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Meta-Analysis of Cognitive Strategies and Athletic Performance

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META-ANALYSIS OF COGNITIVE STRATEGIES AND ATHLETIC PERFORMANCE

by

Jody Meg Gold

A Thesis Submitted to the Faculty of the Graduate School
of Loyola University of Chicago in Partial Fulfillment
of the Requirements for the Degree of

Master of Arts

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VITA

The author, Jody Meg Gold, is the daughter of Norton Gold and Rhoda (Siegel) Gold. She was born August 28, 1963 in Chicago, Illinois.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	ii
VITA.	iii
LIST OF TABLES.	vi
 Chapter	
I. INTRODUCTION	1
Self-Efficacy Theory	1
Cognitive Strategies	3
Sex Differences.	4
Method of Induction.	4
II. REVIEW OF THE LITERATURE	6
Self Efficacy.	8
Mental Imagery	10
Anxiety Control.	12
Visuo-Motor Behavior Rehearsal (VMBR).	14
Positive and Negative Self-Statements.	15
Gender Differences	17
Efficacy Enhancement Methods	18
III. METHOD	22
Procedure.	22
Selection of Studies.	22
Coding Study Variables.	23
Meta-Analysis Procedure	23
Homogeneity vs. Heterogeneity of Effect Sizes	25
IV. RESULTS.	28
Description of Data Sample	28
Self-Efficacy.	28
Self-Efficacy vs. Other Cognitive Strategies	30
Gender Differences	33
Method of Self-Efficacy Induction.	33

V. DISCUSSION AND CONCLUSIONS	34
Self-Efficacy.	34
Self-Efficacy Versus Other Cognitive Strategies.	37
Gender Differences	39
Methods of Self Efficacy Induction	41
Direction of Future Research	42
REFERENCES.	44

LIST OF TABLES

Table	Page
1. Guidelines for Converting Various Test Statistics to r .	24
2. Means and t-Values for Self-Efficacy vs. Other Cognitive Strategies.	32

CHAPTER I

INTRODUCTION

Much recent research in psychology and education has focused upon the influence of cognitive strategies on individual behavior. Several forms of mental practice such as anxiety management, expectations and self-instruction have been studied as predictors of a wide variety of behaviors such as evaluation anxiety, career decision-making, and motor coordination (Lent, Brown & Larkin, 1986; Mahoney & Avener, 1977; Passer, 1983). Recently, the role and effect of cognitive processes on athletic performance has also gained recognition. Several mental strategies have been investigated for their ability to predict athletic performance including: self-instruction (Meyers, Cooke, Cullen & Liles, 1979), imaginary rehearsal (Epstein, 1980), anxiety control (McAuley, 1985), and self-perception (Feltz & Brown, 1984). The present study will focus upon one such cognitive activity (self-efficacy) to evaluate its relationship to athletic performance. In addition, self-efficacy will be compared to other cognitive strategies in order to compare its predictive power to other commonly studied mental strategies in athletic performance.

Self Efficacy Theory

Research has demonstrated that one's confidence in his or her ability to succeed at a given task or behavior is a strong determinant of outcome in a variety of sports such as racquetball (Meyers et al.,

1979), gymnastics (Lee, 1982), and marathon running (Okwumabua, 1983). Much of the above research supports the principles of Albert Bandura's (1977) self-efficacy theory. Behavioral change is mediated by a common cognitive mechanism. According to Bandura (1977) psychological procedures, whatever their form, alter the level and strength of self-efficacy. Self-efficacy is defined as the strength of one's conviction that he or she can successfully execute a behavior required to produce certain outcome. This is not to say that self efficacy is equivalent to outcome expectancy, which may be defined as the understanding that a certain behavior will lead to a specific outcome or consequences. For example, a sprinter may understand that he must run quicker than the opponent to achieve victory (outcome expectation), but the extent to which that person believes he or she can actually produce this behavior signifies the level of efficacy expectations. Assuming that an individual is capable of a response and appropriate incentives for performance are available, then self-efficacy theory asserts that actual performance will be predicted by the individual's belief in personal competence.

Although the relationship between self-efficacy and athletic performance has been examined in a number of different sports settings (Barling & Abel, 1983; Feltz, Landers & Raeder, 1979; Gould & Weiss, 1981), no attempt has been made to integrate this literature and to estimate the strength of the relationship of self-efficacy and performance across a variety of sport settings. Therefore, a meta analysis of the published and unpublished literature relating self-efficacy and sports performance was undertaken in this study. It

is specifically hypothesized that there is a positive correlation between levels of self-efficacy and athletic performance. Due to the paucity of studies specifically examining the stated variables, the term "self-efficacy" is broadly defined. Some studies do not precisely state that they are measuring "self-efficacy"; however, studies have been included which measure one's expectations that he or she can successfully perform a specific behavior, or one's confidence level specifically pertaining to the sport behavior being measured. Athletic performance has been defined as any sport-related behavior that is actually performed (excluding behavioral intentions to perform a specific behavior).

Cognitive Strategies

Mental strategy is not a substitution for physical practice. Instead, the combination of the two significantly enhances performance outcome. The strategy utilized may determine the athlete's ultimate performance. Many of the strategies suggest improvement in athletic potential; however, which method is most efficacious remains to be investigated. Meta-analytic procedures will also be applied to the following cognitive mechanisms--self-efficacy, imaginary rehearsal, anxiety control, self-perception and self-instruction, to determine the strength of the relationship between strategy use and performance improvement. Effect sizes will be calculated and averaged for each strategy. It is hypothesized, as stated previously, that self-efficacy is positively correlated with athletic performance (Bandura, 1977), and it is the most potent predictor of performance outcome.

Sex Differences

According to Godin and Shephard (1985) there exists significant sex differences in perceived physical self-efficacy. An instrument was designed to measure one's perceived level of physical self-efficacy. Sample items on the Perceived Physical Self-Efficacy Scale (PPSE) include: "I have excellent reflexes; I am never intimidated by the thought of a sexual encounter; athletic people do not receive more attention than me." Godin and Shephard (1985) reported internal consistency reliability estimates of .63. Analysis of variance revealed significant sex differences favoring men in total physical self-efficacy and perceived physical ability scores. Another purpose of this study is to explore sex differences in sport performance self-efficacy relationships. It is anticipated that men will display significantly higher self-efficacy beliefs than will women.

Method of Induction

Bandura proposes that there are four sources of efficacy enhancement: (1) performance accomplishment (e.g. participant modeling, performance desensitization, performance exposure, self instructed performance), (2) vicarious experience (e.g. live and symbolic modeling), (3) verbal persuasion (e.g. suggestion, exhortation, self-instruction, interpretive treatment), (4) emotional arousal (e.g. attribution, relaxation biofeedback, symbolic desensitization, symbolic exposure). Although Bandura postulates that there are four different sources of efficacy enhancements (enactive, vicarious, emotive and exhortative), the sport literature primarily

concentrates on the enactive mode. The strongest and most enduring determinant of self-efficacy is performance accomplishment, modeling techniques may be considered a close second (Feltz & Weiss, 1982). Modeling is important to self-efficacy because seeing others perform successfully encourages the observers to examine their own abilities for success. Given the proper incentive and motivation self-efficacy can be a strong predictor of performance. The study will also attempt to discern which of the enhancement strategies is the most efficacious method of self-efficacy enhancement.

In summary, the present study is designed to: (1) investigate the relationship between self-efficacy and athletic performance, (2) compare self-efficacy and other cognitive predictors of performance, (3) explore gender differences in self-efficacy performance relationship, (4) assess the relative strength of past performance, modeling, and participant modeling as self-efficacy enhancement techniques. The study predicts that: (1) a positive relationship exists between self-efficacy and athletic performance, (2) self-efficacy is the strongest predictor of performance, (3) the relationship between self-efficacy and performance will be higher for males than for females, (4) participant modeling is the strongest method of efficacy induction.

CHAPTER II

REVIEW OF THE LITERATURE

In recent years there has been a proliferation of studies which examine the different forms of "mental practice" involved in athletic behavior. Experimental evidence has acknowledged that the cognitive strategy which is chosen can directly influence an athlete's performance (Barling & Abel, 1983; Highlen & Bennett, 1983; Mahoney & Avener, 1977; Meyers, Cooke, Cullen, & Liles, 1979; Wilkes & Summers, 1984). Some of the popular techniques include: self-efficacy statements, anxiety control, imaginary rehearsal, and positive vs. negative self-talk. Apparently, some techniques may be more effective than others when studied in direct comparison. For example, Mahoney and Avener (1977) studied several forms of mental practice such as anxiety control, self-efficacy statements, imagery, and positive vs. negative self-talk. The elite athletes utilized more control over their anxiety and had higher expectations than their less qualified counterparts. Because results have been equivocal in determining the effectiveness of these techniques in predicting enhanced athletic performance, an investigation of each strategy will follow.

Nelson and Furst (1972) were among the pioneers who investigated subject expectation on performance in a competitive athletic setting (arm wrestling). The study predicted that where actual strength differences were small, the weaker man would win if both he and his

opponent thought him to be the stronger of the two. Subjects ranked each other according to what they believed represented the strongest opponent to the least strong. Individual arm strength was covertly measured and contestants were paired in an arm wrestling context in which both opponents thought the weaker of the two to be the stronger of the two. The subjects' expectation of their successes proved to be a stronger predictor of their performance than their previous performance; each outcome contingent upon the stronger opponent expecting to lose.

Congruent findings were revealed in the Ness and Patton (1977) study which examined the role of expectations based on perceived environmental cues in determining maximum strength lifting performance. Resistance machines were deceptively altered so that in one treatment setting subjects were pressing more weight than they believed; and in the third treatment subjects were denied any indication of weight being manipulated. Results demonstrated an increased strength performance (from an established baseline strength) by the treatment group when resistance was set higher than the subjects believed. This indicated that the subjects' expected resistance rather than actual resistance was the ultimate factor in predicting maximum performance. Ness and Patton (1977) suggest that the increase in performance reflects the subject's attempt to (at least) match their previous performance levels. Therefore, the subject's strong conviction that they would perform a specific behavior enabled them to achieve a performance level superior to their previous performance.

Self Efficacy

The above concept directly relates to Bandura's (1977) theory of self-efficacy which maintains that the strength of one's belief that he or she can successfully perform a certain behavior will determine the effort and persistence put forth. Evidence suggests that higher levels of self-efficacy coexist with superior athletic performance (Barling & Abel, 1983; Feltz, Landers, & Raeder, 1979; Gould & Weiss, 1981; Weinberg, Gould, Yukelson, & Jackson, 1981). Okwumabua (1985) examined the cognitive contributions to marathon running. Subjects were given questionnaires prior to the race, assessing their level and strength of self-efficacy (among other variables such as practice, previous performance, and expected performance). The subjects' strength of self-efficacy accounted for over 40% of the variance in marathon finishing time. The highest levels of self efficacy significantly correlated with the most superior performance scores among contestants. Gould et al. (1981) compared the cognitive strategies of the successful and unsuccessful wrestler and found that the elite wrestler felt more confident in his ability to achieve his maximum potential than the less successful wrestlers.

Efficacy expectations influence an individual's effort and persistence in the face of failure and aversive circumstances. Weinberg et al. (1979) conducted the first study investigating the relationship between self-efficacy and a competitive motor skill. Level of efficacy was manipulated prior to the task. Subjects in the low efficacy group competed against a confederate who was an alleged weight lifter in preparation for track season. Subjects in the high

efficacy condition competed against a confederate with a supposed knee injury. Results supported the self-efficacy predictions with the high efficacy group extending their legs significantly longer than low efficacy subjects. In addition, despite the failure on the first trial, high efficacy subjects exhibited improvement in performance whereas low efficacy subjects displayed a performance decrement.

Bandura (1977) states that after strong efficacy expectations are developed through repeated success, the negative impact of an occasional failure is likely to be reduced. In accordance with this assertion Feltz, Landers, and Raeder (1979) found that an occasional failure on subjects' back diving performance did not appear to have a negative effect on their self-efficacy. Intermittent failures that are later overcome can even strengthen self-efficacy (Bandura, 1977).

An important facet of self-efficacy theory is the potential for generalization. Once self-efficacy is developed in a specific behavioral mode it may lead to higher efficacy expectations in other areas (Bandura, 1977). Effectively established self-efficacy may carry over into other situations in which performance was once self-debilitated by preoccupation with personal inadequacies. Slate (1981) utilized Bandura's (1977) principles and applied them to patients in a psychiatric setting. He established a three month jogging program and attempted to assess the relationship between jogging, self-efficacy, and its effects on the subjects' psychosocial well-being.

Performance measurement was based upon the subject's heart rate recovery, number of laps completed, and a Discharge Readiness

Inventory. In addition, subjects' psychosocial assessments were based upon semi-structured interviews, behavioral ratings, review of progress notes, and recording of data at each individual jogging session. Slate (1981) found that in five out of the nine subjects who completed the program there existed an increase in personal sense of self-efficacy. The improvement was noted in greater future orientation, more realistic and specific planning, more goal directedness and purposeful behavior, and more willingness to face reality. Slate (1981) noted the most apparent improvement in self-efficacy in those subjects whose primary psychiatric symptoms had abated, were in the process of rehabilitation, and those subjects for whom the exercise of jogging had a special appeal. The latter is consistent with Bandura's (1977) theory in that efficacy can be mediated when an individual is capable of a response and appropriate incentives for performance are available.

Mental Imagery

Although the cognitive process of mental imagery has been studied, logically, one variable which would determine its potency is the athlete's ability to imagine him or herself performing the task. For some individuals this skill may be easily developed, and therefore, beneficial. Start and Richardson (1964) examined the use of kinesthetic (internal) imagery versus visual (external) imagery and its relationship to successful gymnastic performance. External imagery is defined as occurring when a person views him or herself from the perspective of a third person (much like watching TV); internal imagery is potentially kinesthetic and is distinguished by a real-life

phenomenology such as the individual actually experiences those sensations which would be expected in the actual situation (Mahoney, 1979). The gymnasts found the former (internal imagery) to be a more useful strategy for improvement than the latter (external imagery).

Mahoney and Avener (1977) noted that the more successful gymnasts utilized internal (kinesthetic) imagery, while the less successful athletes primarily relied on external (visual) imagery. Self-report data from cross country skiers confirms the effectiveness of utilizing pertinent mental images, particularly internal images (Gravel, Lemieux, & Landouceur, 1980).

Silva (1982) discussed three case studies which involved the use of mental imagery and concentration cues as intervention strategies to improve competitive basketball and hockey performance. All three cases demonstrated performance improvement with use of self-instructional imagery which involves the subject describing covert verbalizations and images he or she believes to experience immediately before, during, and after the behavior is performed. However, Silva (1982) is skeptical because imagery is better controlled in clinical research than in the existing sport literature. It is unclear how often the imagery is actually engaged in during the experimental periods. It is clear that covert and imaginary rehearsal has the potential to positively influence behavior, but when it is utilized in conjunction with additional cognitive strategies the effect may be accentuated (e.g., Silva, 1982; Meyers, Cooke, Cullen, & Liles, 1979).

On the other hand, several studies found no relation between

image perspective and skill level (Gould & Weiss, 1981; Meyers et al., 1979; Wilkes & Summers, 1984). Highlen and Bennett (1979) also failed to find a distinguishing factor between the qualifying and non-qualifying wrestlers who both reported the use of imagery to a moderate degree. Epstein (1980) designed a study to examine specifically the relationship between internal and external imaginary rehearsal and imaginal style to a skilled motor behavior (dart-throwing). Again, the impact of imaginary rehearsal on immediate performance was not statistically significant. It should be noted that few studies have addressed the issue of internal versus external imagery; therefore, the findings are inconsistent. Perhaps both types of imagery can be beneficial, but their effectiveness is contingent upon variables such as type of task, familiarity with task, and timing of practice (Corbin, 1972; Mahoney, 1979).

Anxiety Control

Increases in anxiety tend to cause individuals to narrow their attention as well as lose flexibility, thereby impeding their performance (Weinberg, 1982). Various anxiety patterns have been found to coexist with elite athletic performers. The focus should be placed on how the athlete copes with his or her anxiety rather than measuring the level of anxiety. The latter may lead to misinterpretation of the athlete's ability (Epstein & Fenz, 1962). These findings are later confirmed by Fenz and Jones (1972) who found similar response patterns in elite parachute jumpers; the more experienced jumpers indicated anticipatory control over their anxiety. Gravel, Lemieux, and Landouceur (1980) examined the intensity of the

maladaptive cognitive pattern in ski racers. Findings supported the hypothesis that advocates detecting patterns of anxiety and channeling these energies toward more appropriate stimuli performance.

During the International Racquetball Association National Championship the cognitive patterns of the competitors was investigated (Meyers et al., 1979). Results reported both the champion racquetball players and their collegiate competitors to be equally anxious during precompetition periods; however, once the actual competition began the more experienced players reported a leveling off and eventual decrease in anxiety while the less skillful players continued to report an increase in anxiety (Meyers et al., 1979). Congruent findings are cited in a study involving the sport of orienteering (Gal-Or, Tennenbaum, & Shimrony, 1986). The superior orienteers coped more adaptively with their precompetition anxiety by demonstrating the ability to decrease their anxiety to a more moderate level just prior to actual performance, whereas the less qualified competitors continued to grow more anxious. Similar results were displayed with elite divers and wrestlers (Highlen & Bennett, 1979; 1983).

On the contrary, Gould, Weiss, and Weinberg (1981) failed to find anxiety coping responses which distinguished the successful big ten wrestlers from the unsuccessful. All athletes responded similarly with their anxiety increasing prior to the meet and declining during actual performance.

One study was designed to directly test two competing models explaining change in avoidance behavior (McAuley, 1985). Eysenck

(1978) maintains that anxiety reduction mediates behavior change, rather than self-efficacy cognitions which are merely by products of reduction in anxiety. Bandura (1977) argues conversely that behavioral change is determined by self-efficacy expectations and that efficacy cognitions lead to anxiety reduction. Only self-efficacy proved to be a significant predictor of skilled performance (McAuley, 1985). Bandura's (1977) theory provided a more parsimonious explanation of behavior change than the anxiety reduction model. Although it is likely that anxiety control mediates behavior and improves performance, it remains equivocal whether it is one of the prominent factors involved in performance enhancement.

Visuo-Motor Behavior Rehearsal (VMBR)

In reviewing the sport literature another technique emerged which includes a combination of the previous strategies discussed. Visuo-Motor Behavior Rehearsal (VMBR), developed by Suinn (1972), combines imaginary rehearsal and anxiety control. The process involves three stages: (1) an initial relaxation phase, (2) visualizing performance during a relevant stressful situation, and (3) practicing the skill during a simulated stressful scenario. Studies demonstrate inconsistent results regarding the technique's efficacy. Noel (1980) found the more experienced athletes only achieved marginally significant improvement in their tennis performance; whereas the more novice players showed a performance decrement. On the contrary, Kolonay (1977) and Hall and Erffmeyer (1983) both noted a significant performance increment in their basketball players. Similarly, Weinberg, Seabourne, and Jackson (1981) maintain that VMBR

was more effective in enhancing specific karate moves than either imagery or relaxation alone. Because so few relevant studies exist to date more outcome studies may be needed to verify the effectiveness of VMBR.

Positive and Negative Self-Statements

Much research supports the notion that self-statements have the potential for eliciting emotional reactions which may affect performance (Gal-Or et al., 1986; Gravel et al., 1980; Mahoney & Avenier, 1977). The self-verbalizations occurring during the athlete's performance is a crucial cognitive process which influences behavior in a logical manner. Positive self-statements produce more favorable performance than negative self-verbalizations (Weinberg, 1982). For example, Mahoney and Avenier (1977) found that gymnasts who reported experiencing occasional doubts about their ability just prior to performance (e.g. "I hope I don't fail") tended to perform more poorly than those athletes qualifying for the Olympic Gymnastic Team (e.g. "I know I can do it").

A cognitive-behavioral treatment model was utilized with a group of downhill ski racers which involved a combination of deep muscle relaxation along with a goal toward gaining increasing control over negative thoughts and replacing them with adaptive ones (Gravel, Lemieux, & Landouceur, 1980). A control group which concentrated on irrelevant free-association words was used for comparison. Gravel et al. (1980) chose to focus upon self-statements because these persistent and recurrent thoughts distract the skiers from their body movements and racing techniques which ultimately leads to a

deterioration in performance. These negative thought patterns were categorized into five groups: (1) ruminations of self-depreciation, (2) failure ruminations, (3) pair ruminations, (4) climate and topographical ruminations, and (5) other ruminations (i.e. unrelated problems which may reduce concentration). Results demonstrated significant improvement in comparison of the experimental over the control group; there was a substantial decrease in the intensity of the maladaptive cognitive pattern. Unfortunately, the results could not be quantified because contestants were competing in four exclusive groups: senior men, senior women, junior men, junior women. Hence, no performance measures were obtained other than a questionnaire of subjective estimates.

Meyers, Cooke, Cullen, and Liles (1979) administered a questionnaire similar to the one designed by Mahoney and Avenier (1977) to investigate the cognitive strategies employed by competitors in the Memphis State University racquetball team. Meyers et al. (1979) reported a negative correlation between frequency of self-doubts about racquetball abilities and placement in the Tennessee State Championships. Elite athletes believe they are closer to reaching their maximum potential, have fewer self-doubts, and are more confident (Gould, Weiss, & Weinberg, 1981). Findings consistently support the notion that positive self-verbalizations enhance performance, whereas critical thoughts or self-doubts tend to impede performance quality. Self-statements would logically appear to be in direct alignment with self-efficacy beliefs. Perhaps self-efficacy theory provides a more precise explanation for ultimate performance

improvement than self-verbalizations alone.

Gender Differences

It has been suggested that females, in general, are discouraged from physical activity, lack participation in regular strenuous exercise, and report more physical illness symptoms than males (Lips, 1985; Myers & Lips, 1978; Rubenstein, 1982; Westkott & Coakley, 1981). The Perceived Physical Self-Efficacy questionnaire was designed to specifically test the notion that males demonstrate higher levels and strength of self-efficacy (related to athletic performance) than women (Ryckman, Robbins, Thornton, & Cantrell, 1982). When compared to women, males had more positive concepts of their bodies (Godin & Shephard, 1985).

The expectations and performance level of men and women was manipulated in a muscular endurance task (Weinberg, Gould, & Jackson, 1979). The experiment was rigged so that subjects lost in competition with a confederate who was injured (high efficacy) or a varsity athlete (low efficacy). The subjects' performance and cognitive states were investigated, indicating that the efficacy-performance relationship was stronger for males than for females. It was also found that males exhibited significantly more positive self-talk, whereas females displayed more negative self-statements. Weinberg et al. (1979) suggest that the significant differences largely resulted from the nature of the task which is traditionally labeled as male-oriented (muscular endurance). Due to the difference in sex role socialization patterns society emphasizes the importance of competition and winning for males, while females are socialized to be

more motivated toward affiliation (Weinberg et al., 1979).

From an attributional perspective men are more likely to attribute athletic success to their own perceived effort and ability. Conversely, females tend to attribute their successes to luck (Bird & Williams, 1980; Duda, 1981; Roberts & Duda, 1984). Therefore, it would seem that utilization of cognitive processes to improve athletic ability such as self-efficacy, positive self-instruction, or anxiety control would be more amenable to males than females.

Efficacy Enhancement Methods

The self-efficacy sport-related literature predominantly promotes efficacy enhancement through performance accomplishments (e.g., Barling & Abel, 1983; Feltz, 1982; Lee, 1982; McAuley, 1985; Okwumabua, 1985; Slate, 1981; Weinberg, Yukelson, & Jackson, 1981; Wilkes & Summers, 1984). One's level of self-efficacy is mediated by factors such as previous performance (Lee, 1982; Okwumabua, 1985), modeling techniques (Feltz et al., 1979; Gould & Weiss, 1981), persuasion techniques (Hogan, 1981), and in some cases anxiety control (Gal-Or et al., 1986). Feltz and Weiss (1982) maintain that the strongest and most durable determinant of self-efficacy is performance accomplishment; modeling may be considered a close second. Bandura's (1977) theory predicts that the most parsimonious method of self-efficacy enhancement is "participant modeling" which is defined as including three basic criteria: modeling, guided participation, and success experiences.

People tend to avoid situations they believe exceed their capabilities but they confidently undertake activities they judge

themselves to be capable of doing (Bandura, 1980). Active engagement in activities helps to foster the growth of competencies. Hogan (1981) applies these concepts to working with the elderly in a physical sport. The elderly manifest diminished levels of self-efficacy by avoiding those activities they may prefer to engage in, but due to a perceived lack of ability, consider themselves unable to participate. The older adults who perceived themselves as becoming more successful in their swimming performance and skill demonstrated higher efficacy (Hogan, 1981).

Although both experimental groups were actively engaged in the sport of swimming, only the group which received daily attention from coach-like confederates experienced significant self-efficacy enhancement; the other group which continued to practice on their own, and received no attention, experienced stagnated efficacy levels (Hogan, 1981). Therefore, it appears that self-instructed performance alone may not be enough of an efficacy enhancement. It is likely that enhancement followed the verbal persuasion from the swim instructors, and the vicarious experience of watching the instructors perform the skills in a successful manner.

Another study specifically investigated the effectiveness of participant, live, and videotape modeling on the acquisition of a high avoidance diving skill (Feltz, Landers, & Raeder, 1981). As predicted, results indicated the most performance successes in the participant modeling group, but little difference was found between the live and videotape modeling groups. Feltz et al. (1981) proposes that because the modeling group did not display enhanced efficacy and

performance scores to the same extent as the participant modeling group, guidance was predominantly the reason for participant modeling effects.

Congruent results were reported by McAuley (1985) who examined the differences between aided participant modeling (with physical guidance) and unaided participant modeling (live modeling with practice), and a control group (practice alone). The aided participant modeling group scored the highest on performance followed by the unaided participant modeling group; the control group displayed the least performance improvement (McAuley, 1985). Research consistently supports the effectiveness of the participant modeling technique for self-efficacy enhancement in comparison to the other methods of induction (Bandura & Adams, 1979; Feltz, Landers, & Raeder, 1981; Hogan, 1981; McAuley, 1985).

This review has attempted to encompass the extensive literature on cognitive strategies and their relationships to athletic performance. Relevant strategies include: self-efficacy statements, imaginary rehearsal, anxiety control, visuo-motor behavior rehearsal, and positive vs. negative self-statements. A more precise conclusion may be drawn as to the effectiveness of each technique by conducting meta-analyses comparing the various cognitive strategies involved in athletic performance. It is hypothesized that a positive relationship between self-efficacy and athletic performance exists; furthermore, self-efficacy is the most powerful predictor of performance.

It should be noted that the subject's gender may influence the strategy's predictability of performance. It is suggested that males

will tend to yield higher effect sizes than the female population. Specific to the self-efficacy literature, method of self-efficacy induction may strengthen or weaken the technique's effectiveness. It is hypothesized that the participant-modeling method of self-efficacy enhancement will yield the strongest effect size.

CHAPTER III

METHOD

Procedure

Selection of Studies

The literature search began in November of 1986 from four principle sources: Psychological Abstracts, ERIC Search, Medline, and Dissertation Abstracts, dating back to 1977. The beginning point of reference was chosen due to the publication date of Bandura's (1977) initial article on self-efficacy theory. A manual search was also conducted for articles dating December 1986 through April 1987, using journals containing the largest number of relevant studies. Studies were further recruited from the references of chosen literature.

Studies were included in the meta-analysis which met the following criteria: (a) actual performance of a sport behavior, (b) performance measurement, (c) self-efficacy measurement or equivalent mental strategy (i.e. situationally specific self-confidence or expectations, imaginary rehearsal, anxiety control, self instruction, or self-perception). Studies were excluded for the following reasons: (a) only a behavioral intention was measured, (b) a study assessed self-esteem or self-perception as a general personality trait, (c) only a sport-like skill was tested such as hand grip strength or stability, rather than performance in a sport, (d) the study failed to include enough data to determine an effect size, or (e) the sample

size included five or less subjects.

Coding Study Variables

The following information was recorded for each study: (a) date of publication, (b) source of publication, (c) sample size, (d) mean age of subjects, (e) setting (lab vs. field), (f) subject type (i.e. student, college athlete, nonathlete), (g) reliability/type, (h) sport, (i) method of self-efficacy enhancement (if applicable), (j) type of mental strategy used (i.e. imagery, self instruction, self-efficacy).

Meta-Analysis Procedure

Pearson Product Moment Correlations (r) between self-efficacy (or other mental strategy) and actual sport behavior were chosen as effect size estimates since correlational relationships were most often reported in the reviewed studies. In the event that correlations were not provided, formulas presented by Wolfe (1986) were used to derive r from reported statistics (see Table 1). Separate meta-analyses were conducted for males and females and for each mental strategy examined. Further analyses were conducted comparing effect sizes of studies utilizing the following methods of self-efficacy enhancement: participant modeling, modeling with practice, and practice alone.

To avoid the problem of bias or Type I error resulting from multiple effect sizes per single study, studies were allowed to contribute only one effect size per meta-analysis. If effect sizes reported in a single study were independent (measuring unrelated constructs such as separate effect sizes for self-efficacy, anxiety

Table 1

Guidelines for Converting Various Test Statistics to r

Statistics to be Converted	Formula for Transformation to r	Comment
t	$r = \frac{t^2}{t^2 + df}$	
F	$r = \frac{F}{F + df \text{ (error)}}$	Use only for comparing two group means (i.e. numerator df = 1)
χ^2	$r = \frac{\chi^2}{n}$	n = sample size. Use only for 2 X 2 frequency tables df = 1
d	$r = \frac{d}{d^2 + 4}$	

Wolfe, 1986, p. 35.

control, and imaginary rehearsal all within a single study), each effect size was coded. Studies having multiple effect sizes measuring similar variables (i.e. confidence and self-efficacy) were averaged to yield a single effect size. Given that studies with a larger sample size provide a more unbiased description of the true population effect size, each individual effect size was weighted on the basis of the specific sample size used in the study. The procedure used to derive the weighted effect size was:

$$r_w = \frac{\sum(Nr)}{N} \quad [2]$$

where r_w is the estimated true (i.e., weighted) effect size, and N is the total sample size used in calculating the specific r_w (cf. Hunter, Schmidt, & Jackson, 1982).

Homogeneity vs. Heterogeneity of Effect Sizes

It is generally expected that effect sizes measuring similar constructs will be relatively homogeneous. Assuming that the standard deviation among effect sizes exceeds zero, reasons for heterogeneity must be explored. Sources of bias may be inherent within the studies. According to Hunter, Schmidt, and Jackson (1982), primarily two sources of variance exist: (1) true variance among scores in the population, and (2) variance due to statistical artifact. The latter source may be broken down further into variance due to: (1) sampling error, (2) unreliability of either the predictor or the criterion measure, (3) restriction of range, and (4) computational or transcription errors.

The criterion for concluding that more than artifacts is responsible for variance is that variance attributable to such artifacts as sampling error or unreliability across studies is less than 75% of the observed variance in study outcomes (Hunter, Schmidt, & Jackson, 1982). Therefore, if the ratio of error to sample variance is less than .75 additional moderator variables must be explored. The moderator variable refers to some situational or personal characteristic that is associated with differences in study outcomes. For example, the type of sport, or number of years of athletic experience may influence effect size outcome.

The above procedure for searching for moderators is referred to as the "S & H-75" procedure by Spector and Levine (1987). Spector and Levine (1987) found that Type I error rates for the "S & H-75" technique is unacceptably large; when a small number of correlations were being compared (6-10) the error rate exceeded 20%.

Furthermore, the power of "S & H-75" to detect differences is too small, and the means of ratios of error to correlation variance was inconsistent and too large. Spector and Levine (1987) calculated the Type I error rate by aggregating the number of times the "S & H-75" procedure and the U (Marascuilo, 1971) statistic (which they were advocating) detected differences among correlations when all were from the same population. This would be represented by the "S & H-75" procedure failing to find that 75% of the variance among correlations is accounted for by sampling error (the only possible artifact investigated) or the U procedure being statistically significant. Instead, Spector and Levine (1987) recommend using tables they have

calculated based on number of r 's and population size to estimate Type I and Type II error rates in deciding whether to use U or the "S & H-75" technique.

When comparing large numbers of correlations, "S & H-75" represents an acceptable choice because it incorporates corrections for other artifacts in addition to sampling error. Spector and Levine's (1987) procedure only examines one statistical artifact, sampling error, because it accounts for the major portion of corrections in observed variance with the "S & H-75" technique relative to other artifacts such as reliability of criteria. Furthermore, much of the data necessary for such corrections is unavailable in the present studies being cumulated. In conclusion, when sampling error is the only artifact in question or when comparing smaller numbers of correlations, the U statistic is preferable (Spector & Levine, 1987).

The U statistic was, therefore, calculated using the following procedure:

$$U = \sum (n - 3) (z - \bar{z})^2, \quad [3]$$

where $z = z$ transformed r , and \bar{z} mean of z 's. It is distributed as chi-square with $nc - 1$ degrees of freedom, where $nc =$ number of correlations. A significant U indicates that a group of correlations comes from at least two populations (i.e., are not homogeneous). Thus, moderators were explored when the U statistic indicated significant heterogeneity.

CHAPTER IV

RESULTS

Description of Data Sample

A total of 22 studies were found on self-efficacy and athletic performance in the published literature and five studies in the unpublished dissertation literature which met the criterion for data selection. In the published literature, a total of 11 studies on imaginary rehearsal, 18 studies on anxiety control, eight studies involving positive and negative self statements, and three studies on visuo-motor behavior rehearsal met the criterion for selection. This investigation included a total of 67 studies on the chosen cognitive strategies. It should be noted that 50% of the studies were found in the Journal of Sport Psychology.

Self-Efficacy

The overall mean effect size (\bar{r}) for the self-efficacy method of improving athletic performance was .46; therefore, the first hypothesis stating that a positive relationship exists between self-efficacy and athletic performance was supported. The correlation indicates that higher levels of self-efficacy co-exist with superior athletic performance. The strength of the relationship is moderate to large according to Cohen (1977); $r = .10$ indicates a small effect size, $r = .30$ a medium effect size, and $r = .50$ or higher is considered a large effect size.

Although Cohen's (1977) suggestion implies that the effect size $\bar{r} = .46$ is moderate to large, the significance of the effect size must be examined more closely. Cooper (1979) recommended that when significant effect sizes occur in meta-analyses, it would be useful to know how many unretrieved studies with null findings would be needed in order to reverse the conclusion that a significant relationship exists. This is referred to as the "Fail Safe N" (N_{fs}) calculated using the following formula (Orwin, 1983):

$$N_{fs} = \frac{N(\bar{d} - \bar{d}_c)}{\bar{d}_c}$$

where N = the number of studies sampled in the meta-analysis, d = the average effect size calculated (for the purpose of this study all r 's were transformed into d 's and then substituted in the equation), and d_c = the criterion value selected that d would equal when some knowable number of hypothetical studies (N_{fs}) were added to the meta-analysis (Wolf, 1986). The typical \bar{d}_c suggested by Cohen (1977) is $d = .2$ (small effect size). The fail safe N statistic revealed that a total of 96 studies with a null hypothesis (or $r \leq .10$) would be needed to reverse the significant finding. The positive relationship between self-efficacy and athletic performance appears to stand up under scrutiny.

Schmidt, Hunter, and Jackson (1982) suggest correcting the effect size for attenuation due to the unreliability of the criterion measure used. However, since only one third of the studies used included reliability estimates for the measures, the \bar{r}_c statistic was not used

in this study. The estimated true mean effect size (r_w) is the effect size weighted on the basis of sample size. The weighted mean effect size decreased the value for self-efficacy slightly from .46 to .44.

Heterogeneity of effect size was examined utilizing the procedure recommended by Spector and Levine (1987). In this case the U statistic was highly significant $X^2(26) = 235.14$, $p < .001$, indicating that there existed heterogeneity among effect sizes for self-efficacy. Thus, moderator variables were explored. One potential source for moderation was found. The variation involved whether the study was conducted in a lab or field setting. Investigations occurring in a field setting yielded significantly higher effect sizes ($\bar{r} = .51$) than those performed in a laboratory setting ($\bar{r} = .32$), $F(1,26) = 4.28$, $p < .05$.

Self-Efficacy vs. Other Cognitive Strategies

Results revealed that the second hypothesis, suggesting that self-efficacy is the most potent predictor of athletic performance was also supported. Separate meta-analyses were conducted for each cognitive strategy examined.

The mean effect size (\bar{r}) for imaginary rehearsal was found to be .14; a small effect size according to Cohen (1977). The weighted mean effect (\bar{r}_w) size for imaginary rehearsal decreased to .09.

The next meta-analysis involved the cognitive strategy anxiety control. A positive relationship was found between anxiety management and athletic performance, $\bar{r} = .30$. When the effect sizes were weighted by sample size the mean effect size decreased sharply to .15. One of the studies which included a large sample size, 458 subjects

yielded nonsignificant findings (Gould, Horn, & Spreeman, 1983). When this study alone was eliminated the weighted mean effect size only decreased to .25.

Results demonstrated that positive and negative self statements had no significant relationship to athletic performance. Although the mean effect size was .19, the mean effect size decreased .09 when weighted by sample size.

The mean effect size for visuo-motor behavior rehearsal was .62. The effect size weighted by sample size decreased to .58. Only three studies were included in this meta-analysis; therefore, VMBR was not used in the final comparison of strategies. More studies examining the effectiveness of VMBR upon athletic performance are necessary for future comparison with other strategies.

A one way (cognitive strategy) analysis of variance (ANOVA) revealed significant differences among the cognitive strategy-performance mean effect sizes [$F(4,66) = 5.34, p < .001$]. Post-hoc t-tests (see Table 2) conducted between individual mean and weighted mean effect sizes revealed that the self-efficacy mean and weighted mean effect sizes were significantly larger than the mean and weighted mean effect sizes for imaginary rehearsal ($p < .001$) and positive and negative self-statements ($p < .005$). No significant difference was found between self-efficacy and anxiety control when mean effect sizes were analyzed ($p < .09$), but significant differences were evident between the two strategies when weighted mean effect sizes were analyzed $t(44) = 2.9, p < .01$.

Table 2

Means and t-Values for Self-Efficacy vs. Other Cognitive Strategies

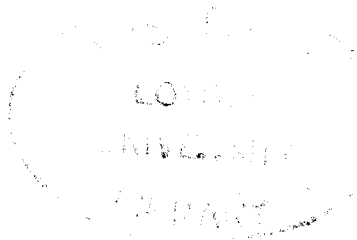
Strategy	\bar{r}	\bar{r}_w	Pooled Variance Estimate		Degrees of Freedom	p
			Standard Error	t-Value		
self-efficacy vs anxiety control	.46	.44	7.4	1.7	62	.09
self-efficacy vs imaginary rehearsal	.30	.15	8.7	3.7	62	.001
self-efficacy by positive/negative self talk	.46	.44	9.8	2.8	62	.005

Gender Differences

The third hypothesis was unsupported; effect size differences between males ($r = .43$) and females ($\bar{r} = .40$) were nonsignificant ($t(20) = 1.71, p > .1$). Hence, it may be suggested that the relationship between self-efficacy and athletic performance is the same for both males and females. No comparison was made between sexes for other cognitive strategies because either the cell sizes were unbalanced, or empty. For imaginary rehearsal none of the studies found provided enough information to determine the female effect size.

Method of Self-Efficacy Induction

Contrary to the predictors that participant modeling would yield the highest effect sizes, results indicated no significant differences for the various methods of self-efficacy induction, $F(3,26) = 1.22, p > .10$ ($\bar{r} = .48, .60, .44$, for participant modeling, modeling, and performance exposure, respectively). The primary reason suggested for the nonsignificance is due to the fact that all of the studies involved utilized the performance accomplishment method of self-efficacy enhancement. The differences between participant modeling, modeling only, and practice only were too subtle to detect.



CHAPTER V

DISCUSSION AND CONCLUSIONS

Self-Efficacy

The results indicate a moderate to strong positive relationship between self-efficacy and athletic performance ($r = .46$). This implies that higher levels of self-efficacy are inherent to the more successful athletes. The elite athletes demonstrate higher levels of self-confidence in their ability to perform (Gal-Or, Tenenbaum, & Shimrony, 1986; Mahoney & Avener, 1977), higher expectations of successful behavior (Barling & Abel, 1983; Weinberg, Gould, & Jackson, 1979), and more persistence in their efforts to succeed (Weinberg et al., 1979; 1980; 1981).

Heterogeneity among effect sizes was noted by the wide range among scores ($r = .04 - r = .84$), as well as the significant U statistic. The setting of the investigation, laboratory versus field, was found to be a major moderator of effect sizes, with studies conducted in field settings yielding larger effect sizes than those conducted in the laboratory. Although no other moderators were found to be significant, additional reasons for variation may be speculated.

First, a wide range of sports was investigated among studies (exactly 12), too many to compare by meta-analysis given the number of studies analyzed. Some of the sports included competitive (i.e. weight-lifting, wrestling, tennis), noncompetitive (i.e. marathon

running), aesthetic (diving, gymnastics), and "open and closed-skill athletics." The former is defined by Highlen and Bennett (1983) as sports where skills are executed in a constantly changing environment (i.e. tennis, wrestling). On the other hand, in a closed-skill sport the environmental surroundings remain relatively constant, enabling more involvement of psychological strategies. It may be then that self-efficacy enhancement would prove to be more effective in closed-skill sports than in open-skill sports. However, this meta-analysis did not provide enough studies to compare the effect sizes of open skill sports against closed skill sports. Future research may determine if closed skill sports would provide more opportunity for cognitive processes such as self-efficacy; therefore, the higher levels of self-efficacy would accompany more closed-skill sport behaviors.

Second, in a literature review on self-efficacy and athletic performance Wurtele (1986) concluded that self-efficacy expectations "adequately" predict athletic performance; however, other predictors of behavior coexisting with self-efficacy were equally as important. For example, past performance experience was also found to be a potent predictor of performance. Studies have yet to determine whether past performance or self-efficacy is the more consistent predictor. Lee (1982) directly compared self-efficacy expectations with previous performance, in a gymnastic skill, and found self-efficacy to be the more reliable predictor. It should be noted that gymnastics is a closed skill sport which provides more opportunity for cognitive intervention.

On the contrary, Woolfolk, Murphy, Gottesfeld, and Aitken (1985) examined the differences in predictability between self-efficacy and past performance in a golf (open-skill sport) setting. Consequently, self-efficacy proved to be the less powerful predictor of performance than previous sport experience. Relative to behaviors other than sport, many researchers have found self-efficacy expectancies to be a more reliable predictor of performance than previous performance (e.g. Bandura, Adams, Hardy, & Howells, 1980; Bandura, Reese, & Adams, 1982; DiClemente, 1981; Kendrick, Cray, Lawson, & Davidson, 1982; McIntyre, Lichtenstein, & Mermelstein, 1983). However, more comparison studies are necessary to determine whether past performance or self-efficacy expectations is the more accurate predictor of performance.

Third, the type of subject participating in the studies was investigated for another potential source for moderation. It was postulated that the effect size would be contingent upon whether the subjects were "athletic" or "nonathletic." Although the results were nonsignificant, it should be noted that nine of the studies included professional or college athletes, while the other 18 studies involved students (who may or may not have been athletic). The data consisted of a large cell size imbalance and a small total sample size; precluding sufficient statistical power to detect the subtle differences among the groups. Larger, more equal sample sizes are necessary for future comparisons.

Two basic measures of self-efficacy were utilized in the sport related literature: sport specific self-confidence and expectations of future performance. Many of the studies used in the meta-analysis

which focused upon sport-specific self-confidence (e.g. Gould, Weiss, & Weinberg, 1981; Meyers, Cooke, Cullen, & Liles, 1979) had adapted a questionnaire similar in form to the one created by Mahoney and Avenier (1977).

Self-Efficacy Versus Other Cognitive Strategies

When compared to other popular cognitive strategies used in the sport literature (anxiety reduction, imaginary rehearsal, positive/negative self verbalizations), self-efficacy appears to be the most potent predictor of performance. The effect size for self-efficacy was significantly higher than imaginary rehearsal and positive/negative self-statements. When effect sizes were weighted by sample size self-efficacy was found to be significantly higher than anxiety reduction ($p < .01$). Anxiety management is tantamount to one of Bandura's (1977) sources of efficacy expectations, emotional arousal. One of the modes of self-efficacy induction occurs through relaxation or biofeedback. Therefore, it may be argued that even though the investigators of anxiety reduction strategies did not examine the subjects' level or strength of self-efficacy during the investigation, this mediational process may have taken place.

The next step would involve determining whether the reduction in anxiety is associated with efficacy enhancement in the sports arena. According to Bandura (1977) self-efficacy is the major determinant of behavior. Anxiety does not activate behavior, rather the cognitive appraisal (self-efficacy perceptions) is the medium of operation. As self-efficacy increases, subsequent arousal may decrease. Reduction of arousal may be a sufficient, but not necessary condition for

improved performance (Bandura, 1977).

The opposing view suggests that efficacy expectations are a by product of anxiety reduction (Eysenck, 1978), extinction of anxiety mediates behavior change (Mowrer, 1947). Feltz (1982) performed a path analytic technique to determine the more parsimonious explanation for behavior change. Feltz (1982) concluded that the anxiety based model fared worse than the Bandura model; however, self-efficacy was neither an effect, nor the primary direct influence in the sport performance. Both self-efficacy and previous performance were accurate predictors of performance, as opposed to anxiety. McAuley (1985) reported similar findings. Although the self-efficacy model (Bandura, 1977) did not fully explain behavior change, it offered a more parsimonious explanation than the anxiety reduction model (Eysenck, 1978).

The self-efficacy method of performance enhancement was clearly more significant than imaginary rehearsal. Imaginary rehearsal appears to fare better in combination with other techniques such as relaxation, as in visuo-motor behavior rehearsal (Swinn, 1972) or systematic desensitization (Wolpe, 1978). Bandura (1977) has advocated the use of imagery as a source for enhancing efficacy expectations. Both symbolic desensitization and symbolic exposure involve using imagery in combination with other techniques to enhance self-efficacy through emotional arousal. Symbolic desensitization specifically entails presenting aversive stimuli gradually in conjunction with relaxation until anxiety reactions are completely extinguished to imaginal representations of the most aversive scenes

(Bandura & Adams, 1977). Findings reported enhanced self-efficacy and mastery of threats for snake phobics.

Weinberg (1982) logically sums up the technique's major limiting-factor: the technique is only useful for those individuals who have the ability to construct clear, vivid images. Further investigation is necessary involving imagery in combination with other techniques in determining the effectiveness in sport behavior.

Self-efficacy was found to be a more reliable predictor of performance than positive/negative self-statements. There was no evidence that positive or negative thoughts alone were related to sport performance ($\bar{r} = .19$, $\bar{r}_w = .09$); however, only eight studies qualified for this meta-analysis. Therefore, the results may not be generalizable to the whole population.

It may be argued that positive and negative self-statements are comparable to one of Bandura's (1977) sources of self-efficacy enhancement, verbal persuasion. One of the modes of induction is self-instruction. Bandura (1977) asserts that efficacy expectations induced in this manner (verbal persuasion) are likely to be weaker than those arising from one's own accomplishments (i.e. participant modeling, performance exposure) because they do not provide an authentic experiential base.

Gender Differences

According to the results of this study, the self-efficacy method of (sport) performance enhancement demonstrates generalizability across sexes. Effect sizes differences among men and women were nonsignificant, contrary to previous predictions. However, only two

of the studies in the meta-analysis directly compared the self-efficacy and performance relationships of males and females (Weinberg et al., 1979; Weinberg et al., 1980). Only one of the studies (Weinberg et al., 1980) indicated that the efficacy performance relationship was stronger for males, $r = .31$, $p < .01$, than for females, $r = .04$. Weinberg et al. (1980) suggested that the significant differences largely resulted from the nature of the task, which is traditionally labeled as male-oriented (muscular endurance). However, these results may have occurred due to sex-role socialization patterns. Society emphasizes the importance of competition and running for males, whereas females are socialized to be motivated toward affiliation and compliance (Weinberg et al., 1980).

The level of self-confidence and motor performance of preadolescent boys and girls was investigated (Corbin, Stewart, & Blair, 1981). Results indicated that when the task performed was perceived to be neutral in sexual orientation the level of self-confidence did not differ among sexes. Many of the sports investigated in this meta-analysis may be considered neutral in sexual orientation (i.e. diving, running, tennis, gymnastics). Tasks perceived to be "male" in orientation are likely to elicit low self-confidence among females (Corbin et al., 1981). Eight out of 10 of the studies yielding female effect sizes were conducted in a noncomparative environment, meaning that women only competed amongst themselves. The findings were consistent with Corbin, Stewart, and Blair (1981); when females participate in a task perceived to be neutral in sexual orientation, in a noncomparative environment, the

level of self-confidence did not differ from males. Based on the results of this study the self-efficacy method of performance enhancement is equally effective among males and females. Future research may investigate females' level and strength of self-efficacy when directly competing against males in a "neutral" task.

Methods of Self Efficacy Induction

Bandura (1977) proposed that there exist four methods of self-efficacy enhancement: (1) performance accomplishment, (2) vicarious experience, (3) verbal persuasion, and (4) emotional arousal. In the sport literature only three methods of induction were utilized: (1) participant modeling, (2) modeling only, (3) performance exposure; all of which fall under the category of performance accomplishment. This source of efficacy expectation is based upon personal mastery experiences. Successes raise efficacy expectations while repeated failure tends to lower them. Once a high level of self-efficacy has been established a few failure experiences will not effect efficacy expectations. Bandura (1977) maintains that performance accomplishment is the most powerful source of efficacy enhancement.

The self-efficacy theory implies that performance exposure and modeling only undoubtedly contribute to one's sense of personal efficacy; however, the participant modeling techniques provides for more precise refinement of skill (Bandura, 1977). Although it was suggested that the participant modeling method of self-efficacy enhancement may be the strongest form of efficacy induction, the results indicated that all the sources of efficacy induction used in

the study were comparable.

Feltz, Landers, and Raeder (1979) investigated the differences in effectiveness between participant, live, and videotaped modeling on a diving task. Findings supported the hypothesis that the participant modeling treatment produced stronger efficacy expectations and higher performance levels. Similar results were reported by Bandura and Adams (1977).

Only one study directly compared the participant modeling group with live modeling and had nonsignificant results. McAuley (1985) assigned subjects to one of three experimental conditions "aided participant modeling" (APM, defined as models giving a live demonstration, verbal explanation, and actual physical guidance throughout the subjects' trial), "unaided participant modeling" (UPM, involving the same as the above without the physical guidance), or a control group. Although the APM group performed significantly better than the UPM, differences between the modeling groups on efficacy expectations was nonsignificant. Therefore, the findings of this study are inconsistent with the existing literature. Further investigations comparing induction techniques are therefore needed.

Direction of Future Research

Results confirm that Bandura's (1977) construct of self-efficacy is positively related to sport performance. Strong efficacy expectations coexist with superior athletic performance. In comparison to other popular cognitive strategies used in conjunction with athletic behavior the self-efficacy method of performance enhancement appears to be one of the strongest techniques. Future

research may determine whether self-efficacy expectations are more potent predictors of performance in specific sport settings (i.e. closed-skill sports). Although self-efficacy sufficiently predicts athletic performance other predictors of behavior may be equally as important. It still remains to be determined whether, in sport performance, experience mediates self-efficacy or self-efficacy influences performance.

References

- Bandura, A. (1980). Gauging the relationship between self-efficacy judgement and action. Cognitive Therapy and Research, 4, 263-268.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. Psychological Review, 84, 191-215.
- Bandura, A., & Adams, N. (1977). Analysis of self-efficacy theory of behavioral change. Cognitive Therapy and Research, 1, 287-310.
- Bandura, A., Adams, N., Hardy, A., & Howells, G. (1980). Tests of the generality of self-efficacy theory. Cognitive Therapy and Research, 4, 39-66.
- Bandura, A., Reese, L., & Adams, V.E. (1982). Micro-analysis of action and fear arousal as a function of differential levels of perceived self-efficacy. Journal of Personality and Social Psychology, 43, 5-21.
- Bird, A.M., & Williams, J.M. (1980). A development-attributional analysis of sex-role stereotypes for sport performance. Developmental Psychology, 16, 319-322.
- Bobrow, D.G., & Vorman, D.A. (1975). Some principles of memory schemata. In D.G. Bobrow & A. Collins (Eds.), Representation and understanding: Studies in cognitive science. New York: Academic Press.
- Burke, M., & Day, R. (1986). A cumulative study of the effectiveness of managerial training. Journal of Applied Psychology, 71, 232-245.
- Cohen, J. (1977). Statistical power analysis for the behavioral sciences (revised edition). New York: Academic Press.
- Cooper, H. (1979). Statistically combining independent studies: A meta-analysis of sex differences in conformity research. Journal of Personality and Social Psychology, 37, 131-146.
- Corbin, C. (1982). Mental practice. In W.P. Morgan (Ed.), Ergogenic aids and muscular performance. New York: Academic Press.
- Corbin, C., Stewart, M., & Blair, W. (1981). Self-confidence and motor performance of preadolescent boys and girls studied in different feedback situations. Journal of Sport Psychology, 3, 30-34.

- DiClemente, C.C. (1981). Self-efficacy and smoking cessation maintenance: A preliminary report. Cognitive Therapy and Research, 5, 175-187.
- Duda, J.L. (1981). A cross-cultural analysis of achievement motivation in sport and the classroom. Unpublished doctoral dissertation, University of Illinois.
- Epstein, S., & Fenz, W.D. (1962). Theory and experiment on the measurement of approach-avoidance conflict. Journal of Abnormal and Social Psychology, 64, 96-112.
- Eysenck, H.J. (1978). Expectations as causal elements in behavior change. In S. Rachman (Ed.), Advances in behaviour research and therapy (Vol. 1). Oxford: Pergamon Press.
- Feltz, D., & Weiss, M. (1982). Developing self-efficacy through sport. Journal of Physical Education, Recreation and Dance, 53, 24-26, 36.
- Fenz, W.D., & Jones, G.B. (1972). Individual differences in physiologic arousal and performance in sport parachutists. Psychosomatic Medicine, 34, 1-8.
- Godin, G., & Shephard, R. (1985). Gender differences in perceived physical self-efficacy among older individuals. Perceptual and Motor Skills, 60, 599-602.
- Gravel, R., Lemieux, G., & Ladouceur, R. (1980). Effectiveness of cognitive behavioral treatment package for cross-country ski racers. Cognitive Therapy and Research, 4, 83-89.
- Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. Human Development, 21, 34-64.
- Highlen, P., & Bennett, B. (1983). Elite divers and wrestlers: A comparison between open- and closed-skill athletes. Journal of Sport Psychology, 3, 390-409.
- Hunter, J.E., Schmidt, F.L., & Jackson, G.B. (1982). Meta-analysis: Cumulating research findings across studies. Beverly Hills, CA: Sage.
- Lips, H. (1985). Self-schema theory and gender-related behaviors; research on some correlations of university women's participation in mathematics, science, and athletic activities. Unpublished manuscript, Social Sciences and Humanities Research Council of Canada, Ottawa.
- McIntyre, K.D., Lichtenstein, E., & Mermelstein, R.J. (1983). Self-efficacy and relapse in smoking cessation: A replication and

extention. Journal of Consulting and Clinical Psychology, 51, 632-633.

- Mowrer, O.H. (1947). On the dual nature of learning: A reinterpretation of "conditioning" and "problem-solving." Harvard Educational Review, 17, 102-148.
- Myers, A.M., & Lips, H.M. (1978). Participation in competitive amateur sports as a function of psychological angrogyny. Sex Roles, 4, 571-578.
- Nelson, L.R., & Furst, M.L. (1972). An objective study of the effects of expectation on competitive performance. Journal of Psychology, 81, 69-72.
- Orwin, R.G. (1983). A fail-safe N for effect size. Journal of Educational Statistics, 8, 157-159.
- Roberts, G.C., & Duda, J.L. (1984). Motivation in sport: The mediating role of perceived ability. Journal of Sport Psychology, 6, 312-324.
- Rubenstein, C. (1982). Wellness is all: A report on Psychology Today's survey of beliefs about health. Psychology Today, 116, 28-37.
- Ryckman, R., Robbins, M., Thornton, B., & Cantrell, P. (1982). Development and validation of a Physical Self-Efficacy Scale. Journal of Personality and Social Psychology, 42, 891-900.
- Ryckman, R., Robbins, M., Thornton, B., Gold, J., & Kuchrel, R. (1985). Physical self-efficacy and actualization. Journal of Research in Personality, 19, 288-298.
- Silva, J. (1982). Competitive sport environments performance enhancement through cognitive intervention. Behavior Modification, 6, 443-463.
- Slate, F. (1981). Psychiatric patients participation in a three month jogging program. Unpublished doctoral dissertation, University of Illinois, Champaign-Urbana.
- Smith, M. (1980). Sex bias in counseling and psychotherapy. Psychological Bulletin, 87, 392-407.
- Spector, P.E., & Levine, E. (1987). Meta-analysis for integrating outcomes: A Monte Carlo study of its susceptibility to Type I and Type II errors. Journal of Applied Psychology, 72, 3-9.
- Start, K.B., & Richardson, A. (1964). Imagery and mental practice. British Journal of Educational Psychology, 34, 280-284.

- Suinn, R. (1972). Removing emotional obstacles to learning and performance by visuo-motor behavior rehearsal. Behavior Therapy, 3, 308-310.
- Westkott, M., & Coakley, J.J. (1981). Women in sport: Modalities of feminist social change. Journal of Sport and Social Issues, 5, 32-43.
- Weinberg, R. (1982). The relationship between mental preparation strategies and motor performance: A review and critique. Quest, 33, 195-213.
- Wolf, F. (1986). Meta-analysis quantitative methods for research synthesis. Beverly Hills, CA: Sage.
- Wolpe, J. (1978). Self-efficacy theory and psychotherapeutic change: A square peg for a round hole. In S. Rachman (Ed.), Advances in behavior research and therapy (Vol. 1). Oxford: Pergamon Press.
- Wurtele, S.K. (1986). Self-efficacy and athletic performance: A review. Journal of Social and Clinical Psychology, 4, 290-301.

Studies Included in the Meta-Analysis

- Andre, J.C., & Means, J.R. (1986). Rate of imagery in mental practice: An experimental investigation. Journal of Sport Psychology, 8, 124-128.
- Barling, J., & Abel, M. (1983). Self-efficacy beliefs and tennis performance. Cognitive Therapy and Research, 7 (3), 265-272.
- Cox, R.H. (1986). Relationship between skill performance in women's volleyball and competitive state anxiety. International Journal of Sport Psychology, 17, 183-190.
- DeWitt, D.J. (1980). Cognitive and biofeedback training for stress reduction with university athletes. Journal of Sport Psychology, 2, 288-294.
- Epstein, M.L. (1980). The relationship of mental imagery and mental rehearsal to performance of a motor task. Journal of Sport Psychology, 2, 211-220.
- Feltz, D. (1982). Path analysis of the causal elements in Bandura's theory of self-efficacy and an anxiety-based model of avoidance behavior. Journal of Personality and Social Psychology, 42 (4), 764-781.
- Feltz, D., Landers, D.M., & Raeder, U. (1979). Enhancing self-efficacy in high avoidance motor tasks: A comparison of

- modeling techniques. Journal of Sport Psychology, 1, 112-122.
- Gal-Or, Y., Tenenbaum, G., & Shimrony, S. (1986). Cognitive behavioral strategies and anxiety in elite orienteers. Journal of Sport Sciences, 4, 39-48.
- Griffiths, D.H., Steel, P., Vaccaro, R., Allen, M., & Karpman. (1985). The effects of relaxation and cognitive rehearsal on the anxiety levels and performance of scuba students. International Journal of Sport Psychology, 16, 113-119.
- Griffiths, D.H., Steel, P., Vaccaro, R., & Karpman. (1981). The effects of relaxation techniques on anxiety and underwater performance. International Journal of Sport Psychology, 12, 176-182.
- Gould, D., Horn, T., & Spreeman, J. (1983). Competitive anxiety in junior elite wrestlers. Journal of Sport Psychology, 5, 58-71.
- Hall, E.G., & Erffmeyer, E.S. (1983). The effect of visuo-motor behavior rehearsal with video-taped modeling on free-throw accuracy of intercollegiate female basketball players. Journal of Sport Psychology, 5, 343-346.
- Harris, R.S. (1984). The effects of two types of goal setting instruction on the development of physical fit self-efficacy and physical fitness in middle school students. Unpublished doctoral dissertation, University of Oregon, Portland.
- Highlen, P.S., & Bennett, B.B. (1983). Elite divers and wrestlers: A comparison between open and closed-skill athletes. Journal of Sport Psychology, 3, 390-409.
- Highlen, P.S., & Bennett, B.B. (1979). Psychological characteristics of successful and nonsuccessful elite wrestlers: An exploratory study. Journal of Sport Psychology, 1, 123-137.
- Hogan, P. (1981). The effect of physical activity on self-efficacy, leisure satisfaction and subjective well-being of older adults. Unpublished doctoral dissertation, University of Oregon, Portland.
- Kolonay, B.J. (1977). The effects of visuo-motor behavior rehearsal on athletic performance. Unpublished master's thesis, Hunter College, The City University of New York.
- Lanning, W., & Hisanaga, B. (1983). A study of the relation between the reduction of competition anxiety and an increase in athletic performance. International Journal of Sport Psychology, 14, 219-227.

- Lee, C. (1982). Self-efficacy as a predictor of performance in competitive gymnastics. Journal of Sport Psychology, 4, 405-409.
- Mahoney, M.J., & Avenier, M. (1977). Psychology of the elite athlete: An exploratory study. Cognitive Therapy and Research, 1 (2), 135-141.
- Marascuilo, L.A. (1971). Statistical methods for behavioral science research. New York: McGraw-Hill.
- McAuley, E. (1985). Modeling and self-efficacy: A test of Bandura's model. Journal of Sport Psychology, 7, 283-295.
- McAuley, E., & Gill, D. (1983). Reliability and validity of the Physical Self-Efficacy Scale in a competitive sport setting.
- Meyers, A.W., Cooke, C.J., Cullen, J., & Liles, L. (1979). Psychological aspects of athletic competitors: A replication across sports. Cognitive Therapy and Research, 3 (4), 361-366.
- Ness, R.G., & Patton, R.W. (1979). The effect of beliefs on maximum weight-lifting performance. Cognitive Therapy and Research, 3, 205-211.
- Noel, R.C. (1980). The effect of visuo-motor behavior rehearsal on tennis performance. Journal of Sport Psychology, 2, 221-226.
- Oliff, M.B. (1980). The psychological and physical effects and implications of therapeutic tennis instruction. Unpublished doctoral dissertation, University of Illinois, Champaign.
- Okwumabua, T.M. (1983). Psychological and physical contributions to marathon performance: An exploratory investigation. Journal of Sport Behavior, 8 (3), 163-171.
- Powell, F.M., & Verner, J.P. (1982). Anxiety and performance relationships in first time parachutists. Journal of Sport Psychology, 4, 184-188.
- Rotella, R.J., Gansneder, B., Ojala, D., & Billing, J. (1980). Cognitions and coping strategies of elite skiers: An exploratory study of young developing athletes. Journal of Sport Psychology, 2, 350-354.
- Scanlan, T.K., Lewaite, R., & Jackson, B.L. (1984). Social psychological aspects of competition for male youth sport participants: II. predictors of performance outcomes. Journal of Sport Psychology, 6, 422-429.
- Sonstroem, R.J., & Bernardo, P. (1982). Intraindividual programs

state anxiety and basketball performance: A re-examination of the inverted-U curve. Journal of Sport Psychology, 4, 235-245.

Weinberg, R. (1985). Relationship between self-efficacy and cognitive strategies in enhancing endurance performance. International Journal of Sport Psychology, 17, 280-292.

Weinberg, R., & Ginuchi, M. (1980). Relationship between competitive trait anxiety, state anxiety, and golf performance. Journal of Sport Psychology, 2, 148-154.

Weinberg, R.S., Gould, D., Yukelson, D., & Jackson, A. (1981). Effect of preexisting and manipulated self-efficacy on a competitive muscular endurance task. Journal of Sport Psychology, 4, 345-354.

Weinberg, R., Gould, D., & Jackson, A. (1979). Expectations and performance: An empirical test of Bandura's self-efficacy theory. Journal of Sport Psychology, 1, 320-331.

Weinberg, R.S., Seabourne, T.G., & Jackson, A. (1981). Effects of visuo-motor behavior rehearsal, relaxation, and imagery on karate performance. Journal of Sport Psychology, 3, 228-238.

Weinberg, R.S., Yukelson, D., & Jackson, A. (1980). Effect of public and private efficacy expectations on competitive performance. Journal of Sport Psychology, 2, 340-349.

Weiss, M., & Gould, D. (1981a). The effects of model similarity and model talk on self-efficacy and muscular endurance. Journal of Sport Psychology, 3, 17-29.

Weiss, M., & Gould, D. (1981b). Psychological characteristics of successful and unsuccessful big ten wrestlers. Journal of Sport Psychology, 3, 69-81.

White, K.D., Ashton, S., & Lewis. (1979). Learning a complex skill: Effects of mental practice, physical practice, and imagery ability. International Journal of Sport Psychology, 10, 71-78.

Wilkes, R.L., & Summers, J.J. (1984). Cognitions, mediating variables, and strength performance. Journal of Sport Psychology, 6, 351-359.

Woolfolk, R.L., Murphy, S., Gottesfeld, D., & Aitken, D. (1985). Effects of mental rehearsal of task motor activity and mental depiction of task outcome on motor skill performance. Journal of Sport Psychology, 7, 191-197.

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The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

Date

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