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SELF-CONFIDENCE AND BASEBALL PERFORMANCE: A CAUSAL EXAMINATION OF SELF-EFFICACY THEORY

By

Thomas Robert George

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ABSTRACT

SELF-CONFIDENCE AND BASEBALL PERFORMANCE: A CAUSAL EXAMINATION OF SELF-EFFICACY THEORY

by

Thomas Robert George

The relationship between self-confidence and performance has been ~~been~~ examined by sport scientists for years. Yet, this relationship is still not fully understood. Though many theories of self-confidence have been proposed, self-efficacy theory currently provides the strongest framework from which to investigate self-confidence in sport. This study employed path analytic techniques in an effort to examine the causal relationships in Bandura's model of self-efficacy in a field setting. Male intercollegiate and high school baseball players (N=53) completed self-report measures over a nine-game period during their respective seasons. Perceptions of self-efficacy (confidence in hitting performance), competitive state anxiety, effort expenditure, and performance were assessed, as well as an objective measure of performance (contact percentage). It was hypothesized that previous performance and anxiety would significantly predict self-efficacy beliefs, and that self-efficacy would mediate the effects of previous performance and anxiety on effort expenditure and hitting performance. Moderate support for Bandura's model was found in that higher contact percentages were predictive of stronger percepts of efficacy in five games, and lower levels of somatic and cognitive anxiety were associated with stronger self-efficacy beliefs in seven

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games. In turn, self-efficacy was a predictor of effort and hitting performance in six of the nine games. In all cases, higher percepts of efficacy were associated with increased effort expenditure and greater hitting performances. Results are discussed in relation to the ecological validity of previous causal examinations of self-efficacy theory, as well as the utility of self-efficacy theory as a framework for investigating the self-confidence-performance relationship.

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to Dr. Deborah L. Feltz for all the encouragement and insight she offered not only during the dissertation process, but throughout my doctoral education. I would also like to thank the members of my committee, Dr. Mary Ewing, Dr. Vern Seefeldt, and Dr. Galen Bodenhausen for their valuable suggestions and critical input. The time and effort put forth by my committee members certainly improved the quality of this work. A special thank-you is also extended to Dr. Feltz, Dr. Ewing, and Dr. Seefeldt for all of the professional advice and guidance they offered during my graduate training.

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CHAPTER I

Introduction

Nature of the Problem

For years, athletes and coaches have espoused the importance of self-confidence as an essential component of successful athletic performance. Typically, coaches tell athletes to "think like a winner" or "believe in yourself" in an effort to boost athletes' self-confidence. Similarly, when athletes are performing well they are said to be "very self-confident"; whereas, they are often characterized as having "lost their self-confidence" during poor performances. Self-confidence has received so much attention in the world of sport that it is one of the most frequently cited psychological factors thought to affect athletic performance, and may be the most critical cognitive factor in sport (Feltz, 1984; Gill, 1986). Researchers in the sport sciences have devoted a considerable amount of attention to the concept of self-confidence and the relationship between self-confidence and athletic performance. Generally, the research has provided support for the notion that one's level of self-confidence is related to one's athletic performance. For example, one of the most consistent differences between successful and less successful elite athletes is that successful elite athletes report greater self-confidence (Gould, Weiss, & Weinberg, 1981; Highlen & Bennett, 1979, 1983; Mahoney & Avener, 1977; Meyers, Cooke, Cullin, & Liles, 1979).

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The construct of "self-confidence" has been defined in a number of ways in the research literature. Concepts such as "performance expectancies" (Dweck, 1978), "perceived ability" (Nicholls, 1980), and "perceived competence" (Harter, 1978) have all been used in the achievement and motivation literature to describe the perception of one's ability to successfully perform a given task. In the sport and motor performance literature, self-confidence has been conceptualized in similar terms to those described above as well as in other ways. Griffin and Keogh (1982) have coined the term "movement confidence" to describe an individual's feeling of adequacy in a movement situation as both a personal consequence and a mediator in that situation. Vealey (1986) developed a sport-specific model of self-confidence in which "sport-confidence" was defined as the belief in one's ability to be successful in sport. Perhaps the most extensively used theory for examining self-confidence in sport and motor performance has been Bandura's (1977, 1986) self-efficacy theory (Feltz, 1988a). Bandura (1986) defines self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p.391). The construct of self-efficacy is more concerned with one's judgment of performance potential given one's skills, rather than the sheer number of skills one possesses. Thus, whereas self-confidence is generally perceived as a more global trait, self-efficacy is a situation-specific form of self-confidence in which individuals believe that they can do whatever needs to be done in a specific situation.

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skills and appropriate incentives are present, one's self-efficacy will predict actual performance. Moreover, self-percepts of efficacy determine the choice of activities attempted, the amount of effort expended and the persistence to complete the activity, as well as thought patterns and emotional reactions during actual and anticipated encounters with the environment (Bandura, 1986). In turn, self-percepts of efficacy are based on four principle sources of information: performance accomplishments, vicarious experiences, verbal persuasion, and emotional arousal. Bandura (1986) asserts that "enactive attainment" or performance accomplishments provide the most influential source of efficacy information because they are based on actual mastery experiences. Vicarious experiences provide efficacy information through social comparison processes. Efficacy information from verbal persuasion may include social persuasion, self-talk, imagery, and other cognitive strategies. Emotional arousal can affect perceived self-efficacy through cognitive appraisal such as associating physiological arousal with fear and self-doubt. According to Bandura (1977), self-efficacy operates as a common cognitive mechanism for mediating the effects of these sources of information on performance. Figure 1 illustrates the relationship between the sources of efficacy information, self-efficacy, and athletic performance.

A number of studies in the sport and motor performance literature have provided support for Bandura's (1977) predictions of the effects of various sources of efficacy information on perceived efficacy and performance. Feltz, Landers, and Raeder (1979) found that subjects in a

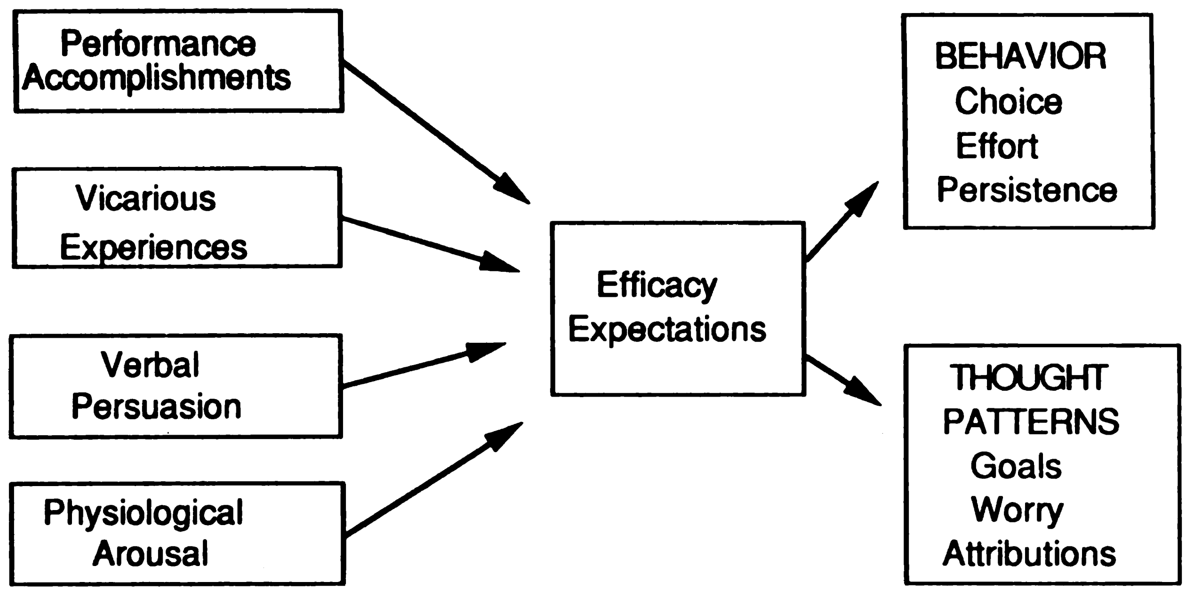

Figure 1. Relationship between major sources of efficacy information, efficacy expectations, and behavior/thought patterns as predicted by Bandura's theory (from Feltz, 1992).

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participant modeling group outperformed and exhibited stronger expectations of self-efficacy than did subjects in a live and videotape model groups. McAuley (1985) found similar results using a high-avoidance gymnastics skill.

Other research has focused on the effects of modeling (vicarious experiences) on self-efficacy and performance. Gould and Weiss (1981) found that viewing a similar model perform a muscular endurance task resulted in better performance and higher ratings of perceived self-efficacy for performing that same task. Similar findings have been reported by McAuley (1985), and McCullagh (1987). Verbal persuasion as another source of efficacy information has received little attention in the sport and motor performance literature. However, Feltz and Riessinger (1990), Ness and Patton (1979), Weinberg, Gould, and Jackson (1979), and Wilkes and Summers (1984) have provided support for the influential effects of persuasion on self-efficacy. Several studies have also investigated the effects arousal asserts on self-percepts of efficacy (Feltz, 1982, 1988b; Feltz & Mugno, 1983; McAuley, 1985; Lan & Gill, 1984). The results of these studies tend to show that arousal influences performance through its affects on perceived self-efficacy.

Based on the preceding research in the sport and motor performance literature, self-efficacy has been shown to be influenced by the four factors postulated by Bandura's (1977) theory. In turn, self-efficacy has been shown to be correlated with athletic performance. However, the correlational designs of most of the preceding studies have not permitted inferences to be made with regard to causality and direction of the relationship. In an effort to ascertain whether

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whether a causal relationship existed and to determine the direction of such a relationship, Feltz (1982) examined the predictions of Bandura's self-efficacy model, as well as those of an anxiety based-model, using path-analytic techniques. Subjects were measured across four trials on self-efficacy, heart rate, self-reported anxiety, and approach/ avoidance of a back dive.

The results of Feltz's study indicated that self-efficacy was a significant predictor of back-diving performance. In addition, a reciprocal cause and effect relationship between self-efficacy and diving performance was found, providing support for Bandura's model. However, contrary to Bandura's model, performance exerted a greater influence on self-efficacy than self-efficacy exerted on performance. Moreover, self-efficacy was not the strongest predictor of performance, as Bandura would assert. Previous performance was also found to have a direct effect on future performance after the first performance trial. These findings prompted Feltz to propose a respecified model composed of previous performance and self-efficacy as predictors of motor performance. Subsequent goodness-of-fit analyses revealed that the respecified model explained more variance than did Bandura's model, and thus proved to better fit the data.

Feltz and Mugno (1983) replicated the 1982 study and found similar results. The respecified model accounted for more variance and fit the data better than did Bandura's self-efficacy model or an anxiety-based model. Further support for the influences of past performances and self-efficacy on future performance has been provided by McAuley

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(1985) and Feltz (1988b).

Feltz (1988b) noted that previous research examining the causal relationships in Bandura's model has employed female subjects only. Thus, it was uncertain as to whether the same results would be found with male subjects. In an effort to examine possible gender differences, Feltz (1988b) contrasted the path analysis models of female and male subjects using the respecified model of Bandura's (1977) self-efficacy theory. The same high-avoidance diving task used in her earlier work (Feltz, 1982; Feltz & Mugno, 1983) was employed. Results indicated that the respecified model fit the data better for females than for males, though much variance was unexplained in both groups. Overall, however, the relationships in the respecified model tended to be supported.

Taken together, the previous research indicates that Bandura's (1977) model of self-efficacy, and more specifically Feltz's respecified model, has some utility for predicting sport and motor performance. These studies indicate that self-efficacy is a strong predictor of motor performance. Moreover, a causal and reciprocal relationship between self-efficacy and performance has been demonstrated. However, contrary to prediction, self-efficacy has not been the only predictor of performance. Rather, as Feltz (1982) has proposed in her respecified model, previous performance as well as self-efficacy have been shown to be strong predictors of subsequent motor performance.

Although the extant sport psychology literature has tended to support Bandura's (1977) theory of self-efficacy, the research is not without limitations. First, in the four

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studies using path analytic techniques to examine Bandura's model, very few performance trials were allowed over a short period of time. Subjects generally performed a few trials within a one hour time period (or less). Though self-efficacy was found to be a significant predictor of performance, past performance was an even stronger predictor. As Feltz (1988a) noted, perhaps subjects' self-percepts of efficacy were only partially influenced due to the limited number of performance trials and/or the short time period in which they performed. Furthermore, subjects in these studies had little experience with the task being performed. Thus, efficacy expectations were likely based on experiences perceived to be similar to the experimental task, but may or may not have been relevant to the performance of the task. The present study employed subjects who had extensive experience with the hitting task, and thus had a strong sense of personal efficacy with regards to their ability to perform the task.

Second, the existing self-efficacy research in the sport and motor performance literature has generally examined non-athletic subjects performing novel tasks under controlled, invariant conditions. Though this research has generally supported the basic tenets of self-efficacy theory, the extent to which self-efficacy predicts motor performance under changing, dynamic conditions remains unclear. For example, is the relationship between self-efficacy and performance dependent upon the type of task being performed or the conditions under which it is performed? In an effort to address this issue, the present study examined subjects' performance of an open skill (hitting a baseball) under variable e

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Moreover, with the exception of a few studies (e.g. Gayton, Matthews, & Burchstead, 1986; Lee, 1982; McAuley & Gill, 1983), the research has examined the self-efficacy/performance relationship in "artificial" sport settings. That is, the research has not examined athletic performance in actual competitive situations. Though this is not a weakness of the previous research per se, it is a limiting factor if Bandura's (1977) model of self-efficacy is to be used to explain and/or predict athletic performance. Before such a generalization can be made, research examining athletic performance in actual competitive situations is needed in order to delineate the causal and directional relationships of self-efficacy theory. The present study attempted to address this concern.

Third, the previous research has generally employed objective measures of performance in order to predict future performance and self-efficacy. As Bandura (1986) has noted, individuals are more influenced by how they perceive their performance successes and failures than by their performance attainments per se. For example, two baseball players may experience the identical hitting performance (e.g. one hit in three at-bats) differently. Thus, objective performance measures may not accurately reflect one's subjective appraisal of past performances. It may, therefore, be more important to assess how one perceives his or her past performances in order to assess the effect of past performances on self-efficacy expectations. Furthermore, as Feltz (1988a) has noted, previous research has measured only performance and not other measures of behavior such as effort

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effort. The present study employed both objective and subjective measures of performance, as well as a measure of effort as dependent variables.

Finally, the previous research (e.g. Feltz, 1982; Feltz & Mugno, 1983; McAuley, 1985) has used female subjects predominantly to examine Bandura's (1977) self-efficacy theory. Prior research indicates that males and females differ in perceptions of self-confidence in relation to a variety of performance situations (Lirgg, 1991; Maccoby & Jacklin, 1974). Likewise, perceptions of anxiety and arousal have been shown to differ among male and female subjects (Borkovec, 1976). These differences may affect the proposed relationships in Bandura's model. Therefore, this study assessed anxiety in order to determine whether males' perceptions of anxiety influenced self-efficacy and/or performance.

In summary, the previous research has provided support for Bandura's (1977) self-efficacy theory. Self-efficacy has been shown to be a strong predictor of motor performance. Moreover, a reciprocal relationship between self-efficacy and performance has been demonstrated in a number of studies. However, the data do not fully support Bandura's predictions. Feltz and associates (Feltz 1982, 1988b; Feltz & Mugno, 1983) have consistently found that after the first performance trial, previous performance is as strong a predictor of future performance as self-efficacy. Bandura's (1977) model asserts that the effects of previous performance on future performance are mediated by self-efficacy, and therefore, self-efficacy should be the strongest predictor of performance. Bandura and his colleagues have found support for su

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for such a relationship in their research efforts (Bandura & Adams, 1977; Bandura, Adams, Hardy, & Howells, 1980; Bandura, Reese, & Adams, 1982). As previously noted, this has not necessarily been the case in the sport and motor performance literature.

Perhaps these inconsistencies are due to some of the aforementioned research designs. The temporal aspects of performance, the types of tasks being performed, the conditions under which tasks are performed, or the number of past performances may limit the influence past performance exerts on self-efficacy, and therefore limit the ability to predict future performance from measures of self-efficacy. Furthermore, objective measures of performance may not be tapping the influence performance exerts on self-percepts of efficacy, and vice versa. The key to understanding the relationship between self-confidence (self-efficacy) and sport performance may lie in the longitudinal examination of athletic performance. By measuring self-efficacy and performance in an actual sport setting over a period of time, the predicted relationships posed by Bandura's (1977) self-efficacy theory may become more evident. Thus, a conceptual model was proposed to test the network of path analytic relationships among anxiety, self-efficacy, effort, and performance across games (see Figure 2). Though only the first three waves of the model are shown, the network of relationships were hypothesized to persist across nine waves.

Based on previous research (Bandura, 1977; Feltz, 1982; Feltz & Mugno, 1983), anxiety as well as past related performance accomplishments is expected to exert direct effects on self-efficacy. Self-efficacy, in turn, effects

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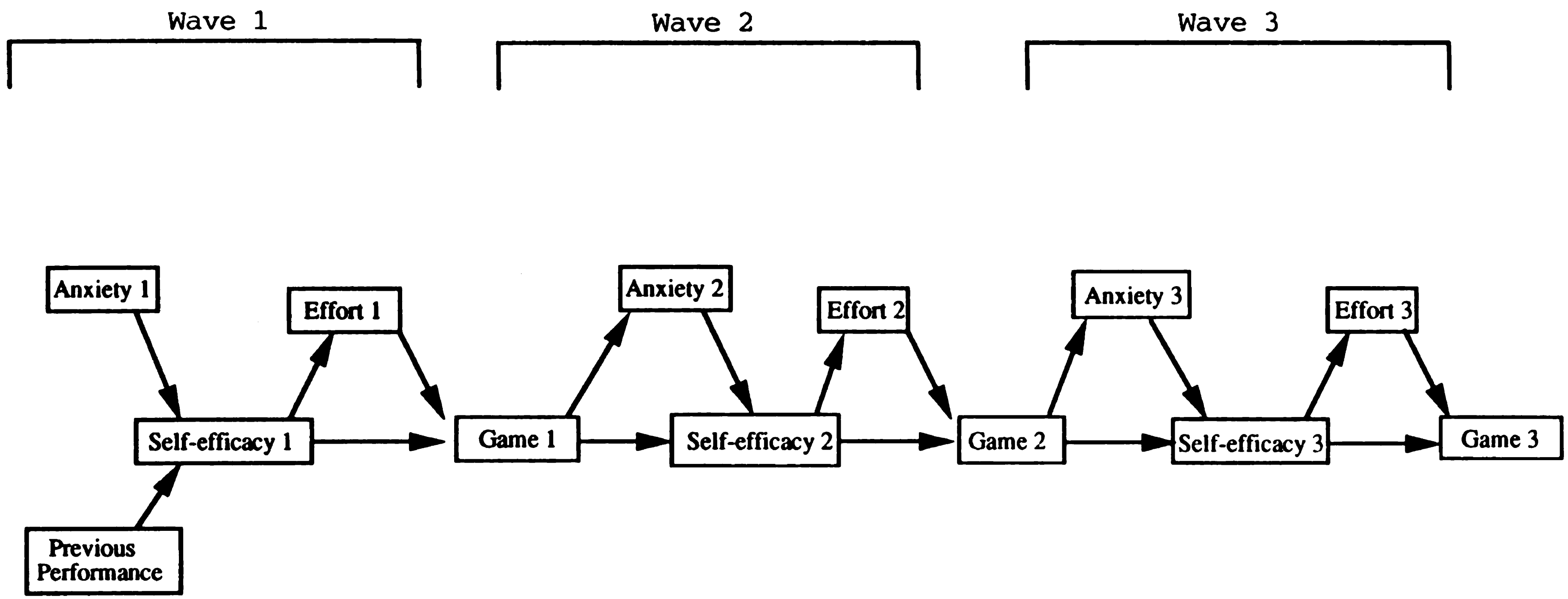

Figure 2. Conceptual model of the network of relationships among anxiety, self-efficacy, effort, and performance across games.

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performance directly and indirectly through effort. Finally, performance has been shown to directly influence subsequent anxiety as well as self-efficacy (Feltz, 1982).

Statement of the Problem

The major purpose of this field study was to examine the causal and directional relationships predicted in Bandura's (1977) self-efficacy theory and found in previous path models using male athletes in actual sport performance situations. More specifically, self-perception measures including perceived self-efficacy (confidence in hitting performance), competitive state anxiety, effort expenditure, and subjective performance ratings, as well as objective performance ratings, were obtained from collegiate and high school baseball players over a portion of a baseball season. These variables were used to test the predictions of a conceptual model based on Bandura's (1977) theory and previous path models of the self-efficacy-performance relationship. This model was tested against a fully recursive model that contained all of the pathways among the variables.

Hypotheses

Based on Bandura's (1977) theory of self-efficacy and the extant literature, the following hypotheses were set forth for each wave:

1. Performance will be a significant predictor of anxiety in the proposed model. Furthermore, performance will be negatively related to anxiety.

2. Anxiety and past performance will be significant predictors of self-efficacy. Anxiety will be negatively

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related to self-efficacy, whereas past performance will be positively related.

3. Self-efficacy will be the only predictor of effort in the proposed model.

4. Perceived self-efficacy and effort will be the only predictors of performance in the proposed model, with self-efficacy being the strongest predictor.

5. Subjective performance ratings will more strongly predict self-efficacy than will objective performance ratings.

Delimitations

This study is limited to collegiate and high school male athletes participating in the sport of baseball. Generalizations to other levels of sport participation, to activities other than baseball, or to female populations cannot be made.

Definitions

Terms and operational definitions which apply to this study are listed below.

Hitting self-efficacy - an individual's judgment of his capabilities to organize and execute courses of action to attain designated performances; for this study, strength of hitting efficacy relating to a subject's ability to hit a pitched baseball within fair territory was assessed before each game.

Objective baseball performance rating - hitting performance measured by contact percentage, a representation of the number of times the ball was hit within fair territory relative

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Perceived competitive anxiety - measured by the Competitive State Anxiety Inventory - 2 (CSAI-2), a shortened version of the 27-item self-report state anxiety inventory developed by Martens, Burton, Vealey, Bump and Smith (1983) which measured how a subject felt just prior to hitting.

Perceived effort expenditure - a self-report measure which required subjects to indicate on a 10-point Likert scale how much effort they exerted while hitting.

Subjective baseball performance rating - a self-report measure which required subjects to rate their performances on a 10-point Likert-type scale; subjects completed a performance rating after each game.

Basic Assumptions

1. Athletes possessed the requisite abilities and were motivated to perform baseball skills.

2. Athletes answered the self-report measures honestly.

Limitations

1. External factors (factors not measured in the study) that may have influenced self-efficacy and/or performance were not controlled.

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CHAPTER II

Review of Literature

Much of the research investigating self-confidence and motor performance has employed Bandura's (1977,1986) theory of self-efficacy. Generally, researchers have found self-efficacy theory to be a useful framework from which to examine the relationship between one's sense of physical competence and actual sport or motor performance. The extant research has examined the self-efficacy/performance relationship in a number of ways, including correlational and causal assessments. Typically, support has been found for the propositions in Bandura's model, though a number of studies have reported contrary findings. In an effort to address the utility of self-efficacy theory, as well as compare and contrast the research in this area, this chapter examines the self-efficacy research conducted in the motor performance area. First, a brief overview of self-efficacy is provided. Second, the relevant literature relating to the four sources of efficacy information is addressed. Finally, research examining the causal relationships in Bandura's model of self-efficacy is reviewed.

Overview of Self-efficacy Theory

Self-efficacy theory, developed within the framework of a social cognitive theory (Bandura, 1986) poses self-efficacy as a common cognitive mechanism for mediating people's motivation, thought patterns and behavior. As noted in

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Chapter 1, self-efficacy refers to people's judgments of their capability to perform at given levels, and determines people's levels of motivation as reflected in the challenges they undertake, the effort they expend in the activity, and their perseverance in the face of difficulties. However, self-efficacy is a major determinant of behavior only when proper incentives and the necessary skills are present. People's self-efficacy beliefs are also reciprocally related to certain thought patterns that influence motivation (Bandura, 1986). For example, self-efficacy beliefs influence people's success/failure imagery, worry, goal setting, and attributions (Feltz, 1992).

Expectations of self-efficacy are, in turn, a product of a complex process of self-persuasion that relies on cognitive processing of diverse sources of efficacy information (Bandura, 1990). These sources of information include performance accomplishments, vicarious experiences, verbal persuasion, and physiological states. Performance accomplishments provide efficacy information through one's own mastery experiences, whereas vicarious experiences provide efficacy information through a social comparison process with others. Persuasory information includes verbal persuasion from significant others, as well as self-talk, imagery and other cognitive strategies. One's physiological state or condition can also provide efficacy information through cognitive appraisal such as associating physiological arousal with fear and self-doubt. Much of the research investigating self-efficacy in the motor performance literature has focused on one or more of the sources of efficacy information. The next section addresses the motor performance research by organizing it around the four sources of efficacy information.

Self-Efficacy Research in Motor Performance

Performance Accomplishments

Performance accomplishments provide the most dependable and powerful source of efficacy information because they are based on one's own mastery experiences (Bandura, 1977, 1986). Repeated successful performances lead to heightened percepts of efficacy, whereas consistent failure causes one to lower efficacy appraisals. Likewise, self-efficacy influences performance (Bandura, 1986). Heightened percepts of self-efficacy will lead to superior performance, whereas low efficacy expectations will lead to poor performance. Thus a reciprocal relationship exists between performance and self-efficacy in which previous performance will influence one's efficacy expectations, which in turn will affect future performance.

The influence performance exerts on self-efficacy may be mediated by a number of factors including the amount of effort expended, the situational characteristics of the performance, the patterning of success and failures, and the amount of external help received (Bandura, 1986). For example, succeeding on a simple or easy task provides little information concerning one's abilities, and thus may not alter efficacy expectations. However, succeeding on a difficult task provides valuable information about one's competencies and therefore should raise self-percepts of efficacy.

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Research in the motor performance literature examining the effects of performance accomplishments on efficacy expectations has generally found that percepts of efficacy are influenced by previous performance attainments. For example, Feltz, Landers, and Raeder (1979) provided support for Bandura's contentions that mastery attempts provide the strongest source of efficacy information. In this study, subjects were assigned to a participant modeling, live modeling, or video-taped modeling condition in which they observed a model perform a high avoidance motor task (back dive). After viewing the model, the subjects attempted the same task. Results indicated that subjects in the participant modeling group, in which they were physically guided through the task, reported higher levels of self-efficacy and produced greater back-diving performance than subjects in either of the other two groups.

McAuley (1985) conducted a similar experiment using a basic, but high-avoidance gymnastic stunt. Again, subjects were assigned to one of three conditions: aided participant modeling in which the subjects received verbal and visual instruction, as well as physical guidance while practicing the stunt; unaided participant modeling, which was similar to aided participant modeling except that no physical guidance was provided; and a control condition in which subjects viewed an irrelevant gymnastics videotape. Results revealed that both modeling groups reported significantly higher self-efficacy and performance scores. More specifically, aided participant modeling subjects performed significantly better than unaided participant modeling subjects, but the two groups did not differ on efficacy expectations. These findings also support Bandura's assertions regarding the powerful influential effects of performance accomplishments on percepts of self-efficacy.

The influence of performance accomplishments on self-efficacy has also been examined in terms of perceived psychological momentum. Shaw, Dzewaltowski, and McElroy (1992) attempted to delineate the causal dimensions of psychological momentum by examining self-efficacy as a potential mediator of the relationship between performance and perceived psychological momentum. In this investigation, subjects were assigned to either a "success" or "failure" condition in a free throw shooting task. Results indicated that successful performances led to stronger efficacy beliefs and were associated with heightened perceptions of psychological momentum. However, changes over time in perceived momentum were not associated with changes in self-efficacy beliefs. Performance failures were associated with decreases in perceived psychological momentum, but did not influence percepts of self-efficacy. However, subjects who experienced failure exhibited a significant relationship over time between self-efficacy and momentum. Decreases in self-efficacy were associated with decreases in perceived momentum. This study provides support for previous research in that successful past performance was found to influence self-efficacy beliefs. In addition, partial support was found for the proposition that self-efficacy mediates the influence of performance on perceived psychological momentum. However, more research is needed before the role of self-efficacy in the psychological momentum process is more clearly understood.

Vicarious Experience

Research has shown that modeling facilitates the performance of a variety of motor skills (Carroll & Bandura, 1985; Feltz, 1982; Martens, Burwitz, & Zuckerman, 1976; McCullagh, 1986; 1987), as well as enhances self-percepts of efficacy for performance (Feltz et al., 1979; George, Feltz, & Chase, 1992; Lirgg & Feltz, 1991; McAuley, 1985). According to social cognitive theory, modeling influences operate primarily through their informative function, and are governed by four component processes: attention, retention, production, and motivation (Bandura, 1986). Attentional and retentional subprocesses are hypothesized to influence the acquisition of skills, and production and motivational subprocesses are hypothesized to influence performance.

Efficacy information obtained through observing others engaging in a task is an important source of information when observers themselves have never performed the task. Live and filmed modeling have been shown to increase perceived efficacy in motor performance tasks (Feltz et al., 1979; Gould & Weiss, 1981; McAuley, 1985). The effectiveness of modeling on one's efficacy perceptions and performance depends, however, on a number of modeling variables (Bandura, 1986). For example, research has shown that model status and model competence mediate the influential effects of modeling (Bandura, 1969; Baron, 1970). Lirgg and Feltz (1991) found that observers of a skilled model, regardless of the model's status, exhibited higher efficacy expectations and superior performance relative to subjects who observed an unskilled model. McCullagh (1986) found that subjects who viewed a high status model performed better than subjects who viewed a low status model.

Similarities to the model in terms of performance or personal characteristics have also been shown to enhance the effectiveness of modeling procedures on subjects' efficacy perceptions and performance (Brown & Inouye, 1978; George et al., 1992; Gould & Weiss, 1981). For example, Brown and Inouye (1978) found that similar models were more effective in influencing observers' feelings of learned helplessness than were dissimilar models. Gould and Weiss (1981) examined the effects of model similarity and model talk on muscular endurance and self-efficacy. The model-similarity results revealed that similar model subjects extended their legs significantly longer than dissimilar model and control subjects. In addition, similar-model subjects had higher and stronger self-efficacy beliefs than dissimilar-model subjects. It may be reasoned that the demonstrator-observer similarity increases the personal relevance of vicariously derived information for the observer, thereby enhancing or detracting the observer's self-efficacy perceptions and performance.

Unfortunately, the design employed by Gould and Weiss (1981) did not permit the determination of the most salient dimensions of model similarity. More specifically, the authors used a nonathletic female as a similar model, and a male varsity athlete as a dissimilar model. Although the subjects (all nonathletic females) perceived the female nonathlete as being more similar and the male athlete as being less similar, it remained unclear as to whether this was due to similarities/dissimilarities in sex or ability (varsity athlete vs. nonathlete). Subsequently, George et al. (1992) provided evidence towards clarifying this issue. They found that model ability was the most salient similarity cue among low-skilled female subjects, and that model sex was not a determinant of self-efficacy or performance. These findings suggest that the saliency of model characteristics may be dependent in part on the kinds of tasks being performed, as well as the ability level of the observer.

Verbal Persuasion

Verbal persuasion as a source of efficacy information usually involves receiving persuasory information from others. Bandura (1986) stresses that the effectiveness of persuasory information may be only as strong as the credibility or expertness of the person or persons providing the information. Judgments of personal efficacy are likely to change if the source of persuasive information is highly believable. Feltz (1984) argued that efficacy information obtained from verbal persuasion may also be derived from various cognitive techniques, such as positive imagery, self-talk, "psyching-up", and performance deception.

Though verbal persuasion is purported to be an influential source of efficacy information, little research in the sport literature has been conducted. One of the few studies to examine the effects of persuasion on performance beliefs was conducted by Ness and Patton (1979). Results showed that weightlifters were able to improve their maximum lifts when they were persuaded that they were lifting less weight than they actually pressed. Though self-efficacy was not assessed per se, beliefs about one's capabilities to perform were altered, and performance improved.

Strength performance has also been shown to be enhanced by other "persuasive" cognitive strategies. Weinberg, Gould, and Jackson (1980) found that "psyching-up" produced enhanced strength performance, but did not improve performance on tasks involving speed or balance. Similarly, Shelton and Mahoney (1978) found that competitive weightlifters facilitated performance by "psyching-up." Again, these studies did not directly measure self-efficacy, but they provide some evidence that cognitive processes such as self-talk and imagery influence beliefs about motor performance, as well as actual performance.

One major problem with the aforementioned research relates to the definition of "psyching-up." The component elements involved in "psyching-up" were not addressed. Thus, it makes it difficult to delineate the cognitive processes underlying the changes that occurred in performance. In an attempt to more directly assess the effect of cognitive strategies on strength performance, Wilkes and Summers (1984) had subjects employ one of several "persuasive" strategies before attempting a strength task. Psyching-up and positive self-efficacy conditions produced the greatest changes in strength performance. In addition, subjects in these two conditions reported higher expectancy ratings for performance.

Though the previous research has tended to show that certain "persuasive" cognitive strategies lead to enhanced performance, the underlying mechanisms mediating that change remain unknown. In other words, the previous research did not assess whether changes in self-efficacy accompanied changes in performance. In an effort to delineate this relationship, Fitzsimmons, Landers, Thomas, and van der Mars (1991) replicated and extended the Ness and Patton (1979) study by assessing the effects of false information feedback on the self-efficacy and strength performance of experienced weightlifters. Subjects were provided with accurate, overinflated, or underinflated feedback regarding the amount of the weight they were attempting to lift. Results indicated that subjects who were told that they were lifting more weight than they actually were (false positive feedback) increased subsequent efficacy beliefs and weightlifting performance. However, self-efficacy beliefs were not found to be predictive of weightlifting performance. Instead, subjects' previous performance accounted for nearly all of the variance in subsequent performances. Thus, the study provided some support for Bandura's (1986) theory in that the hypothesized influential effects of verbal persuasion on self-efficacy were found to exist. However, changes in self-efficacy were not found to predict subsequent performance.

Feltz and Riessinger (1990) conducted an investigation which examined the influence of in vivo emotive imagery and performance feedback on self-efficacy and muscular performance. Subjects were assigned to one of three conditions: mastery imagery plus feedback, feedback alone, or control condition. Results indicated that subjects in the imagery and feedback group reported significantly higher and stronger self-efficacy beliefs after each performance trial relative to the subjects in the other two conditions. Performance results also indicated that subjects in the imagery and feedback group outperformed subjects in the other groups, but only on the first performance trial.

Feltz and Riessinger (1990) also assessed the sources of subjects' efficacy beliefs, in an effort to determine whether the in vivo emotive imagery was operating as a influential source of efficacy information through verbal persuasion, as was previously suggested. Subjects reported that self-efficacy beliefs were primarily based upon their own performance accomplishments, as Bandura would suggest. Only a small percentage of subjects indicated that their efficacy beliefs were based on persuasory information. Thus, the strength and effectiveness of verbal persuasion as a source of efficacy information remains unclear.

Emotional Arousal

Emotional arousal also serves as a source of efficacy information. According to Bandura (1986), arousal influences efficacy expectations through the cognitive appraisal of the arousal. If one interprets increased arousal as facilitory, personal efficacy and performance are likely to be enhanced. Likewise, efficacy and performance will suffer when arousal is labeled as fear or anxiety. A number of factors may influence one's appraisal of arousal, including the source and level of the arousal, one's past experiences on the effects of arousal on performance, and the circumstances under which the arousal is elicited (Bandura, 1986).

Bandura (1986) also posits that self-efficacy reciprocally influences subsequent arousal. In other words, emotional arousal is viewed as both a source of efficacy information and a co-effect of behavior (Feltz, 1984). Thus, one's assessment of emotional arousal partially determines personal efficacy, which in turn influences future assessments of arousal.

Research examining the arousal/self-efficacy relationship has provided mixed results. Feltz (1982) examined physiological arousal as source of efficacy information by measuring the heart rate of subjects prior to performing. Physiological arousal was not found to significantly influence diving efficacy. Similarly, self-efficacy was not found to be related to heart rate prior to subsequent dives. Thus, Bandura's predictions were not supported.

In an effort to further examine the arousal-self-efficacy relationship, Feltz and Mugno (1983) replicated and extended the Feltz (1982) study by assessing subjects' perceived arousal as well as their actual physiological arousal (heart rate). Again, heart rate was not found to influence diving efficacy, nor did self-efficacy significantly affect subsequent heart rate. However, perceived autonomic arousal was found to be significantly related to self-efficacy on all four diving attempts. The authors found that lower levels of perceived arousal corresponded to higher levels of self-efficacy. Similar results were found on the first of two dives for both male and female performers in a subsequent study (Feltz, 1988b). These latter findings support Bandura's assertion that it is not arousal per se that influences self-efficacy, but one's assessment of arousal that provides efficacy information (Bandura, 1986). However, Bandura's hypothesis of a reciprocal relationship among self-efficacy and physiological arousal has yet to receive support in the motor performance literature.

Bandura (1986) also notes that physiological sources of efficacy information are not limited to perceptions of emotional arousal. Cognitive appraisal of one's physiological state may also influence percepts of self-efficacy. For example, levels of fatigue, fitness, and pain may be perceived as signs of inefficacy (Feltz, 1988a). This may be especially relevant in tasks involving strength or endurance. Interpreting fatigue, pain, or lowered stamina as a sign of declining physical capacity is likely to lead to lower percepts of efficacy, and reduced effort and persistence in an activity (Bandura, 1986). Indeed, Taylor, Bandura, Ewart, Miller, and DeBusk (1985) found that heart attack patients tended to base their perceptions of cardiac capability on such observable signs as fatigue, shortness of breath, pain, and decreased stamina. These perceptions were found to be strong determinants of the patients' level of activity.

Mood states have also been shown to influence self-efficacy beliefs. Research shows that positive mood states lead to higher judgments of capabilities than do neutral mood states, and negative mood is related to lowered efficacy expectations (Kavanagh & Bower, 1985). Bandura (1986) notes that the impact of mood on self-efficacy is not specific to the task at-hand, but pervades other achievement domains as well.

Unfortunately, most of the motor performance research on physiological states has focused on the impact of arousal on self-efficacy. Virtually no attention has been given to other physiological states. Only one motor performance study has

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has examined the effect of mood state on self-efficacy and performance. Using a handgrip strength task, Kavanagh and Hausfeld (1986) found no consistent effect for induced happy or sad mood states on subjects' efficacy expectations. Support was found for self-efficacy theory in that efficacy expectations were found to be a significantly correlated with strength performance. Moreover, mood was found to have a significant impact on handgrip performance. However, this relationship was not mediated by subjects' efficacy beliefs. The authors did find that mood significantly influenced subjects' efficacy for performing a strength task in the future. Subjects in a positive mood state believed they could perform more push-ups than subjects in a negative mood state. However, these latter findings should be viewed with caution because subjects were never required to actually perform the task.

Taken together, the findings on the impact of mood states on self-efficacy are equivocal at best. Given the paucity of research in the motor performance literature, the effects of fatigue, pain, physical condition, and/or mood on efficacy expectations and subsequent performance remains unclear.

Causal Examinations of Self-Efficacy

Much of the literature examining the influential effects of various sources of efficacy information have provided support for Bandura's theory in that individual efficacy expectations for motor performance have been found to be partially dependent upon performance accomplishments, vicarious experiences, and to a lesser extent verbal persuasion and physiological arousal. However, the majority of the research has failed to examine the causal and directional relationships posed by Bandura's model. Instead, the research has inferred causality and directionality from correlational relationships. Several studies have been conducted in an effort to directly examine the causal relationships in Bandura's model, which hypothesizes that the effects the four sources of efficacy information exert on performance are mediated through one's percepts of self-efficacy.

Feltz and colleagues (Feltz, 1982, 1988b; Feltz & Mugno, 1983) have provided the most comprehensive attempt in the motor performance literature at delineating the causal mechanisms and directionality in self-efficacy theory. Feltz (1982) employed path analytic techniques to compare Bandura's model of self-efficacy with an anxiety-based model in which self-efficacy was predicted to be an effect rather than a cause of performance. Subjects performed or attempted to perform four back-dives. Self-efficacy and physiological (heart rate) measures were taken just prior to each of the four attempts. Results were not very supportive of either model. Instead, self-efficacy was found to be the strongest predictor of back-diving performance only on the first trial. Self-efficacy was a significant predictor of subsequent diving performances, but previous performance was found to be a stronger predictor over the last three trials. However, self-efficacy and performance were found to be reciprocally related, as predicted. Heart rate was not found to predict self-efficacy, nor was self-efficacy found to be a predictor

of heart rate. These findings led Feltz to respecify Bandura's model to include previous performance accomplishments in addition to self-efficacy beliefs as direct predictors of performance.

Feltz and Mugno (1983) replicated and extended Feltz's (1982) original study by adding autonomic perception as a measure of physiological arousal. Using the original protocol, the authors found that self-efficacy was the strongest predictor of back-diving performance, but once again only on the first trial. Subsequent trials were best predicted by previous back-diving performance, though self-efficacy was also a significant predictor on three of the four trials. Moreover, self-efficacy and performance were found to be reciprocally related. In addition, perception of autonomic arousal was found to be a better predictor of self-efficacy than was heart rate. However, the reciprocal relationship hypothesized to exist between self-efficacy and arousal was not found. Findings from the study provided further evidence that previous performances are important and direct determinants of future performance, and thus supported Feltz's respecified model of self-efficacy.

Both of the previous causal examinations of Bandura's model employed female subjects. Because existing literature suggests that males and females differ in their perceptions of self-confidence, fear, and arousal (Borkovec, 1976; Maccoby & Jacklin, 1974), a third study was conducted in order to assess possible gender differences in the causal mechanisms of self-efficacy. Feltz (1988b) employed the same back-diving task used in the previous studies, and tested her respecified model of self-efficacy using both male and female subjects. Path analysis results revealed that the respecified model did not explain much of the variance for males or females, though it did fit the data better for female subjects.

Specifically, for females self-efficacy was the strongest predictor of the first dive, but previous performance was the better predictor on a subsequent dive. Moreover, self-efficacy and performance were reciprocally related. Surprisingly, nothing predicted males' first diving attempt. In contrast to consistent earlier findings, both self-efficacy and previous performance predicted the second diving performance, but the differential effects of the two variables were not as divergent. Self-efficacy was nearly as strong a predictor of performance as was previous performance. Also, contrary to prediction self-efficacy and performance were not found to be reciprocally related in the first back-diving performance.

Overall, the results for females tended to support Feltz's respecified model. That is, after the initial performance of a novel task, previous performance accomplishments strongly influence subsequent performance attainments. However, this relationship was not as strong for male subjects. Feltz (1988b) indicated that the lack of a significant self-efficacy-performance relationship on the first diving attempt may stem in part from a tendency for males to overestimate their efficacy beliefs. When performance scores were compared with efficacy scores, males' efficacy beliefs were nearly twice as strong as females' efficacy expectations, even though the two groups exhibited similar performances. This explanation is consistent with

other motor performance research in which males have demonstrated an inflated sense of self-confidence (Feltz, Bandura, & Lirgg, 1989; Vealey, 1986).

Several other studies have examined the causal relationships posed in Bandura's model of self-efficacy. In the motor performance domain, McAuley (1985) found that vicarious experiences (modeling) had a direct effect on self-efficacy and an indirect effect on performance through self-efficacy, as the model would predict. However, McAuley also found that vicarious experiences exerted a direct effect on performance. In fact, the modeling-performance path was stronger than the efficacy-performance path. Similar results were found by Schunk (1981) for math achievement among grade school children. However, Schunk found that the efficacy-performance relationship was stronger than the modeling-performance relationship.

In an investigation of female basketball, soccer, and field hockey players, Haney (1991) found partial support for Bandura's (1986) model. Path analysis revealed that objective past performance accomplishments were predictive of subsequent self-efficacy. Similarly, subjective ratings of past performance predicted self-efficacy, but only after the first performance trial. Anxiety was also found to be significantly related to efficacy beliefs. Self-efficacy was found to be significantly related to subsequent objective performance, but did not predict subjective ratings of performance. Contrary to Bandura's theory, self-efficacy did not mediate the effects of past performance accomplishments and anxiety on performance. Instead, past performance attainments were found to directly influence

subsequent performance, and anxiety was thought to influence performance through other meditators such as control or coping. Taken together, these studies corroborate the work of Feltz and associates and lend support to the notion that sources of efficacy information exert direct influences on both self-efficacy and performance.

In conclusion, the motor performance research tends to support the postulates of Bandura's self-efficacy theory. The four sources of efficacy information set forth by Bandura have been shown to influence self-efficacy and motor performance. Much of the research has focused on the effects of vicarious experiences or modeling on self-efficacy at the expense of the other sources. Specifically, the influential effects of verbal persuasion and physiological arousal have received some support, but more research is needed before conclusions can be made regarding these two sources of efficacy information.

A few research studies have also tested the causal mechanisms posed in self-efficacy theory. This line of research has provided some support for Bandura's model, but causal relationships not hypothesized in the model have been consistently reported. Namely, in addition to self-efficacy being a predictor of motor performance, sources of efficacy information such as previous performance and vicarious experience have been significant predictors of self-efficacy and subsequent performance. These findings do not fully support the predictions of Bandura's model and warrant further investigation.

In addition to consistent alternative findings, most of the research has examined inexperienced subjects performing

novel tasks. Only a few studies (e.g. Barling & Abel, 1983; Fitzsimmons et al., 1991; Haney, 1991) have employed experienced athletes. However, in most of these studies athletes performed a limited number of trials in a contrived situation. Thus, little knowledge was gleaned as to the predictiveness of self-efficacy in actual sport settings. Whether self-efficacy theory is a viable framework from which to study athletes and athletic performance remains unclear. Therefore, the present study attempts to delineate further the casual elements of self-efficacy theory. Unlike the existing research, this study employs experienced athletes performing in a natural sport setting, and examines self-efficacy and performance over an extended period of time.

CHAPTER III

Method

Subjects and Design

The subjects (N = 53) for this study were 25 intercollegiate baseball players from two universities competing in the Big Ten Conference, and 28 high school baseball players from two teams competing in a Connie Mack summer league. As previously noted, athletes participating in their chosen sport were selected in order to examine the efficacy-performance relationship in a "natural" and dynamic sport environment. In addition, male subjects were chosen in an effort to extend the research investigating the efficacy-performance relationship among males.

Subjects completed questionnaires on nine successive game days scheduled over a 2-week period. Questionnaire responses for each game were combined across teams to form a single unit of analysis for each game, referred to as a wave. Nine total units or waves were employed in this study, thus permitting the efficacy-performance relationship to be examined over time.

Dependent Measures

Hitting self-efficacy. A questionnaire assessing strength of baseball hitting self-efficacy was employed (see Appendix A) in which subjects indicated on a scale of 0 (very uncertain) to 100 (very certain) how certain they were of their ability to hit a pitched ball in fair territory. The hitting situations varied in degree of difficulty, and ranged from putting the ball in play one in four times at-bat to four in four at-bats. As can be seen in Appendix A, the self-efficacy questionnaire originally consisted of 18 different hitting situations. and included other aspects of hitting such as executing hit-and-runs and bunts, and advancing or scoring runners with base hits and sacrifices. These items were not used in the analyses because they were not closely linked with any single performance measure, as opposed to the questions relating to contact percentage. Bandura (1986) asserts that measures of self-efficacy must be tailored to the task being examined, and that causal processes are best examined by a microanalytic approach in which percepts of self-efficacy are made in reference to specific actions. Thus, only the self-efficacy questions relating to contact percentage were used in the analyses. Following Bandura's (1977) recommendations, efficacy strength was calculated by summing the certainty ratings and dividing by four, the total number of contact percentage situations. Descriptive statistics for all of the self-efficacy questionnaire items are provided in Table 16 in Appendix I.

Competitive Anxiety. Subjects' anxiety associated with competition was measured using the Competitive State Anxiety Inventory-2 (CSAI-2), a 27-item self-report measure developed by Martens, Burton, Vealey, Bump, and Smith (1983). The CSAI-2 is a multidimensional instrument that assesses somatic and cognitive anxiety, as well as self-confidence (see Appendix B). For this study, only the cognitive and somatic anxiety measures were used, resulting in an 18-item questionnaire. In addition, the instrument items were odified to make them more specific to hitting. For example, e statement, "I am concerned about this competition," was odified to, " I am concerned about my hitting in this ompetition." The CSAI-2 required subjects to indicate how ey felt just prior to hitting along a 4-point Likert scale. erceived arousal measures were employed because they have een shown to be better predictors of self-efficacy than have ore objective measures of arousal (Feltz & Mugno, 1983).

Objective hitting performance measure. Objective erformance was measured by calculating each subject's ontact percentage. As reported by Courneya and Chelladurai 1991), this type of hitting performance measure has been ound to be the most responsive to skill execution and subtle hanges in performance, and the least affected by contaminating factors such as random chance, an official's bad call, or performance strategy.

Subjective hitting performance measure. Subjects completed a self-report hitting performance measure following each game (see Appendix C). The measure was designed to assess subjects' perceptions of their hitting performance. Subjects were asked to respond to the statement, "**Please rate how well you think you hit in today's game**". Responses were indicated on a Likert scale ranging from 1 (extremely poorly) to 10 (extremely well).

Effort scale. Subjects were also asked to indicate how much effort they exerted while hitting during each game (see Appendix C). Subjects responded to the question, "**How much effort did you put into hitting in today's game**?" Responses were indicated on a scale divided into intervals of 10 percentage points, ranging from 0% effort to 100% effort.

Procedure

Permission was obtained from each of four head coaches prior to data collection. An explanation of the study was orally presented to players on each of the four teams, and informed consent was obtained from all players (see Appendix D). Responses to questionnaire items were kept confidential in that subjects were identified only by the last four digits of their social security numbers and the first letter of their last name. During a group meeting the week before the first data collection period, subjects completed the baseball self-efficacy questionnaire and the CSAI-2 in a "mock game" situation, so that all subjects were familiar with the questionnaires and understood how to complete the instruments prior to actual data collection.

On each game day, subjects completed the hitting self-efficacy questionnaire just prior to the start of the game, and the CSAI-2, the effort scale, and the subjective performance scale immediately following the conclusion of the game. In addition, the objective performance measure was calculated following each game.

The questionnaires were administered by the same researcher for all games. For college players, questionnaires were placed in subjects' lockers prior to each game, and subjects completed the hitting efficacy questionnaire approximately 15-20 min before the start of the game. The questionnaires remained in each players' locker during the game, and were completed and placed in a sealed box at the conclusion of the game. Questionnaires were removed from the box after all players had vacated the lockerroom.

Questionnaires were also administered to the high school players approximately 15-20 min prior to each game. However, high school players completed the questionnaires while sitting in the dugout. After completing the hitting efficacy scale, the questionnaires were placed in a box until the completion of the game, at which time the remaining items were completed and the questionnaires were collected by the researcher. This protocol was followed for nine consecutive games for each team.

Treatment of the Data

Prior to conducting the path analysis, correlation coefficients were computed for all independent variables in each wave in order to test for multicollinearity ($r \geq .70$). In addition, correlation coefficients were computed for each independent variable across the nine waves. These coefficients were obtained in order to examine the stability of independent variables over time.

Descriptive statistics were conducted for the aggregate of nine waves of responses for all subjects, as well as for the aggregate responses of the college and high school players. One-way analyses of variance were conducted on the aggregate scores of each variable to determine whether the two groups differed on any of the variables in the model. Differences in the relationship among independent and dependent variables for college and high school players were also analyzed via z-tests. Correlation coefficients were computed, by wave and group, for each independent variable in

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relation to the dependent variable it was predicting. Each coefficient was then transformed to a Fisher Z statistic, so that the differences between the correlation coefficients of college and high school players could be tested (Glass & Hopkins, 1984). Group differences were tested in order to determine whether the two groups could be combined for subsequent analyses.

The data were then analyzed using path analytic techniques. This analysis examined the fit of the hypothesized model to the data. Multiple regression equations were written for each of the hypothesized relationships presented in Chapter 1. Standardized path coefficients (Beta's) and zero-order correlations were calculated for each path in the model (see Figure 2).

The hypothesized model was compared to a fully recursive model, which contained all possible paths to each dependent variable. The fully recursive model represented all the variance that could be explained by the independent variables in the model. The hypothesized and fully recursive models were compared using two techniques. First, a Chi-square goodness-of-fit statistic was computed (Pedhazur, 1982). Nonsignificant Chi-square values indicated that the data fit the proposed theoretical model, and thus provided a more parsimonious explanation of the data. The larger the probability associated with the Chi-square, the better the fit of the model to the data (Pedhazur, 1982).

A second statistic was computed, the Q coefficient (Pedhazur, 1982), because the Chi-square test is affected by sample size. The Q coefficient represents the ratio of the variance explained by the hypothesized model relative to that explained by the fully recursive model. Q can vary from 0 to 1, with values close to 1 indicating that the hypothesized model explains nearly all of the explainable variance in the dependent variables.

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CHAPTER IV

Results

This chapter is divided into two major sections. First, preliminary results relating to the overall responses of the subjects, as well as differences between the responses of the college and high school groups are presented. Group differences were examined in order to determine whether the responses of college and high school athletes could be combined for the path analytic procedures. Second, the results pertaining to each hypothesis are discussed in terms of the path analysis conducted on Bandura's model. The alpha level for all analyses was set at .05; however, actual p values are given when available so that significance levels can be reported more accurately.

Preliminary Analyses

Descriptive statistics were conducted for the aggregate of nine waves of responses for all subjects, as well as for the aggregate responses of each of the two groups. One-way analyses of variance were conducted on the aggregate scores of each variable to determine whether the two groups differed on any of the variables in the model. Means and standard deviations for all variables for each wave are presented in Table 1 in Appendix E.

Hitting Performance. As noted in Chapter 3, contact percentage was used as an objective measure of each subject's hitting performance. In addition to an objective measure of performance, subjective performance ratings (SPR) were also emp

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employed as a measure of hitting performance.

Overall, players' hitting performance was quite high (M = .825, SD = .140). On average, college players' hitting performance (M = .847, SD = .100) tended to be higher than high school players' performance (M = .805, SD = .168). However, a one-way analysis of variance indicated that this difference was not statistically significant, F (1,51)=1.22, $p > .05$.

Figure 3 presents a comparison of the hitting performances of high school and college players. As can be seen, the pattern of hitting performances across the nine waves varied for the college and high school players. For example, high school players' hitting performances tended to fluctuate from game to game, whereas college players' hitting performances tended to improve across the nine waves (with the exception of Wave 7 hitting performance).

An examination of the consistency of hitting performance across the nine waves for all subjects revealed that most of the correlations were moderate to low, indicating variability in performance. However, a number of significant correlations were found across the nine waves. For example, Wave 1 hitting performance was significantly related to Wave 2 (r = .46, $p < .05$), Wave 5 (r = .40, $p < .03$), and Wave 9 (r = .45, $p < .02$) hitting performances. Similarly, Wave 3 hitting performance was significantly correlated with Wave 4 (r = .33, $p < .05$), Wave 5 (r = .49, $p < .01$), and Wave 9 (r = .36, $p < .05$) performance. All intracorrelations for hitting performance are presented in Table 2 in Appendix F.

Self-report ratings of hitting performance tended to be moderate, with an overall mean rating of 5.35 (on a 10-point

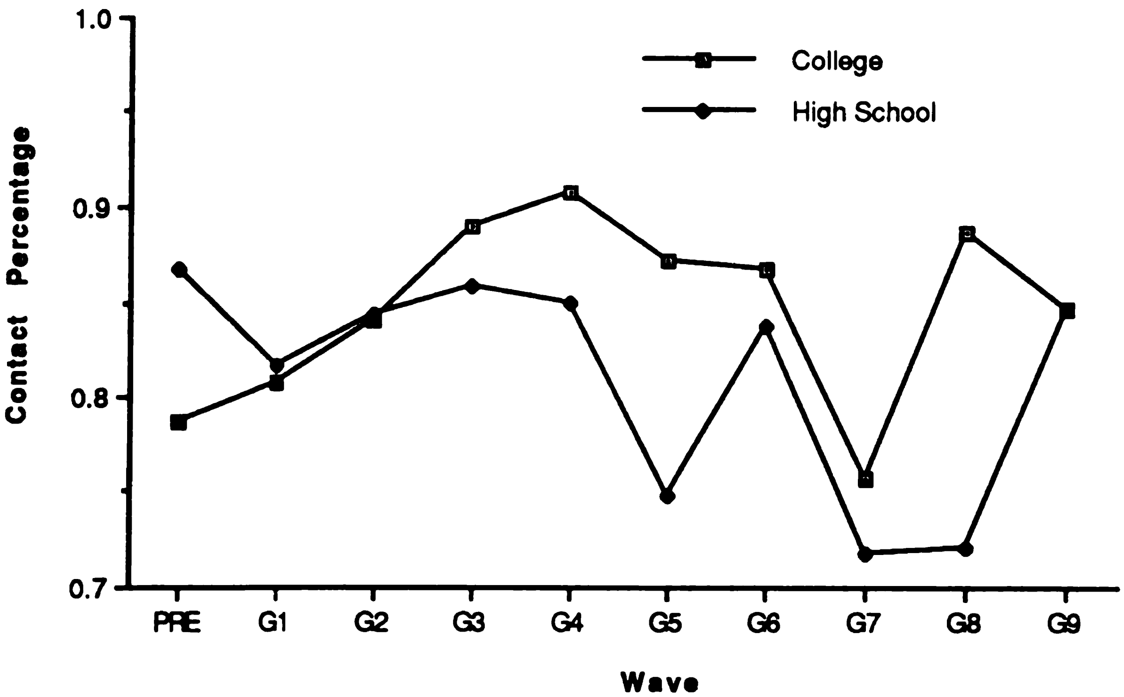

Figure 3. Hitting Contact Percentage of College and High School Players by Wave.

scale). Both high school and college players reported moderate ratings of hitting performance (M = 5.51, SD = 1.43, M = 5.18, SD = 1.44, respectively). No overall differences were found for self-ratings of hitting performance.

Subjective ratings of hitting performance were fairly consistent for the college players across the nine waves, but were quite erratic for the high school players (see Figure 4). A comparison of the actual and subjective performance scores reveals that both college and high school players' perceptions of performance and actual performance followed a similar pattern. Changes in subjective performance ratings tended to correspond with fluctuations in actual hitting performance.

Self-Efficacy. Overall, the strength of self-efficacy beliefs for putting the ball in play was quite high (M = 84.68, SD = 13.61), ranging from 73.54 to 94.57 on a 100-point scale (see Appendix A). However, when comparing the two groups on self-efficacy aggregated across the season, college players reported significantly higher percepts of efficacy (M = 91.41, SD = 10.12) than high school players (M = 78.66, SD = 13.65), as indicated by a one-way analysis of variance, $F(1,51)=14.63$, $p < .001$ (see Table 16 in Appendix I for descriptive statistics of all self-efficacy items).

As seen in Figure 5, college players' self-efficacy was consistently higher than high school players' efficacy across all nine waves. In addition, the self-efficacy of college players remained fairly consistent across all waves, whereas high school players' efficacy increased through Wave 4, and then fluctuated slightly for the remaining four waves.

The self-efficacy intracorrelations across the nine

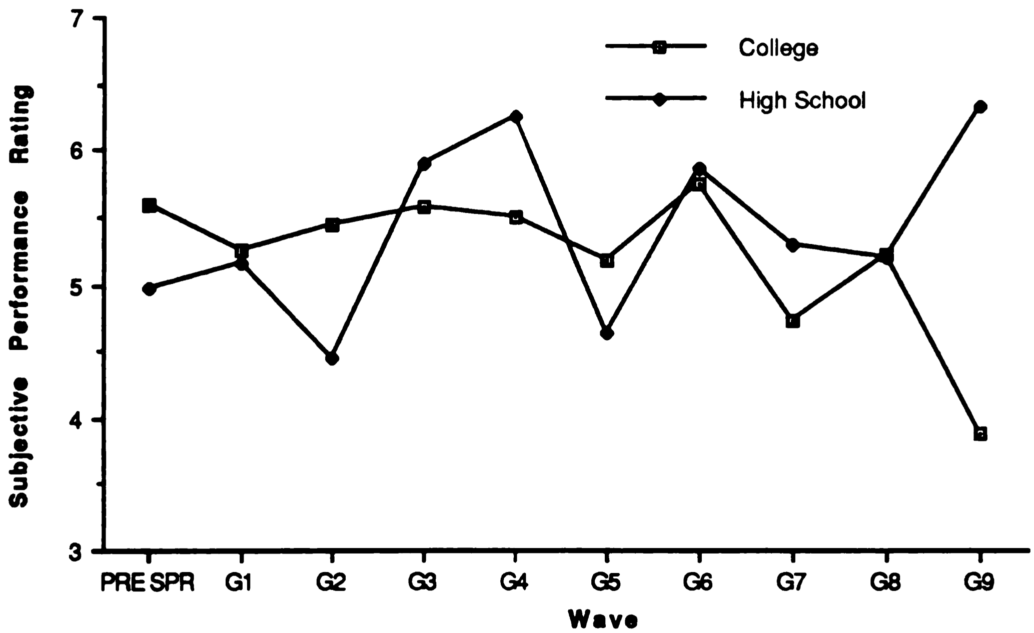

Figure 4. Subjective Performance Ratings of College and High School Players by Wave.

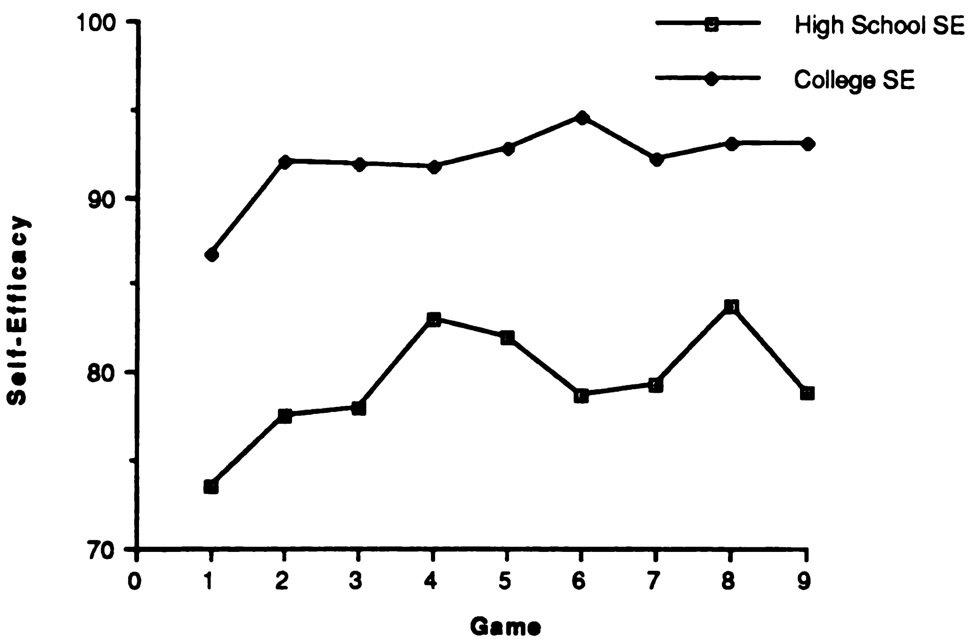

Figure 5. Self-efficacy of College and High School Players by Wave.

waves for all subjects are presented in Table 3 in Appendix F. As can be seen, self-efficacy was highly correlated across the nine Waves, and all correlations were significant at the $p \leq .001$ level. The consistently strong correlations among self-efficacy, in contrast to the weaker hitting performance correlations, suggested that players' efficacy beliefs were quite resilient to fluctuations in performance.

Anxiety. Anxiety was examined in terms of its cognitive and somatic components (see Appendix B). Overall, perceived cognitive anxiety (M = 16.61, SD = 4.30) was higher than perceived somatic anxiety (M = 13.31, SD = 3.01). A paired t test revealed that this difference was statistically significant, $t(52)=7.70$, $p < .001$. However, one-way ANOVAs conducted on the cognitive and somatic anxiety scores of the two groups aggregated across the season revealed that the somatic anxiety reported by college players (M = 12.23, SD = 1.60) was significantly less than that of high school players (M = 14.27, SD = 3.62), $F(1,51)=6.70$, $p < .013$. The two groups did not differ on aggregated cognitive anxiety.

Cognitive anxiety tended to decrease over the season for both college and high school players (see Figure 6). Compared to Wave 1 levels, both groups reported lower levels of cognitive anxiety for all subsequent waves. However, as illustrated in Figure 6 cognitive anxiety fluctuated to some extent over the season and from game to game. After the initial wave, college players maintained a fairly consistent level of cognitive anxiety, with the exception of Wave 6. High school players reported slightly less consistent levels of cognitive anxiety across the nine waves, but the changes in anxiety levels were small, fluctuating no more than four

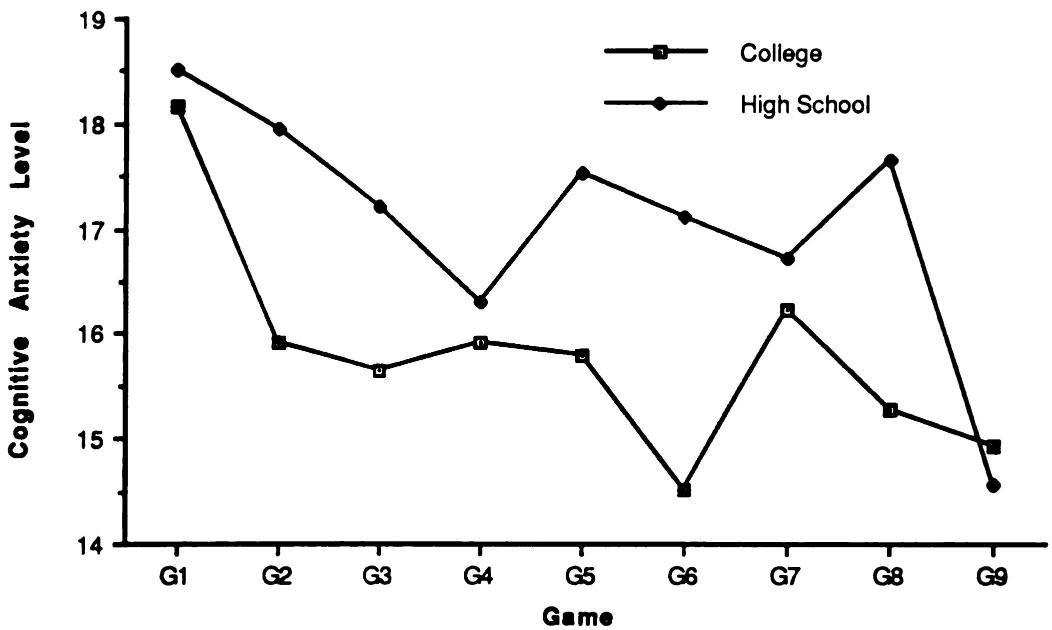

Figure 6. Cognitive Anxiety Levels of College and High School Players by Wave.

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points (on a 36-point scale) over the nine waves.

The intracorrelations for cognitive anxiety over the nine waves were quite strong, and all but one correlation was significant (see Table 4 in Appendix F). Wave 3 cognitive anxiety was not significantly related to Wave 9 cognitive anxiety (r = .30, p > .05). Similar to self-efficacy, the strong correlations among cognitive anxiety across all nine waves suggested that perceived cognitive anxiety was fairly stable from game to game.

Figure 7 presents the pattern of somatic anxiety for college and high school players across the nine waves. Though lower levels of somatic anxiety were reported by college players, both groups indicated game to game fluctuations. As can be seen, college players' level of somatic anxiety tended to decrease across the first six waves. An increase in Wave 7 somatic anxiety to a level similar to that found in Wave 1 was again followed by slight decreases in Waves 8 and 9.

High school players' somatic anxiety tended to rise and fall on a game-to-game basis. Thus, an undulating pattern of somatic anxiety was reported by high school players, whereas college players tended to report more consistent levels of somatic anxiety.

The intracorrelations for somatic anxiety were also very different than those for cognitive anxiety. As shown in Table 5 in Appendix F, no consistent relationship was found for somatic anxiety. Somatic anxiety in Waves 1 and 2 were highly correlated, but did not correlate with somatic anxiety in Waves 5 through 9. However, a fairly strong relationship existed for somatic anxiety in Waves 3-9, as 16 of the 21

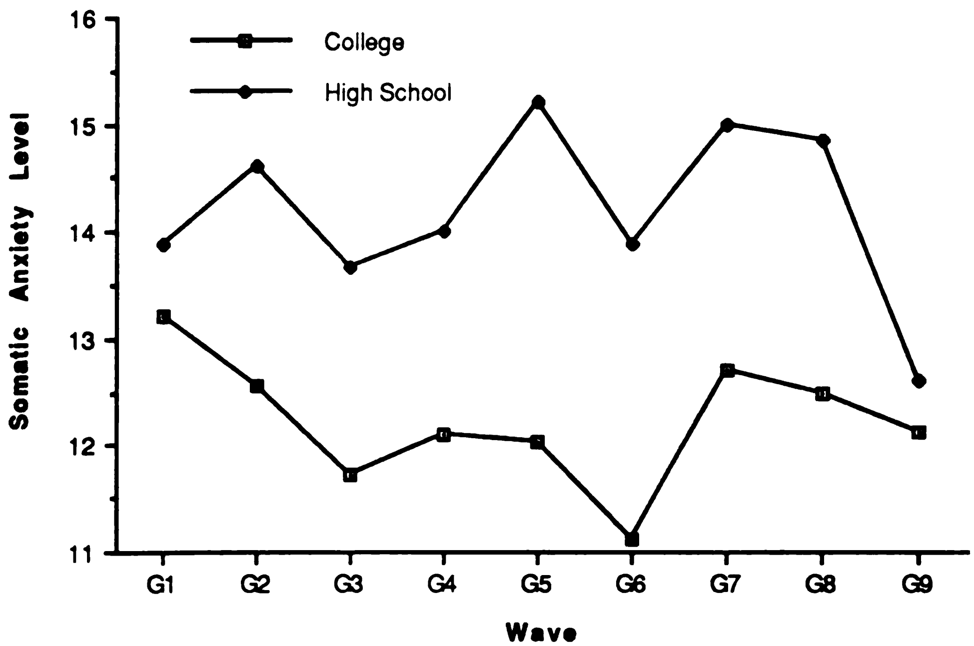

Figure 7. Somatic Anxiety of College and High School Players by Wave.

intracorrelations were significant.

Effort. On average, subjects reported exerting a relatively great amount of effort while hitting. On a 10-point scale, effort ratings aggregated across the season ranged from 4.75 to 10.00 (M = 8.51, SD = 1.36). A one-way ANOVA indicated a significant group difference in aggregate ratings of effort, $F(1,51)=9.96$, $p < .003$. College players reported exerting more effort while hitting (M = 9.09, SD = 0.71) than high school players (M = 7.99, SD = 1.60).

An examination of effort across the nine waves suggests that college players consistently thought they exerted higher levels of effort while hitting compared to high school players. As seen in Figure 8, college players consistently reported an effort rating of 8.5 to 9.5 for all nine waves. Conversely, high school players' ratings fluctuated from game to game, and did not exhibit a consistent pattern. Following the lowest level of effort in Wave 2, high school players' effort consistently increased across Waves 3, 4, 5, and 6, at which point lower levels of effort were reported for the final three waves.

Intracorrelations for effort were somewhat consistent, ranging from .02 to .78 (see Table 6 in Appendix F). Wave 6 effort differed from the effort exerted in most of the other waves, and was found to be significantly related to only Wave 2 and Wave 7 effort. Most of the other intracorrelations for effort were significant, suggesting that the amount of effort exerted while hitting was similar across the nine waves.

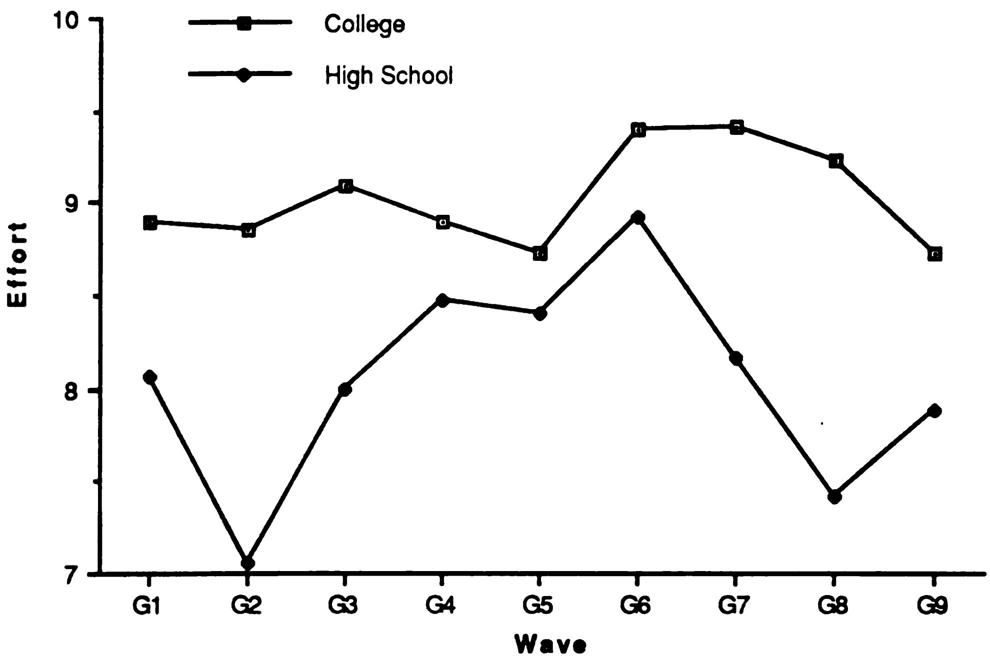

Figure 8. Perceived Effort of College and High School Players by Wave.

Correlations Among Independent Variables

Pearson product-moment correlations were conducted in order to determine whether multicollinearity ($r \geq .70$) existed among any of the independent variables. The correlations for independent variables existing in different waves (e.g. Wave 1 cognitive anxiety and Wave 2 somatic anxiety) were not examined because only first-order dependence was considered in the path analysis. That is, direct paths were not tested across waves. Therefore, highly correlated variables in different waves were not perceived to be problematic.

Table 7 in Appendix G presents the intercorrelations for the independent variables for each Wave. As can be seen, cognitive anxiety and somatic anxiety were highly correlated in Wave 3 ($r = .70$, $p < .001$), Wave 4 ($r = .68$, $p < .001$) Wave 6 ($r = .70$, $p < .001$), Wave 7 ($r = .67$, $p < .001$), and Wave 8 ($r = .72$, $p < .001$). In addition, the correlation coefficient for objective hitting performance and self-efficacy was very high in Wave 9 ($r = .70$, $p < .001$). These correlation coefficients suggested that multicollinearity may have existed in these waves, and thus problems may have arisen in the estimation of regression statistics.

In an effort to circumvent potential problems with highly correlated independent variables, multicollinearity was also tested by examining the tolerance estimates of the predictor variables in each regression equation. Tolerance estimates are a measure of the degree of linear association between the independent variables. Small values for the tolerance of a variable indicate that the variable is, or almost is, a linear combination of the other independent variables. Variables with small tolerances (less than .01) were not allowed in the regression analyses. However, all tolerance values were found to be acceptable and no independent variables were removed from the regression analysis.

Group Differences

Group differences pertaining to the relationships between independent and dependent variables across the nine waves were examined via *z*-tests. Zero-order correlation coefficients were computed by wave and group for each path associated with the hypothesized model. Each coefficient was then transformed to a Fisher *Z* statistic. In doing so, it was possible to test the differences between the correlation coefficients of college and high school players for each hypothesized path (Glass & Hopkins, 1984).

One-hundred and seventeen pairs of correlation coefficients were examined, and only four significant differences were found. All correlation coefficients for the hypothesized paths are presented in Table 8. The correlation coefficients associated with the self-efficacy --> subjective performance paths were found to be significantly different in Waves 5 ($z = 2.29$, $p < .05$) and 9 ($z = 2.23$, $p < .05$). In Wave 5, college players reported a significant positive relationship ($r = .47$, $p < .03$), whereas high school players exhibited a negative relationship ($r = -.26$, $p > .10$). The opposite association was found in Wave 9. High school players demonstrated a non-significant but positive relationship between self-efficacy and subjective performance ($r = .21$, $p > .10$). On the other hand, self-efficacy was

Table 8. Zero-Order Correlation Coefficients for the Hypothesized Model by Wave and Group.

	Wave								
Path	1	2	3	4	5	6	7	8	9
PP --> Coganx	**-.03**	**.26**	**.18**	**.35**	**-.08**	**-.24**	**.03**	**-.46**	**.16**
	-.25	-.27	-.25	-.29	-.31	.33	-.56*	.04	-.46
SPR --> CogAnx	**-.10**	**.55***	**-.01**	**.34**	**.24**	**.12**	**-.26**	**.05**	**.19**
	-.47*	-.63*	-.50	-.03	.02	.18	-.81**	-.03	-.54*
PP --> Somanx	**-.37**	**.15**	**.18**	**.31**	**-.44***	**-.38**	**.25**	**-.46**	**.28**
	-.50*	.11	-.30	-.16	-.05	.25	-.17	.41	-.35
SPR --> SomAnx	**-.30**	**.40**	**-.21**	**.49***	**-.19**	**.01**	**.05**	**.05**	**-.06**
	-.40	-.49	-.34	-.09	-.14	.05	-.54**	.15	-.69**
CogAnx --> SE	**-.36**	**-.18**	**-.47***	**-.54****	**-.40**	**-.20**	**-.42**	**-.32**	**-.11**
	-.40	-.40	-.51*	-.37	.09	-.27	-.58**	-.24	-.64**
SomAnx --> SE	**-.74****	**.03**	**-.27**	**.07**	**-.31**	**-.36**	**-.66****	**-.36**	**.08**
	-.37	.13	-.47*	-.29	.21	-.04	-.44*	-.44*	-.58**

Note: College players = bold type; high school players = plain type.

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

PP = previous hitting performance
Coganx = cognitive anxiety
SE = self-efficacy

SPR = subjective performance
Somanx = somatic anxiety
Hit = hitting performance

Table 8 (Cont'd).

Path	Wave 1	2	3	4	5	6	7	8	9
PP --> SE	**.21**	**.28**	**.18**	**.07**	**.09**	**-.38**	**-.39**	**.20**	**-.01**
	.22	.71**	.61**	.53*	.59*	.43	.64**	.04	.79**
SPR --> SE	**.37**	**.13**	**.13**	**.06**	**-.05**	**.52***	**-.09**	**-.06**	**-.11**
	.25	.50	-.08	.32	.20	.20	.46	.14	.52*
SE --> Effort	**.27**	**.12**	**-.02**	**-.28**	**.51***	**-.11**	**.52***	**-.32**	**-.26**
	.44	.12	.44	.36	.20	.32	.09	.46*	.19
SE --> Hit	**.49***	**-.10**	**.19**	**-.15**	**.37**	**-.06**	**.02**	**.12**	**.28**
	.59**	.66**	.45	.45*	.52*	.40	.01	.44	.23
Effort --> Hit	**.18**	**.11**	**-.02**	**.47***	**.62****	**.31**	**-.29**	**-.13**	**-.15**
	.45	.01	.40	-.01	.16	-.04	-.14	.33	.49*
SE --> SPR	**.00**	**.15**	**.05**	**-.02**	**.47***	**.23**	**.30**	**-.05**	**-.54***
	.29	-.08	-.10	.21	-.25	.10	.04	.14	.21
Effort --> SPR	**.33**	**.49***	**.36**	**.38**	**.51***	**.02**	**.06**	**.15**	**.43**
	.50*	.01	.67**	.31	.35	.58*	.53*	.38	.45

Note: College players = bold type; high school players = plain type.

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

negatively related to subjective performance for college players (r = -.54, p < .02).

The correlation coefficients associated with somatic anxiety and self-efficacy were also found to significantly differ in Wave 9. High school players exhibited a moderate, negative relationship (r = -.58, p < .02), whereas virtually no association between somatic anxiety and self-efficacy was found for college players (r = .08, p > .10). Lastly, the correlation coefficients associated with the previous hitting performance --> somatic anxiety path were found to significantly differ in Wave 8. Previous performance was negatively related to somatic anxiety for college players (r = -.46, p > .05), and positively related for high school players (r = .41, p > .05). No other differences were found.

It should be noted that the z-ratios reported were compared a critical z-value of 1.96. However, the probability of making a type-I error was greatly increased due to the large number of comparisons being made. Thus, the Bonferroni t (Miller, 1966) method was employed to estimate the maximum probability of making a type-I error. When the critical z-values were adjusted to account for the multiple comparisons, none of the correlation coefficients were found to significantly differ. Thus, because no consistent pattern of group differences emerged from the z-tests, the two groups were combined for all subsequent analyses.

Path Analysis

Five hypotheses pertaining to the causal relationships in Bandura's model were set forth (see Chapter 1). In order to test these hypotheses, path coefficients were calculated via multiple regression analyses for each of the hypothesized relationships. Tables 9 to 13 contain the path coefficients for the hypothesized model. Each table contains only the path coefficients for equations that tested a particular hypothesis. A complete representation of the hypothesized and full model is provided in Tables 14 and 15 in Appendix H. Based on the lack of significant differences found in the relationship between independent and dependent variables of college and high school subjects, the scores for both groups were combined and used in the regression analyses.

The first hypothesis posited that past hitting performance would predict somatic and cognitive anxiety in the theoretical model. Hitting performance was predicted to be negatively related to anxiety. Multiple regression analyses revealed virtually no support for the past performance--> anxiety relationship. As seen in Table 9, actual hitting performance did not predict somatic or cognitive anxiety in any of the nine waves. On the other hand, the subjective performance rating --> somatic anxiety path coefficient was significant in Wave 9 ($\beta = -.387$, $p < .05$), and was marginally significant in Wave 3 ($\beta = -.311$, $p < .07$) and Wave 7 ($\beta = -.393$, $p < .07$). Likewise, subjective performance significantly predicted cognitive anxiety in Wave 7 ($\beta = -.514$, $p < .01$), and was a marginally significant predictor of cognitive anxiety in Wave 3 ($\beta = -.296$, $p < .09$). In all five cases, significant path coefficients were in the predicted direction. Better performances were related to lower levels of anxiety, and poorer performances were associated with increased anxiety levels.

The second hypothesis was related to the variables

Table 9. Path coefficients for Hypothesis 1.

Path	Wave 1	2	3	4	5	6	7	8	9
PP --> Coganx	.003	-.066	-.039	-.025	-.220	-.071	-.097	-.126	-.219
SPR --> CogAnx	-.182	-.086	-.296+	.144	.238	.152	-.514**	.052	-.211
PP --> Somanx	-.171	.149	-.098	.022	-.258	-.109	.054	.116	-.041
SPR --> SomAnx	-.102	-.213	-.311+	.232	-.072	.045	-.393+	.070	-.387*

+ $p < .10$
* $p < .05$
** $p < .01$

PP = previous hitting performance
Coganx = cognitive anxiety
Somanx = somatic anxiety
SPR = subjective ratings of previous performance

influencing self-efficacy beliefs. Hypothesis 2 stated that subject's past performance experiences and anxiety would significantly predict self-efficacy. Moreover, past hitting performance was hypothesized to be positively related to self-efficacy, whereas anxiety was expected to be negatively related to self-efficacy. Path coefficients for Hypothesis 2 are presented in Table 10. The results of multiple regression analyses revealed strong support for both portions of the second hypothesis. The cognitive anxiety --> self-efficacy path coefficients were significant in Waves 2 ($\beta = -.433$), 4 ($\beta = -.485$), and 6 ($\beta = -.391$), and were marginally significant in Wave 3 ($\beta = -.399$). Moreover, somatic anxiety predicted self-efficacy in Waves 1 ($\beta = -.434$), 7 ($\beta = -.471$), and 8 ($\beta = -.599$). As predicted, both cognitive and somatic anxiety were found to be negatively related to self-efficacy.

Strong support was also found for the influence of objective past performance on self-efficacy. The hitting performance --> self-efficacy path coefficients were significant in Wave 2 ($\beta = .434$), Wave 3 ($\beta = .343$), Wave 5 ($\beta = .470$), Wave 6 ($\beta = .441$), Wave 7 ($\beta = .493$) and Wave 9 ($\beta = .632$). All significant paths were in the predicted direction, as stronger hitting performances were associated with higher percepts of hitting efficacy.

Conversely, subjective ratings of prior performance predicted self-efficacy in only two waves. A significant SPR --> self-efficacy path coefficient was found in Wave 1 ($\beta = .308$, $p < .05$), and the SPR --> self-efficacy path coefficient was marginally significant in Wave 2 ($\beta = .255$, $p < .10$). Thus, despite the strong predictive ability of

Table 10. Path coefficients for Hypothesis 2.

Path	Wave 1	2	3	4	5	6	7	8	9
CogAnx --> SE	-.067	-.433*	-.399+	-.485*	-.198	-.391*	-.107	.129	-.120
SomAnx --> SE	-.434*	.212	-.153	.081	.050	.069	-.471*	-.599*	-.192
PP --> SE	-.044	.434**	.343*	.210	.470*	.441**	.493**	.174	.632**
SPR --> SE	.308*	.255+	-.032	.137	-.056	.195	-.239	.036	.010

+ P < .10
* P < .05

PP = previous hitting performance
SPR = subjective performance rating

actual hitting performance, the data provided little support for the subjective performance --> self-efficacy relationship.

In the third hypothesis, self-efficacy was purported to be the only predictor of effort in the proposed model. Results of the path analysis indicated that self-efficacy was at least a marginally significant predictor of effort in six of the nine waves, thus providing support for Hypothesis 3. As seen in Table 11, the self-efficacy --> effort path coefficients were significant in Waves 1 (β = .436), 3 (β = .372), 5 (β = .393), and 8 (β = .414), and marginally significant in Waves 2 (β = .313) and 7 (β = .278). All paths were in a positive direction, indicating that stronger percepts of efficacy were predictive of higher effort expenditure while hitting.

That self-efficacy significantly predicted effort in only four of the nine waves suggested that variables other than self-efficacy were influencing the amount of effort exerted while hitting. This possibility was tested by examining the fully recursive model over all nine waves (which regressed effort on previous performance, anxiety, and self-efficacy) and comparing it to the hypothesized model via a Chi-square goodness-of-fit test and a "Q" ratio (Pedhazur, 1982). The X^2 goodness-of-fit test resulted in a nonsignificant value, X^2 (36, n=38) = 3.11, p > .05, suggesting that the hypothesized model adequately explained the relationships among the variables.

However, as a further comparison of the full and hypothesized models, a Q-coefficient was computed in order to

Table 11. Path coefficients for Hypothesis 3.

Path	Wave								
	1	2	3	4	5	6	7	8	9
SE --> Effort	.436**	.313+	.372*	.106	.393*	.210	.278+	.414*	.227

+ $p < .10$
* $p < .05$
** $p < .01$

SE = Self-efficacy

examine the differences in the variance explained by the hypothesized model relative to the variance explained by the full model. As noted in Chapter 3, the Q coefficient may vary from 0 to 1, with values close to 1 indicating that the hypothesized model fit the data and can explain nearly all of the "explainable" variance in the dependent measures. The $\underline{Q}$ coefficient for the hypothesized model was only .21, suggesting that much of the variance was left unexplained.

An examination of the full model paths revealed that with the exception of Waves 2, 6, and 7, self-efficacy was the only predictor of effort. Somatic anxiety ($\beta = -.540$, $p < .05$) and cognitive anxiety ($\beta = .525$, $p < .05$) significantly predicted effort in Wave 7. In addition, the subjective performance --> effort path coefficient was marginally significant in Waves 2 ($\beta = -.341$, $p < .10$) and 6 ($\beta = -.353$, $p < .06$). Surprisingly, no other variables in the full model were found to predict effort. Apparently, the addition of four paths was enough to account for a significant amount of variance in effort even though no individual variable exerted a strong influence on effort. Given that other variables predicted effort in only two of the nine waves, it appeared as though self-efficacy was the strongest, if not the only predictor of effort in the model.

Hypothesis 4 stated that self-efficacy and effort would be the only predictors of performance, and that self-efficacy would be the stronger of the two predictors. Moderate support was found for this hypothesis in that self-efficacy was a significant predictor of actual hitting performance in Wave 1 ($\beta = .449$, $p < .02$), Wave 5 ($\beta = .379$, $p < .02$), and Wave 8 ($\beta = .349$, $p < .05$). In addition, the self-efficacy -

-> performance path coefficients were marginally significant in Wave 2 (β = .339, p < .06) and Wave 3 (β = .310, p < .08). In contrast, the effort --> hitting performance path coefficient was found to be significant in Wave 5 only, and this effect was marginal (β = .296, p < .07). All hypothesized model path coefficients for Hypothesis 4 are presented in Table 12.

That self-efficacy was at least a marginal predictor of actual performance in five of the nine Waves supports the hypothesis that self-efficacy is the stronger predictor of performance. However, in order to test the hypothesis that self-efficacy and effort are the only predictors of performance, the hypothesized model was compared to the fully recursive model. The X^2 goodness-of-fit test was significant, X^2 (36, n=38) = 69.36, p < .05, and the Q coefficient was .13, indicating that variables other than self-efficacy and effort were accounting for the variance in hitting performance. An examination of the full model indicated that there was a trend toward significance for the previous performance --> performance path coefficients in Wave 2 (β = .420, p < .08) and Wave 4 (β = .311, p < .08). In addition, somatic anxiety (β = -.432, p < .03) was a significant predictor of performance and cognitive anxiety (β = .325, p < .06) was a marginally significant predictor of performance in the first wave. Somatic anxiety was also a marginally significant predictor of performance in Wave 2 (β = -.412, p < .06). However, only somatic anxiety exhibited an inverse relationship with performance. Thus, in addition to self-efficacy, previous performance and anxiety also

Table 12. Path coefficients for Hypothesis 4.

	Wave								
Path	1	2	3	4	5	6	7	8	9
SE --> Hit	.449*	.339+	.310+	.225	.379*	.290+	.091	.349*	.113
Effort --> Hit	.103	-.083	.087	.142	.296+	.047	-.177	.210	.284
SE --> SPR	.003	.027	-.262+	-.016	.051	.049	-.010	-.063	-.271
Effort --> SPR	.398*	.248	.557**	.304+	.445*	.243	.312+	.332+	.342+

+ $p < .10$
* $p < .05$
** $p < .01$

SE = self-efficacy
Hit = actual hitting performance
SPR = subjective performance rating

exerted direct influences on actual performance.

The relationship between self-efficacy, effort and subjective performance was quite different than the relationship exhibited with actual performance. The self-efficacy --> subjective performance path coefficient was marginally significant in Wave 3 only ($ß$ = -.262, p < .10), and contrary to prediction, the relationship was inverse. Effort, on the other hand, significantly predicted subjective performance in Wave 1 ($ß$ = .398), Wave 3 ($ß$ = .557), and Wave 5 ($ß$ = .445). There was also a trend toward significant effort --> subjective performance path coefficients in Wave 4 ($ß$ = .304, p < .07), Wave 7 ($ß$ = .312, p < .08), Wave 8 ($ß$ = .332, p < .08), and Wave 9 ($ß$ = .342, p < .08). All of the paths were in the predicted direction.

The amount of error associated with the prediction of subjective performance in each of the nine waves was quite large, again suggesting that variables other than self-efficacy and effort were not accounted for in the prediction of subjective performance. Thus, the fully recursive model, which included past objective and subjective hitting performance, somatic and cognitive anxiety, self-efficacy, and effort as predictors of performance, was again compared to the hypothesized model. The X^2 value for subjective performance was found to be significant, X^2 (36, n = 38) = 89.47, p < .01, indicating that the hypothesized model did not fit the data. The Q coefficient was also extremely low (.07), providing further support that the hypothesized model did not explain much of the variance in the dependent variables.

An examination of the full model indicated that in addition to effort and self-efficacy, previous subjective performance significantly predicted subsequent subjective performance in Wave 4 ($\beta = .399$, $p < .05$), Wave 6 ($\beta = .460$, $p < .01$) and Wave 9 ($\beta = .462$, $p < .05$). In addition, the cognitive --> SPR path coefficient was significant in Wave 6 ($\beta = -.773$, $p < .01$), and the somatic anxiety --> SPR path was marginally significant in Wave 2 ($\beta = -.360$, $p < .10$). As predicted, both cognitive somatic anxiety were inversely related to performance. Though previous subjective performance and anxiety accounted for a portion of the variance in subjective performance, effort still significantly predicted subjective performance in five of the nine waves in the full model. Thus, the influence of effort on subjective performance appears to be strong even though it does not account for all the variance.

Hypothesis 5 stated that subjective performance would be a stronger predictor of self-efficacy than would objective performance. No support was found for this hypothesis in that the subjective performance --> self-efficacy path coefficient was significant in Wave 1 ($\beta = .308$, $p < .05$) only. As noted in Hypothesis 2, objective performance was a significant predictor of self-efficacy in six of the nine waves. Thus, contrary to prediction, the hypothesis that perceptions of performance, as opposed to actual performance, more strongly predict subsequent efficacy expectations was not supported by the data. Table 13 contains the path coefficients for Hypothesis 5.

Table 13. Path coefficients for Hypothesis 5.

	Wave								
Path	1	2	3	4	5	6	7	8	9
Hit --> SE	-.044	.434**	.343*	.210	.470*	.441**	.493**	.174	.632**
SPR --> SE	.308*	.255+	-.032	.137	-.056	.195	-.239	.036	.010

+ $P < .10$
* $P < .05$
** $p < .01$

Hit = actual hitting performance
SE = self-efficacy
SPR = subjective performance rating

Summary of the Path Analysis

Hypothesis 1 stated that past performance accomplishments would predict subsequent somatic and cognitive anxiety. Virtually no support was found for this hypothesis in that objective performance did not predict anxiety in any of the nine waves and subjective performance predicted anxiety in only two waves.

Hypothesis 2 stated that past performance and anxiety would be significant predictors of self-efficacy. Moreover, past performance was hypothesized to be positively related to self-efficacy, whereas anxiety was predicted to be negatively related to self-efficacy. Strong support for Hypothesis 2 was found in that cognitive and/or somatic anxiety predicted self-efficacy in seven of the nine waves, and hitting performance predicted self-efficacy in six of the nine waves. Subjective performance was not found to be a predictor of self-efficacy.

The third hypothesis received moderate support from the hypothesized model. The self-efficacy --> effort path coefficients were significant in four waves and marginally significant in two other waves. An examination of the full model revealed that no other variables were consistent predictors of effort.

Moderate support was found for the fourth hypothesis. Self-efficacy predicted hitting performance in five of the nine waves, but effort predicted performance in only one wave. Conversely, effort predicted subjective performance in three waves and the path coefficients were marginally significant in four other waves. No significant self-efficacy --> subjective performance path coefficients were found.

CHAPTER V

Discussion

The primary purpose of this study was to examine the causal relationships in Bandura's (1977, 1986) theory of self-efficacy in a naturalistic sport setting over an extended period of time. Based on a review of the sport and motor performance literature relating to self-efficacy theory, baseball players' percepts of hitting efficacy were hypothesized to be the strongest predictor of effort expenditure while hitting, as well as actual hitting performance. Likewise, hitting performance was hypothesized to be the strongest predictor of self-efficacy. Furthermore, players' perceptions of hitting performance were hypothesized to be stronger predictors than actual hitting performances of self-efficacy beliefs. Finally, cognitive and somatic anxiety were hypothesized to be predictors of self-efficacy.

Preliminary Results

Before discussing the results of the path analysis, some of the preliminary results warrant further discussion. In particular, the findings relating to the high intracorrelations among self-efficacy over time seem particularly salient. The self-efficacy of all players was found to be consistent over the nine waves, despite fluctuations in performance. This finding is important for two reasons. First, it provides some support for Bandura's (1986) assertion that percepts of self-efficacy are not merely reflections of past performances, but beliefs in one's capabilities to execute specific actions. Had players' efficacy beliefs simply been reflections of their hitting performance, percepts of efficacy would have undulated in accord with the fluctuations in objective and subjective hitting performance. As shown in Figures in 3, 4, and 5, this was not the case. Self-efficacy remained fairly consistent, whereas performance fluctuated across waves.

Second, the consistency of self-efficacy is noteworthy because it speaks to the resiliency of self-efficacy beliefs. Bandura (1986) posits that individuals who are fully assured of their capabilities maintain high percepts of efficacy even after encountering repeated failures. In the present study, all players tended to report very strong efficacy beliefs, though collegiate players consistently reported higher efficacy beliefs than high school players. In fact, players typically used only the upper quarter of the efficacy scale. Players maintained these strong efficacy beliefs despite fluctuations in hitting performances. These findings are consistent with those of Brown and Inouye (1978), who found that highly efficacious individuals remained efficacious even after repeated failure on an unsolvable problem.

In conclusion, self-efficacy was found to be consistent across the nine waves, as well as resilient to acute changes in performance. The reasons for the resiliency of efficacy beliefs demonstrated in the present study remains unclear. Future research needs to investigate the underlying processes involved in the development of resilient efficacy expectations. For example, why are some individuals able to maintain their efficacy beliefs in the face or adversity, while others succumb to failure experiences? Can individuals learn or be manipulated to remain efficacious after experiencing repeated failures? These and other questions should be addressed in future research.

Path Analysis

The primary purpose of the present study was to examine the causal relationships in Bandura's (1977) model of self-efficacy. The overall results of the path analysis offered little support for the hypothesized model. Contrary to predictions in Hypothesis 1, past performance accomplishments did not predict cognitive or somatic anxiety, nor were they found to be the most salient source of efficacy information, as Bandura (1977, 1986) would assert. Similarly, subjective performance predicted anxiety in only two waves. Although several explanations may account for these findings, the most likely explanation pertains to the measurement of anxiety. Players' perceptions of anxiety were assessed retrospectively. That is, players completed anxiety measures following their hitting performance. Thus, players may have "adjusted" their assessments of anxiety to reflect their most recent hitting performance, rather than how they felt just prior to performance. Thus, it would not be surprising to find that hitting performance from a previous game was a poor predictor of anxiety. The effectiveness of assessing anxiety retrospectively should be a concern for future research endeavors.

Past performance accomplishments and anxiety were also found to be consistently strong predictors of self-efficacy, as proposed in Hypothesis 2. The past performance --> self-efficacy path was found to be significant in Waves 2, 3, 5, 6, 7, and 9. Conversely, subjective ratings of performance predicted self-efficacy in only one of the nine waves.

The past performance --> self-efficacy paths were not significant in all nine waves, and the lack of significant paths in several waves may have been due to methodological concerns. Prior performances consisted of each player's average contact percentage for the most recent game, and self-efficacy measures were completed just prior to each game. Typically, games were played every two or three days. This protocol allowed a considerable amount of time to elapse between each game. The time span between games may have allowed other factors to influence players' self-efficacy beliefs. For example, the potential effects of a poor hitting performance may have been offset by hitting instruction or batting practice. Perhaps players were able to maintain their percepts of hitting efficacy based on positive feedback from hitting practice. Players may also have engaged in cognitive strategies designed to circumvent the debilitating effects of poor performances. Research has shown that baseball players typically engage in a variety of cognitive strategies designed to facilitate their performance (George, 1988; Gmelch, 1972). It is reasonable to assume that players in the present study engaged in self-talk, imagery, relaxation, and other cognitive techniques in an effort to overcome or rebound from the effects of poor performances.

Contextual factors may also have contributed to changes in self-efficacy, such as the opposing pitcher or team, or whether a player's team won or lost a previous game. This possibility is illustrated by examining the, the contextual factors associated with various games across the nine waves. For example, after reporting very strong efficacy beliefs in Wave 4 and winning their respective games, high school players' self-efficacy expectations dropped for Waves 5, 6, and 7, when they faced their toughest competition. This decrease occurred despite strong hitting performances in Waves 4 and 6 (see Figures 1 and 3). Conversely, after winning in Wave 7 despite extremely poor hitting performances, high school players' self-efficacy beliefs rose to their highest level in Wave 8. This increase in self-efficacy may be attributed to the weak opponent (pitching) each team faced in Wave 8. Thus, opponent's ability may have been a more salient source of efficacy information than previous hitting performance.

The potential influence of contextual factors on college players' efficacy beliefs was less clear, mainly due to little variation in self-efficacy across the nine waves. However, contextual factors may still have influenced efficacy expectations. For example, players' self-efficacy dropped slightly in Wave 4 despite weak opposition in Wave 4 and strong hitting performances in Wave 3. Perhaps this decrease is partially due to each team losing their respective game in Wave 3. Similarly, efficacy expectations increased slightly from Wave 7 to Wave 8, even though players exhibited their lowest level of hitting performance in Wave 7. Again, winning the previous game may have accounted for the increase in efficacy beliefs. However, each team played a conference rival in Wave 8. Perhaps the rivalry led to additional preparation for the game, and thus accounted for the heightened efficacy beliefs. These factors as well as others shoul

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others should be investigated in future research endeavors. Certainly the present findings suggest that contextual factors may serve as sources of efficacy information that contribute to individuals' appraisals of efficacy beliefs.

The second part of Hypothesis 2 stated that anxiety would be a significant predictor of self-efficacy, and the relationship would be inverse. Results of the path analysis partially supported this part of the hypothesis. Cognitive anxiety was a predictor of self-efficacy in three waves, and somatic anxiety predicted self-efficacy in three other waves. All path coefficients were in the predicted direction. These findings lend support to Bandura's (1977, 1986) contention that emotional arousal can be a strong source of efficacy information, and also supports the findings from previous research indicating that lower levels of arousal are associated with higher percepts of efficacy (Feltz, 1982, 1988b; Feltz & Mugno, 1983; McAuley 1985).

The results pertaining to the relationship between anxiety and self-efficacy also emphasize the importance of assessing cognitive arousal in addition to physiological indices of arousal. Players' perceptions of cognitive anxiety predicted self-efficacy just as strongly and consistently as perceptions of somatic anxiety. In similar research, Feltz (1988b) and Feltz and Mugno (1983) found that subjects' perceptions of autonomic arousal were better predictors of self-efficacy that were physiological indices of arousal. Taken together, these findings suggest that one's cognitive appraisal of arousal may provide stronger efficacy information than arousal level per se. In conclusion, the results supported Hypothesis 2, and lent support to Ba

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support to Bandura's (1977, 1986) assertion that past performance accomplishments and emotional arousal are sources of efficacy information, with past performance attainments providing the strongest source of efficacy information.

In Hypothesis 3, self-efficacy was hypothesized to be the strongest predictor of effort. Again, the data partially supported this hypothesis. The self-efficacy --> effort path coefficients were significant in Waves 1, 3, 5, and 8, and marginally significant in Waves 2 and 7. Thus, self-efficacy at least marginally predicted effort in six of the nine waves. Results of the full model analysis indicated that Wave 7 somatic and cognitive anxiety were the only other significant predictors of effort in the model. Bandura (1977, 1986) contends that judgments of efficacy are a major determinant of one's effort expenditure. Research has supported this notion in that individuals with a strong sense of efficacy have been shown to exert greater effort in an attempt to master a challenge, whereas those with weaker efficacy beliefs exert less effort when confronted with difficulties (Schunk, 1984; Weinberg, Gould, & Jackson, 1979). Similarly, self-efficacy was found to be a fairly consistent predictor of effort in the present study .

The absence of stronger self-efficacy --> effort paths may be the result of players' biased perceptions. Perceptions of effort were assessed at the conclusion of each game, so players were aware of their hitting performance as they responded to the effort question. In situations where performance was poor, players' reports of effort expenditure may have been more an indication of the attributions they were making for their performance, rather than the actual amount of ef

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amount of effort they exerted while hitting. Performing poorly while exerting high levels of effort may have been perceived as indicative of low ability. Thus, the effort measure may have been tapping a self-serving attributional bias that athletes employed in attempt to make a positive self-presentation.

In sum, the findings lend moderate support to the hypothesis that self-efficacy is a determinant of one's effort expenditure. Moreover, Bandura's (1986) proposition that higher percepts of efficacy are associated with increased effort expenditure received partial support. Moreover, these findings are of particular relevance given the dearth of self-efficacy research employing effort, as opposed to performance, as a dependent variable. The moderately consistent relationship between self-efficacy and effort found in the present study suggests that variables other than self-efficacy may have accounted for some of the variance in effort. An inadequate assessment of effort may also have been responsible for the findings. Future research should examine alternative methods of assessing effort, as well as consider variables other than self-efficacy that may influence effort expenditure.

Hypothesis 4 stated that self-efficacy and effort would be the only predictors of hitting performance in the model, with self-efficacy being the stronger of the two predictors. Again, the results of the path analysis revealed partial support for this hypothesis. Effort was a marginal predictor of hitting performance in only one wave, whereas self-efficacy was found to predict objective performance in six of the nine waves. Conversely, effort was at least a marginally

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significant predictor of subjective performance in seven of the nine waves, while only a trend toward significance was found for the Wave 3 self-efficacy --> subjective performance path.

The absence of significant self-efficacy --> performance paths in Waves 4, 6, 7, and 9 was likely due to measurement concerns. Self-efficacy is purported to predict performance only when the execution of specific skills accounts for performance (Bandura, 1986, 1990). In other words, self-efficacy will not predict performance if factors that are beyond one's control are partially responsible for successful performance. In the present study, hitting performance consisted of the contact percentage of each player. A closer examination of contact percentage suggests that it is a performance index that is determined only in part by a performer's execution of specific skills. The performance of the opposing pitcher or the umpire also plays a role in the determination of performance success. For example, a pitcher may throw the ball extremely fast or may exhibit precise control over the location of his pitches, so as to make hitting the ball extremely difficult. A batter may execute the mechanics of his swing perfectly, and yet not contact the ball. Likewise, the umpire's decisions on called balls and strikes may have impacted the number of attempts players were permitted to make contact with the ball. Given this interdependence, self-efficacy may not have predicted performance because skill execution was not totally responsible for hitting performance.

Another assessment issue stems from the fact that the performance measure was comprised of each players' average

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performance for a game. For example, if a player made four plate appearances, his performance was assessed by calculating the average contact percentage of those four at-bats. In contrast, each player completed only one self-efficacy measure per game. It is possible that players' efficacy expectations changed during the course of a game. If this were the case, the self-efficacy measure taken before the game would not have been an accurate assessment of players' efficacy appraisals while the game was being played. A stronger relationship between self-efficacy and performance may have been found if self-efficacy were assessed prior to each plate appearance. This way fluctuations in self-efficacy during competition could be assessed and compared to performance. Unfortunately, this protocol was not feasible in the present study due to situational constraints. Future field-based research should attempt multiple self-efficacy assessments to capture any changes in efficacy beliefs during competition.

The time lapse between the administration of the efficacy questionnaire and actual performance may also have influenced the strength of the self-efficacy --> performance paths. Bandura (1978) has argued that if self-efficacy and performance are not measured closely in time, efficacy beliefs may be influenced by new experiences during the intervening period. Self-efficacy was assessed approximately 15-20 min prior to each game. Events occurring during this time period may have altered players' efficacy expectations. For example, heightened anxiety levels just prior to performance may have influenced players' percepts of efficacy. This explanation seems somewhat plausible, given the moderate

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the moderate relationship found between anxiety and self-efficacy. The cognitive anxiety --> self-efficacy paths were significant in three waves, and somatic anxiety predicted self-efficacy in three other waves. It is also possible that variables not accounted for in the model, such as vicarious experiences and/or verbal persuasion, affected self-efficacy during this time period. Certainly, these potentially influential factors should be examined in future research.

The results of the path analyses also denote the reciprocal relationship hypothesized to exist between self-efficacy and performance. In the hypothesized model, past performance was a significant predictor of self-efficacy, which in turn significantly predicted subsequent performance. However, this relationship was not as strong as the self-efficacy-performance relationship reported in previous studies (Feltz, 1982; Feltz & Mugno, 1983). Though contact percentage appeared to be an appropriate measure of hitting performance, as previously noted it still may have been influenced to some extent by external factors (i.e. umpire's calls; ability of pitcher) which may have inhibited stronger associations between self-efficacy and performance.

The finding that effort positively and consistently predicted subjective performance supports the contention that players' reports of effort may have been tapping their attributions for performance. Better subjective performances were associated with higher percepts of effort, whereas poorer perceived performances were associated with less effort expenditure. In both instances, attributing performance, at least in part, to effort expenditure could have been a self-serving bias on the part of the players.

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For example, attributing a good performance to heightened effort expenditure suggests that a player was able to bring about the performance through effort, a factor that is within his control. Similarly, poor performances could have been attributed to a lack of effort, in which case the athlete still exhibited control, and could improve performance through increased effort.

This notion is supported by McAuley (1990), who found that subjects making internal but unstable attributions for dropping out of exercise programs had higher efficacy expectations with regard to their ability to overcome possible barriers in future exercise programs. In the present study, athletes may have continued to exhibit high efficacy beliefs due to the attributions they were making for performance. It should be noted that though greater effort expenditure has been shown to be associated with lower perceived ability (Nicholls, 1978, 1980), heightened effort is typically perceived as a socially desirable behavior within a sport team framework, and therefore may not have been indicative of incompetence.

The fifth hypothesis stated that subjective measures of performance would be stronger predictors of self-efficacy than would objective measures of performance. This hypothesis was based on Bandura's (1986) assertion that individual's efficacy expectations are influenced more by how they interpret their performance successes and failures, than by performance attainments per se. Thus, the predictive capability of perceived performance was compared with that of actual performance. Virtually no support was found for the influence of subjective performance on self-efficacy beliefs,

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as subjective performance predicted self-efficacy in only one wave, whereas objective performance predicted efficacy in six of the nine waves.

This finding may be the result of incongruous efficacy and subjective performance measures. The hitting efficacy questionnaire may have been assessing aspects of hitting that were very different from the criteria players used to rate their hitting performance. Thus, beliefs about hitting performance may have had little relevance to the hitting efficacy being assessed. Haney (1991) and McAuley (1985) have also found subjective assessments of performance to be weak predictors of self-efficacy. It should be noted, however, that the lack of significant perceived performance --> self-efficacy paths may also be due to poor conceptualizations of perceived performance. For example, Haney (1991) used subjects' satisfaction with performance as a measure of perceived performance. Clearly, one's satisfaction with performance does not necessarily reflect level of performance attainment. Thus, it is not surprising that self-efficacy was not found to predict perceived performance in that study. Perhaps a more appropriate assessment of perceived performance may be obtained by having subjects estimate how well they performed relative to other performers. In this way, subjects would use a common criteria for subjective assessment. Certainly, the use of subjective performance assessments in self-efficacy research is an area that needs further attention. Presently, little support has been found for Bandura's (1986) assertion that the way in which one interprets performance provides stronger efficacy information than performance attainments per se.

Conclusions

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The results of the path analysis were consistent with earlier causal studies in motor performance in that self-efficacy was found to be both a cause and effect of performance (Feltz, 1982, 1988b; Feltz & Mugno, 1983, Schunk, 1984). However, self-efficacy tended to be more of an effect of performance, rather than a cause of performance. The past performance --> self-efficacy path coefficients were consistently stronger than the self-efficacy --> performance path coefficients (see Table 14). Similarly, Feltz (1982, 1988b) and Feltz and Mugno (1983) found that the influence of performance on self-efficacy increased over time, while the influence of self-efficacy on performance decreased over time.

The findings in the present study differ from previous path analytic studies in that the reciprocal relationship found between self-efficacy and performance in the present study explained only a small portion of the variance, whereas previous research has found that self-efficacy accounted for a large portion of the variance in performance (e.g. Feltz, 1982; Feltz & Mugno, 1983). In addition, previous studies have consistently reported a direct, significant path from past performance to subsequent performance. A direct past performance --> performance path was not found in the present study.

These differences may be due to contextual factors associated with performance. For example, in previous causal studies of motor performance subjects performed a closed skill under controlled conditions. That is, the environment remained virtually unchanged for all performance trials.

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Thus, it is not surprising that one's efficacy expectations and performance remained somewhat stable over trials. In the present study, players performed an open skill under variable, dynamic conditions. For example, players had to hit a thrown ball, whose speed and location varied from pitch to pitch. Moreover, players had to adjust to different pitchers each game, and often times faced a variety of pitchers within the same game. In addition, games were played on a number of fields, against a variety of opponents, under variable weather conditions. Given the changing, almost unpredictable environment and the potential for the influential effects of other factors, it is not surprising that prior performance did not predict subsequent performance. Nor is it surprising that self-efficacy and performance accounted for only a small portion of the variance in the data. On the other hand, it is somewhat remarkable that self-efficacy and performance were found to be fairly consistent predictors of each other under such variable conditions.

The findings from the path analysis also suggest that self-efficacy and performance are not only reciprocally related, but also that self-efficacy acts a cognitive mediator of performance. According to Baron and Kenny (1986), mediation would have occurred if past performance and/or anxiety exerted a direct effect on self-efficacy, which in turn directly affected effort and/or hitting performance. An examination of the hypothesized and full models indicated that self-efficacy was the strongest and most consistent predictor of effort and performance in either model. Moreover, the effect of past performance on subsequent

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subsequent performance was mediated by self-efficacy in Waves 2, 3, 5, and 6, and the effect of anxiety on performance was mediated by self-efficacy in Waves 1, 2, 3, 6, and 8 . Self-efficacy mediated the effect of past performance on effort in Waves 2, 3, 5, and 7, and the effect of anxiety on effort in Waves 1, 2, 3, 7, and 8.

The support found for Bandura's (1977) model under such variable conditions also speaks to the utility of self-efficacy theory in actual sport settings. As previously noted, most of the previous research examining the causal elements in Bandura's model have employed nonathletic populations engaging in novel tasks under controlled conditions (e.g. Feltz, 1982, 1988b; McAuley, 1985). Other studies have examined athletes performing in competitive settings, but examined only the correlational relationships between self-efficacy and performance (e.g. Barling & Abel, 1983; Lee, 1982). Still other studies have undertaken causal investigations of athletes performing in contrived situations (Fitzsimmons et al., 1991; Haney, 1991). The present study examined the causal relationships hypothesized in Bandura's model, using athletes competing in their chosen sport, and replicated the causal and mediational effects of self-efficacy on performance found in controlled settings. Field-based support for the causal mechanisms of self-efficacy theory had been missing in the literature relating to sport and motor performance prior to the present study.

Practical Implications

The finding that self-efficacy significantly and consistently predicted effort and performance has strong implications for sport psychologists, coaches, and teachers. If self-efficacy acts as a mediator of effort and performance, then factors that influence self-efficacy may be manipulated to facilitate performance and increase effort toward performance. For example, sport psychology consultants may provide athletes with cognitive strategies that enhance performance through the persuasory effects they exert on self-efficacy. Positive self-talk, goal-setting, and imagery techniques are three performance enhancement strategies that may operate through the effects they exert on efficacy beliefs.

Likewise, coaches may structure practice situations to maximize mastery experiences, which in turn should enhance efficacy expectations and facilitate future performance. For example, practices may be structured so that players successfully perform various parts of a skill or gradated versions of a skill prior to attempting the whole skill. Players' mastery of the components of a skill should enhance efficacy expectations toward performance of the entire skill. Conversely, placing inexperienced players prematurely in a taxing situation where they are likely to fail will undermine their sense of efficacy, and make it difficult for them to master the skills necessary to successfully compete in that situation.

Teachers and coaches may also facilitate future performance by helping students/athletes focus on salient features of previous performance. In the present study, athlete's subjective performance assessments were not predictive of specific measures of self-efficacy. It is likely that athletes were focusing on aspects of hitting other than making contact with the ball, and thus a poor relationship existed. On the other hand, actual contact percentage was a strong predictor of "contact" efficacy. Perhaps if players had been instructed to subjectively rate their hitting performance in terms of making contact with the ball, a stronger relationship would have been found between subjective performance and self-efficacy. Thus, by directing students'/athletes' attention toward specific aspects of performance, percepts of efficacy may be enhanced, leading to stronger performances.

In addition to athletic settings, the work of Schunk and colleagues (Schunk, 1984; Schunk & Cox, 1986; Schunk & Gunn, 1986) provide support for the enhancement of academic performance through the manipulation of self-efficacy beliefs. Attributional feedback related to effort and ability has been shown to enhance childrens' self-efficacy beliefs and academic performance. Similar feedback strategies could be employed in classroom and athletic settings in an effort to raise percepts of efficacy, which may lead to greater effort and improved performance.

Limitations of the Study

Though the present study found support for Bandura's (1977, 1986) model of self-efficacy, the results should be interpreted with caution due to several methodological limitations. First, the sample size was relatively small. Only fifty-three baseball players participated in the study. Because not all of the players participated in every game, only a portion of the total sample (72%) was employed in the path analysis at any given time. Pedhazur (1982) suggests that a sample size of at least 100 is necessary to conduct path analysis. However, most other path analytic studies of self-efficacy in the literature pertaining to sport and motor performance have employed smaller sample sizes (e.g. Feltz, 1982, 1988b; Feltz & Mugno, 1983; McAuley, 1985). Thus, the sample size employed in the present study is not uncommon in research relating to sport and motor performance. In addition, the small sample size may have influenced the $\underline{X}^2$ goodness-of-fit tests. However, the use of the Q ratio added confidence to the accuracy of the $\underline{X}^2$ tests because it was not affected by sample size. Therefore, the potential problems associated with a small sample may have been reduced to some extent.

Second, as previously noted, the perceived competitive anxiety measure used in the present study was administered retrospectively, rather than prior to performance. Players were asked to recall how anxious they felt just prior to hitting. This protocol was implemented on the recommendation of Feltz and Mugno (1983) in an effort to assess perceptions of anxiety as close as possible to actual performance. It is possible that players' recollections of perceived anxiety were inaccurate, or that players' appraisals of anxiety were influenced by their hitting performance. Similarly, the perceived effort measure was completed following performance and may have reflected a self-serving attributional bias to account for performance. Thus, the relationships found between these variables may not be an accurate portrayal of their association.

Finally, the influence of extraneous factors (e.g.

opposing pitcher) on self-efficacy perceptions and performance was not controlled. Thus, the extent to which environmental and/or situational variables impacted efficacy expectations and performance is not known. Certainly, the lack of significant path coefficients for the various hypotheses, as well as the small amount of variance accounted for in the data may be attributable to factors outside of the model.

Future Directions

The results of the present field study provide support for Bandura's (1977) model of self-efficacy in an actual sport setting. The causal relationships found in previous controlled research settings were replicated in a field setting, though perhaps not as convincingly. Nonetheless, the results of the present study provide ecological validity for Bandura's model.

Contrary to previous research (Feltz 1982, 1988b; Feltz & Mugno, 1983), past performance accomplishments did not exert a strong, direct influence on future performance. Instead, in support of Bandura's (1986) contentions, the influence of past performance was mediated by self-efficacy. The discrepancies in the findings may reside in the type of tasks employed in the various studies, or the conditions under which subjects performed the tasks. Past performance exerted a strong direct influence on future performance in controlled settings using a closed skill, but did not influence performance in a field setting employing an open skill. Future research should investigate potential task types and contextual factors that may play a role in the past performance - future performance relationship. Perhaps the predictability of one's performance meditates the extent to which past performance predicts future performance.

Future research should also focus on the development and use of self-efficacy measures. Typically, researchers have developed their own measures of self-efficacy in order to address a specific question. Researchers have asked similar questions, but have employed vastly different measures of self-efficacy in an attempt to address these questions. The development of valid, reliable measures of self-efficacy may be facilitated by repeated use of efficacy measures across a variety of populations and research settings. The work of Feltz and associates (Feltz, 1982, 1988b; Feltz & Mugno, 1983; George et al., 1992) illustrates the repeated use of efficacy questionnaires across a number of studies. Future research should employ similar strategies and attempt to replicate the findings of self-efficacy studies in both controlled and field settings by employing similar measures of efficacy and performance. Until this type of research is undertaken, the ways in which self-efficacy and performance are assessed will likely determine the strength of the relationship between self-efficacy and performance.

Another area in which future research should focus pertains to the sources of efficacy information. Typically, research has examined the effects of only one or two sources of efficacy information on self-efficacy beliefs. Most of the causal examinations of the effects of efficacy information on self-efficacy have employed past performance and anxiety as the only sources of efficacy information. Future research should also investigate the causal

Continued

relationships in the self-efficacy model using vicarious experiences and verbal persuasion. The causal studies that have employed these two sources of efficacy information have generally provided support for Bandura's theory (e.g. Feltz & Riessinger, 1990; Fitzsimmons et al., 1991; McAuley, 1985). In addition, future research should attempt to examine all four sources of efficacy information simultaneously. Such research would provide valuable information relating to the most salient sources of efficacy information. Moreover, this research may provide some indication as to whether the four sources of efficacy information are accounting for unique variance in self-efficacy or sharing the variance they explain.

As noted in Chapters 1 and 2, self-efficacy is hypothesized to influence behavior in terms of choice of activities, effort expenditure, persistence, thought patterns, and emotional reactions. However, much of the self-efficacy research has examined the effects of self-efficacy on performance. Though support has been found for the self-efficacy - performance relationship and research should continue to examine this relationship, future research should also focus on the behaviors originally proposed by Bandura's (1977) theory. The present study attempted to assess the effects of self-efficacy on perceived effort expenditure. Perhaps a physiological assessment or other objective measure of effort is required to address this relationship. Nonetheless, future research should continue to investigate the influence of self-efficacy on behaviors such as effort, persistence, choice of activities, and thought patterns.

Finally, the results of the present study supported the hypothesized causal mechanisms in Bandura's model of self-efficacy using experienced athletes competing in an actual sport setting. Several other research endeavors have also supported the relationships in self-efficacy theory using experienced athletes (Barling & Abel, 1983; Fitzsimmons et al., 1991; Haney, 1991, Lee, 1982). However, these studies have either used noninferential techniques to examine athletes competing in actual sport settings, or causal techniques to investigate athletes performing in contrived situations. Future research should continue to engage in field-based, causal investigations that examine athletes competing in their chosen sport. This line of research would delineate further the predictive generality of self-efficacy across sports, and provide an indication of the utility of self-efficacy theory as a conceptual framework from which to examine self-confidence in athletic pursuits.

APPENDIX A

APPENDIX A

Hitting Self-efficacy Scale

PLEASE INDICATE HOW CERTAIN YOU ARE OF YOUR ABILITY TO PERFORM THE FOLLOWING HITTING TASKS IN TODAY'S GAME AGAINST BY PLACING AN "X" IN THE APPROPRIATE BOX.

	very uncertain				somewhat certain					very certain	
	0	10	20	30	40	50	60	70	80	90	100
Put the ball in play 1 time in 4 at-bats											
Put the ball in play 2 time in 4 at-bats											
Put the ball in play 3 time in 4 at-bats											
Put the ball in play 4 time in 4 at-bats											
Drive in a runner from 2nd base 1 time in 4 at-bats											
Drive in a runner from 2nd base 2 times in 4 at-bats											
Drive in a runner from 2nd base 3 times in 4 at-bats											
Drive in a runner from 2nd base 4 times in 4 at-bats											
Lay down a sacrifice bunt in the 1st, 2nd, or 3rd inning											
Lay down a sacrifice bunt in the last inning											
Hit a sacrifice fly in the 1st, 2nd, or 3rd inning											
Hit a sacrifice fly in the last inning											
Execute a hit-and-run in the 1st, 2nd, or 3rd inning											
Execute a hit-and-run in the last inning											
Drive in the winning run with 0-1 outs in the last inning											
Drive in the winning run with 2 outs in the last inning											
Lay down a suicide squeeze bunt in the early innings of a tie game											
Lay down a suicide squeeze bunt in the last inning of a tie game											

APPENDIX B

APPENDIX B

Competitive Anxiety Scale

Directions: A number of statements which athletes have used to describe their feelings about competition are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate ***how you felt just before hitting.*** There are no right or wrong answers. Do not spend too much time on any one statement, but choose the answer which described your feelings ***just before hitting.***

	Not at All	Somewhat	Moderately So	Very Much So
1. I was concerned about hitting in today's game	1	2	3	4
2. I felt nervous about hitting.	1	2	3	4
3. I had self-doubts about hitting	1	2	3	4
4. I felt jittery at the plate.	1	2	3	4
5. I was concerned that I may not hit as well in today's game as I could.	1	2	3	4
6. My body felt tense at the plate.	1	2	3	4
7. I was concerned about striking out.	1	2	3	4
8. I felt tense in my stomach.	1	2	3	4
9. I was concerned about choking under pressure.	1	2	3	4
10. My body felt relaxed at the plate.	1	2	3	4
11. I was concerned about hitting poorly	1	2	3	4
12. My heart was racing while standing at the plate.	1	2	3	4
13. I was worried about reaching my hitting goal	1	2	3	4
14. I felt my stomach sinking as I stood at the plate.	1	2	3	4
15. I was concerned that others would be disappointed with my hitting performance.	1	2	3	4
16. My hands were clammy.	1	2	3	4
17. I was concerned I wouldn't be able to concentrate while I was hitting.	1	2	3	4
18. My body felt tight while standing at the plate.	1	2	3	4

APPENDIX C

APPENDIX C

Subjective Performance Scale and Effort Scale

☐ **PLACE AN "X" IN THE BOX IF YOU DID NOT PLAY IN TODAY'S GAME**

HITTING PERFORMANCE RATING

Please circle a number on the following scale which best indicates HOW WELL YOU THINK YOU HIT IN TODAY'S GAME.

extremely poor		poor		moderate		good			extremely well
1	2	3	4	5	6	7	8	9	10

Please circle a number on the following scale which best indicates HOW MUCH EFFORT YOU PUT INTO HITTING IN TODAY'S GAME(S).

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

APPENDIX D

APPENDIX D

Informed Consent Form
Michigan State University
Department of Health and Physical Education

Investigator: Thomas R. George

I, ____________________, hereby agree to participate as a volunteer in a scientific study of self-confidence and athletic performance as an authorized part of the research program in the Department of Physical Education at Michigan State University under the supervision of Dr. Deborah Feltz.

The purpose of this study is to examine the relationship between self-confidence and baseball hitting performance. In addition, this study will examine the effects of anxiety on self-confidence and performance. You will be required to complete a battery of questionnaires assessing self-confidence, anxiety, and performance before and after nine successive baseball games. You will remain anonymous and your responses will be known only to the investigator.

The study and my part in the study have been defined and fully explained to me and I understand this explanation. I have been given an opportunity to ask whatever questions I may have had and all such questions and inquiries have been answered to my satisfaction. I understand that my participation in this study does not guarantee any beneficial results to me. I understand that any data or answers to questions will remain confidential with regard to my identity. Within these restrictions, results of the study will be made available to me at my request. I FURTHER UNDERSTAND THAT I WILL NOT BE PENALIZED IN ANY WAY FOR REFUSING TO PARTICIPATE IN THIS STUDY, AND THAT I AM FREE TO WITHDRAW MY CONSENT AND DISCONTINUE MY PARTICIPATION AT ANY TIME.

____________	____________	____________
DATE	DATE OF BIRTH	SOCIAL SECURITY NUMBER

____
SUBJECT'S SIGNATURE

I, the undersigned, have defined and fully explained the study to the above subject.

____________	____________________
DATE	INVESTIGATOR'S SIGNATURE

APPENDIX E

APPENDIX E

Table 1. Means and Standard Deviations for Variables.

Wave	Som Anx	Cog Anx	Self-Efficacy	Effort	Hitting Performance	SPR
Past Performance						
College						
M					.786	5.60
SD					.238	1.63
High School						
M					.867	4.96
SD					.291	1.90
Wave 1						
College						
M	13.22	18.17	86.77	8.89	.807	5.25
SD	3.14	5.97	13.62	1.37	.190	1.77
High School						
M	13.89	18.50	73.54	8.06	.816	5.16
SD	3.85	3.75	16.65	1.12	.254	2.04
Wave 2						
College						
M	12.57	15.90	92.00	8.85	.841	5.46
SD	2.98	3.97	9.19	1.09	.223	2.34
High School						
M	14.61	17.94	77.50	7.06	.843	4.44
SD	6.20	6.01	17.75	2.19	.223	2.82
Wave 3						
College						
M	11.73	15.64	91.90	9.09	.890	5.58
SD	2.90	4.21	10.16	1.04	.189	2.39
High School						
M	13.67	17.22	78.03	8.00	.858	5.89
SD	6.01	5.47	16.02	1.63	.273	2.49
Wave 4						
College						
M	12.09	15.91	91.70	8.89	.908	5.50
SD	3.26	3.62	12.01	1.41	.161	2.90
High School						
M	14.00	16.30	83.07	8.47	.850	6.25
SD	5.08	5.89	11.95	1.74	.270	2.24

Som anx = somatic anxiety
Cog anx = cognitive anxiety
SPR = subjective performance rating

Table 1 (Cont'd).

Wave	Som Anx	Cog Anx	Self-Efficacy	Hitting Effort	Performance	SPR
Wave 5						
College						
M	12.04	15.78	92.71	8.73	.871	5.17
SD	3.78	5.03	9.18	1.78	.225	2.74
High School						
M	15.21	17.53	82.02	8.40	.748	4.63
SD	4.37	3.94	12.91	1.72	.215	1.89
Wave 6						
College						
M	11.13	14.52	94.57	9.39	.867	5.74
SD	2.72	4.55	6.60	0.89	.135	2.38
High School						
M	13.89	17.11	78.68	8.92	.838	5.86
SD	5.99	7.16	16.63	1.38	.278	2.94
Wave 7						
College						
M	12.71	16.24	92.16	9.41	.757	4.74
SD	2.62	5.90	11.58	0.94	.223	2.52
High School						
M	15.00	16.71	79.29	8.16	.718	5.29
SD	4.78	5.61	18.20	2.12	.339	2.72
Wave 8						
College						
M	12.50	15.28	93.12	9.24	.886	5.22
SD	2.85	4.34	8.79	1.09	.164	1.77
High School						
M	14.85	17.65	83.75	7.42	.721	5.20
SD	5.23	7.24	12.65	2.22	.338	2.33
Wave 9						
College						
M	12.12	14.94	93.04	8.73	.847	3.89
SD	3.57	4.66	9.44	1.35	.207	2.47
High School						
M	12.61	14.56	78.87	7.89	.847	6.33
SD	3.55	5.96	21.33	2.17	.236	2.52

APPENDIX F

APPENDIX F

Intracorrelations for Independent Variables

Table 2. Intracorrelations of Hitting Performance - Waves 1-9.

Wave	Pre	1	2	3	4	5	6	7	8	9
1	-.12	1.00								
2	.15	.46+	1.00							
3	.27	.22	.24	1.00						
4	.13	.20	.51*	.33+	1.00					
5	.18	.40+	.24	.49*	.26	1.00				
6	-.09	.19	.07	.01	.08	-.09	1.00			
7	-.16	.11	.00	.33	.02	-.03	.37+	1.00		
8	.01	.09	-.02	.14	.09	.22	.01	-.01	1.00	
9	.18	.45+	.16	.36+	.14	.24	.18	.45+	-.10	1.00

+ $p < .05$
* $p < .01$

Pre = previous hitting performance

Table 3. Intracorrelations of Self-Efficacy - Waves 1-9.

	Wave								
	1	2	3	4	5	6	7	8	9
Wave									
1	1.00								
2	.89*	1.00							
3	.82*	.88*	1.00						
4	.75*	.81*	.84*	1.00					
5	.84*	.85*	.73*	.86*	1.00				
6	.61*	.84*	.73*	.78*	.89*	1.00			
7	.74*	.82*	.92*	.86*	.76*	.87*	1.00		
8	.79*	.79*	.75*	.83*	.82*	.85*	.85*	1.00	
9	.54*	.75*	.82*	.66*	.60*	.71*	.80*	.71*	1.00

* $p < .001$

Table 4. Intracorrelations of Cognitive Anxiety - Waves 1-9.

	Wave								
	1	2	3	4	5	6	7	8	9
<u>Wave</u>									
1	1.00								
2	.83+	1.00							
3	.77+	.72+	1.00						
4	.63+	.74+	.83+	1.00					
5	.36*	.48+	.53+	.54+	1.00				
6	.57+	.61+	.76+	.81+	.73+	1.00			
7	.63+	.58+	.66+	.69+	.48+	.80+	1.00		
8	.61+	.61+	.70+	.77+	.63+	.78+	.76+	1.00	
9	.51+	.49+	.30	.55+	.43*	.63+	.65+	.76+	1.00

* $p < .05$
\+ $p < .01$

Table 5. Intracorrelations of Somatic Anxiety - Waves 1-9.

	Wave								
	1	2	3	4	5	6	7	8	9
<u>Wave</u>									
1	1.00								
2	.44+	1.00							
3	.80+	.40*	1.00						
4	.49+	.40*	.55+	1.00					
5	.13	.10	.31	.31	1.00				
6	.23	.24	.52+	.62+	.56+	1.00			
7	.30	.24	.48+	.52+	.46+	.83+	1.00		
8	.60+	.33	.80+	.61+	.23	.44+	.60+	1.00	
9	-.12	.17	.31	.52+	.08	.65+	.46+	.54+	1.00

* $p < .05$
\+ $p < .01$

Table 6. Intracorrelations of Effort - Waves 1-9.

Wave	1	2	3	4	5	6	7	8	9
1	1.00								
2	.53+	1.00							
3	.58+	.43+	1.00						
4	.14	.56+	.66+	1.00					
5	.51+	.28	.39*	.38*	1.00				
6	.04	.47+	.29	.08	.02	1.00			
7	.50+	.48+	.55+	.58+	.35	.48+	1.00		
8	.42*	.67+	.78+	.72+	.11	.11	.44*	1.00	
9	.38	.36	.57+	.68+	.47*	.05	.79+	.52+	1.00

* $p < .05$
\+ $p < .01$

APPENDIX G

APPENDIX G

Table 7. Correlations Among Independent Variables by Wave.

	Wave								
Variables	1	2	3	4	5	6	7	8	9
PP-SPR	.28*	.21	.00	.15	.23	.40**	.57**	.39*	.31*
PP-Cog	-.05	-.08	-.04	.00	-.17	-.01	-.39*	-.11	-.29
PP-Som	-.20	.10	-.10	.06	-.27	-.09	-.17	.14	-.16
PP-SE	.13	.55**	.37*	.24	.48**	.52**	.48**	.09	.70**
PP-Effort	.03	-.06	-.04	.10	-.00	-.12	-.05	-.16	-.11
SPR-Cog	-.18	-.10	-.30+	.14	.19	.12	-.57**	.00	-.28
SPR-Som	-.15	-.18	-.31	.23	-.13	.00	-.36*	.12	.40
SPR-SE	.37**	.35*	.14	.12	.01	.32*	.27	.04	.32
SPR-Effort	.02	-.17	-.07	.23	.05	-.39*	.10	-.18	-.10

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

PP = previous hitting performance
SPR = subjective performance ratings
Cog = cognitive anxiety
Som = somatic anxiety
SE = self-efficacy

Table 7 (Cont'd).

	Wave								
Variables	1	2	3	4	5	6	7	8	9
Som-Cog	.49**	.52**	.70**	.68**	.63**	.70**	.67**	.72**	.62**
Som-SE	-.50**	-.01	-.46**	-.20	-.20	-.25	-.54**	-.48**	-.37*
Som-Effort	-.31	.05	-.32*	.03	-.22	-.32	-.39*	-.37*	-.17
Cog-SE	-.33*	-.39*	-.51**	-.41**	-.26	-.32*	-.48**	-.32*	-.42**
Cog-Effort	-.18	-.01	-.27	.10	-.21	-.43**	-.02	-.13	-.06
SE-Effort	.44**	.31	.37*	.11	.39*	.21	.28	.41**	.23

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

APPENDIX H

APPENDIX H

Table 14. Path coefficients for the Hypothesized Model by Wave.

Path	Wave 1	2	3	4	5	6	7	8	9
PP --> Coganx	.003	-.066	-.039	-.025	-.220	-.071	-.097	-.126	-.219
SPR --> CogAnx	-.182	-.086	-.296+	.144	.238	.152	-.514**	.052	-.211
PP --> Somanx	-.171	.149	-.098	.022	-.258	-.109	.054	.116	-.041
SPR --> SomAnx	-.102	-.213	-.311+	.232	-.072	.045	-.393+	.070	-.387*
CogAnx --> SE	-.067	-.433*	-.399+	-.485*	-.198	-.391*	-.107	.129	-.120
SomAnx --> SE	-.434*	.212	-.153	.081	.050	.069	-.471*	-.599*	-.192
PP --> SE	-.044	.434**	.343*	.210	.470*	.441**	.493**	.174	.632**
SPR --> SE	.308*	.255+	-.032	.137	-.056	.195	-.239	.036	.010
SE --> Effort	.436**	.313+	.372*	.106	.393*	.210	.278+	.414*	.227
SE --> Hit	.449*	.339+	.310+	.225	.379*	.290+	.091	.349*	.113
Effort --> Hit	.103	-.083	.087	.142	.296+	.047	-.177	.210	.284
SE --> SPR	.003	.027	.262+	-.016	.051	.049	-.010	-.063	-.271
Effort --> SPR	.398*	.248	.557**	.304+	.445*	.243	.312+	.332+	.342+

+ $p < .10$
* $p < .05$
** $p < .01$

PP = previous hitting performance
SPR = subjective performance
Coganx = cognitive anxiety
Somanx = somatic anxiety
SE = self-efficacy
Hit = hitting performance

Table 15. Path coefficients for the Fully Recursive Model by Wave.

Path	Wave 1	2	3	4	5	6	7	8	9
PP --> Coganx	.003	-.066	-.039	-.025	-.220	-.071	-.097	-.126	-.219
SPR --> CogAnx	-.182	-.086	-.296+	.144	.238	.152	-.514**	.052	-.211
PP --> Somanx	-.171	.149	-.098	.022	-.258	-.109	.054	.116	-.041
SPR --> SomAnx	-.102	-.213	-.311+	.232	-.072	.045	-.393+	.070	-.387*
CogAnx --> SE	-.067	-.433*	-.399+	-.485*	-.198	-.391*	-.107	.129	-.120
SomAnx --> SE	-.434*	.212	-.153	.081	.050	.069	-.471*	-.599*	-.192
PP --> SE	-.044	.434**	.343*	.210	.470*	.441**	.493**	.174	.632**
SPR --> SE	.308*	.255+	-.032	.137	-.056	.195	-.239	.036	.010
PP --> Effort	-.003	-.351	-.200	.044	-.320	-.151	-.203	-.068	-.459
SPR --> Effort	-.160	-.341+	-.185	.213	.101	-.353+	.250	-.123	-.179
SomAnx --> Effort	-.102	.094	-.251	-.142	-.172	-.121	-.540*	-.334	-.162
CogAnx --> Effort	-.012	.251	.038	.217	-.044	-.200	.525+	.209	.113
SE --> Effort	.441	.721**	.376+	.130	.499*	.307	.266	.332	.593+
PP --> Hit	-.205	.420+	.128	.311+	.040	-.285	.174	.005	-.321
SPR --> Hit	-.178	-.029	-.031	.179	-.044	-.074	.285	-.130	-.116
SomAnx --> Hit	-.432*	-.412+	-.412	-.321	-.258	.028	.444	.022	-.016
CogAnx --> Hit	.325+	.335	.243	-.151	-.054	-.416	-.321	-.375	-.035
SE --> Hit	.463*	.216	.213	.004	.312	.386+	-.033	.254	.380
Effort --> Hit	.033	.001	.059	.118	.256	-.201	.002	.188	.173

+ $p < .10$
* $p < .05$
** $p < .01$

PP = previous hitting performance
Coganx = cognitive anxiety
Somanx = somatic anxiety
Hit = hitting performance
SPR = subjective performance ratings

Table 15 (Cont'd).

Path	Wave 1	2	3	4	5	6	7	8	9
PP --> SPR	-.099	.143	.022	.089	-.182	.001	.156	-.035	.061
SPR --> SPR	.191	.349	.087	.399*	.288	.460**	.014	.210	.462*
SomAnx --> SPR	-.240	-.360+	-.012	.008	-.351	.138	.032	-.197	.157
CogAnx --> SPR	.230	-.132	-.090	-.169	.125	-.773**	-.407	-.432	-.323
SE --> SPR	-.106	-.287	-.336	-.146	.138	-.304+	-.289	-.300	-.568+
Effort --> SPR	.412*	.432*	.563**	.233	.344+	.188	.398+	.334+	.471*

+ $p < .10$
* $p < .05$
** $p < .01$

APPENDIX I

Table 16. Means and Standard Deviations for Individual Self-efficacy Items Across Waves.

Question "How certain are you in your ability to:"	Wave 1	2	3	4	5	6	7	8	9
Put the ball in play 1 in 4 times	95.62 (6.81)	95.11 (7.87)	95.45 (7.30)	96.38 (7.64)	96.22 (6.14)	94.76 (10.87)	93.49 (12.51)	96.96 (6.28)	94.42 (14.02)
Put the ball in play 2 in 4 times	87.92 (14.14)	90.44 (13.64)	91.14 (12.62)	93.62 (10.72)	92.67 (10.09)	91.19 (13.83)	90.00 (15.43)	93.70 (9.97)	91.40 (15.82)
Put the ball in play 3 in 4 times	75.62 (22.68)	83.33 (19.07)	83.18 (19.14)	85.11 16.27)	85.11 (14.87)	85.24 (16.12)	84.19 (17.76)	85.87 (14.39)	83.95 (19.78)
Put the ball in play 4 in 4 times	61.46 (27.21)	73.33 (23.55)	73.86 (22.95)	75.53 (20.52)	76.89 (20.43)	78.33 (21.06)	75.81 (22.17)	78.04 (21.04)	76.05 (24.61)
Drive in runner from 2nd base 1 in 4 times	77.71 (19.49)	81.56 (18.46)	84.55 (14.86)	84.47 (12.65)	85.78 (12.88)	83.33 (13.73)	81.86 (16.66)	84.13 (13.76)	84.42 (15.17)
Drive in runner from 2nd base 2 in 4 times	63.33 (21.77)	69.33 (20.16)	72.95 (17.99)	74.47 (15.15)	74.22 (15.00)	75.71 (14.34)	72.09 (18.07)	74.57 (15.59)	74.88 (16.09)
Drive in runner from 2nd base 3 in 4 times	48.12 (22.94)	56.22 (21.98)	60.68 (19.70)	62.98 (19.99)	62.00 (18.17)	66.19 (17.10)	61.86 (19.06)	64.78 (18.10)	62.33 (18.62)

Note: Standard deviations are given in parentheses below each mean.

Table 16 (Cont'd).

Question "How certain are you in your ability to:"	Wave 1	2	3	4	5	6	7	8	9
Drive in runner from 2nd base 4 in 4 times	34.79 (22.78)	43.56 (20.36)	46.36 (22.21)	50.64 (24.08)	50.22 (20.61)	54.76 (19.78)	49.77 (22.52)	53.48 (20.35)	51.16 (21.84)
Lay down sacrifice bunt in 1st, 2nd, 3rd inning	88.54 (18.79)	89.56 (13.64)	89.77 (14.55)	88.09 (16.63)	92.44 (9.57)	91.43 (11.38)	89.77 (12.44)	90.00 (12.47)	87.44 (16.34)
Lay down sacrifice bunt in last inning	83.12 (20.54)	85.33 (15.61)	84.55 (17.97)	83.19 (18.19)	88.44 (14.92)	86.90 (16.60)	84.42 (16.37)	84.57 (16.43)	81.86 (20.15)
Hit sacrifice fly in 1st, 2nd, 3rd inning	(74.17 (16.61)	79.11 (17.56)	79.77 (17.18)	79.36 (16.47)	81.56 (14.45)	82.62 (15.94)	80.23 (17.52)	79.78 (16.40)	79.77 (21.77)
Hit sacrifice fly in last inning	67.08 (19.89)	72.89 (17.79)	73.64 (20.01)	72.98 (15.73)	73.56 (16.54)	75.95 (18.35)	73.49 (19.01)	73.26 (18.14)	71.40 (26.33)
Execute hit-run in 1st, 2nd, 3rd inning	72.08 (16.24)	77.78 (16.08)	76.36 (16.86)	78.51 (16.15)	80.89 (14.11)	82.14 (16.46)	78.60 (19.10)	80.43 (15.20)	79.07 (19.98)
Execute hit-run in last inning	64.58 (17.62)	72.00 (19.49)	71.14 (19.07)	71.70 (18.33)	74.00 (18.39)	74.76 (20.27)	72.79 (21.42)	72.17 (19.54)	72.09 (24.26)

Table 16 (Cont'd).

Question	Wave								
	1	2	3	4	5	6	7	8	9
"How certain are you in your ability to:"									
Drive in winning run-0,1 outs in last inning	69.58 (17.98)	72.67 (18.76)	72.05 (18.37)	73.40 (19.48)	77.78 (14.12)	75.71 (17.83)	71.40 (19.59)	74.35 (19.05)	73.49 (21.48)
Drive in winning run-2 outs in last inning	62.92 (19.13)	65.78 (20.39)	63.86 (21.80)	67.45 (22.21)	68.00 (19.26)	70.24 (18.14)	63.49 (22.56)	65.65 (20.94)	64.42 (24.43)
Lay down suicide bunt early innings of tie game	79.79 (18.62)	80.44 (18.46)	82.50 (18.06)	80.64 (20.26)	84.89 (16.04)	84.52 (18.11)	81.86 (17.08)	83.70 (15.11)	81.16 (19.54)
Lay down suicide bunt last inning of tie game	74.79 (20.21)	75.11 (18.78)	76.36 (20.92)	75.96 (22.42)	77.56 (21.01)	79.05 (20.34)	76.28 (21.49)	75.87 (20.61)	75.58 (25.19)

APPENDIX J

APPENDIX J

Data Coding Sheet

Variable	Line	Column	Values
Team	1	1	1, 2 =college 3, 4 = high school
I.D. number	1	2-5	
Previous contact percentage (cumulative)	1	6-9	
Previous contact percentage (most recent)	1	10-13	
Previous hitting performance (subjective)	1	14-15	
Game 1 self-efficacy	1	16-20	
Game 1 subjective performance	1	21-23	
Game 1 contact percentage	1	24-27	
Game 1 contact percentage (cumulative)	1	28-31	
Game 1 effort	1	32-33	
Game 1 anxiety (overall)	1	34-35	
Game 1 cognitive anxiety	1	36-37	
Game 1 somatic anxiety	1	38-39	
Game 2 self-efficacy	1	40-44	
Game 2 subjective performance	1	45-47	
Game 2 contact percentage	1	48-51	
Game 2 contact percentage (cumulative)	1	52-55	
Game 2 effort	1	56-57	

Variable	Line	Column
Game 2 anxiety (overall)	1	58-59
Game 2 cognitive anxiety	1	60-61
Game 2 somatic anxiety	1	62-63
Game 3 self-efficacy	1	64-68
Game 3 subjective performance	1	69-71
Game 3 contact percentage	1	72-75
Game 3 contact percentage (cumulative)	1	76-79
Game 3 effort	1	80
Game 3 effort	2	1
Game 3 anxiety (overall)	2	2-3
Game 3 cognitive anxiety	2	4-5
Game 3 somatic anxiety	2	6-7
Game 4 self-efficacy	2	8-12
Game 4 subjective performance	2	13-15
Game 4 contact percentage	2	16-19
Game 4 contact percentage (cumulative)	2	20-23
Game 4 effort	2	24-25
Game 4 anxiety (overall)	2	26-27
Game 4 cognitive anxiety	2	28-29
Game 4 somatic anxiety	2	30-31
Game 5 self-efficacy	2	32-36
Game 5 subjective performance	2	37-39

Variable	Line	Column
Game 5 contact percentage	2	40-43
Game 5 contact percentage (cumulative)	2	44-47
Game 5 effort	2	48-49
Game 5 anxiety (overall)	2	50-51
Game 5 cognitive anxiety	2	52-53
Game 5 somatic anxiety	2	54-55
Game 6 self-efficacy	2	56-60
Game 6 subjective performance	2	61-63
Game 6 contact percentage	2	64-67
Game 6 contact percentage (cumulative)	2	68-71
Game 6 effort	2	72-73
Game 6 anxiety (overall)	2	74-75
Game 6 cognitive anxiety	2	76-77
Game 6 somatic anxiety	2	78-79
Game 7 self-efficacy	2	80
Game 7 self-efficacy	3	1
Game 7 self-efficacy	3	2
Game 7 self-efficacy	3	3
Game 7 self-efficacy	3	4
Game 7 subjective performance	3	5-7
Game 7 contact percentage	3	8-11
Game 7 contact percentage (cumulative)	3	12-15

Variable	Line	Column
Game 7 effort	3	16-17
Game 7 anxiety (overall)	3	18-19
Game 7 cognitive anxiety	3	20-21
Game 7 somatic anxiety	3	22-23
Game 8 self-efficacy	3	24-28
Game 8 subjective performance	3	29-31
Game 8 contact percentage	3	32-35
Game 8 contact percentage (cumulative)	3	36-39
Game 8 effort	3	40-41
Game 8 anxiety (overall)	3	42-43
Game 8 cognitive anxiety	3	44-45
Game 8 somatic anxiety	3	46-47
Game 9 self-efficacy	3	48-52
Game 9 subjective performance	3	53-55
Game 9 contact percentage	3	56-59
Game 9 contact percentage (cumulative)	3	60-63
Game 9 effort	3	64-65
Game 9 anxiety (overall)	3	66-67
Game 9 cognitive anxiety	3	68-69
Game 9 somatic anxiety	3	70-71

APPENDIX K

APPENDIX K

Raw Data

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