are described here.

First, this study supported the notion of collective efficacy as a shared belief. A high level of within team consensus on collective efficacy was found. Second, although considerable stability in collective efficacy judgments were noted over two time periods, the degree to which collective efficacy judgments were shared and their antecedents changed over time. More specifically at the beginning of the season, collective efficacy was less shared (i.e., within-team variance was larger compared to between-team variance) than later in the season.

With respect to the relationship between self-efficacy and collective efficacy, Watson and Chemers demonstrated that it depended on the average self-efficacy of the team. For teams with high average self-efficacy, the relationship between players' self-efficacy and perceptions of collective efficacy was positive. For teams with low average self-efficacy the relationship between players' self-efficacy and collective efficacy was negative.

With respect to performance, Watson and Chemers found that very early collective efficacy judgments were persistent over time, and impacted overall team performance. Previous performance was unrelated to collective efficacy at the beginning of a season. However, collective efficacy judgments at the beginning of the season predicted later collective efficacy beliefs and overall team performance at season's end. On an individual level, stronger individual performances (as measured by the average number of points a player scored per game) were predicted by high self-efficacy but not by collective efficacy.

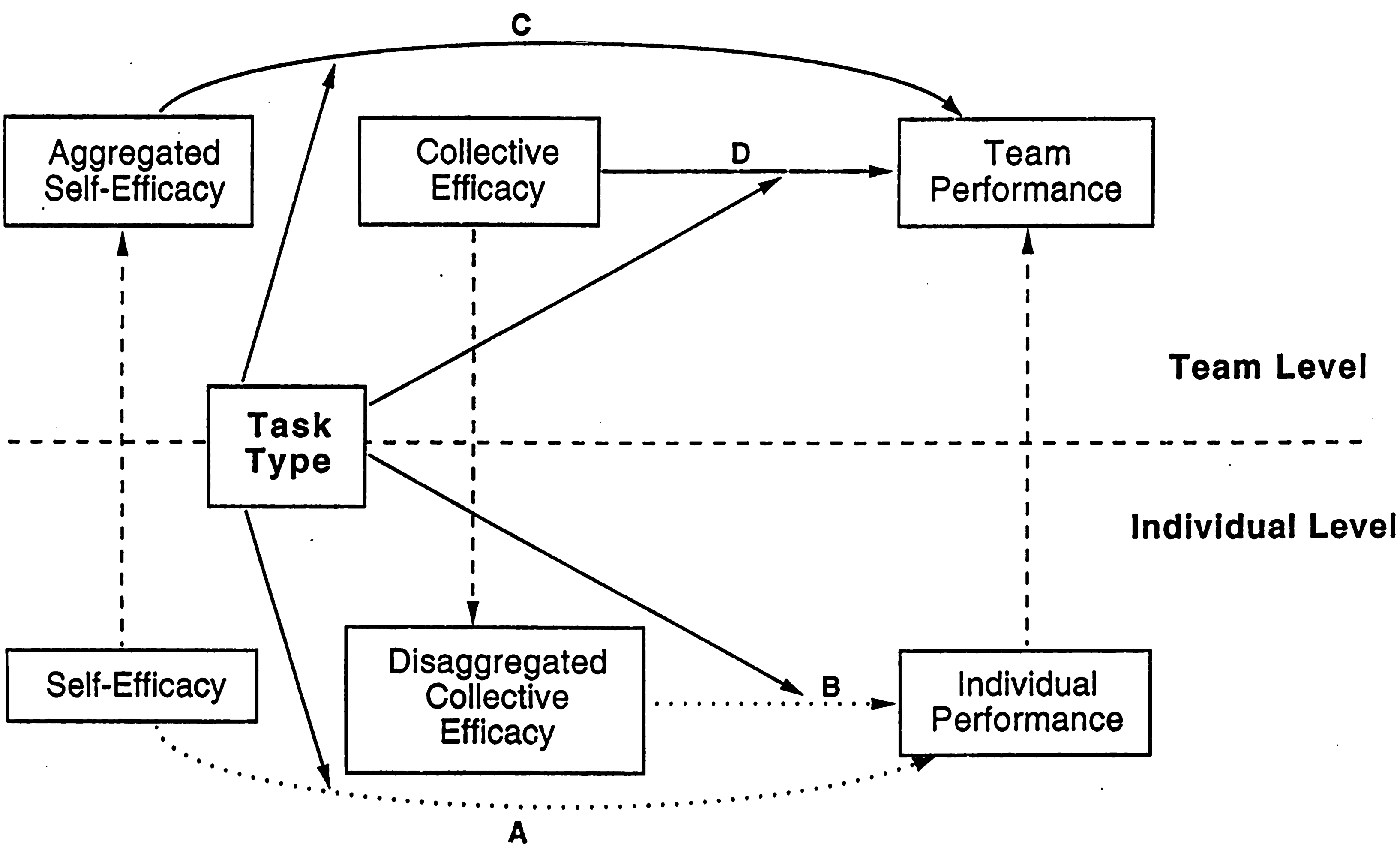
In the second study, the relationship between self-efficacy, collective efficacy and performance was examined by Porter (1992). The participants in this study were 35 work teams (150 individuals) from a manufacturing company. Performance was the total number of parts assembled by the team each day. In order to aggregate individual self-efficacy and collective efficacy ratings to the team level, consensus indexes were estimated using the measures suggested by James et al. (1984). Porter found that neither aggregated self-efficacy or aggregated collective efficacy predicted team performance in a hierarchical multiple regression analysis, although the constructs were correlated with each other.

Other researchers have suggested that the relative predictiveness of self-efficacy and collective efficacy may vary depending on the degree of interdependence in the production of team attainments (cf Bandura, 1997). That is, collective efficacy may be especially relevant to team performance when team attainments require high interdependent effort because members' beliefs about the team encompass the coordinative and interactive dynamics that operate within a team. Furthermore, self-efficacy may be adequate when team attainments represent largely the summed contributions of individual members. Thus, collective efficacy scores may be more relevant in sports requiring high levels of interdependence than in sports with little or no task interdependence (e.g., additive) (Feltz & Lirgg, in press; George & Feltz, 1995). For sports with little interdependence (e.g., additive tasks), aggregated self-efficacy should be more predictive of team performance.

The model that guided this dissertation is illustrated in Figure 1. The figure is separated according to the level of analysis (i.e., individual and team). The bottom portion illustrates the individual level relationships, and the top portion shows the team level relationships. For both levels of analysis, task type is shown as a moderating variable. Each link in the model is discussed below.

Figure 1

Overview: The Relationship Among Efficacy and Performance



The relationship between self-efficacy and individual performance at the individual level of analysis is represented by Link A. There is considerable theoretical (e.g., Bandura, 1986, 1997) and empirical (cf Moritz et al., 1996) support for this relationship. It is unlikely that the type of task a person is performing (in terms of its interdependency) would affect the self-efficacy - individual performance relationship. More specifically, an individual's efficacy beliefs regarding his/her performance should be the same regardless of whether another person's performance scores were being added to his/her scores (i.e., an additive task), or if one was dependent on someone else's performance (i.e., an interdependent task). Similarly, the relationship between disaggregated collective efficacy and individual performance (Link B) is not expected to be affected by task type. There is no theoretical justification to predict a moderator effect for task type on the relationship between disaggregated collective efficacy and individual performance.

At the team level of analysis, task type was expected to affect the relationship between aggregated self-efficacy and team performance (Link C), and the relationship between collective efficacy and team performance (Link D). Support for the differential predictiveness of aggregated self-efficacy and collective efficacy beliefs based on task interdependence in a sport setting is provided by Feltz and Lirgg (in press). They examined the relationships among aggregated self-efficacy, aggregated collective efficacy and team performance across an entire season of intercollegiate ice hockey. Results of this study revealed that aggregated team and aggregated self-efficacy were positively correlated ($\underline{r}$ =.60), and that team performance was correlated with aggregated collective efficacy ($\underline{r}$ =.30) but uncorrelated with aggregated self-efficacy ($\underline{r}$ =.03). Their analysis revealed that aggregated collective efficacy was the strongest predictor of team performance, while aggregated self-efficacy was significant, but in the negative direction.

The Feltz and Lirgg (in press) study was not able to test whether these relationships would hold for teams when performance was less interdependent. Testing the moderating effect of task-type on the relationship between efficacy beliefs and performance poses some challenging issues. A number of factors such as team size, motor skill classification, and level of difficulty need to be controlled.

Deciding on which task to use in this dissertation was very challenging. I wanted to manipulate interdependence, but also control for as many factors as I could (i.e., team size, motor skill classification, level of difficulty). For example, there is no degree of interdependence in singles' tennis, and there is a higher degree of interdependence in doubles' tennis. However, the shift from singles' to doubles' is confounded with group size (1 player to 2 players). In some sports, there are inherent variations of interdependence with respect to the skills needed to perform the task. For example, in ice hockey, penalty shots have no interdependence, while most other aspects of the game are higher in interdependence. Similarly, serving in volleyball is a skill that can be performed independently, while all other offensive and defensive strategies demand coaction among teammates. The problem with these sports is that as the degree of interdependence needed to complete the skills changes, so to does the motor skill classification. More specifically, penalty shots, and serves are both closed skills, while the other aspects of the game can be characterized as open skills. One may also argue that the different skills vary in task difficulty. Scoring on a penalty shot is relatively easier that scoring when both teams are playing at even strength.

I decided to use two bowling tasks for this study. Bowling was an ideal setting for research of this kind. When played in its traditional format, it can be considered as an additive task, whereby each individual team member contributes equally to team performance. Under these conditions, interdependence among members is low, and team performance is determined by summing the scores of individual team members. Bowling can also be manipulated to be a conjunctive task (i.e., all team members must perform some specific action which contributes to the product; Steiner, 1972). This modification results in a higher degree of interdependence among team members compared to the additive task. In the interdependent condition, the two bowlers alternated between bowling first and second for each frame, like a "Scotch Bowling" activity (see Pangrazi & Darst, 1997).

Purpose and Hypotheses

This dissertation extends the research on self-efficacy, collective efficacy and performance by examining task type as a potential moderator (see Figure 1). A moderator is a variable that affects the strength and direction of a relationship between an independent variable (e.g., self-efficacy, collective efficacy), and a dependent variable (e.g., performance) (Baron & Kenny, 1986). Moderation implies that a relationship between two variables changes as a function of the moderating variable.

Task type was hypothesized to moderate the relationships between aggregated self-efficacy and team performance (Link C), and collective efficacy and team performance (Link D). Based on previous research and efficacy theory, at the team level of analysis, I hypothesized that collective efficacy would be a more important predictor of team performance compared to aggregated self-efficacy for the interdependent task. I did not expect to find a relationship between collective efficacy and team performance for the additive task (Link D). With respect to Link C, I expected to find that aggregated self-efficacy would be a stronger predictor of team performance in the additive task, but I did not expect to find a relationship between aggregated self-efficacy and team performance for the interdependent task. On an individual level of analysis, the relationships between self-efficacy and individual performance (Link A), and disaggregated collective efficacy and individual performance (Link B) were hypothesized not to be moderated by task type.

A second purpose of this dissertation was to consider the efficacy - performance relationships within a multi-level model. Even though multi-level models may specify relationships at one level of analysis that are suggested by empirical results or theory at another level of analysis (Rousseau, 1985), it is not necessary for the individual and team level relationships to be exactly similar. That is, it may be possible that a certain variable, like task type, will affect the relationship at the team level, but will not affect the relationship at the individual level. Consistent with this line of thought, I hypothesized that task type would only be a moderator at the team level of analysis, but not at the individual level of analysis. The relationships were tested at two time periods to determine whether they would replicate. Therefore, "time" was not incorporated into Figure 1.

CHAPTER II

REVIEW OF THE LITERATURE

Self-efficacy theory has provided the impetus for a number of research studies across psychological domains due primarily to its significance in affecting people's motivation and performance (Bandura, 1986, 1997; Feltz, 1988, 1992; Gist & Mitchell, 1992; Maddux, 1995). To date, the relationship between self-efficacy and performance has occurred almost exclusively at the individual level despite the fact that in many settings, such as business, military and sport, individuals perform as members of a team rather than as individual competitors (Feltz, 1992). Researchers have suggested that the self-efficacy and performance relationship can be extended from the individual level to the team level, and collective efficacy has been recognised as an important determinant of team performance (Bandura, 1986, 1997).

This chapter reviews relevant literature pertaining to self-efficacy, collective efficacy and performance within sport settings. Although it was contextually relevant to introduce efficacy research from other domains, this inclusion was deemed as complimentary to the examination of efficacy and performance in sport, and therefore, in no way, does this review attempt to cover all of the work on efficacy theory. Rather, a general discussion of the self-efficacy construct, and its relationship with performance is presented. Due to the limited quantity of research on collective efficacy, this construct is considered more fully. The collective efficacy section draws parallels with self-efficacy, and also highlights the unique nature of collective efficacy as a team construct. Next, levels of analysis issues that affect team research are presented. I conclude with a multi-level model between efficacy and performance. In this section, task type is introduced as a moderator of the efficacy - performance relationship.

Self-Efficacy

The construct of self-efficacy was developed within the framework of social cognitive theory (Bandura, 1977, 1986). Self-efficacy is defined as one's beliefs in one's ability to successfully perform a specific behavior or set of behaviors which are required to obtain a certain outcome (Bandura, 1977, 1986). Thus, self-efficacy is a belief in one's capabilities to produce given levels of performance rather than a global trait that accounts for overall performance optimism. Self-efficacy is not concerned with the skills an individual has, but rather with the judgments of what one can do with whatever skills he/she possesses (Bandura, 1986). That is, self-efficacy judgments are about what one can do, not what one has.

Sources of Self-Efficacy

Judgments of efficacy, whether accurate or faulty, are based on six principal sources of information (Bandura, 1977, 1982, 1986; Maddux, 1995). These sources are: performance experiences, vicarious experiences, imaginal experiences, verbal or social persuasion, physiological states, and emotional states. The six categories of efficacy information are not mutually exclusive in terms of the information they provide, although some are more influential than others. Generally, as consecutive outcomes accumulate, personal experience becomes the primary influence on efficacy judgments, and possible counteracting influences such as verbal persuasion and vicarious experience lose their potency (Lindsley et al., 1995). Thus, the most important and most powerful source of efficacy is derived from previous performances. Generally, success at a task, behavior or skill strengthens self-efficacy, whereas perceptions of failure diminish self-efficacy (Bandura, 1977, 1982, 1986; Feltz, 1992; Maddux, 1995).

Self-Efficacy and Performance

Bandura (1986) proposed a reciprocal relationship between self-efficacy and performance, According to Bandura (1977), "mastery expectations influence performance and are, in turn, altered by the cumulative effects of one's efforts" (p.194). Researchers have supported this notion (Feltz, 1994). In sport performance, self-efficacy has been shown to predict initial performance; however, as one gains experience on the task, performance also becomes a strong predictor of both future performance and self-efficacy (Feltz, 1982; 1988; Feltz & Mugno, 1983; McAuley, 1985). For example, Feltz (1982) found that as participants progressed over trials in learning a back dive, performance became a stronger influence on self-efficacy than self-efficacy became on performance, and Feltz (1982), and McAuley (1985) both found that performance correlates stronger with post-performance self-efficacy scores compared with pre-performance self-efficacy scores. In their meta-analyses, Moritz et al. (1996) and Multon, Brown and Lent (1991), also found that correlations for post-performance self-efficacy and performance measures were significantly larger that correlations between pre-performance self-efficacy measures and performance.

The importance of self-efficacy in sport has been repeatedly demonstrated. For example, in correlational studies, self-efficacy has been shown to be an important discriminating factor between "qualifiers" and "non-qualifiers" in Olympic gymnastics (Mahoney & Avener, 1977), as well as between successful and unsuccessful Big 10 wrestlers (Gould, Weiss, & Weinberg, 1981). Furthermore, in recent meta-analyses, self-efficacy was shown to have a positive and moderate correlation with performance across sport and exercise settings (Moritz et al., 1996). Finally, experimental and path analytic studies have demonstrated self-efficacy to be a major determinant of athletic performance (e.g., Feltz, 1982, 1988; Feltz & Mugno, 1983; George, 1994; McAuley, 1985).

Self-efficacy beliefs are a major determinant of behavior only when people have sufficient incentives to act on their self-perception of efficacy and when they possess the requisite subskills (Bandura, 1986). Discrepancies between efficacy beliefs and performance are most likely to occur when tasks or situations are ambiguous or when one has little information on which to base efficacy judgments, such as when one is learning a skill (Bandura, 1977). Bandura stated that self-efficacy beliefs will exceed actual performance when there is little incentive to perform the activity, or when physical and social constraints are imposed on performance. An individual may have the necessary skill and high self-efficacy, but no incentive to perform. This finding does not mean that self-efficacy has no influence whatsoever in the absence of skills. On the contrary, people's beliefs in their ability to learn can influence skill development.

Most of the efficacy research, to date, has assumed the presence of proper incentives rather than assessing and controlling for this factor (Feltz, 1992). However, there are methods available for the assessment of incentives (cf Feltz & Chase, 1998). For example, one method that has been used for the assessment of incentives is a measure of one's perceived importance to perform well on the task (George, Feltz & Chase, 1992). These researchers found that only when they used participants who perceived the task to be at least moderately important did they find a self-efficacy - performance relationship.

Collective Efficacy

To date, almost all of the efficacy research has been focused on the individual level. Bandura (1986, 1997) suggested that the efficacy - performance relationship can be extended from the individual level to the collective level. There has been little development of collective efficacy, either as a theoretical construct or in terms of its measurement (Paskevich, 1995; Zaccaro et al., 1995), and much less is known regarding the relationship between collective efficacy and performance although Bandura (1986, 1997) has suggested it is an important determinant of team performance. This lack of attention and understanding is attributable to problems in initial conceptions of collective efficacy, its treatment as a mere extension of self-efficacy theory to larger aggregations, and the difficulty of conducting research on teams or teams (George & Feltz, 1995; Zaccaro et al., 1995). Thus, more research is needed on efficacy beliefs as they relate to team performance in sport (Bandura, 1977, 1986; Feltz, 1992; Spink, 1990).

To better understand the concept of a team having a collective efficacy for various skills, it is important to establish clear conceptual and operational definitions of teams. In this dissertation, no distinction is made between the terms "group" and "team," and the terms are used interchangeably (cf Guzzo & Shea, 1992).A number of definitions for the terms group or team exist, and these definitions are often accompanied by many different ideas about the minimum set of criteria that constitute a team. Perceptions of "teamness," coordination, and working together have been identified as team characteristics (Zaccaro et al. 1995). A team is defined in this dissertation as "a social unit consisting of a number of individuals who stand in role and status relationships to one another, stabilized in some degree of time, and who possess a set of values or norms of their own regulating their behavior, at least in matters of consequence to the group" (Sherif & Sherif, 1969; p. 131). Sport teams, by virtue of the rules associated with playing a team sport, the distinctive player roles, and a common motivational goal of performance, display these characteristics (Paskevich, 1995).

Definitions of Collective Efficacy

Since the concept of collective efficacy was first introduced by Bandura in 1986, there have been many ways in which the construct has been defined. Thus, it is necessary to determine what collective efficacy is, and how it differs from other constructs. It was until recently that Bandura elaborated upon the collective efficacy construct, and more fully defined it as "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainment" (Bandura, 1997, p. 477). Like self-efficacy, Bandura considers collective efficacy to be task-specific.

Similar operationalizations of collective efficacy have been proposed by other researchers. For example, Lindsley et al. (1995) defined collective efficacy as the group's collective belief that it can successfully perform a specific task. Paskevich (1995) stated that collective efficacy is the perception of the team regarding a team skill, and that it is reflected in the team's belief in their ability as a team to produce desired results.

The work of Zaccaro et al. (1995) reflects a relatively unique conceptualization of collective efficacy. These authors believe that a definition of collective efficacy must acknowledge the notion of collective coordination, and the integration of individual contributions to the collective effort. They defined collective efficacy as "a sense of collective competence shared among members when allocating, coordinating, and integrating their resources as a successful, concerted response to specific situational demands" (p.309). To Zaccaro and his colleagues, collective efficacy refers to a team member's beliefs not only about how well each and every other team member can marshal individual resources to accomplish the team task, but also how well team members can coordinate and combine their resources.

In some definitions, collective efficacy has been defined as a team member's judgment of team capabilities (see Feltz & Chase, 1998; George & Feltz, 1995; Weldon & Weingart, 1993). For example, Bandura (1986) has also referred to collective efficacy as judgments that people make about a group's level of competency. This differentiation between team and individual beliefs has implications for collective efficacy measurement and subsequent research.

Differentiation of collective efficacy from other constructs. Before discussing the differences and similarities between collective efficacy and self-efficacy, it is important to differentiate collective efficacy from other team constructs. First, the concept of collective efficacy is not new to the organizational behavior field (Shamir, 1990). Collective efficacy has been a part of the old concept of group "morale" which was found to enhance the performance of military units, small teams and organizations. The notion of morale, however, was vaguely conceived and too broad. The concept of collective efficacy is analytically narrower and cleaner, and more suitable for inclusion in cognitive models of motivation.

There are other constructs that warrant differentiation from collective efficacy. For example, Zander and Medow's (1963) conceptualization of "group aspiration levels" refer to a score, or a performance level that a team expects to achieve. It differs from collective efficacy in that the former are exact statements of performance goals, rather than cognitive beliefs about a team's capability. Another team construct is "collective esteem," which is operationalized as the extent to which individuals generally evaluate their social group positively (Crocker & Luhtanen, 1990). Collective esteem refers to the value of a team rather than a team's expected effectiveness.

A construct very similar to collective efficacy is group potency (Guzzo, Yost, Campbell, Shea, 1993; Guzzo & Shea, 1992). Group potency is defined as a generalized collective belief in a group that it can be effective across multiple tasks encountered by groups in complex environments. Group potency differs from collective efficacy in that it is a more global construct which encompasses all types of tasks in a number of situations. Guzzo and Shea (1992) conceptualized group potency as an attribute of the group, and advocated for group measures of the construct. According to these authors, this group-focus served to differentiate potency from collective efficacy. The differences between group potency and collective efficacy are minimal, and seem to be more of an issue for measurement. Measures of group potency are much broader in scope compared to the task-specific focus of collective efficacy.

Differences between collective efficacy and self-efficacy. It is also worthwhile to differentiate collective efficacy from self-efficacy. The most obvious difference between these constructs is that self-efficacy refers to people's judgments of individual capabilities and effort, whereas collective efficacy refers to people's judgments of team capabilities. According to Bandura (1997), self-efficacy and collective efficacy differ in the unit of agency. Self-efficacy is an individual level phenomena, while collective efficacy exists as a team level attribute.

Bandura (1986, 1997) stated that collective efficacy is rooted in self-efficacy. More specifically, he stated that one's knowledge of personal efficacy is not unrelated to perceived collective efficacy. A team that has a strong sense of collective efficacy can enhance the perceived task-specific efficacy of its members, but a team with a weak sense of collective efficacy may not totally undermine the perceived self-efficacy of its more resilient members. Team losses, for instance, may decrease a team's efficacy levels, but should not affect the individual efficacies of its more resilient members. As well, members of a team who have weak beliefs in their own individual capabilities are not easily transformed into a strong collective force (Bandura, 1982, 1986).

Research has shown, however, that the relationship between collective efficacy and self-efficacy is modest (Feltz & Lirgg, in press; cf Watson & Chemers, 1998). That self-efficacy and collective efficacy are related, but are also distinct judgments, has implications for researchers interested in these constructs. Most of the self-efficacy research has focused primarily on an individual level, and as such, it can only provide a partial guide to the antecedents and consequents of collective efficacy. Collective efficacy is a team based construct, and therefore must be considered on a team level. The issue of what differences might occur at the team level has not been resolved (Porter, 1992). Bandura (1997) noted that sociocognitive determinants operate in much the same way at the collective level as they do at the individual level, and that both forms of efficacy serve similar functions and operate through similar processes. Thus, self-efficacy and collective efficacy should share similarities in terms of their antecedents and consequences (cf Feltz & Lirgg, in press; Zaccaro et al., 1995).

Sources of Collective Efficacy

Collective efficacy is thought to be influenced by diverse sources of information and determined in part by events and experiences similar to those that determine self-efficacy (Bandura, 1997; George & Feltz, 1995; Feltz & Chase, 1998; Feltz & Lirgg, in press; Zaccaro et al., 1995). In addition, it is also likely that qualities of the collective as a whole add a number of other variables to those associated with self-efficacy (Zaccaro et al., 1995). Expectations of collective efficacy have been hypothesized to be derived from the following five sources of information: performance accomplishments, vicarious experiences, verbal persuasion, physiological states, and influences within the team (Zaccaro et al., 1995).

As with self-efficacy, mastery experiences of the team are predicted to be the most powerful source of efficacy information (Feltz, 1994; Feltz & Chase, 1998; Feltz & Lirgg, in press; George & Feltz, 1995; Zaccaro et al., 1995). Teams that have an outstanding record of performance undoubtedly cultivate strong percepts of efficacy among their members. Likewise, a serious performance failure could decrease the collective efficacy of its membership which, in turn, could influence subsequent failures (Feltz & Lirgg, in press; see also Lindsley et al., 1995). In a recent study, Feltz and Lirgg (in press) found that past team performance affected aggregated collective efficacy beliefs to a larger degree than aggregated self-efficacy beliefs. More specifically, they found that although wins and losses affected aggregated collective efficacy more than aggregated self-efficacy, losses affected aggregated collective efficacy more in comparison to aggregated self-efficacy.

The pattern of prior performances has also been hypothesized to influence the strength of collective efficacy (Zaccaro et al., 1995). According to Zaccaro et al., team members need to share a significant number of performance experiences in order to develop a coherent and consistent sense of collective efficacy.

Although research on the sources of collective efficacy is just starting to emerge, one recent study suggests that the sources of collective and self-efficacy may differ slightly (Chase, Feltz, Tully, & Lirgg, 1997). Using data from 43 women collegiate basketball players prior to 12 games, these researchers investigated the frequency of occurrence of five different efficacy sources: past performance, physiological/emotional states, social comparison, outside sources, and persuasion. The results revealed that past performance, and physiological/emotional states were both ranked as the most important sources of self- and collective efficacy. The only difference was that self-efficacy was influenced by sources outside of sport more than collective efficacy, and that collective efficacy was influenced more by social comparison than self-efficacy. More specifically, individual players perceived events such as school demands as more of an influence on their personal efficacy than their team's efficacy. In addition, social comparisons (e.g., "We're a stronger team") were found to be more important than sources outside of sport for collective efficacy information. For both self- and collective efficacy, persuasion was ranked as the least used source for efficacy information.

Collective Efficacy and Performance

Like self-efficacy, collective efficacy is hypothesized to influence what people choose to do as a team, how much effort they put into their team endeavours, and their staying power when collective efforts fail to produce quick results or encounter forcible opposition (Bandura, 1982, 1986, 1997). Zaccaro et al. (1995) hypothesized that highly efficacious teams should be more likely to persist in the face of collective difficulties and obstacles, and be willing to set more difficult goals and be more committed to these goals, as well as accept more difficult challenges for the team. In addition, high collective efficacy should also facilitate a team's responses to environmental stress, promote persistence and perseverance in the face of significant demands, and may be linked to greater readiness for risk taking.

The bottom line with respect to collective efficacy is that highly efficacious teams should perform better and persist longer than teams having lower collective efficacy (Feltz & Lirgg, in press; George & Feltz, 1995; Spink, 1990; Zaccaro et al., 1995). George and Feltz (1995) stated that the relationship between collective efficacy and team performance is likely to be reciprocal. That is, similar to the relationship between self-efficacy and performance, successful team performance should positively influence percepts of collective efficacy, which in turn are likely to lead to behaviors and actions that enhance the ability of the team to succeed in the future.

According to Bandura (1997), the stronger the beliefs people hold about their collective capabilities, the more they achieve. He stated that this is true regardless of whether the team's sense of efficacy develops naturally or is created experimentally, and that the relationship holds across domains (e.g., education, organizational, athletic). Although little research has been conducted on collective efficacy beliefs as they relate to team performance in sport, in the studies that have been conducted, a positive relationship has been found between collective efficacy and performance in both the field and laboratory (Feltz & Lirgg, in press; Hodges & Carron, 1992; Lichacz & Partington, 1996; Paskevich, 1995; Spink, 1990; Watson & Chemers, 1998).

Collective Efficacy Research

Bandura (1982, 1986) called for a broad and comprehensive research effort with respect to collective efficacy. He stated that the greatest progress will be made in elucidating the development, decline, and restoration of collective efficacy and how it affects team functioning; that is, if measures of perceived collective efficacy are tied to explicit indices of performance. To date, however, there are only a few studies that have examined the collective efficacy construct. The purpose of this section is describe this research. Table 1 provides a brief summary of the collective efficacy research. In this table, only the relationships between self-efficacy and collective efficacy, and collective efficacy and performance are noted.

Table 1. Summary of Collective Efficacy Research in Chronological Order.

Authors/ Date	Setting	Definition of Collective Efficacy	Type of Study	Results
Kerr, 1989	Social Psyc.	Rating of which group was more likely to receive an investment payoff.	Exper.	Under certain experimental conditions, for which personal and collective efficacy do not decline, people still presume that they do (no values reported).
Spink, 1990	Sport	Operationalized as a construct which reflects the fact that teams often have collective expectations for success	Corr.	Individuals who were high in collective efficacy were on teams that finished higher in the tournament than individuals who were in low collective efficacy.
Hodges & Carron, 1992	Sport	Cited Bandura, 1986.	Exper.	Experimental triads high in collective efficacy improved their performance on the muscular endurance task following a failure experience, whereas triads low in collective efficacy experienced a performance decrement. Teams with high efficacy persisted longer than low efficacy teams Both high and low efficacy teams decreased their collective efficacy following failure.
Porter, 1992 (Unpublished Dissertation)	I/O	Extension of self-efficacy definition to team level	Corr.	Neither aggregated self-efficacy or aggregated collective efficacy predicted performance in regression analysis. $\underline{r}$'s between aggregated self-efficacy and performance ranged between -.05 - -.55 $\underline{r}$'s between aggregated collective efficacy ranged between -.59 - .17
Parker, 1994	Educ.	Judgments that people make about a team's level of competency.	Corr.	$\underline{r}$'s between self-efficacy and collective efficacy ranged from .60 - .93 $\underline{r}$'s between teacher's collective efficacy and student performance ranged between .29 - .61.
Riggs & Knight, 1994	I/O	The beliefs that individuals hold concerning the ability of their team to successfully perform it's work tasks	Corr./ Path Analysis	$\underline{r}$ between self-efficacy and collective efficacy = .18 Performance not assessed.

Paskevich, 1995	Sport	Defined as a sense of collective competence shared among team members when allocating, coordinating, and integrating their resources as a successful, concerted response to situational demands.	Corr.	Collective efficacy mediated the relationship between cohesion and performance, at early season, but not later in the season. Evidence for the independent effects of both collective efficacy and cohesion on performance. (No correlations listed)
Lichacz & Partington, 1996	Sport	The judgment by team members of the team's capabilities to organize and execute courses of action required to attain designated types of performance.	Exper.	Correlation between the individual perceptions of collective efficacy and team performance was .27. High efficacy conditions demonstrated larger means for collective performance than the low collective efficacy teams
Prussia & Kinicki, 1996	I/O	Individual perceptions regarding a team's ability to perform in a particular situation	Exper.	Correlations between team effectiveness and collective efficacy were .60, and .74.
Silver & Bufanio, 1996	I/O	The collective belief in a team that is can be successful.	Exper.	Correlations between efficacy and performance were .62, and .37. Past performance correlated positively with subsequent judgements of collective efficacy (r's = .80 and .67)
Little & Madigan, 1997	I/O	Members' judgments of team capabilities, or an assessment of the team's collective ability to perform a job at hand	Repeated measures ANOVA	Collective efficacy was related to team performance
Watson & Chemers, 1998	Sport	Cited Bandura (1997)	HLM	Relationship between self-efficacy and collective efficacy depended on the average self-efficacy of the team (for teams with high average self-efficacy, relationship was positive for teams with low average self-efficacy, relationship was negative). Previous performance was unrelated to collective efficacy at the beginning of the season. Collective efficacy at beginning of season predicted later collective efficacy beliefs and overall team performance at season's end.

Feltz & Lirgg, in press	Sport	Degree of confidence that player's had in their team's ability to outperform their opponents on important game competencies.	Corr.	Team and player efficacy were positively correlated (r=.60), Team performance was correlated with collective efficacy (r=.30) but uncorrelated with player efficacy (r=.03).

Collective efficacy research -- Outside of sport. Those who have investigated collective efficacy outside of sport have found that collective efficacy is related to group size (Kerr, 1989); that teacher's collective efficacy is related to student achievement (Parker, 1994); that success/failure influence collective efficacy (Riggs & Knight, 1994); and that collective efficacy is related to group effectiveness (Prussia & Kinicki, 1996). With respect to the relationship between collective efficacy and performance, generally a positive relationship (Little & Madigan, 1997; Silver & Bufanio, 1996), or equivocal results have been reported (Porter, 1992).

For example, Riggs and Knight (1994) used path analysis to describe the relationships between perceived group success-failure, individual and collective levels of job-specific efficacy and outcome expectancy, satisfaction, and organizational commitment (one's acceptance and willingness to work for organizational goals) with a sample of 59 work groups. Collective efficacy was defined as the beliefs that individuals hold concerning the ability of their group to successfully perform it's work tasks, and as such was an individually held belief about the group in which each participant belonged.

The results of their path analysis demonstrated that group success-failure played a direct, dominant role in the determination of self- (r =.37) and collective efficacy (r = .56). Other results indicated that self-efficacy failed to be linked with satisfaction (r = -.09) or organizational commitment (r = -.12), and that the links between collective efficacy and satisfaction, and collective efficacy and organizational commitment were the weakest in their model (r's = .48, .64 respectively). With respect to the relationship between self-efficacy and collective efficacy, a correlation of .18 was reported.

Prussia and Kinicki (1996) investigated how perceived collective efficacy operates in concert with other sociocognitive determinants, namely group goals and affective evaluative reactions, in determining group effectiveness. Their model predicted that group affective evaluations, group goals, and collective efficacy would mediate the influences of performance feedback and vicarious experience on group effectiveness. Collective efficacy was defined as individual perceptions regarding a group's ability to perform in a particular situation, and group effectiveness was evaluated as the process behaviors and the output quantity of novel brainstorming tasks.

Four-person, concocted groups ($n = 81$) were lead to believe that their group performed either above or below the normative productivity standard. In addition, half of the groups viewed a brainstorming information video, while the other half did not (i.e., a 2 X 2 design). The results of this study found that feedback, vicarious experience, and group effectiveness at Time 1 all affected collective efficacy (the correlation between group effectiveness and collective efficacy was .60). With respect to feedback, as expected, a positive relationship was found between collective efficacy and positive feedback, and a negative relationship was found between negative feedback and collective efficacy. In addition, collective efficacy affected group goals ($r = .80$) and group effectiveness at Time 2 ($r = .74$).

Upon further analysis, a number of mediating relationships were evident. For example, collective efficacy was found to mediate the relationship between group effectiveness and feedback, and also partially mediated the relationship between vicarious experience and group effectiveness. Lastly, collective efficacy was also found to mediate the relationship between feedback and group goals.

Recently, Silver and Bufanio (1996) investigated the impact of collective efficacy and group goals on group performance. Collective efficacy was defined as the collective belief in a group that it can be successful, and was assessed by having the groups make judgments about their capabilities to complete a construction task (i.e., building model trucks from Lego construction pieces). Twenty-five groups composed of undergraduate students participated in this study. The groups completed the collective efficacy and group goal level measures prior to completing the task. The groups completed the task 3 times; one performance measure was used as a pre-trial measure.

The results revealed that collective efficacy was related positively to group performance, on both experimental trials. The correlations between efficacy and performance were .62, and .37, respectively. In addition, hierarchical regression analyses showed that efficacy accounted for a significant proportion of the variance in group goals beyond that explained by previous task performance. The total variance explained using these two predictors was 60% and 77% for trials one and two, respectively. Past performance was also correlated positively with subsequent judgments of collective efficacy for both trials ($\underline{r}$'s = .80 and .67, respectively). Finally, to determine the proportion of variance in task performance accounted for by past performance, collective efficacy, and group goals, multiple regression analyses were conducted on past performance. Although the total variance accounted for by these 3 variables was 52% and 44% (for Trials 1 and 2), collective efficacy and group goals added unique predicted variance beyond that accounted for by past performance, but only for Trial 1.

A comment on the Silver & Bufanio study by Kaplan (1997) suggested that Silver and Bufanio may have wrongly interpreted their results. More specifically, Kaplan noted

Silver and Bufanio hypothesized that the correlation of efficacy and goals with subsequent performance would become progressively stronger over time. Initial performance, efficacy, and goal measures did predict the performance scores for the first trial. However, by the next trial, the additional predictive value of efficacy and goals was gone. That is, the variance in performance explained by past performance increased, whereas the variance explained by efficacy and goals decreased. Rather than growing stronger, as the hypothesized model implied, the correlation of efficacy and goals with subsequent performance grew weaker, and the second efficacy and goal measures accounted for no additional variance in a multiple regression analyses beyond that contributed by the second performance score alone. Kaplan concluded that the results of the Silver and Bufanio study provide stronger evidence against the influence of collective efficacy and goals on performance than in favor of such an influence.

Porter (1992) examined the relationship between self-efficacy, collective efficacy and performance using 35 work groups (150 individuals) from a manufacturing company. Performance was the total number of parts assembled by the group each day. Porter's study was conducted on the individual and group levels. In order to justify the aggregation of individual level perceptions to the group level, she first calculated the degree of consensus for each group using the method recommended by James et al. (1984). Porter found that neither aggregated self-efficacy or aggregated collective efficacy predicted performance in a hierarchical multiple regression analysis. However, correlations between aggregated self-efficacy and group performance ranged between -.05 and -.55, whereas correlations between aggregated collective efficacy and group performance ranged between -.58 to .17.

Collective efficacy research -- Sport studies. More research has been conducted on collective efficacy in the sport domain and all have found collective efficacy to be an important factor in team performance. Spink (1990) investigated the relationship between group cohesion and collective efficacy in elite and recreational volleyball teams. In this study, collective efficacy was operationalized as a construct which reflects the fact that teams often have collective expectations for success. It was assessed with the following two questions: "What placing do you expect to attain in Supervolley (the tournament)?" and "How confident are you that your team will attain this placing?" The participants who expected their team to finish first formed the "high" collective efficacy team, whereas the participants who expected their team not to place in the top three formed the "low" efficacy team. Ninety-two volleyball players participated in this study.

Results for the elite sample demonstrated that the high and low collective efficacy teams could be differentiated by cohesion beliefs. Specifically, Attractions to Group - Task (ATG-T) and Group Integration - Social (GI-S) were greater for team members who were high in collective efficacy. For the recreational volleyball players, however, none of the cohesion variables discriminated between the high collective efficacy and low collective efficacy teams.

Spink also reported a relationship between collective efficacy and team performance. Specifically, in a post hoc examination of the final tournament placings, he found that "high collective efficacy teams finished higher in the tournament than low collective efficacy teams" (p.308). He suggested that the cohesiveness might be an important determinant of collective efficacy, whereby the greater the perception of group cohesion, the greater the collective efficacy.

The study conducted by Hodges and Carron (1992) investigated the effects of collective efficacy on performance using a laboratory task. Experimental triads competed against a confederate team on a muscular endurance task (i.e., holding a medicine ball aloft). The 51 triads were divided into high and low collective efficacy teams. Collective efficacy was manipulated by telling the high efficacy teams that their performance was superior to a confederate team. Low collective efficacy teams were told that their performance were substantially inferior to the confederate teams. In all cases, the confederate team won the competition. Collective efficacy was assessed by asking the teams to give a team response to the following questions: "what do you think your team's chances are of winning?" and "how confident are you of your prediction?" An overall efficacy measure was computed by multiplying the two scores together. Results demonstrated that the manipulation was successful in producing high and low efficacy teams.

Hodges and Carron (1992) found support for the hypothesis that experimental triads high in collective efficacy improved their performance on the muscular endurance task following a failure experience, whereas triads low in collective efficacy experienced a performance decrement. In addition, the teams with high efficacy persisted longer than low efficacy teams. Furthermore, both teams (high and low efficacy teams) decreased their collective efficacy following failure.

A series of three studies examining a number of collective efficacy issues were conducted recently by Paskevich (1995). In his first study, Paskevich developed a multi-dimensional measure of collective efficacy. The collective efficacy measure contained separate subscales for task (offensive, defensive, transition), communication, motivation, confidence in the face of obstacles, confidence in skills in overcoming obstacles associated with teammates, and general collective efficacy. Reliabilities for each subscale were greater than .85 (in all 3 studies), and the correlations between the subscales ranged from .41 to .82.

This collective efficacy measure was subsequently used to examine the relationship between cohesion and collective efficacy. Paskevich hypothesized that because collective efficacy measures focus on specific skills and abilities that the team performs, collective efficacy would predict athletes who were high or low in their perceptions of the task-related measures of cohesion. The sample used in this study comprised 70 volleyball players from 7 teams.

Results from discriminant function analyses revealed that two of the group cohesion constructs (GI-T, and ATG-T) were able to differentiate between the high and low collective efficacy teams. When the constructs were reversed, four of the collective efficacy subscales (communication, motivation, overcoming obstacles in association with teammates, and general collective efficacy) were able to differentiate the teams high and low in group integration - task (GI-T).

A correlational analysis revealed that GI-T and ATG-T demonstrated a number of significant relationships with the collective efficacy subscales. In addition, GI-S was also correlated with the communication and the motivation subscales of the collective efficacy measure. ATG-S was not significantly correlated to any of the collective efficacy subscales. Thus, individuals high in collective efficacy had greater levels of task-related cohesion than those individuals with lower levels of collective efficacy.

In his second study, Paskevich examined collective efficacy data from both team and individual perspectives. The purpose of this study was to clarify the degree of sharing reflected in collective efficacy beliefs and cohesion beliefs, and to determine whether collective efficacy and cohesion were best represented as an individual, a team phenomena, or some combination of both. Two hundred and eighty-seven individuals from 25 collegiate level volleyball teams participated in this study. Through the use of Kenny and LaVoie's (1985) LEVEL program, Paskevich used intraclass correlations to test for non-independence of team member responses.

Paskevich found that all measures of collective efficacy and cohesion appeared to be more of a function of team processes and interaction than individual level processes. He stated that because the majority of the larger correlations and percentage of variance accounted for were found at the adjusted team level, this fact should provide elementary evidence, as suggested by Steiner (1972), Shaw (1981) and Zaccaro et al. (1995), that the team is something more than the simple collection of individuals. He recommended assessing collective efficacy as team level construct.

In his final study, Paskevich examined the direction of the relationships between collective efficacy, cohesion and performance-outcome. The participants for this study were the same as those who participated in study two (i.e., 25 teams). Winning percentage was used as the performance-outcome variables.

Paskevich found that perceptions of collective efficacy and cohesion increased over the course of a season, with later season efficacy values being larger than early season values. This is consistent with Feltz and Lirgg (in press). He also found initial evidence that the task subscale of the collective efficacy measure mediated the relationship between cohesion (GI-T) and performance, at early season, but not later in the season. However, there was also evidence for the independent effects of both collective efficacy and cohesion on performance.

Another study was conducted by Lichacz and Partington (1996). These authors investigated the relationship between collective efficacy and performance for "true" and "ad hoc" teams. The participants in this study comprised 8 teams. The four true teams were made up of individuals who belong to either the same rowing team (2 teams), or the same basketball team (2 teams). Thus, these teams had a history of playing together. The ad hoc teams were made up of individuals who either had some previous team sport experience (2 teams) or who did not (2 teams). The ad hoc teams did not know each other before the study. The experimental task was a rope-pulling task. All participants pulled on a rope, individually, and then collectively with their other team members. The collective pulls and the sum of the respective individual pulls were used to derive a collective performance efficiency index (i.e., collective pull divided by sum of individual pulls).

Perceptions of collective efficacy were manipulated through performance feedback during the experimental session. The participants were given differential feedback after each of their individual and collective pulls. Participants in the low efficacy condition were told that their pulls were 10% below the standards set by high-level athletes, or non-athletes (depending upon the composition of the team), while those in the high-level efficacy condition were told that their pulls were 10% above the standards set by high-level athletes or non-athletes. In addition, perceptions of collective efficacy were assessed by the following question: "Do you think that your team will achieve a better pull than the normative pull?" Ratings were made from 0 (no chance of obtaining the best score) to 10 (will obtain the best score). The participants in the high collective efficacy teams all displayed mean collective efficacy scores greater than the participants in the low collective efficacy teams. Thus, they concluded that the experimental manipulation was successful. The correlation between the individual perceptions of collective efficacy and team performance was .27. In addition, the teams from the high efficacy conditions demonstrated larger means for performance than the low collective efficacy teams.

More recently, in their multi-level analysis of collective efficacy, Watson and Chemers (1998) investigated the antecedents and consequences of collective efficacy in college basketball teams. Twenty-eight teams participated in the study (336 individuals). Collective efficacy and self-efficacy were assessed twice during the season. In order to demonstrate that collective efficacy was a shared belief, the procedures outlined by James et al. (1984) were used. Data were analyzed using Hierarchical Linear Modeling (HLM) techniques. HLM allows for the testing of data with a hierarchically nested structure (i.e., individuals nested within teams). Only the results related to efficacy and performance are described here.

First, this study supported the notion of collective efficacy as a shared belief. A high level of within team agreement on collective efficacy was documented. Second, although considerable stability in collective efficacy judgments were noted over the two time periods, the degree to which collective efficacy judgments were shared and their antecedents changed over time. More specifically at the beginning of the season, collective efficacy was more personalized than later in the season. Watson and Chemers also showed that the relationship between self-efficacy and collective efficacy depended on the average self-efficacy of the team. For teams with high average self-efficacy, the relationship between players' self-efficacy and perceptions of collective efficacy was positive. For teams with low average self-efficacy the relationship between players' self-efficacy and collective efficacy was negative.

With respect to performance, Watson and Chemers found that previous performance was unrelated to collective efficacy at the beginning of a season,. However, collective efficacy judgments at the beginning of the season predicted later collective efficacy beliefs and overall team performance at season's end. On an individual level, stronger individual performances (as measured by the average number of points a player scored per game) were predicted by high self-efficacy but not by collective efficacy.

Feltz and Lirgg (in press) examined the pattern of collective and self-efficacy across a season of competition, and examined the relationships among self-efficacy, collective efficacy and team performance. This study was conducted on the team level, and therefore the collective efficacy and self-efficacy constructs comprised aggregated individual perceptions. The participants in this study were 159 ice hockey players representing 6 teams. The task-specific efficacy measure assessed the degree of confidence that player's had in their team's ability to outperform their opponents on important game competencies. To determine if athletes held shared beliefs within their teams regarding collective efficacy perceptions, these authors conducted a consensual analysis in accordance with the procedures outlined by James et al. (1984).

To compare how collective and self-efficacy beliefs varied across the season, polynomial trend analyses were used. A significant cubic trend was found. The following relationship was evident for the entire sample: all teams increased in collective efficacy across the first half of the season, then collective efficacy decreased at the midpoint of season, and then, at the end of the season, collective efficacy increased to a level higher than initial values. The same trend was evident for self-efficacy, except for a more subtle decline in the second half of the season.

Although all teams demonstrated a high degree of consensus in their collective efficacy beliefs, because of the small number of teams, team by game was used as the unit of analysis in regression analyses. Bivariate correlations revealed that collective and self-efficacy were positively correlated ($r=.60$), and that team performance was correlated with collective efficacy ($r=.30$) but uncorrelated with self-efficacy ($r=.03$). The regression analysis revealed that collective efficacy was the strongest predictor of performance, while self-efficacy was significant, but in the negative direction.

A secondary purpose of the Feltz and Lirgg study was to investigate if winning or losing affected efficacy judgments. They found that wins and losses affected collective efficacy more than self-efficacy, but losses affected collective efficacy more in comparison to self-efficacy. That is, winners increased collective efficacy beliefs following a win, and losers significantly decreased their perceptions of team's abilities following a loss. Results for self-efficacy supported the same trend, but were not significant. Thus, they concluded that past team performance affects collective efficacy beliefs to a greater extent than self-efficacy beliefs. This study supported the association between collective efficacy and team performance, and the fact that it was conducted over a full season gives credence that this association was not spurious.

As one can see, the research using the collective efficacy construct has been varied, and diverse. Collective efficacy has attracted researchers from social, educational, industrial/organizational and sport psychology. One problem that plagues this research, however, is the inconsistencies in the conceptualizations and measurement of collective efficacy. In some studies, researchers have treated collective efficacy as a team level phenomena (e.g., Feltz & Lirgg, in press), while others conceptualized collective efficacy as individual level perception (e.g., Prussia & Kinicki, 1996; Riggs & Knight, 1994). In one case, collective efficacy was conceptualized as having both individual and team level effects (i.e., Paskevich, 1995). Adding to the confusion, is that Bandura (1997) and others (e.g., Gist, 1987; Guzzo et al., 1993; Lindsley et al., 1995) have identified a number of methods that can be used to assess collective efficacy. Thus, the next section of this chapter addresses the myriad of ways collective efficacy can be assessed.

<u>Measurement of Collective Efficacy</u>

Bandura (1977, 1986) recommended that self-efficacy be measured along the dimensions of magnitude (level), strength and generality. The same format is applicable to collective efficacy measures. Also similar to self-efficacy measures, measures of perceived collective efficacy should be closely tied to explicit indices of team performance (George & Feltz, 1995). That is, researchers need to conduct a contextual analysis of the competency areas within sport teams prior to developing their questionnaire items.

Bandura (1986, 1997) called for a "broad and comprehensive research effort" (p. 452) with respect to the construct of collective efficacy. He stated that advancement in collective efficacy research requires the "development of suitable tools for measuring perceptions of collective efficacy to achieve varying levels of results" (p. 452). To date, collective efficacy measures have been developed in a number of ways, and there is alot of confusion regarding the appropriate way to assess the construct.

The first method that has been suggested as a means to assess collective efficacy involves aggregating the perceptions of individual self-efficacy beliefs. That is, individual self-efficacy beliefs are averaged to form a team measure which represents collective efficacy. However, Bandura (1986; 1997) and others (Feltz, 1994; Feltz & Chase, 1998; Feltz & Lirgg, in press; Lindsley et al, 1995; Paskevich, 1995; Zaccaro et al, 1995) have pointed out that collective efficacy may be insufficiently represented by the sum of the perceived personal efficacies of participants.

One rationale for why collective efficacy is more than the sum of individual efficacy expectations is based upon Steiner's (1972) work with group performance. Steiner found that group performance was more than the sum of the individual's abilities, and showed clearly that group performance is typically overestimated by the simple summation of member abilities because coordination and motivational processes are not taken into account (i.e., actual group productivity equals potential productivity minus any social process losses). The existence of a group structure and the associated coordinated and interactive processes that occur relative to matters of consequence to the group imply that researchers are unrealistic in their estimates of group function when they simply sum its member abilities (cf Steiner, 1972). Similarly, Paskevich (1995) and Zaccaro et al. (1995) argued that merely summing judgments of abilities of other group members on a task misses the group's interaction, coordination and integration factors.

Bandura (1997) stated that team functioning is a product of the interactive and coordinative dynamics of it's members and these interactive dynamics create an emergent property that is more than the sum of the individual attributes. He also argued that the sum of the team members' individual efficacy expectations would not be an accurate representation of the collective efficacy construct under most circumstances. In addition, Bandura stated that there are certain conditions under which aggregated personal and wholistic judgements of collective efficacy are likely to diverge. A weak link in an activity that has to be performed interdependently can spell team failure even though the remaining individuals are highly efficacious. Similarly, a collection of supremely efficacious members may perform poorly as a unit if they do not work well together. In both of these cases, the aggregate of personal efficacies would overpredict the level of team performance. Furthermore, when a key function for team success is performed by a highly efficacious individual, members will have a higher opinion of their team's capability than what they can do personally. Where success rests in the hands of a few extraordinary efficacious members in critical positions, aggregated personal efficacies would underpredict team attainments.

A second method to assess collective efficacy involves aggregating individuals' own perceptions of collective efficacy (Lindsley et al., 1995). To assess collective efficacy in this manner, team members would be asked to respond to this type of statement: "rate your confidence that your team can beat the opposing team." This approach of aggregating individual beliefs about the collective to assess collective efficacy is not without criticism, however. The major drawback with this method is that the wording of the items reflects individuals' perceptions of their team's capability rather than a team's efficacy per se (Earley, 1993). That is, respondents are asked their individual perception of the collective efficacy of the team (Lindsley et al., 1995). Lindsley et al. (1995) stated that this is a useful strategy if it is assumed that individuals may not be knowledgeable of the team's collective perception, or it is assumed that the "collective mind" is a differentiated system in which no individual (part) has access to the collective whole.

Bandura (1997), however, stated that the methods of aggregating individual perceptions of self-efficacy (Method 1) and aggregating individual perceptions of the team (Method 2) are not as distinct as they might appear. He stated that when people are judging perceived efficacy in a team endeavour they are not plumbing an abstract team mind in which the members are detached from each other, and that an assessment focus at the individual level is steeped in processes operating within the team. Furthermore, a focus at the team level does not remove any thought about the individuals that contribute to the collective effort. Thus, he stated that these two indices of collective efficacy would be at least moderately correlated. Some support for this proposition was provided by Feltz and Lirgg (in press). In their study, they assessed efficacy by aggregating individual self-efficacy beliefs, and aggregating individual beliefs about the collective. They found that these two measures were positively correlated ($r = .60$).

Another assessment method is to use individuals as informants to estimate the team's collective efficacy. This procedure is similar to the one just described, however, it involves assessing each team member's appraisal of their team's ability that it can perform specific tasks successfully (Lindsley et al., 1995). For example, an item may read "rate your team's confidence that your team can beat the opposing team." Thus, when items are phrased in this way, the focus is on the team's belief, rather than individual level beliefs. However, it is still an individual's perception or rating. Similar to the second method, individual beliefs regarding the team's ability would be aggregated to produce one index of collective efficacy.

According to Lindsley et al. (1995), although the empirical difference between this method and the second method may be minor when respondents share beliefs about the team's capabilities, the methods for assessing reliability differ. That is, focusing on the team's belief, rather than individual beliefs, avoids many of the debates and pitfalls of multi-level analysis. The rationale for using individuals as informants to estimate a team's collective efficacy is based on the notion that there are certain cognitions that team members have which are quite different and distinguishable from the beliefs they experience as individuals in isolation, or in other contexts outside the team (Lindsley et al., 1995). These cognitions are collective, team-based beliefs arising from an individual's ability to cognitively consider social entities larger than himself or herself. Thus, they are emergent properties of the team rather than the individual, and cannot be reduced to their constituent parts.

This method is partially consistent with what Zaccaro et al. (1995) and Paskevich (1995) recommend for assessing collective efficacy. That is, these authors concur with Lindsley et al. (1995) that collective efficacy measures should focus on the collective as a whole. However, they also recommend that collective efficacy measures assess the various aspects that may influence how well a team perceives that it can work together. Because collective efficacy beliefs can be influenced by a variety of factors including differences in task competencies, physical qualities, social skills and a team's coordination and integration capabilities, they believe that collective efficacy should be conceptualized as multi-dimensional in nature, and assessed with multi-dimensional measures.

In his study, Paskevich (1995) developed a multi-dimensional measure of collective efficacy for volleyball. The scales were constructed to be sport and context specific. The questionnaire items pertained to the various general components of practises and games that concern offensive and defensive team capabilities/strategies. The items also assessed the team's confidence in it's skills and abilities to make the team's communication, coordination, persistence, and barrier reduction strategies effective. Thus, Paskevich's measure was composed of eight collective efficacy subscales.

Although Zaccaro et al. (1995) and Paskevich (1995) believe that collective efficacy must be assessed in this multi-dimensional format in order to capture the variety of forces that may impact collective efficacy beliefs, Bandura (1997) may disagree. According to Bandura, the wholistic judgment of a team member's appraisal of their team's capability encompasses the coordinative and interactive influences operating within a team. Thus, the multi-dimensional measures of collective efficacy are not needed.

One important final point, however, that is especially evident in Paskevich's (1995) study, is that in both cases (i.e., if one asks respondents to rate his/her perceptions of the team, or rate his/her teams' perceptions), <u>individuals</u> are still responsible for providing the rating. More specifically, although the items on each of Paskevich's collective efficacy subscales were phrased as "rate your team's confidence...," in his description of each subscale he stated that the items "assessed the athlete's perceptions of the team's confidence..." It can be argued that although team features, events and processes provide the situational stimuli that are a determinant of collective efficacy beliefs, it is the individuals who attempt to extract the psychological meaning and interpret these factors and processes, and therefore the perception, interpretation and meaning of collective efficacy beliefs should occur at the individual level (cf Kozlowski & Hattrup, 1992). Thus, despite the fact that items may be worded as "rate your team's confidence..." rather than "rate your confidence in the team..." the appropriate level of analysis would be the individual until consensus was demonstrated. The issue of consensus or agreement is paramount in collective efficacy research and will be discussed in more detail later.

In any event, some researchers (e.g., Prussia & Kinicki, 1996), have argued that the use of aggregation procedures represent surrogates of team level measures, and are not team level measures per se. These authors would advocate for collective efficacy measures that require team members to provide a single response as a team, thereby theoretically treating the team as an entity. Thus, another method to assess collective efficacy is to have the team members make the collective efficacy judgment together. This approach eliminates the calculation of statistical indicators of agreement and avoids the aggregation issue. It is believed by some (e.g., Guzzo et al., 1993) to be an acceptable way of measuring a team's collective belief. However, it also has drawbacks. For example, according to Bandura (1997), team members are rarely of one mind in their appraisals of matters. He pointed out that forming a consensual judgment of a team's efficacy by team discussion is subject to social persuasion and conformity pressures. For example, it is possible that a more prestigious team member could influence the judgment in such a way that it does not accurately represent the views of many of its members. Thus, team members may publicly consent to a response without truly believing it (Guzzo et al., 1993). Forced consensus may be highly misleading, especially with a large collective.

It is obvious that the conceptualization of collective efficacy raises a number of methodological and interpretive issues. Before Bandura's new chapter, it was generally accepted that collective efficacy referred to people's perceptions about the collective as a whole, but it was not clear whether these beliefs were shared, and therefore represented a team level rather than an individual level phenomenon (Zaccaro et al., 1995). Bandura (1997) stated clearly that collective efficacy does refer to shared beliefs, and is a team level attribute.

The specification of collective efficacy as a team level attribute requires that team members be sufficiently similar with respect to their collective efficacy beliefs so that they may be characterised as a whole (Klein, Dansereau, & Hall, 1994). Accordingly, homogeneity of beliefs is considered to be a prerequisite for asserting that the construct in fact applies to that team (Dansereau, Alutto, & Yammarino, 1984). Thus, the theoretical conceptualization of collective efficacy as a shared belief (Bandura, 1997; Zaccaro et al., 1995), implies that team members' collective efficacy beliefs should be sufficiently homogeneous.

According to Klein et al. (1994), asserting that members of a team are homogenous with respect to a theoretical construct, like collective efficacy, means that a researcher is predicting that team members' collective efficacy beliefs are identical. However, Bandura (1997) stated that commonality of efficacy belief among team members does not mean that every member is of exactly the same view on every aspect of team functioning. He stated that although complete uniformity would be rare, the differences in efficacy beliefs between teams should be greater than the variation within teams (Bandura, 1997). Thus, in proposing relationships, the focus should be on the variation between teams, and that hypotheses should conform to the prediction that differences between teams on one construct of the theory are related to differences between teams on other constructs of the theory.

By conceptualizing collective efficacy as shared beliefs, researchers need to assess the degree of agreement or consensus of team member's perceptions in order to validate the collective efficacy construct. In his recent writings, Bandura (1997) stated that collective efficacy is best characterised by a representative value for the beliefs of it's members and the degree of variability or consensus around that central belief. That is, the differences in efficacy beliefs between teams should be greater than the variation within teams.

Now that collective efficacy has been conceptualized to be a team level phenomenon, importance must be placed on how individual perceptions of collective competence are shared and aggregated in a conceptually appropriate fashion (Shamir, 1990). Feltz and Chase (1998) stated that although aggregated individual data may be an appropriate way to assess collective efficacy, it is first necessary to examine the degree of consensus at the individual level. Gully et al. (1995) recommend that the individual data be aggregated to form a team level construct only when there exists an acceptable degree of consensus. There are a number of methods that can be used to assess the degree of consensus or homogeneity of collective efficacy judgments. These statistical tests fall into two rough categories: (a) those that assess the extent of agreement within a single team, (b) those that assess the extent of agreement or consensus by contrasting within- and between-team variance. For example, one method that can be used in consensus analysis involves using an index of within team interrater agreement (James et al., 1984). Other methods are based on analysis of variance models, and related measures of association like eta-squared, and different forms of the intraclass correlation (Kenny & LaVoie, 1985). Although they employ different criteria, these indicators are designed to answer a common question: does the variability within teams differ from what would be expected from chance?

Just how much inter-member agreement is enough? If one adopts the James et al. (1984) approach where team members are viewed as multiple judges rating the same stimulus, then guidelines from classical test theory can be applied to inform the judgment of whether an observed level of inter-member agreement is sufficient. Nunnally (1978) stated the sufficiency of a measure depends on the use to which the measure is put. Generally, coefficients of .50 to .80 can be quite sufficient for research purposes, but coefficients in excess of .90 may be required for certain applied purposes.

One question, then, is what would a researcher do if there was no consensus in efficacy beliefs among team members? Bandura (1997) stated that when individuals differ as widely in efficacy beliefs within teams as they do between teams, there is no distinguishable shared efficacy attribute for the team as a whole. This is in agreement with Guzzo and Shea (1993) who stated that low agreement may indicate that the team is not a consequential entity to its members, or that the unity of the team is doubtful. Thus, a researcher might properly chose to exclude from further analysis those teams having insufficient inter-member agreement. Zaccaro et al. (1995) stated that collective efficacy may be comprised of both individual and team level components. A team level phenomenon would be said to exist if there is little variability between team members' perceptions of their collective competence, and this homogeneity cannot be attributed to external factors. If however, there is considerable heterogeneity or variability in individual perceptions of the team, then it is possible that individual level processes are being expressed.

Levels Issues

The phrase "level of analysis" was coined to refer to the unit in which data are assigned for hypothesis testing and statistical analysis (Rousseau, 1985). Thus, the level of analysis describes the treatment of data during statistical procedures (Klein et al., 1994). "Level of measurement," is used to describe the actual source of the data (i.e., the unit to which data are directly attached). For example, self-report measures generally result in individual level data, whereas the number of team members in a team is a team level attribute (Klein et al., 1994; Rousseau, 1985). If the level of measurement is the individual, but individual scores are aggregated by using team means in data analysis, then the level of statistical analysis is the team.

A critical first step in addressing levels issues is the specification of the level of one's theory (Klein et al., 1994; Rousseau, 1985). The level of theory shapes the fundamental nature of the constructs of the theory by describing the target (e.g., individual, team, organization) that a theorist or researcher aims to depict and explain, and specifying the level to which generalizations are made. More simply stated, when specifying the level of the theory, a researcher needs to ask him/herself the following questions: (a) to what level do you want to make generalizations, and (b) what are the constructs of interest (i.e., the individual or team)? The answers to these questions drive the wording of questionnaire items and the form of data collection and analysis. The failure to specify the level(s) to which a theory applies leads to imprecision within the theory, and confusion during data collection and analysis to test the theory (Klein et al., 1994; Rousseau, 1985).

In addition to the level of one's theory, the research question is equally important to consider. More specifically, although Bandura (1997) conceptualized collective efficacy as a team level construct, at times it may be best to collective efficacy as an individual belief. For example, Feltz (1994) conceptualized social loafing as a possible "dark side" of collective efficacy. In order to investigate the relationship between collective efficacy, and social loafing, it would be necessary to measure both performance, and collective efficacy at the individual level. That is, one would measure individual perceptions of collective efficacy (i.e., confidence in one's team), and correlate this with individual performance; in this case, the level of analysis would be the individual (Feltz & Chase, 1998).

Levels issues create particular problems when the level of theory (i.e., level of the research question), level of measurement, and/or the level of statistical analysis are not the same (Klein et al, 1994). A fallacy of the wrong level (i.e., misspecification) occurs when a mismatch between the focal level and the level of analysis occurs. In this case, relationships are attributed to a level other than the actual behavioral or responsive unit. That is, the use of individual-level data to say something about the team may be an unjustified shift in level. For example, by operationalizing and measuring group cohesion at the individual level and generalizing findings to the team level, a researcher is committing a fallacy of the wrong level.

Equally significant is the problem of spuriousness or aggregation bias. Aggregation bias refers to a class of errors in which an apparent relationship is an artifact of the data combination method (James, 1982). For example, if individual level data are summarized as team means without ensuring the homogeneity of responses at the individual level, then aggregation bias becomes a potentially severe problem (Gully et al., 1995). Indik (1968) argued that variables at the same level of analysis should be more highly related than variables at different levels of analysis, and Ostroff (1992) demonstrated that relationships at higher levels of analysis are often stronger than those from individual level analyses due to statistical artefacts, biased estimates, elimination of error variances, or actual differences between individual and higher level constructs. Thus, there are a myriad of methodological reasons that suggest that relationships at the team level will be stronger than relationships at the individual level, especially when aggregation is performed without consideration for consensus (cf Gully et al., 1995).

In some cases, a theory may operate on a number of levels (Klein et al, 1994; Rousseau, 1985). The generation of these multi-level models have tremendous advantages in that they are uniquely powerful and parsimonious. Multi-level models postulate relationships among variables which apply at two or more levels (Rousseau, 1985). Thus, they describe relations at one level that are generalizable to other levels. One benefit of this approach is that multi-level models may generate testable hypotheses at one level of analysis that are suggested by empirical results or theory at another level of analysis. In addition, multi-level thinking forces a theorist and/or researcher to examine individuals, teams and organizations as parts of a whole, each affecting and being affected by the other, rather than as separate conceptual categories (Lindsley et al., 1995).

Recently, it has been suggested that self-efficacy, collective efficacy and individual and team performance may comprise a multi-level model (cf Feltz & Lirgg, in press; Lindsley et al., 1995, Prussia & Kinicki, 1996; Silver & Bufanio, 1996). A number of individual studies have demonstrated the existence of a relationship between self-efficacy and individual performance, and initial research on collective efficacy has demonstrated that a similar relationship exists between collective efficacy and team performance. A multi-level conception of efficacy, however, does not simply identify self-efficacy as an individual level phenomenon and collective efficacy as a group level attribute (Moritz & Watson, 1998). Instead, a multi-level model of efficacy postulates the relationship between context, efficacy and behavior within and across levels. Further, it is not necessary for the individual level and team level relationships to be exactly the same. It is possible that a certain variable will not affect the relationships among constructs at one level, but yet, the same variable may act as an intervening variable at another level. Thus, there may be potential discontinuities when one shifts from the individual to the team level with respect to the efficacy - performance relationship. One of the variables that may affect the efficacy - performance relationship is task type.

Task Type as a Moderator of the Efficacy - Performance Relationship

The type of task has been identified by a number of researchers as a potential moderator of the efficacy - performance relationship (cf Bandura, 1997; Feltz, 1988, 1994; Feltz & Chase, 1998; Feltz & Lirgg, in press; George & Feltz, 1995; Little &

Madigan, 1997; Paskevich, 1995; Porter, 1992; Zaccaro et al., 1995). According to Steiner (1972), the optimal process of converting a group's resources into group products depends heavily on the nature of the task a group is performing. Steiner distinguished between unitary and divisible tasks. Unitary tasks are those that cannot be divided into subtasks, and are characterized by a single group output. For example, rope-pulling, which is often used in tug-of-wars, is a unitary task. Divisible tasks can be broken down into sub-tasks that can be assigned to different group members. For example, playing a football game is a divisible task.

Several types of unitary tasks can be distinguished, each of which has implications for how individuals ought to combine their resources in a single group output. Additive tasks involve summing individual inputs to yield a group product. Completing an additive task requires every member of a group to perform the same function. For example, team bowling may be considered as an additive task -- each member of the team bowls his or her own game, and the final team score is derived by summing the individual scores. The group product for compensatory tasks is the average of individual performances. For example, taking the average of each bowling team member's scores may be considered as compensatory. Disjunctive tasks require that only one member do the task for the group to succeed (i.e., the potential productivity of a group is determined entirely by the resources of its most competent member). Often, these tasks typically require a single specific answer to an either/or, yes/no type problem. For example, refereeing a tennis match can be considered to be disjunctive. Although there are a number of officials, a "call" (e.g., in or out) is typically made by only one member of the team of officials. Conjunctive tasks require that each group member must individually succeed if the group is to succeed (i.e., the potential productivity of the group is determined by its least productive member). That is, conjunctive tasks are completed only when all of the group members perform some specific action. Many team sports, like hockey and basketball can be considered as conjunctive. Finally, discretionary tasks are those tasks where the group can decide how individual inputs will relate to the group outcome. That is, the group members are free to choose the method by which they will combine their individual inputs.

Bandura (1997) noted that the manner in which the individual contributions combine to affect team performance is dependent upon the degree of task interdependence among the individual tasks. He suggested that the predictiveness of collective efficacy may depend upon the degree of interdependence required by the team. Teams are interdependent in the sense that an event which affects one member is likely to affect all members. Interdependence can be conceptualized as varying along a continuum from low to high.

Shaw (1971) defined group tasks in terms of the degree to which integrated action of group members is required to complete the task. At a minimum, individuals often require resources and support from their surrounding social environment, even if there is little or no coaction (i.e., members work in the same location, but do not interact with one another) or interaction with other individuals. That is, under conditions of minimal task interdependence, individual tasks are totally independent, and each one is unaffected by the others (i.e., members of the group do not have to rely on each other to perform their job though they have shared goals and provide mutual social support). Group performance is simply the sum of individual performances. Bandura (1997) stated that under these conditions, collective efficacy should approximate the sum of individual self-efficacies. Thus, under low interdependence, an aggregate of individual efficacies should have predictive value.

Zaccaro et al. (1995) stated that even on such tasks that require minimal interdependence, the independence of action does not mean that individual team members are not influenced in some manner by the activities of other team members. He stated that members may be affected by the speed and intensity of their peer's actions, and may alter the strength and nature of their own responses in accordance with earlier team activities. Thus, collective efficacy beliefs may still be contingent on other member's responses.

At a higher level of interdependence, individuals may coact to produce an aggregated product. While there may be little interaction, characteristics of the aggregate (e.g., team size, homogeneity) may still influence its member's beliefs about personal mastery and hence the nature of their performance. At the most complex level of interdependence, individuals often behave in complete concert with each other. Such behavior typically has the characteristics of complete integration, coordination, and synchronization. Individual actions are fully dependent upon the actions of others to produce a collective outcome. In this case, team performance is not the sum of individual performance, and in fact, individual performances often cannot be distinguished from one another. Thus, only the collective or aggregate product is identifiable.

Bandura (1990) stated that the predictiveness of individual and collective efficacy may depend on the degree of integrated action of team members required to achieve success. Perceived collective efficacy beliefs may not show predictive superiority over aggregated players own perceived abilities in sports with little or no task interdependence because there are fewer co-ordination efforts to assess (cf Feltz & Lirgg, in press). Other researchers have also suggested that aggregated perceived collective efficacy scores may be more relevant in sports requiring high levels of interdependence (e.g., conjunctive tasks) than in sports with little or no task interdependence (George & Feltz, 1995).

Initial support for the differential predictiveness of collective efficacy beliefs based on task interdependence is provided Feltz and Lirgg (in press). These authors stated that on highly interactive tasks, team member's beliefs in their team's ability to perform successfully will be a better predictor of collective efficacy than aggregated self-efficacies because member's beliefs about the collective encompass the coordinative and interactive dynamics that operate within a team Their results supported this proposition. To date, no collective efficacy research has been conducted using tasks that are low in interdependence.

CHAPTER III

METHOD

Overview

The purpose of this dissertation was to examine the relationships among aggregated self-efficacy, collective efficacy, and team performance in a less interdependent (additive) versus a more interdependent condition in bowling. Based upon theory and past research, it was hypothesized that task type would moderate the relationships between aggregated self-efficacy and team performance (Link C) and between collective efficacy and team performance (Link D). Task type was not hypothesized to moderate the relationships between self-efficacy and individual performance (Link A) and between disaggregated collective efficacy and individual performance (Link B).

The second purpose of this study was to determine if the relationships among efficacy and performance differed according to the level of analysis. Researchers have suggested that self-efficacy, collective efficacy and performance may comprise a multi-level model (e.g., Lindsley, Brass, & Thomas, 1995, Prussia & Kinicki, 1996; Silver & Bufanio, 1996). At the individual level of analysis, the relationships among self-efficacy, (disaggregated) collective efficacy and individual performance were examined. At the team level of analysis, the relationships among aggregated self-efficacy, collective efficacy, and team performance were considered (see Figure 1). It was hypothesized that task type would be a moderator of performance for the team level relationships (Links C and D), but not for the individual level relationships (Links A and B). These relationships were tested at two time periods to see if they would replicate.

First, a pilot study was conducted to determine if the bowling manipulation was effective, to determine the best measures of self- and collective efficacy, to determine the appropriateness of the aggregation of individual responses to a team level construct (cf Little & Madigan, 1997), and to make other procedural refinements. The participants in the pilot study were 42 students (Males: $\underline{n} = 26$; Females: $\underline{n} = 16$) who were enrolled in one of two introductory bowling courses. Two-member bowling teams were constructed based on ability to ensure adequate heterogeneity of efficacy beliefs and performance scores between teams. All data were collected during the "tournament period" of the course with one class bowling in the additive format and the other bowling in the interdependent format.

Three self-efficacy (SE-Pins, SE-Spares, SE-Strikes) and four collective efficacy (CE-Pins, CE-Spares, CE-Strikes, CE-Points) measures were used in the pilot study. The reliability for each measure, as assessed via Cronbach's Alpha was acceptable; all Alpha's were over .90. The means, standard deviations, and ranges for all efficacy and performance measures for each task type are contained in Appendix A, Table A1. The intercorrelations among these variables can be found in Appendix A, Table A2. Performance measures included number of pins, number of strikes, number of spares, and total points.

Consensus was tested using two methods: Pearson correlations were computed for each team for each measure (Shrout, 1995), and a multiple item index of within group agreement or consensus ($r_{(wg)}$; James et al., 1984) was calculated. Using the criteria of $\underline{r}_{(wg)} \geq .80$, and $\underline{r} \geq .80$ (cf George, 1990) excluded a number of teams that could be used in analysis ($\underline{n} = 10$ for Pins, $\underline{n} = 12$ for Strikes, $\underline{n} = 11$ for Spares). Therefore a different method of assessing collective efficacy was proposed for the larger study whereby teammates completed the measures together rather than individually. This procedure eliminated the need for consensus for the collective efficacy measures. Assessing collective efficacy in this manner, however, created the need to demonstrate that the partners functioned as a team. More specifically, did the partners feel that they were a team? Did they perceive that they worked together? Did they perceive that they coordinated their efforts? Measures were constructed to assess these perceptions.

Although consensus analyses were not needed for collective efficacy, they were needed before self-efficacy beliefs could be aggregated to the team level. In the larger study, the criteria for consensus for aggregation purposes was lowered to .70 (see Porter, 1992). Results from individual and team level analyses showed that there were enough trends in the data to indicate that the type of bowling would moderate the efficacy-performance relationship. Thus, the larger study was undertaken with the above-mentioned modifications.

Participants and Task

Two hundred and ninety students from introductory and advanced bowling activity courses participated in this study, however only data from 250 individuals (179 males, and 70 females; one person did not indicate his/her gender) were useable. The other 40 participants were excluded because they (or their partners) did not complete the first portion of this study. One hundred and twenty five two-person teams were used for the first part of this study. The participants ranged in age from 18 to 39 years (M = 20.15, SD = 2.33). The majority of the sample indicated that they were recreational bowlers (66%). The average number of years bowled was 5.59 (SD = 4.26), and the self-reported mean for bowling averages was 117.47 (SD = 20.67). The same participants were used in the second part of this study (Time 2). However, only 160 participants (80 teams) had complete data (117 males, and 43 females). Even with the missing data, the Time 2 sample was comparable to the first, in that they ranged in age from 18 to 39 years (M = 20.15, SD = 2.65). The majority of the sample indicated that they were recreational bowlers (68%), and the average number of years bowled was 5.74 (SD = 4.14). The mean for self-reported bowling averages was 116.93 (SD = 21.37).

In the additive condition, each team member contributed equally to team performance. That is, each participant bowled a 10 frame game, and team performance was the sum of the two individual scores (the performance score ranged from 0 to 600 points). In the interdependent condition, the two bowlers alternated between bowling first and second for each frame, like a "Scotch Bowling" activity (see Pangrazi & Darst, 1997). In this task, however, if Bowler A bowled the first ball, unless he/she bowled a strike, Bowler B was responsible for bowling the second ball in that frame. In the next frame, Bowler B bowled the first ball, (regardless of whether he/she bowled the second ball in the preceding frame). Unless Bowler B bowled a strike, Bowler A was responsible for delivering the second ball in this frame etc. The instructions which were given to the bowlers can be found in Appendix B. I imposed these rules so that I could control how many balls were delivered by each team member; I wanted to ensure that each bowler started the same number of frames (i.e., 10 each) in this task. One game was designed to be 20 frames long so that the final performance score would be comparable to the additive condition (i.e., range between 0 to 600 points).

With respect to the degree of interdependence in the two bowling tasks, the second task was considered to be more interdependent compared to the first task because it required more coordination between teammates (cf Zaccaro et al., 1995). More specifically, in this condition, the bowlers were dependent on their teammates for all "marks" (i.e., spares, multiple strikes) and for total points. Both of the tasks, however, produced the same performance measures (i.e., number of pins dropped on first ball, number of strikes and number of spares), and these performance measures were available for both the individual and team levels. Total points, however, was an exception. Although team scores were available for both teams, individual performance scores were not available for the additive team.

Measures

Performance Measures. The performance measures consisted of the scoresheets used in the tournament (see Appendix C). At the individual level, the number of strikes and spares bowled by each individual per game were recorded. In addition, the average number of pins dropped on each first ball was computed. At the team level, the number of spares and strikes bowled by each team was used as a performance measure. For example, if Bowler A bowled 3 strikes and Bowler B bowled 2 strikes, the team "strike" performance measure was 5. The average number of pins knocked down on the first balls was also computed as a team score. In this case, if Bowler A averaged 5 pins, and Bowler B averaged 7 pins, the team "pin" performance measure was 6. "Total points per game" were collected but not used because it was impossible to construct a corresponding self-efficacy measure with the same range of points (i.e., 0 to 600), even though collective efficacy measures were available. For the additive team, total score was the sum of the individual members' scores; for the interdependent team, the final score for each 20-frame game was used.

Self-efficacy questionnaires. Three self-efficacy measures were used in this study (see Appendix D). All of the measures were constructed in accordance with Bandura's (1977, 1986) recommendations. That is, the measures were task-specific, and were hierarchically arranged to represent increasing levels of complexity. Participants indicated the "level' of their self-efficacy beliefs, as well as the "strength" of their beliefs using a 0 to 10 probability scale where 0 = "I cannot do this at all" and 10 = "Very certain I can do this." All of the self-efficacy measures started with the phrase "Rate your confidence that you can..." The individual items pertained to: (a) bowl a strike in one of your frames (up to all 10 frames); (b) bowl a spare in one of your frames (up to all 10 frames), and (c) drop at least one pin with your first ball consistently (up to 10 pins). The reliability for each measure, as assessed via Cronbach's Alpha was acceptable; the coefficients ranged from .89 to .96.

Collective efficacy questionnaires. The four collective efficacy measures that were used in this study were constructed in the same way as the self-efficacy measures (see Appendix E). However, this time the participants were asked to collectively "Rate your confidence that your team" can (a) bowl a strike in one of your frames (up to all 20 frames); (b) bowl a spare in one of your frames (up to all 20 frames), and, (c) drop at least one pin with your first ball consistently (up to 10 pins). The reliability for each measure, as assessed via Cronbach's Alpha was acceptable; the coefficients ranged from .89 to .96. In addition, a collective efficacy measure was constructed to assess each teams' confidence that their team could average a certain number of points in this game.

This measure ranged from 25 to 600 points; the baseline was 25 points, and the scale increased in 25 point increments. The collective efficacy measures were anchored with 0 = "We are certain that we cannot do this at all" and 10 = "We are very certain that we can do this." The reliability for this measure, as assessed via Cronbach's Alpha was .89. In accordance with other researchers (e.g., Prussia & Kinicki, 1996), and based on the results of the pilot study, all of the collective efficacy measures were completed by the team.

Team concept and incentive measures. Efficacy beliefs are a major determinant of behavior only when people have sufficient incentives to act on their self-perception of efficacy and when they possess the requisite subskills (Bandura, 1986). In order to determine if the participants in this study had sufficient incentives to perform their best, and to ensure that the study participants felt that they were part of their respective "team," a questionnaire was developed to assess a number of "team-related" characteristics. There were five items on this questionnaire, and all were constructed using the same anchors as the self-efficacy and collective efficacy measures (see Appendix F). Question 1 asked participants to indicate the degree to which they felt that they and their partner were a "team." Question 2 asked participants to indicate the degree to which they felt that they and their partner were "working together" in this tournament. The third question asked participants to indicate the degree to which they felt that they and their partner were "coordinating their efforts" in this tournament. Question 4 asked each individual to indicate how much effort they felt that they were putting into this tournament. The last question asked each individual to indicate how important it was for them to bowl well during this tournament. All of these questions were completed individually by each participant.

Procedure

Approval to conduct this study was granted by the Institutional Review Board (see Appendix G). The study participants were recruited from bowling classes offered through the Department of Kinesiology. On average, there are 50 students in each class, and there are 8 sections offered per semester. The length of the classes is 50 min and there are typically 30 classes per course.

All individuals registered in the bowling classes were asked to volunteer for the study. They were told that the purpose of the study was to determine how *self-confidence and team confidence* are related to team performance in a bowling tournament. The individuals who agreed to participate in the study were required to complete a consent form (see Appendix H).

All consenting participants were then randomly assigned to two member bowling teams (within their respective course sections). The experimental manipulation occurred during the latter portion of the semester. Teams from certain sections competed in the additive task (i.e., all team members bowled one game, and team performance was the sum of each member's score). In the other sections, the teams competed in the modified interdependent format.

All bowling teams were given "practice" sessions. These sessions were designed to give the teams experience in completing the collective efficacy questionnaires, as well as to become familiar with his/her bowling partner and the bowling task. Depending on the course section, three or four practice sessions were given. After the practice sessions, the tournament started. All of the measures were completed by the participants before they bowled. The tournament lasted for 2 days thereby resulting in 2 sets of data (Time 1 and Time 2). Prizes were awarded to the winning teams in each section based on the team performance data.

CHAPTER IV

RESULTS

The results are presented in 2 sections. First, descriptive statistics are reported, In this section, means, standard deviations, and ranges are presented for all measures (self-efficacy, collective efficacy, performance, and team concept and incentive measures). The results are presented separately for each task type (additive and interdependent), for each level of analysis (individual and team) and for each time period (Time 1 and Time 2).

The second section presents the results of the moderator analyses. This section is divided into Time 1 and Time 2. Within each time period, the results of the moderator analyses are presented for the individual and the team level. Because two of the three team level constructs (i.e., self-efficacy and performance) are composed of aggregated individual level responses, the individual level analyses are presented first. All of the statistical analyses were conducted with SPSS Release 7.0. The consensus analyses were done using Microsoft Excel Version 5.0c.

Descriptive Statistics for Measures

There were three self-efficacy (SE-Pins, SE-Spares, SE-Strikes) and four collective efficacy measures (CE-Pins, CE-Spares, CE-Strikes, CE-Points) used in this study. For each measure, two scores were computed (strength and level). The correlations between these measures ranged from .56 to .89, and all were significant ($p < .01$). Because of the high correlation between the measures, only the strength scores were used in subsequent analyses. The individual level means, standard deviations, and ranges for the self-efficacy, collective efficacy and performance measures can be found in Table 2.

The individual level correlations between these variables are presented in Tables 3 and 4. Descriptive results for the team level data are presented in Tables 5 and 6. Table 7 reports the results of the incentive analyses for both time periods.

With respect to the incentive analyses, a one-way ANOVA using task type as the independent variable showed that the additive and interdependent teams did not differ statistically on any of the five items ($p > .05$). Except for the item pertaining to the importance of bowling well in this tournament, all of the means listed in Table 7 are above 8.00, which correspond to the "we definitely..." anchor in the questionnaire. The means for the importance of bowling well in this tournament are lower than the other items, but are still above 7.0. Thus, there was an acceptable level of interest in the bowling task.

Table 2

Individual Level: Means, Standard Deviations, and Ranges for Self-Efficacy, Collective Efficacy and Individual Performance for the Additive and Interdependent Groups

Measure	Additive						Interdependent					
	Time 1			Time 2			Time 1			Time 2		
	M	SD	Range	M	SD	Range	M	SD	Range	M	SD	Range
SE-Pins	7.88	1.37	3.4 - 9.7	8.00	1.19	3.9 - 9.7	7.93	1.31	3.2 - 10.0	7.75	1.29	3.2 - 9.6
SE-Strikes	4.84	1.64	0.6 - 8.2	5.19	1.58	2.0 - 8.0	5.02	1.42	2.0 - 9.0	4.85	1.46	2.1 - 8.5
SE-Spares	6.33	1.70	1.5 - 10.0	6.19	1.88	1.3 - 10.0	6.21	1.53	2.4 - 10.0	5.87	1.54	2.5 - 9.0
CE-Pins	8.04	1.35	4.4 - 10.0	8.21	1.09	5.3 - 9.8	7.86	1.25	4.2 - 9.9	7.61	1.50	3.6 - 10.0
CE-Strikes	4.63	1.62	1.4 - 7.5	4.70	1.58	1.7 - 7.3	4.40	1.32	1.1 - 7.6	4.17	1.53	1.9 - 7.5
CE-Spares	5.72	1.52	2.6 - 8.8	5.62	1.47	3.1 - 7.9	5.52	1.46	1.7 - 9.0	5.08	1.42	1.8 - 8.3
CE-Points	5.31	1.29	1.8 - 9.4	5.43	1.14	3.3 - 7.4	5.53	1.07	3.5 - 8.1	5.16	1.03	3.1 - 8.4
IP: Pins	6.88	1.21	3.7 - 9.8	7.01	1.24	3.4 - 9.2	6.69	1.20	3.2 - 9.4	6.52	1.07	4.3 - 8.6
IP: Spares	2.78	1.71	0.0 - 7.0	2.84	1.83	0.0 - 8.0	2.46	1.48	0.0 - 6.0	2.51	1.60	0.0 - 8.0
IP: Strikes	1.44	1.19	0.0 - 6.0	1.59	1.50	0.0 - 7.0	1.40	1.31	0.0 - 6.0	1.49	1.18	0.0 - 4.0
IP: Points	121.13	26.56	68.0 - 192.0	124.09	31.67	71.0 - 193.0						

Note: Time 1: n = 170 for interdependent group, n = 80 for additive group; Time 2: n = 96 for interdependent group, n = 64 for additive group. SE = Self-efficacy; CE = Collective efficacy; IP = Individual performance. Collective Efficacy data is disaggregated.

Table 3

Individual Level: Correlations Between Self-Efficacy, Collective Efficacy, and Performance Measures for the Additive Group

	SE- Strikes	SE - Spares	SE - Pins	CE-Strikes	CE-Spares	CE-Pins	CE-Points	IP -Pins	IP - Strikes	IP - Spares	IP -Points
SE - Strikes	--	.79**	.60**	.69**	.62**	.19	.60**	.42**	.19	.19	.36**
SE - Spares	.82**	--	.60**	.55**	.60**	.23	.55**	.48**	.26*	.25*	.42
SE - Pins	.62**	.56**	--	.32**	.37**	.48**	.43**	.27*	.23	.25*	.39**
CE - Strikes	.57**	.53**	.44**	--	..89**	.35**	.84**	..38**	.16	.25	.33**
CE - Spares	.59**	.63**	.51**	.80**	--	.41**	.81**	.34**	.11	.28*	.30*
CE - Pins	.39**	.29**	.67**	.39**	.40**	--	.40**	.11	.23	.19	.27*
CE - Points	.54**	.50**	.51**	.73**	.65**	.54**	--	.32*	.12	.26*	.32**
IP - Pins	.31**	.45**	.20	.27*	.35**	.06	.38**	--	.61**	.37**	.80**
IP - Strikes	.18	.33**	.10	.57**	.23*	-.01	.18	.45**	--	.01	.69**
IP - Spares	.26*	.31**	.14	.26*	.27*	.08	.38**	.40**	.01	--	.64**
IP - Points	.22*	.30**	.28*	.23*	.39**	.13	.30**	.73**	.69**	.64**	--

Note: Correlations below the diagonal are from Time 1 (n = 80); correlations above the diagonal are from Time 2 (n = 64). SE = Self-efficacy; CE = Collective efficacy; IP = Individual performance.

Table 4

Individual Level: Correlations Between Self-Efficacy, Collective Efficacy, and Performance for the Interdependent Group

	SE- Strikes	SE - Spares	SE - Pins	CE-Strikes	CE-Spares	CE-Pins	CE-Points	IP -Pins	IP - Strikes	IP - Spares
SE - Strikes	--	.71**	.53**	.65**	.56**	.39**	.57**	.12	.04	.11
SE - Spares	.67**	--	.63**	.50**	.66**	.40**	.42**	.09	.13	.20
SE - Pins	.54**	.57**	--	.40**	.51**	.62**	.43**	.16	.14	.11
CE - Strikes	.51**	.53**	.33**	--	.72**	.51**	.69**	.13	.07	.16
CE - Spares	.45**	.53**	.37**	.69**	--	.58**	.63**	.17	.00	.16
CE - Pins	.31**	.39**	.55**	.42**	.54**	--	.56**	.29**	.11	.20
CE - Points	.41**	.47**	.37**	.70**	.59**	.49**	--	.19	.06	.12
IP - Pins	.20**	.22**	.22**	.16*	.22**	.28**	.24**	--	.55**	.26**
IP - Strikes	.21**	.13	.06	.12	.13	.06	.17*	.57**	--	.15
IP - Spares	.15*	.16*	.10	.10	.03	.14	.13	.20**	.06	--

Note: Correlations below the diagonal are from Time 1 (n = 170); correlations above the diagonal are from Time 2 (n = 96). SE = Self-efficacy; CE = Collective efficacy; IP = Individual performance.

Table 5

Team Level: Means, Standard Deviations, and Ranges for Self-Efficacy, Collective Efficacy and Team Performance for the Additive Group.

Measure	Time 1				Time 2			
	M	SD	Range	n	M	SD	Range	n
SE-Pins	8.08	1.01	3.9 - 9.4	36	8.00	1.03	5.5 - 9.3	32
SE-Strikes	4.86	1.40	1.7 - 8.1	38	5.20	1.45	2.6 - 8.0	30
SE-Spares	6.41	1.30	3.9 - 9.7	36	6.13	1.59	2.8 - 8.9	27
CE-Pins	8.20	1.22	5.1 - 10.0	36	8.21	1.10	5.3 - 9.8	32
CE-Strikes	4.74	1.59	1.4 - 7.6	38	4.64	1.63	1.7 - 7.3	30
CE-Spares	5.87	1.49	2.6 - 8.8	36	5.52	1.49	3.1 - 7.9	27
CE-Points	5.31	1.3	1.8 - 9.4	40	5.43	1.14	3.3 - 7.4	32
TP - Pins	6.95	0.83	4.9 - 8.7	36	7.05	0.92	4.5 - 8.5	32
TP - Spares	5.67	2.32	2.0 - 12.0	36	5.56	3.29	1.0 - 15.0	27
TP - Strikes	2.92	1.73	0.0 - 9.0	38	3.13	2.24	0.0 - 9.0	30
TP - Points	241.88	39.10	168.0 - 358.0	40	248.47	47.24	160.0 - 341.0	32

Note: The number of teams used for each measure varies. Only those teams that demonstrated consensus for individual level beliefs were used in the team analyses. SE = Self-efficacy; CE = Collective efficacy; TP = Team performance.

Table 6
Team Level: Means, Standard Deviations, and Ranges for Self-Efficacy, Collective Efficacy and Team Performance for the Interdependent Group.

Measure	Time 1				Time 2			
	M	SD	Range	n	M	SD	Range	n
SE-Pins	7.96	1.07	4.4 - 9.7	81	7.83	1.03	5.1 - 9.3	45
SE-Strikes	5.02	1.17	2.8 - 8.3	80	4.90	1.27	2.6 - 7.6	46
SE-Spares	6.18	1.15	2.8 - 8.8	78	5.86	1.33	2.9 - 8.3	46
CE-Pins	7.85	1.27	4.2 - 9.9	81	7.69	1.42	3.6 - 9.3	45
CE-Strikes	4.39	1.31	1.1 - 7.6	80	4.26	1.50	1.9 - 7.5	46
CE-Spares	5.50	1.40	1.7 - 8.5	78	5.10	1.45	1.8 - 8.3	46
CE-Points	5.53	1.1	3.5 - 8.1	85	5.16	1.03	3.1 - 8.4	48
TP - Pins	6.69	0.93	4.5 - 8.8	81	6.55	0.83	4.9 - 8.4	45
TP - Spares	4.90	2.36	0.0 - 12.0	78	5.00	2.59	1.0 - 14.0	46
TP - Strikes	2.85	1.90	0.0 - 10.0	80	2.96	1.73	0.0 - 7.0	46
TP - Points	232.92	40.30	164.0 - 371.0	85	231.63	40.15	156.0 - 371.0	48

Note: The number of teams used for each measure varies. Only those teams that demonstrated consensus for individual level beliefs were used in the team analyses. SE = Self-efficacy; CE = Collective efficacy; TP = Team performance.

Table 7

Means and Standard Deviations for Team Concept and Incentive Measures for Task Type at Time 1 and Time 2

Item	Additive				Interdependent			
	Time 1		Time 2		Time 1		Time 2	
	M	SD	M	SD	M	SD	M	SD
Degree to which you feel that you and your partner are a "team."	8.39	1.85	8.31	1.84	8.62	1.63	8.69	1.54
Degree to which you and your partner are "working together"	8.30	2.02	8.45	1.67	8.73	1.42	8.55	1.71
Degree in which you and your partner are "coordinating your efforts"	8.25	2.05	8.23	1.98	8.50	1.63	8.30	1.86
Amount of effort you put in this tournament	8.28	1.50	8.23	1.73	8.20	1.60	8.06	1.58
Importance of bowling well in this tournament	7.58	2.60	7.66	1.99	7.29	2.41	7.28	2.21

Note: there were no statistically significant differences between the additive and interdependent team on any item ($p > .05$). Time 1: $n = 250$; Time 2: $n = 160$.

Moderator Analyses

Time 1: Individual level. I hypothesized that task type would not moderate the relationship between self-efficacy and individual performance (Link A) or the relationship between disaggregated collective efficacy and individual performance (Link B). In order to test these hypotheses, the procedures described by Baron and Kenny (1986) were used. Regression analyses were run for each performance measure (i.e., Pins, Spares and Strikes). The dependent variable for each analysis was the performance measure; whereas the predictor variables were SE, CE, Task, SE by Task, and CE by Task. All 125 teams (250 individuals) were used in this analysis.

In order to test for moderating relationships at the individual level, collective efficacy scores were "disaggregated." That is, for each team, the team members that comprised the team were given the same collective efficacy score. The $\underline{F}$ test for the change in $\underline{R}^2$ was used to test the hypothesis that task type was a moderator variable. The results of these analyses are presented in Table 8.

The results of the individual level analysis show that a significant moderator effect was obtained only when Pins was used as the dependent variable. More specifically, the CE by Task interaction (Link B) produced a significant increase in the $\underline{R}^2$. Follow-up bivariate regression analyses demonstrate that, for the additive condition, CE-Pins was not a significant predictor of Pin performance (13%, Adjusted $\underline{R}^2 = .02$, $\underline{F}$ $(1,76) = 1.21$, $\underline{p} = .28$; $\beta = .13$; $\underline{n} = 80$); whereas it was for the interdependent condition (28%, Adjusted $\underline{R}^2 = .08$, $\underline{F}$ $(1,168) = 13.92$, $\underline{p} = .003$; $\beta = .28$; $\underline{n} = 170$). When Spares or Strikes were used as the dependent variable, there were no moderating effects. The relationship between self-efficacy and performance (Link A) was not moderated by task type for any of the performance measures (Pins, Spares, or Strikes).

Table 8

Time 1: Individual Level: Moderation Analysis between Efficacy and Performance (Links A and B).

	Multiple R	R^2	Increment	F	p	B	SEB	β	p level for t
Pins									
1) SE	.25	.06	.06	15.71	.0001	.35	.13	.38	.01
2) CE	.27	.07	.01	2.99	.09	-.11	.13	-.12	.39
3) Task	.27	.08	.004	1.01	.32	-.75	1.08	-.29	.49
4) SE*Task	.28	.08	.0006	0.16	.69	-.25	.16	-.81	.11
5) CE*Task	.30	.09	.02	4.34	.04	.33	.16	1.03	.04
Spares									
1) SE	.22	.05	.05	12.45	.0005	.24	.13	.24	.07
2) CE	.22	.05	.00001	.003	.96	.13	.15	.12	.38
3) Task	.24	.06	.01	2.30	.13	1.09	.91	.33	.23
4) SE*Task	.25	.06	.006	1.43	.23	-.04	.16	-.08	.79
5) CE*Task	.26	.07	.005	1.35	.25	-.20	.17	-.36	.25
Strikes									
1) SE	.20	.04	.04	9.84	.002	.10	.11	.12	.33
2) CE	.20	.04	.0007	.19	.66	.05	.11	.06	.64
3) Task	.20	.04	.0006	.14	.71	-.28	.63	-.10	.65
4) SE*Task	.20	.04	.001	.29	.59	.08	.13	.16	.55
5) CE*Task	.20	.04	.0003	.07	.79	-.04	.14	-.07	.79

Note: SE = Self-efficacy; CE = Collective efficacy.

Time 1: Team level. This analysis was used to investigate the hypotheses corresponding to Links C and D in Figure 1. Although it was not necessary to aggregate the individual level collective efficacy perceptions to represent a higher level construct, this analysis was needed for self-efficacy. The results of the consensus analysis resulted in a few teams being excluded from the subsequent regression analyses (for Pins: n of excluded teams = 8; for Strikes: n of excluded teams = 7; for Spares: n of excluded teams = 11). Correlations among aggregated self-efficacy, collective efficacy and team performance for Pins, Spares and Strikes, at the team level, can be found in Table 9. There were 117, 114, 118, and 125 teams used in the Pin, Spare, Strike, and total Points analyses, respectively.

The team level regression analyses were the same as the individual level analyses; that is, the team performance measures were used as the dependent variables, and aggregated self-efficacy and collective efficacy scores were the predictor variables. Task type was entered as a moderator variable (see Table 10). For this analysis, I expected that collective efficacy would be a more important predictor of team performance for the interdependent task (Link D). I did not expect to find a relationship between collective efficacy and team performance for the additive task, but rather that aggregated self-efficacy would be a stronger predictor of team performance for the additive task (Link C).

The results of the team level analysis were the same as the individual level analysis. The only significant moderator effects were obtained for Pins. Follow-up bivariate regression analyses demonstrated that, in the additive condition, CE-Pins was not a significant predictor of team Pin performance (13%, Adjusted R^2 = .02, F (1,34) =

0.58, p =.45; β = .13; n = 36), whereas it was for the interdependent condition (39%, Adjusted R^2 = .15, F (1,79) = 13.45, p =.0004; β = .38; n = 81). When Spares and Strikes were used as the dependent variable, there were no moderating effects. Task type did not moderate the relationship between aggregated self-efficacy and team performance, for any of the performance measures.

Task type also did not moderate the relationship between CE-Points and performance at the team level. This analysis was only done at the team level because the interdependent group did not have individual level performance data.

Therefore, for Time 1, for performance as measured by Pins, task type did moderate the relationship between collective efficacy and performance (supporting Link D). This moderating effect was evident at both levels of analysis (i.e., Links B and D). Thus, the effect of task type on the collective efficacy - performance relationship was isomorphic (i.e., functionally similar) across levels. Task type did not moderate the relationship between self-efficacy and individual performance at the individual level (Link A) or between aggregated self-efficacy and team performance at the team level (Link C).

Table 9

Time 1: Team level: Correlations among Aggregated Self-Efficacy, Collective Efficacy and Team Performance for the Additive and Interdependent Groups

	CE	Performance
Additive Group		
Pins (n = 36)		
SE	.81**	.32
CE		.13
Spares (n = 36)		
SE	.77**	.35
CE		.34
Strikes (n = 38)		
SE	.68**	.20
CE		.19
Points (n = 40)		
CE		.51**
Interdependent Group		
Pins (n = 81)		
SE	.71**	.27*
CE		.38**
Spares (n = 78)		
SE	.65**	.10
CE		-.04
Strikes (n = 80)		
SE	.65**	.22
CE		.20
Points (n = 85)		
CE		.28**

Note: SE = Self-efficacy; CE = Collective efficacy.

Table 10

Time 1: Team Level: Moderation Analyses Between Efficacy and Performance (Links C and D)

	Multiple R	R^2	Increment	*F*	*p*	B	SEB	β	*p* level for *t*
Pins									
1) SE	.28	.08	.08	10.04	.002	.50	.24	.58	.04
2) CE	.33	.11	.03	3.76	.05	-.25	.20	-.35	.21
3) Task	.35	.12	.01	1.21	.27	-.43	1.36	-.22	.75
4) SE*Task	.35	.12	.00001	.00066	.98	-.51	.27	-2.14	.06
5) CE*Task	.40	.16	.04	5.62	.02	.53	.23	2.23	.02
Spares									
1) SE	.20	.04	.04	4.44	.04	.40	.47	.20	.40
2) CE	.20	.04	.003	.35	.55	.26	.41	.16	.54
3) Task	.25	.06	.02	2.31	.13	2.18	2.44	.43	.38
4) SE*Task	.27	.07	.01	1.28	.26	.06	.56	.08	.91
5) CE*Task	.29	.08	.012	1.43	.23	-.57	.48	-.69	.23
Strikes									
1) SE	.21	.04	.04	5.24	.02	.15	.29	.10	.62
2) CE	.22	.05	.006	.77	.38	.12	.26	.10	.63
3) Task	.22	.05	.0002	.03	.87	-.65	1.45	-.17	.65
4) SE*Task	.23	.05	.002	.18	.67	.11	.37	.15	.78
5) CE*Task	.23	.05	.00002	.002	.96	.02	.33	.02	.96
Points									
1) CE	.35	.12	.12	16.99	.00	15.46	4.64	.44	.00
2) Task	.37	.14	.02	2.66	.11	13.88	33.25	.16	.68
3) CE*Task	.38	.14	.004	.63	.43	-4.75	6.01	-.32	.43

Note: SE = Self-efficacy; CE = Collective efficacy.

Time 2: Individual level. Using the same statistical procedures, the results of the individual level moderator analyses are shown in Table 11. The number of individuals used for these analyses varied according to the measures used. There were 159 participants for Pins and Spares, and 160 participants for Strikes. Task type did not moderate any of the efficacy - performance relationships (i.e., Links A and B). In order to replicate the Time 1 results, task type should have been a significant moderator of the disaggregated collective efficacy - individual performance relationship (Link B) when Pins was used. Task type by itself did account for a significant portion of the variance in Pin performance. However, when all predictors were entered into the analysis, this Beta weight for task type was no longer statistically significant. Task type did not moderate the relationship between disaggregated collective efficacy and performance for Spares or Strikes. It also did not moderate the self-efficacy - individual performance relationship (Link A) for any of the performance measures (i.e., Pins, Spares, and Strikes).

Time 2: Team level. Similar to Time 1, a consensus analysis was conducted on the individual level self-efficacy perceptions prior to aggregation. The results of the consensus analysis resulted in a few teams being excluded from the subsequent regression analyses (for Pins: n of excluded teams = 3; for Strikes: n of excluded teams = 4; for Spares: n of excluded teams = 7). Thus, the number of teams used in each analysis were 77, 73, 76, and 80 for Pins, Spares, Strikes and Points, respectively. Correlations among aggregated self-efficacy, collective efficacy and team performance for Pins, Spares, Strikes and Points for the additive and interdependent groups are found in Table 12.

The results of the moderator analysis (see Table 13) show that task type was not a significant moderator in any of the analyses. Thus, the significant results for Pins from Time 1 were not replicated for the relationship between collective efficacy - team performance (Link D). Similar to the individual level analysis for Time 2, task type by itself accounted for a significant portion of the variance in Pin performance, but when all predictors were entered into the analysis, the Beta weight for task type was no longer statistically significant.

The failure to replicate the collective efficacy - performance relationships at both levels of analysis (i.e., the individual and the team) maybe due the decrease in statistical power that was associated with the decrease in sample size from Time 1 to Time 2. In order to test this postulation, all of the Time 1 analyses were re-run using only those participants who were present for both time periods. The n for the individual analyses was 160, and the n's for the team analyses varied according to the measures used. The results of the analyses using the reduced sample were similar to those reported in the Time 1 section. Links B and D were significantly moderated by task type (for Pins only). Links A and C were not moderated by task type. Summaries of these analyses are presented in Appendix I.

Table 11

Time 2: Individual Level: Moderation Analysis Between Efficacy and Performance (Links A and B)

	Multiple R	R^2	Increment	*F*	*p*	B	SEB	β	*p* level for *t*
Pins									
1) SE	.22	.05	.05	7.95	.005	.30	.13	.32	.03
2) CE	.28	.08	.03	4.91	.03	-.03	.14	-.04	.83
3) Task	.32	.10	.02	4.08	.05	.11	1.37	.05	.94
4) SE*Task	.33	.11	.01	1.72	.19	-.34	.17	-1.15	.05
5) CE*Task	.35	.13	.01	2.49	.12	.28	.17	.92	.12
Spares									
1) SE	.23	.05	.05	8.70	.004	.12	.14	.12	.39
2) CE	.25	.06	.01	1.90	.17	.26	.17	.22	.15
3) Task	.26	.07	.004	.59	.44	.56	1.12	.16	.62
4) SE*Task	.26	.07	.001	.13	.71	.05	.20	.08	.82
5) CE*Task	.27	.07	.004	.66	.42	-.19	.24	-.31	.42
Strikes									
1) SE	.12	.01	.01	2.15	.14	.15	.15	.17	.31
2) CE	.13	.02	.002	.36	.55	.04	.15	.05	.76
3) Task	.13	.02	.0004	.07	.79	.66	.76	.25	.39
4) SE*Task	.15	.02	.007	1.04	.31	-.15	.20	-.30	.43
5) CE*Task	.15	.02	.00002	.003	.96	.01	.19	.02	.96

Note: SE = Self-efficacy; CE = Collective efficacy.

Table 12
Time 2: Team level: Correlations among Aggregated Self-Efficacy, Collective Efficacy and Team Performance for the Additive and Interdependent Groups

	CE	Performance
Additive Group		
Pins (n = 32)		
SE	.56**	.34
CE		.20
Spares (n = 27)		
SE	.68**	.26
CE		.29
Strikes (n = 30)		
SE	.80**	.11
CE		.19
Points (n = 32)		
CE		.42**
Interdependent Group		
Pins (n = 45)		
SE	.73**	.33*
CE		.41**
Spares (n = 46)		
SE	.78**	.20
CE		.18
Strikes (n = 46)		
SE	.77**	.10
CE		.15
Points (n = 48)		
CE		.23

Note: SE = Self-efficacy; CE = Collective efficacy.

Table 13

Time 2: Team Level: Moderation Analysis Between Efficacy and Performance (Links C and D)

	Multiple R	R^2	Increment	*F*	*p*	B	SEB	β	*p* level for *t*
Pins									
1) SE	.34	.12	.12	9.77	.003	.30	.17	.34	.10
2) CE	.39	.15	.03	2.87	.09	.01	.16	.01	.96
3) Task	.44	.20	.05	4.31	.04	-.08	1.61	-.04	.96
4) SE*Task	.45	.20	.003	.23	.63	-.25	.25	-1.11	.31
5) CE*Task	.46	.21	.01	1.03	.31	.21	.21	.93	.31
Spares									
1) SE	.23	.05	.05	3.89	.05	.27	.48	.13	.58
2) CE	.26	.07	.01	1.03	.31	.44	.51	.23	.39
3) Task	.26	.07	.004	.29	.59	1.37	3.05	.23	.65
4) SE*Task	.27	.07	.004	.30	.58	-.13	.70	-.14	.84
5) CE*Task	.27	.07	.001	.06	.80	-.17	.69	-.17	.80
Strikes									
1) SE	.11	.01	.01	.85	.36	-.18	.42	-.12	.67
2) CE	.17	.03	.02	1.39	.24	.38	.37	.31	.31
3) Task	.17	.03	.001	.05	.82	.04	1.80	.01	.98
4) SE*Task	.17	.03	.0001	.01	.92	.14	.56	.18	.81
5) CE*Task	.18	.03	.002	.15	.70	-.19	.48	-.23	.70
Points									
1) CE	.34	.1!	.11	9.96	.00	17.58	6.47	.43	.01
2) Task	.37	.14	.02	1.96	.17	32.02	47.13	.36	.50
3) CE*Task	.38	.15	.01	.96	.33	-8.53	8.69	-.52	.33

Note: SE = Self-efficacy; CE = Collective efficacy.

Past performance

The results of the above analyses demonstrated that task type moderated the relationship between (disaggregated) collective efficacy and individual performance (Link B), and the relationship between collective efficacy and team performance (Link D), but only when Pins was used as the dependent variable. These results were found only for Time 1. Consistent with previous research in the sport psychology literature (i.e., Feltz, 1982; McAuley, 1985), it is likely that performance at Time 1 may have affected the relationship between efficacy beliefs and performance at Time 2. In order to examine the specific effects of efficacy beliefs on Time 2 Pin performance and to simultaneously take into account the effects of past performance (Time 1 Pin performance), I calculated semipartial correlations (cf Pedhazur, 1982). More specifically, the semipartial correlations represented the relationship between efficacy and Time 2 performance after Time 1 performance was partialed out from Time 2 performance.

These analyses were conducted with the "Pin" variables (SE-Pins, CE-Pins and Pin performance) because these measures were the only ones to show statistical significance in the previous analyses. Both the individual and team levels of analysis were examined. The sample size in these analyses was reduced because only those participants (and teams) who had complete data for both Time 1 and Time 2, and demonstrated consensus on the appropriate efficacy measures were used. Thus, for the additive group, $\underline{n} = 64$ at the individual level of analysis, and $\underline{n} = 30$ at the team level of analysis. For the interdependent group, $\underline{n} = 96$ for the individual level analyses, and $\underline{n} = 43$ at the team level of analysis.

At the individual level of analysis, for the interdependent group, the semipartial correlation for disaggregated CE-Pins and Time 2 Pin performance was .23, which was higher than the semipartial correlation between self-efficacy and Time 2 Pin Performance ($\underline{r}$ = .07). For the additive group, the semipartial correlations for disaggregated CE-Pins and Time 2 Pin performance, and self-efficacy and Time 2 Pin performance were similar, $\underline{r}$ = .15 and 12, respectively.

At the team level of analysis, the results for the interdependent group were the same as the individual level of analysis. The semipartial correlation for CE-Pins and Time 2 Pin performance was .29, which was higher than the semipartial correlation between self-efficacy and Time 2 Pin Performance ($\underline{r}$ = .26). For the additive group, the semipartial correlations for aggregated SE-Pins and Time 2 Pin performance was .33, whereas the semipartial correlation for CE-Pins and Time 2 Pin performance was .26.

CHAPTER V

DISCUSSION

The purpose of this dissertation was to investigate the relationships among self-efficacy, collective efficacy and performance in an additive task versus an interdependent task, and to test whether or not the relationships differed according to the level of analysis (i.e., individual vs team). The results of this dissertation have implications for theory, application and measurement, thereby contributing to the efficacy literature in several ways.

This study was the first to examine the predictive utility of collective efficacy in an additive setting, and to compare it to a more interdependent setting. The findings suggest that task type is a significant moderator of collective efficacy and performance, at both levels of analysis. However, these results were found only when the teams first performed the bowling task (Time 1), and were found only when Pins was used as the dependent variable. It did not affect the relationship between self-efficacy and performance, at either level of analysis.

With respect to the relationships among self-efficacy, collective efficacy and performance, the results of this study support the strong association among these constructs, and are consistent with what other researchers found within and outside of sport (e.g., Feltz & Lirgg, in press). However, I expected that the Time 2 analyses would replicate the relationships found at Time 1. The failure to replicate may be due to the decreased statistical power associated with the smaller sample size at Time 2. More specifically, when the correlations are examined, the correlations between some of the constructs in the additive group are higher than those found between the same constructs in the interdependent group, but the additive group correlations are not statistically significant and the interdependent group correlations are statistically significant. Furthermore, the regression analyses that were used to investigate the moderating effects require power. The Time 2 analyses showed the same trends, but the overall results were not significant (see also Appendix I results). Thus, there may not have been adequate power to detect the moderating effects at Time 2.

Interestingly, the results of this study seem to be dependent on the efficacy and performance measures. That is, statistically significant results were found only when "Pins" was used as the performance measure, and when "Pins" was used as the focus of the efficacy measures. Three other efficacy measures were constructed and these measures corresponded with three performance measures (i.e., Spares, Strikes, and Points). Although all of the measures were constructed in accordance with Bandura's (1986) recommendations, and were concordant (Moritz et al., 1996), the relationships among the constructs were not evident. The relationships between efficacy and performance for Pins were consistent throughout the entire analyses. I am not sure why the other measures failed to show the desired relationships. Bowlers may have been more accurate in their efficacy judgments regarding the number of pins they could drop than in the number of strikes or spares they could bowl. Given that the bowlers were beginners, they did not have much consistency in bowling spares or strikes. In addition, Pins was a more variable performance measure, than were Spares or Strikes.

In order to circumvent levels of analysis issues with respect to the collective efficacy measures team members, in this study, made the judgments together. This procedure was adequate given that the teams were dyads. However, Bandura (1997) has cautioned researchers against using this procedure when team size is an issue. Team members are rarely of one mind in their appraisals of matters, and therefore forming a consensual judgment of a team's efficacy by team discussion may be subject to social persuasion and conformity pressures. For example, it is possible that a more prestigious team member could influence the judgment in such a way that it does not accurately represent the views of many of its members. Thus, team members may publicly consent to a response without truly believing it (Guzzo et al., 1993). The bottom line is that a forced consensus can be highly misleading, and may be unmanageable with large collectives.

In this dissertation, consensus analyses were still needed in order to justify the aggregation of the individual level self-efficacy perceptions to the team level. The consensus analyses resulted in a few teams being excluded from the team analyses. However, this number was minimal, and may actually be expected given the experimental design of the study. More specifically, the participants in this study were randomly assigned to two-member bowling teams. They bowled together for approximately 8 h before competing in the "tournament" phase of this study. In natural sport settings, sport teams are never randomly determined, and they practice together for extended periods of time, much longer than 8 hours! That so many teams agreed on their efficacy beliefs may lend credence to the existence of a sport "culture."

The results of this study also supported the levels of analysis hypothesis. When it was a significant moderator, the effect of task type was surprisingly apparent at both the individual and team level of analysis. Thus, this study provides empirical evidence which supports a multi-level conceptualization of these constructs.

Interestingly, the relationship between collective efficacy and performance was isomorphic across levels of analysis. Isomorphism implies that constructs mean the same thing across levels, and it exists when the same functional relationship, or functional process, can be used to represent constructs at more than one level. In this case, task type moderated the relationship between disaggregated collective efficacy and individual performance and the relationship between collective efficacy and team performance. I did not expect task type to moderate the relationship between disaggregated collective efficacy and individual performance. More specifically, I thought that one's belief in his/her team would not impact one's individual performance.

Levels of task interdependence range on a continuum from low to high (Zaccaro et al., 1995). At a minimum, individuals often require resources and support from their surrounding environment, even if there is little or no coaction with other individuals. A higher level of interdependence is found in settings where individuals coact to produce an aggregated product. While there still may be little interaction, characteristics of the aggregate may still influence beliefs and performance. At the most complex level of interdependence, individuals behave in complete concert with each other. Individual actions are fully dependent upon the actions of others to produce a collective outcome and such actions cannot be distinguished from one another; only a collective product is identifiable.

The tasks used in this study were designed to represented varying degrees of interdependence. The additive task had low interdependence among team members -- it could be completed by each team member working independently, and at his or her own speed (Zaccaro et al., 1995). The interdependent task, although constrained by considerations such as task difficulty, team size, and type of motor skill, was designed to foster a greater sense of interdependence by requiring team members to coordinate their efforts, and rely on their partner during the tournament. The degree of coordination in this task was considerably less than in other sports (i.e., hockey, basketball), although it was designed to be greater than the additive condition.

It is noteworthy to mention that all of the participants in this study perceived that they had to coordinate their efforts and work together with their partner in order to be successful in tournament, not just the interdependent team. Zaccaro et al. (1995) stated that low degrees of interdependence do not mean that individual team members are not influenced in some manner by the activities of the other team members. Thus, it is not surprising that the additive team did not differ in their perceptions of coordinated effort compared to the interdependent team. However, task type still differentially affected the relationship between collective efficacy and performance. Thus, the results of this study seem to suggest that it is more than just the perceptions of coordination and "working together" that account for the moderating influence of task type on the collective efficacy - performance relationship. More research is needed to determine what, exactly, accounted for the difference. A within-subjects design where participants rate the degree of interdependence for different tasks seems to be the logical extension of this research.

Interestingly, the relationship between aggregated self-efficacy and team performance was not moderated by task type. I expected aggregated self-efficacy to predict performance for the additive group, but not for the interdependent group. Aggregated self-efficacy may be an adequate predictor of team performance when team attainments represent largely the summed contributions of individual members (Feltz &

Lirgg, in press; George & Feltz, 1995). Even though the majority of the correlations between aggregated self-efficacy and team performance were higher than the correlations between collective efficacy and team performance for the additive group, task type was not a significant moderator.

The findings from this study suggest that collective efficacy is a stronger predictor of team performance for interdependent tasks compared to additive tasks. The implications of these findings are most pronounced when one considers applied settings. That is, when designing interventions to develop, maintain or enhance efficacy, psychologists should consider the setting in which participants are working. The results of this study indicate that in interdependent tasks, interventions should be directed towards the entire team. For example, team goals may be used in interdependent sports. Ultimately, efficacy influences performance, whereby those who are highly efficacious will exert more effort, out-perform, and out-persist their low efficacy counterparts (Bandura, 1986, 1997).

The implications of these findings may be extended outside of the sport domain as well. A common strategy in teaching and coaching is the collaborative or cooperative approach (Pangrazi & Darst, 1997). This approach is characterized by placing students in teams in order to enable the students to work together toward common goals. The student work is arranged so there is an interdependence in the achievement of team goals. The emphasis is placed on team outcomes rather than on individual outcomes, and the success of the approach rests on the assumption that the students perceive that they cannot complete the task alone. This description of student work teams is analogous to the interdependence found in some sports settings. Similar to sport, if teachers and coaches want to develop student efficacy in interdependent settings, they may be advised to focus on collective efficacy enhancement strategies.

Concentrating on developing, maintaining, and enhancing collective efficacy does not imply that there will be no effects on self-efficacy beliefs. Researchers (e.g., Feltz & Lirgg, in press; Watson & Chemers, 1998) have shown that self-efficacy and collective efficacy are related. The correlations between these constructs in this dissertation provide additional support that self-efficacy and collective efficacy are positively related, but also that they are distinct constructs. Future researchers may consider examining the effects of collective efficacy interventions on self-efficacy beliefs and vice versa.

In sport, this is one of only two studies to simultaneously explore the relationships between self-efficacy, collective efficacy and performance on both the individual and team levels (see also Watson & Chemers, 1998). The generation of multi-level models have tremendous advantages in that they are uniquely powerful and parsimonious. Multi-level models postulate relationships among variables which apply at two or more levels (Rousseau, 1985), and they describe relations at one level that are generalizable to other levels. One benefit of this approach is that multi-level models may generate testable hypotheses at one level of analysis that are suggested by empirical results or theory at another level of analysis. Given the vast literature on self-efficacy and performance, the research possibilities for collective efficacy and performance are boundless. Furthermore, multi-level thinking forces a theorist and/or researcher to examine individuals, teams and organizations as parts of a whole, each affecting and being affected by the other, rather than as separate conceptual categories (Lindsley et al., 1995). Efficacy research could benefit from such an approach.

Future studies could examine the same relationships as in this study but with existing sports teams that are additive, such as archery, track, or swimming. In some sports, both additive and interdependent tasks exist and are performed by the same individuals. For instance, in baseball and softball, batting or catching a fly ball are essentially additive tasks, whereas most fielding (e.g., making a double play) is interdependent. Situations such as these provide a natural setting for the examination of the effect of task type on efficacy and performance. Furthermore, these settings offer the researcher the advantages of a within-subjects design.

This dissertation demonstrated that task type moderated the relationship between collective efficacy and performance. Researchers might also consider other factors as potential moderators of this relationship. For example, varying levels of task uncertainty and task complexity may differentially affect the association between collective efficacy and performance. The basic premise is that as task uncertainty or complexity increases, individuals will rely more heavily on team performance when arriving at efficacy judgments (Lindsley et al., 1995). Thus, one might expect the relationship between collective efficacy and performance to be stronger under conditions of high task uncertainty or complexity than under conditions of low task uncertainty or complexity.

Additional constructs which are suited for examination within a multi-level model of efficacy and performance include team size. In this dissertation, care was taken to ensure the team size remained constant under the different task types. However, Zaccaro et al. (1995) stated that members of smaller teams are generally better able to coordinate their activities than their counterparts in larger teams. He stated that as team size increases, individuals participate less, exhibit greater disagreements and dissension, and are absent more often. As these factors occur, the team's sense of collective efficacy would be expected to decline, accompanied by decreases in individuals contributions to the team. Support for this proposition is found in studies of social loafing that have demonstrated that as team size increases, individual effort and performance declines (Hill, 1982; Latane, Williams, & Harkins, 1979). With respect to the effects that team size can have on the efficacy - performance relationship, Lindsley et al. (1995) stated that as the size of the team increases, it is likely that the relationship between self-efficacy and collective efficacy will decrease. In addition, they stated that the relationships between variables at adjacent levels of analysis (i.e., self-efficacy - individual performance; collective efficacy - team performance) would be stronger than relationships between those same variables at non-adjacent levels of analysis (i.e., self-efficacy - team performance).

There is an alternative suggestion regarding the effect of team size on the efficacy - performance relationship. More specifically, a large team can mean that more resources are available to the team. The greater the number of different resources teams can apply to a task, the stronger would be the probability of success. In such circumstances, then, team size may be positively associated with members' perceptions of collective efficacy. To date, the moderating impact of team size has not been investigated in any of the efficacy - performance relationships. There are a number of research options for those who are interested in pursuing how other factors may affect the collective efficacy - performance relationship.

APPENDICES

APPENDIX A

Table A1: Pilot Study - Individual Level: Means, standard deviations, and ranges for self-efficacy, collective efficacy and individual and team performance measures for task teams.

Table A2: Pilot Study: Correlations between self-efficacy, collective efficacy, and performance measures.

Table A1

Pilot Study - Individual Level: Means, Standard Deviations, and Ranges for Self-Efficacy, Collective Efficacy and Individual Performance for the Additive and Interdependent Groups.

Measure	Additive (n = 16)			Interdependent (n = 26)		
	M	SD	Range	M	SD	Range
SE-Pins	76.59	14.20	53.0 - 96.0	74.85	15.64	43.0 - 100.0
SE-Strikes	46.56	20.97	14.0 - 91.0	42.21	17.69	15.0 - 76.0
SE-Spares	63.94	19.22	22.0 - 96.0	61.62	19.49	33.0 - 91.0
CE-Pins	75.97	15.19	52.0 - 93.0	76.98	13.53	47.0 - 100.0
CE-Strikes	91.34	44.99	20.0 - 157.0	96.23	37.17	37.0 - 166.0
CE-Spares	111.19	49.07	10.0 - 200.0	120.23	38.65	57.0 - 193.0
CE-Points	120.91	40.59	55.0 - 195.0	127.54	33.74	63.0 - 196.0
IP - Pins	6.33	0.91	4.9 - 7.7	6.72	1.12	4.8 8.5
IP - Spares	1.94	1.44	0.0 - 5.0	2.69	1.49	0.0 - 6.0
IP - Strikes	1.19	1.22	0.0 - 3.0	1.08	1.06	0.0 - 4.0
IP - Points	107.00	22.19	68.0 - 155.0			

Note: SE = Self-Efficacy, CE = Collective Efficacy, IP = Individual Performance

Table A2

Pilot Study: Individual Level: Correlations Between Self-Efficacy, Collective Efficacy, and Performance for the Additive and Interdependent Groups.

	SE-Strike	SE - Spare	SE - Pins	CE-Strike	CE-Spare	CE-Pins	CE-Point	IP - Points	IP - Strikes	IP - Spares	IP - Pins
SE - Strike	--	.69**	.57*	.69**	.43	.68**	.52**	.52	.49	.29	.35
SE - Spares	.73**	--	.47	.64**	.55*	.35	.70**	.29	.07	.38	.48
SE - Pins	.60**	.36	--	.37	.19	.76**	.41	.19	.18	.05	.19
CE - Strikes	.71**	.83**	.65**	--	.82**	.42	.76**	.23	.03	.40	.46
CE - Spares	.69**	.79**	.64**	.92**	--	.37	.72**	-.06	-.01	.24	.55*
CE - Pins	.65**	.71**	.65**	.65**	.72**	--	.33	.19	.45	-.20	.31
CE - Points	.42*	.53**	.37	.71**	.74**	.44*	--	.44	.03	.55*	.60*
IP - Points									.70**	.58*	.48
IP - Strikes	.15	.26	.20	.34	.46*	.15	.33		--	-.11	.25
IP - Spares	.27	.38	.26	.44	.42*	.26	.54		.32	--	.35
IP - Pins	.41*	.36	.33	.23	.30	.20	.32		.46*	.37	--

Note: Correlations below the diagonal are for the interdependent group (n = 26). Correlations above the diagonal are for the additive group (n = 16). SE = Self-Efficacy, CE = Collective Efficacy, IP = Individual Performance

<u>APPENDIX B</u>

Bowling Instructions

APPENDIX B:

TOURNAMENT RULES: Additive Team

- Teams consist of two players (Player A and Player B)
- Player A and Player B will each bowl a full (10 frame) game
- Team score will be determined by adding Player A and Player B's scores together (out of 600 points)

TOURNAMENT RULES: Interdependent Team

- Teams consist of two players (Player A and Player B)
- Players A and B will ALTERNATE who bowls first in each frame
  For example, for Frames 1, 3, 5, 7, and 9: Player A bowls first
  for Frames 2, 4, 6, 8, and 10: Player B bowls first

If Player A is bowling first:
If Player A strikes, then only Player A records a score for that frame.
If Player A does not strike, then Player B bowls the second ball in that frame.

If Player B was bowling first:
If Player B strikes, then only Player B records a score for that frame.
If Player B does not strike, then Player A bowls the second ball in that frame.

FRAME 10
In Frame 10: Player B bowls first, if he/she strikes, Player A bowls the second ball, and Player B bowls the third ball.
In Frame 10: Player B bowls first, if he/she does NOT strike, then Player A bowls the second ball. If Player A SPARES, then Player A also bowls the third ball.
In Frame 10: Player B bowls first, if he/she does NOT strike, then Player A bowls the second ball. If Player A does not Spare, then no more balls are bowled.

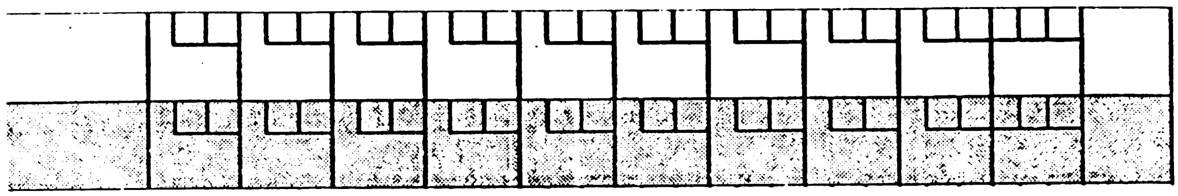
- Two games will be played, whereby each team member is Player A in one game, and Player B in the other game.
- Team scores will be the sum of the scores in both games (out of 600 pins).

APPENDIX C

Performance Measures/Tournament Scoresheet

APPENDIX C:

Performance Measures/Tournament Scoresheet



Date: ___________________

Names of Players: _____________________

____

Summary of Game:

Final TEAM Score: __________

For PLAYER A:

Individual Score: __________
Number of Strikes: __________
Number of Spares: __________
Average number of pins dropped on ONLY first balls: _________

For PLAYER B:

Individual Score: __________
Number of Strikes: __________
Number of Spares: __________
Average number of pins dropped on ONLY first balls: _________

APPENDIX D

Self-Efficacy Questionnaires

APPENDIX D:

SELF-CONFIDENCE QUESTIONNAIRE FOR BOWLERS

FOR THIS TOURNAMENT: Rate your confidence that YOU:	I cannot do this at all				Somewhat certain I can do this				Very certain I can do this		
Can bowl a strike in 1 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 2 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 3 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 4 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 5 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 6 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 7 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 8 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 9 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in all of your frames	0	1	2	3	4	5	6	7	8	9	10

FOR THIS TOURNAMENT: Rate your confidence that YOU:	I cannot do this at all				Somewhat certain I can do this				Very certain I can do this		
Can bowl a spare in 1 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 2 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 3 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 4 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 5 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 6 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 7 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 8 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 9 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in all of your frames	0	1	2	3	4	5	6	7	8	9	10

FOR THIS TOURNAMENT: Rate your confidence that YOU:	I cannot do this at all					Somewhat certain I can do this				Very certain I can do this	
Can drop at least 1 pin with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 2 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 3 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 4 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 5 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 6 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 7 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 8 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 9 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop all 10 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10

APPENDIX E

Collective Efficacy Measures

APPENDIX E:

TEAM CONFIDENCE QUESTIONNAIRE FOR BOWLING TEAMS

FOR THIS TOURNAMENT: Rate your TEAM'S confidence that your team:	We are certain that we cannot do this at all					We are somewhat certain that we can do this				We are very certain that we can do this	
Can average 25 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 50 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 75 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 100 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 125 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 150 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 175 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 200 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 225 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 250 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 275 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 300 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 325 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 350 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 375 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 400 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 425 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 450 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 475 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 500 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 525 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 550 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 575 points in this game	0	1	2	3	4	5	6	7	8	9	10
Can average 600 points in this game	0	1	2	3	4	5	6	7	8	9	10

FOR THIS TOURNAMENT: Rate your TEAMS' confidence that your team:	We are certain that we cannot do this at all				We are somewhat certain we can do this				We are very certain that we can do this		
Can bowl a strike in 1 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 2 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 3 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 4 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 5 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 6 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 7 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 8 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 9 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 10 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 11 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 12 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 13 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 14 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 15 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 16 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 17 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 18 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in 19 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a strike in all of your frames	0	1	2	3	4	5	6	7	8	9	10

FOR THIS TOURNAMENT: Rate your TEAMS' confidence that your team:	We are certain that we cannot do this at all					We are somewhat certain we can do this				We are very certain that we can do this	
Can bowl a spare in 1 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 2 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 3 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 4 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 5 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 6 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 7 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 8 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 9 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 10 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 11 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 12 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 13 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 14 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 15 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 16 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 17 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 18 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in 19 of your frames	0	1	2	3	4	5	6	7	8	9	10
Can bowl a spare in all of your frames	0	1	2	3	4	5	6	7	8	9	10

FOR THIS TOURNAMENT: Rate your TEAMS' confidence that your team:	We are certain that we cannot do this at all					We are somewhat certain we can do this					We are very certain that we can do this
Can drop at least 1 pin with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 2 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 3 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 4 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 5 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 6 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 7 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 8 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop at least 9 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10
Can drop all 10 pins with your first ball consistently	0	1	2	3	4	5	6	7	8	9	10

APPENDIX F

Team Concept and Incentive Measures

APPENDIX F:

Questionnaire for Bowlers

TO BE COMPLETED INDIVIDUALLY

1. Please indicate the degree to which you feel that you and your partner are a "team."

I do not feel like we are a team at all				I somewhat feel like me and my partner are a team				I definitely feel like me and my partner are a team		
0	1	2	3	4	5	6	7	8	9	10

2. Please indicate the degree to which you and your partner are "working together" in this tournament.

We are not working together at all				We somewhat work together				We definitely work together		
0	1	2	3	4	5	6	7	8	9	10

3. Please indicate the degree in which you and your partner are "coordinating your efforts" in this tournament.

We are not coordinating our efforts at all				We somewhat coordinate our efforts				We definitely coordinate our efforts		
0	1	2	3	4	5	6	7	8	9	10

4. How much effort are you putting in this tournament.

No effort				Moderate effort				High Effort		
0	1	2	3	4	5	6	7	8	9	10

5. Please indicate how important it is to you to bowl well in this tournament.

Not important				Moderately important				Very important		
0	1	2	3	4	5	6	7	8	9	10

APPENDIX G

University Approval for Use of Human Subjects

APPENDIX G:

MICHIGAN STATE
UNIVERSITY

June 16, 1997

TO: Deborah L. Feltz
138 IM Sports Circle

RE: IRB#: 97-327
TITLE: THE RELATIONSHIP BETWEEN SELF-EFFICACY, COLLECTIVE EFFICACY PERFORMANCE IN SPORT
REVISION REQUESTED: N/A
CATEGORY: 1-C
APPROVAL DATE: 06/16/97

The University Committee on Research Involving Human Subjects'(UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project and any revisions listed above.

RENEWAL: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must use the green renewal form (enclosed with the original approval letter or when a project is renewed) to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/CHANGES: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc.) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of any future help, please do not hesitate to contact us at (517)355-2180 or FAX (517)432-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:bcd

cc: Sandra E. Moritz

OFFICE OF
RESEARCH
AND
GRADUATE
STUDIES

University Committee on Research Involving Human Subjects (UCRIHS)

Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046

517/355-2180
FAX: 517/432-1171

APPENDIX H

Consent Form

APPENDIX H

Dear Bowler,

I would like to request your participation in a research project that is being conducted by the Department of Physical Education and Exercise Science (PEES) at Michigan State University. The research project will help me fulfill part of the requirements for my Doctoral Degree. The purpose of the study is to determine how self-confidence and team confidence are related to team performance in bowling.

This project will be completed during your regularly scheduled PES Bowling class. If you are willing to participate, you will be asked to complete 2 questionnaires (one self-confidence and one team confidence questionnaire). You will complete the self-confidence questionnaire once. This questionnaire contain 30 items, and you will be asked to circle the most appropriate response. The team confidence questionnaire contains 74 items, and again, you will be asked to circle the most appropriate response. However, for the team confidence questionnaire, you and your partner will complete the questionnaire together for a total of 3 times. That is, you will be given one questionnaire for your team on 3 occasions. These questionnaires should take approximately 20 minutes to complete. In addition, you will be asked to participate in a "team" bowling tournament. This tournament will also be completed during your regularly scheduled bowling classes.

All of the questionnaires, and your bowling performance results will be treated with strict confidence. They will only be used by the experimenter listed below, and the project supervisor from the PEES Department. By signing this consent form, you are agreeing that your results may be used for scientific purposes, including publication in scientific and sport specific journals, as long as your anonymity is maintained. On your request, the results can be forwarded to you upon project completion.

Participation in this project is completely voluntary, and you may choose not to participate at all. You may refuse to participate in any of the procedures, and/or refuse to answer any questions. You may also discontinue your participation in this study at any time without repercussion. There are no risks involved to you through your participation.

Participation in the study will not entail any "extra" course work for you, nor will it adversely affect your final grade for the course.

Thank you for your cooperation.

I have read and I understand the above, and I agree to participate in the study.

Signature of Participant: ____________________________________
Date: _______________

Signature of parent or guardian if participant is under 18 years of age.

____

Sandra Moritz, B.Sc., M.A.
Doctoral Candidate
PEES Department
Michigan State University

Deborah Feltz, Ph.D.
Professor and Department Chair
PEES Department
Michigan State University

Inquiries: (517) 432-1416

APPENDIX I

Summary of Reduced Sample Analysis for Time 1

Table I1: Reduced Sample: Individual Level: Means, Standard Deviations, and Ranges for Self-Efficacy, Collective Efficacy and Individual Performance for the Additive and Interdependent Groups

Table I2: Reduced Sample: Individual Level: Correlations Between Self-Efficacy, Collective Efficacy, and Performance for the Additive and Interdependent Groups

Table I3: Team Level: Means, Standard Deviations, and Ranges for Self-Efficacy, Collective Efficacy and Team Performance for the Additive and Interdependent Groups.

Table I4: Reduced Sample: Individual Level: Moderation Analysis between Efficacy and Performance (Links A and B).

Table I5: Reduced Sample: Team level: Correlations among Aggregated Self-Efficacy, Collective Efficacy and Team Performance for the Additive and Interdependent Groups

Table I6: Reduced Sample: Team Level: Moderation Analyses Between Efficacy and Performance (Links C and D)

APPENDIX I:

Table I1
Reduced Sample: Individual Level: Means, Standard Deviations, and Ranges for Self-Efficacy, Collective Efficacy and Individual Performance for the Additive and Interdependent Groups

	Additive			Interdependent		
	Time 1			Time 1		
	M	SD	Range	M	SD	Range
SE-Pins	7.87	1.36	3.40 - 9.70	7.82	1.33	3.20 - 10.00
SE-Strikes	4.82	1.78	0.00 - 8.20	4.70	1.38	2.00 - 8.60
SE-Spares	6.37	1.65	1.50 - 10.00	5.89	1.50	2.40 - 8.80
CE-Pins	8.12	1.43	4.40 - 10.00	7.74	1.36	4.20 - 9.60
CE-Strikes	4.62	1.67	1.40 - 7.55	4.02	1.32	1.10 - 6.65
CE-Spares	5.64	1.55	2.55 - 8.15	5.21	1.48	1.70 - 8.35
CE-Points	5.44	1.37	1.83 - 9.38	5.14	0.94	3.46 - 7.83
IP: Pins	6.88	1.15	3.70 - 8.70	6.73	1.12	3.90 - 9.40
IP: Spares	2.86	1.76	0.00 - 7.00	2.51	1.47	0.00 - 6.00
IP: Strikes	1.42	1.10	0.00 - 6.00	1.28	1.21	0.00 - 5.00
IP: Points	121.58	25.17	77.00 - 187.00			

Note: n = 96 for interdependent group, n = 64 for additive group. SE = Self-efficacy; CE = Collective efficacy; IP = Individual performance. Collective Efficacy data is disaggregated.

Table I2

Reduced Sample: Individual Level: Correlations Between Self-Efficacy, Collective Efficacy, and Performance for the Additive and Interdependent Groups

	SE- Strikes	SE - Spares	SE - Pins	CE-Strikes	CE-Spares	CE-Pins	CE-Points	IP -Pins	IP - Strikes	IP - Spares	IP -Points
SE - Strikes	--	.75**	.53**	.54**	.59**	.30*	.48**	.15	.15	.16	.21
SE - Spares	.70**	--	.52**	.50**	.62**	.24	.50**	.30*	.26*	.38**	.46**
SE - Pins	.62**	.64**	--	.46**	.52**	.75**	.56**	.28*	.04	.15	.18
CE - Strikes	.57**	.61**	.45**	--	.80**	.34**	.76**	.24	.10	.34**	.30*
CE - Spares	.49**	.60**	.47**	.65**	--	.37**	.70**	.41**	.16	.34**	.36**
CE - Pins	.31**	.43**	.60**	.54**	.56**	--	.52**	.11	-.07	.08	.02
CE - Points	.32**	.43**	.46**	.67**	.53**	.48**	--	.31*	.12	.40**	.37**
IP - Pins	.08	.16	.10	.24*	.30**	.19	.32**	--	.37**	.37**	.69**
IP - Strikes	.00	.02	-.09	.03	.05	-.04	.14	.56**	--	-.04	.63**
IP - Spares	.18	.23*	.13	.28**	.08	.12	.22**	.23*	.07	--	.65**
IP - Points											--

Note: Correlations below the diagonal are the interdependent group (n = 96); correlations above the diagonal are the additive group (n = 64). SE = Self-efficacy; CE = Collective efficacy; IP = Individual performance.

Table I3

Team Level: Means, Standard Deviations, and Ranges for Self-Efficacy, Collective Efficacy and Team Performance for the Additive Group and Interdependent Groups.

Measure	Additive				Interdependent			
	M	SD	Range	n	M	SD	Range	n
SE-Pins	8.03	1.06	5.55 - 9.40	30	7.84	1.14	4.40 - 9.70	46
SE-Strikes	4.96	1.44	1.70 - 8.05	30	4.69	1.16	2.75 - 7.90	44
SE-Spares	6.48	1.19	4.35 - 8.80	28	5.94	1.26	2.80 - 8.05	46
CE-Pins	8.25	1.29	5.10 - 10.00	30	7.72	1.37	4.20 - 9.60	46
CE-Strikes	4.76	1.64	1.40 - 7.55	30	4.02	1.35	1.10 - 6.65	44
CE-Spares	5.81	1.53	2.55 - 8.15	28	5.29	1.46	1.70 - 8.35	46
CE-Points	5.44	1.38	1.83 - 9.38	32	5.14	0.94	3.46 - 7.83	48
TP - Pins	6.95	0.81	4.90 - 8.70	30	6.69	0.89	4.85 - 8.75	46
TP - Spares	5.89	2.48	2.00 - 12.00	28	5.09	2.34	1.00 - 10.00	46
TP - Strikes	2.90	1.49	0.00 - 6.00	30	2.64	1.67	0.00 - 7.00	44
TP - Points	242.69	35.96	168.00 - 314.00	30	231.19	34.54	164.00 - 313.00	48

Note: The number of teams used for each measure varies. Only those teams that demonstrated consensus for individual level beliefs were used in the team analyses. SE = Self-efficacy; CE = Collective efficacy; TP = Team performance.

Table I4

Reduced Sample: Individual Level: Moderation Analysis between Efficacy and Performance (Links A and B).

	Multiple R	R^2	Increment	F	p	B	SEB	β	p level for t
Pins (n = 158)									
1) SE	.18	.03	.03	5.30	.02	.29	.13	.33	.03
2) CE	.19	.04	.003	0.47	.49	- .02	.09	- .03	.78
3) Task	.19	.04	.002	0.33	.56	.24	1.15	.11	.83
4) SE*Task	.22	.05	.01	1.50	.22	-.32	.15	-1.13	.03
5) CE*Task	.32	.10	.06	9.32	.00	.42	.14	.98	.00
Spares (n = 159)									
1) SE	.31	.10	.10	16.80	.00	.30	.15	.29	.05
2) CE	.31	.10	.00	0.08	.78	.19	.16	.18	.24
3) Task	.32	.10	.005	0.84	.36	·1.40	1.06	.43	.19
4) SE*Task	.33	.11	.08	1.35	.25	- .02	.20	- .04	.93
5) CE*Task	.35	.12	.01	1.82	.18	- .28	.21	- .49	.18
Strikes (n = 159)									
1) SE	.07	.005	.005	0.73	.40	.09	.10	.12	.37
2) CE	.08	.006	.001	0.17	.68	.01	.11	.01	.94
3) Task	.09	.009	.003	0.44	.51	.28	.67	.12	.68
4) SE*Task	.11	.01	.004	0.62	.43	- .11	.15	- .24	.46
5) CE*Task	.13	.01	.000	0.03	.86	.03	.15	.05	.86

Note: SE = Self-efficacy; CE = Collective efficacy. Follow-up analyses for the Significant CE*Task Interaction: Interdependent Group: CE accounted for 19% of the variance in Pin performance (Adjusted $R^2 = .03$, $F(1,94) = 3.33$, $p = .07$, $\beta = .19$). For the Additive Group: 11% (Adjusted $R^2 = .01$, $F(1,60) = .73$, $p = .40$, $\beta = .11$).

Table I5

Reduced Sample: Team level: Correlations among Aggregated Self-Efficacy, Collective Efficacy and Team Performance for Additive and Interdependent Groups

	CE	Performance
Additive Group		
Pins (n = 30)		
SE	.83**	.24
CE		.04
Spares (n = 28)		
SE	.77**	.41*
CE		.42*
Strikes (n = 30)		
SE	.74**	.11
CE		.11
Points (n = 32)		
CE		.51**
Interdependent Group		
Pins (n = 46)		
SE	.74**	.21
CE		.25
Spares (n = 46)		
SE	.71**	.31*
CE		.08
Strikes (n = 44)		
SE	.74**	-.05
CE		.12
Points (n = 48)		
CE		.34*

Note: SE = Self-efficacy; CE = Collective efficacy.

Table I6

Reduced Sample: Team Level: Moderation Analyses Between Efficacy and Performance (Links C and D)

	Multiple R	R^2	Increment	F	p	B	SEB	β	p level for t
Pins (n = 76)									
1) SE	.23	.05	.05	4.07	.05	.49	.27	.63	.07
2) CE	.23	.05	.001	.09	.77	- .31	.22	- .48	.16
3) Task	.26	.07	.02	1.23	.27	- .22	1.50	- .12	.88
4) SE*Task	.26	.07	.00	.01	.92	- .45	.31	- 2.04	.16
5) CE*Task	.33	.11	.04	2.93	.10	.44	.26	2.01	.10
Spares (n = 74)									
1) SE	.37	.14	.14	11.29	.00	.44	.57	.23	.45
2) CE	.37	.14	.003	.22	.64	.43	.44	.27	.34
3) Task	.38	.15	.01	.66	.42	1.29	2.92	.26	.66
4) SE*Task	.39	.15	.06	.47	.50	.51	.69	.65	.46
5) CE*Task	.43	.18	.03	2.58	.11	- .88	.55	- 1.04	.11
Strikes (n = 74)									
1) SE	.02	.0001	.0001	.04	.83	.06	.32	.05	.85
2) CE	.17	.03	.03	2.03	.16	.06	.28	.06	.83
3) Task	.17	.03	.002	.11	.74	.68	1.49	.21	.65
4) SE*Task	.19	.04	.006	.40	.53	- .50	.45	- .78	.26
5) CE*Task	.22	.05	.01	.89	.35	.37	.39	.52	.35
Points (n = 80)									
1) CE	.43	.18	.18	17.59	.00	13.32	4.21	.43	.00
2) Task	.44	.19	.01	1.05	.31	- 1.87	35.20	- .03	.96
3) CE*Task	.44	.20	.00	.03	.87	- 1.08	6.54	- .08	.87

Note: SE = Self-efficacy; CE = Collective efficacy. Follow-up analyses for the Significant CE*Task Interaction: Interdependent Group: CE accounted for 25% of the variance in Pin performance (Adjusted R^2 = .06, F (1,44) = 2.83, p = .10, β = .25). For the Additive Group: 4% (Adjusted R^2 = .002, F (1,28) = .06, p = .82, β = .04).

REFERENCES

REFERENCES

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Bulletin, 84, 191-215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37, 122-147.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1990). Some reflections in reflections. Psychological Inquiry, 1, 101-105.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51, 1173-1182.

Chase, M.A., Feltz, D.L., Tully, D.C., & Lirgg, C. D. (1997). Sources of collective and individual efficacy of collegiate athletes. Manuscript submitted for publication.

Crocker, J., & Luhtanen, R. (1990). Collective self-esteem and in-team basis. Journal of Personality and Social Psychology, 58, 60-47.

Dansereau, F., Alutto, J.A., Yammarino, F.J. (1984). Theory testing in organizational behavior: The variant approach. Englewood Cliffs, NJ: Prentice-Hall.

Earley, P.C. (1993). East meets West meets mideast: Further explorations of collectivistic and individualistic work teams. Academy of Management Journal, 9, 319-348.

Feltz, D.L. (1982). Path analysis of the causal elements in Bandura's theory of self-efficacy and an anxiety-based model of avoidance behavior. Journal of Personality and Social Psychology, 42, 764-781.

Feltz, D.L. (1988). Self-confidence and sport performance. In K.B. Pandolf (Ed.)., Exercise and Sport Science Reviews (pp. 423-457). New York: Macmillan.

Feltz, D.L. (1992). Understanding motivation in sport: A self-efficacy perspective. In G.C. Roberts, (Ed.)., Motivation in sport and exercise, (pp 93 - 105). Champaign, IL: Human Kinetics.

Feltz, D.L. (1994). Self-confidence and performance. In D. Druckman & R.A. Bjork (Eds.)., Learning, remembering, believing: enhancing human performance (pp. 173-206). Washington, D.C.: National Academy Press.

Feltz, D.L. & Chase, M.A. (1998). The measurement of self-efficacy and confidence in sport. In J.L. Duda (Ed.)., Advancements in sport and exercise psychology measurement (pp. 65 - 80). Morgantown, WV: Fitness Information Technology.

Feltz, D.L., & Lirgg, C.D. (in press). Perceived team and player efficacy in hockey. Journal of Applied Psychology.

Feltz, D.L., & Mugno, D.A. (1983). A replication of the path analysis of the causal elements in Bandura's theory of self-efficacy and the influence of autonomic perception. Journal of Sport Psychology, 5, 263-277.

Forsyth, D.R. (1990). Group dynamics (2nd Ed.). Pacific Grove, CA: Brooks/Cole.

George, J.M. (1990). Personality, affect and behavior in groups. Journal of Applied Psychology, 75, 107-116.

George, T.R. (1994). Self-confidence and baseball performance: A causal examination of self-efficacy theory. Journal of Sport and Exercise Psychology, 16, 381-399.

George, T.R., & Feltz, D.L.(1995). Motivation in sport from a collective efficacy perspective. International Journal of Sport Psychology, 25, 98-116.

George, T.R., Feltz, D.L., & Chase, M.A. (1992). The effects of model similarity on self-efficacy and muscular endurance: A second look. Journal of Sport and Exercise Psychology, 14, 237-248.

Gist, M.E. (1987). Self-efficacy: Implications for organizational behavior and human resource management. Academy of Management Review, 17, 472-485.

Gist, M.E., & Mitchell, T.R. (1992). Self-efficacy: A theoretical analysis of its determinants and malleability. Academy of Management Review, 17, 183-211.

Gould, D., Weiss, M. R., Weinberg, R.S. (1981). Psychological characteristics of successful and nonsuccessful Big-Ten wrestlers. Journal of Sport Psychology, 3, 69-81.

Gully, S.M., Devine, D.J., & Whitney, D.J. (1995). A meta-analysis of cohesion and performance: Effects of level of analysis and task interdependence. Small Group Research, 26, 497-520.

Guzzo, R.A. & Shea, G.P. (1992). Group performance and intergroup relations in organizations. In M.D. Dunnette, & L.M. Hough (Eds.)., Handbook of industrial and organizational psychology (pp. 269-313). Palo Alto, CA: Consulting Psychologists Press.

Guzzo, R.A., Yost, P.R., Campbell, R.J., & Shea, G.P. (1993). Potency in groups: Articulating a construct. British Journal of Social Psychology, 32, 87-106.

Hill, G.W. (1982). Group versus individual performance: Are N + 1 heads better than one? Journal of Applied Psychology, 91, 517-539.

Hodges, L., & Carron, A.V. (1992). Collective efficacy and team performance. International Journal of Sport Psychology, 23, 48-59.

Indik, B. (1968). The scope of the problem and some suggestions toward a solution. In B.P. Indik & F.K. Berrien (Eds.)., People, groups and organizations. New York, NY: Teachers College Press.

James, L.R. (1982). Aggregation bias in estimates of perceptual agreement. Journal of Applied Psychology, 67, 219-229.

James, L.R., Demaree, R.G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. Journal of Applied Psychology, 69, 85-98.

Kaplan, I.T. (1997). Relationships between group efficacy, goals, and performance: A comment on Silver and Bufanio (SGR, 1996). Small Group Research, 28, 556-558.

Kenny, D.A., & La Voie, L. (1985). Separating individual and group effects. Journal of Personality and Social Psychology, 48, 339-348.

Kerr, N.L. (1989). Illusions of efficacy: The effects of group size on perceived efficacy in social dilemmas. Journal of Experimental Social Psychology, 25, 287-313.

Klein, K.J., Dansereau, F., & Hall, R.J. (1994). Levels issues in theory development, data collection, and analysis. Academy of Management Review, 19, 195-229.

Kozlowski, S.W.J., & Hattrup, K. (1992). A disagreement about within-group agreement: Disentangling issues of consistency versus consensus. Journal of Applied Psychology, 77, 161-167.

Latane, B., Williams, K., & Harkins, S. (1979). Many hands make light the work: The causes and consequences of social loafing. Journal of Personality and Social Psychology, 37, 822

Lichaz, F.M., & Partington, J.T. (1996). Collective efficacy and true team performance. International Journal of Sport Psychology, 27, 146-158.

Lindsley, D.H., Brass, D.J., & Thomas, J.B. (1995). Efficacy-performance spirals: A multilevel perspective. Academy of Management Review, 20, 645-678.

Little, B.L., & Madigan, R.M. (1997). The relationship between collective efficacy and performance in manufacturing work groups. Small Group Research, 28, 517-534.

Maddux, J.E. (1995). Self-efficacy theory: An introduction. In J.E. Maddux (Ed.)., Self-efficacy, adaptation, and adjustment: Theory, research and application (pp. 3-33). New York: Plenum Press.

Mahoney, M.J., & Avener, M. (1977). Psychology of the elite athlete: An exploratory study. Cognitive Therapy and Research, 1, 135-141.

McAuley, E. (1985). Modelling and self-efficacy: A test of Bandura's model. Journal of Sport Psychology, 7, 283-295.

Moritz, S.E., Mack, D.E., & Feltz, D.L. (1996). A meta-analytic investigation of the self-efficacy and performance relationship in sport and exercise. Journal of Applied Sport Psychology, 8, S53.

Moritz, S.E., & Watson, C. B. Levels of analysis issues in group psychology: Towards a multilevel theory of efficacy. Manuscript in preparation.

Multon, K.D., Brown, S.D., & Lent, R.W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. Journal of Counselling Psychology, 38, 30-38.

Nunnally, J.C. (1978). Psychometric theory. New York, NY: McGraw-Hill.

Ostroff, C. (1992). The relationship between satisfaction, attitudes, and performance: An organizational level analysis. Journal of Applied Psychology, 77, 963-974.

Pangrazi, R.P., & Darst, P.W. (1997). Dynamic physical education for secondary school students. Needham Heights, MS: Allyn & Bacon.

Parker, L. E. (1994). Working together: Perceived self- and collective-efficacy at the workplace. Journal of Applied Social Psychology, 24, 43-59.

Paskevich, D.M. (1995). Conceptual and measurement factors of collective efficacy in its relation to cohesion and performance outcome. Unpublished doctoral dissertation. University of Waterloo, Ontario.

Pedhazur, E.J. (1982). Multiple Regression in Behavioral Research (2nd Ed.). New York, NY: Holt, Rinehart and Winston.

Porter, G. (1992). Collective efficacy, and esteem: Measurement and study of "self" attributes at a group level. Unpublished doctoral dissertation, The Ohio State University, Ohio.

Prussia, G.E., & Kinicki, A.J. (1996). A motivational investigation of group effectiveness using social-cognitive theory. Journal of Applied Psychology, 81, 187-198.

Riggs, M.L., & Knight, P.A. (1994). The impact of perceived group success-failure on motivational beliefs and attitudes: A causal model. Journal of Applied Psychology, 79, 755-766.

Rousseau, D.M. (1985). Issues of level in organizational research: Multi-level and cross level perspectives. Research in Organisational Behavior, 7, 1-37.

Shamir, B. (1990). Calculations, values, and identities: The sources of collectivistic work motivation. Human Relations, 43, 313-332.

Shaw, M.E. (1971). Group dynamics: The psychology of small group behavior. New York: McGraw-Hill.

Sherif, M., & Sherif, C.W. (1969). Social psychology. New York, NY: Harper & Row, Publishers.

Shrout, P.E. (1995). Measuring the degree of consensus in personality judgments. In P.E. Shrout, & S. Fiske (Eds.)., Personality research methods and theory, (pp. 79-92). Hillsdale, NJ: Lawrence Erlbaum.

Silver, W.S., & Bufanio, K.M. (1996). The impact of group efficacy and group goals on group task performance. Small Group Research, 27, 347-359.

Spink, K.S. (1990). Group cohesion and collective efficacy of volleyball teams. Journal of Sport and Exercise Psychology, 12, 301-311.

Steiner, I.D. (1972). Group process and productivity. New York: Academic Press.

Watson, C.B., & Chemers, M.M. (1998). The rise of shared perceptions: A multilevel analysis of collective efficacy. Manuscript submitted for publication.

Weldon, E., & Weingart, L.R. (1993). Group goals and group performance. British Journal of Social Psychology, 32, 307-334.

Zaccaro, S.J., Blair, V., Peterson, C., & Zazanis, M. (1995). Collective efficacy. In J.E. Maddux (Ed.)., Self-efficacy. adaptation, and adjustment: Theory, research and application (pp. 305-328). New York: Plenum Press.

Zander , A. (1971). Motives and goals in groups. New York, NY: Academic Press.

Zander, A., & Medow, H. (1963). Individual and group levels of aspiration. Human Relations, 16, 89-105.