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COMBATING "CHOKING" IN SPORTS: COMPARING THE EFFECTIVENESS OF ANXIETY REDUCTION AND SELF-REGULATORY SKILL TRAINING

by

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A dissertation submitted to the Graduate Faculty in Educational Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy,
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Abstract

COMBATING "CHOKING" IN SPORTS: COMPARING THE EFFECTIVENESS OF ANXIETY REDUCTION AND SELF-REGULATORY SKILL TRAINING

by

Gerard J. Nuesell

Adviser: Professor Barry J. Zimmerman

This study sought to test the effectiveness of self-regulatory skill training, anxiety reduction training, and a combination of these approaches in assisting athletes to combat choking in a pressure-filled situation. The impact of training on dart throwing performance, anxiety, self-efficacy, goal setting, attributions, adaptive responses, and self-reactions was explored. Forty-five males and thirty-five females (N = 80) who qualified as intermediate dart throwers and chokers participated on two separate occasions.

Participants were randomly assigned to one of three experimental groups or a control group based on the presence or absence of anxiety reduction and self-regulatory skill training. All data analyses were conducted on data collected during the second assessment period under stressed conditions, except for an evaluation of choking between the first and second assessment periods under stressed conditions.

It was hypothesized that compared to an anxiety reduction training group or a control group, chokers who received self-regulatory skill training would, under stressed conditions, display significantly higher dart throwing, higher self-efficacy beliefs for dart throwing, more process-oriented goals, more technique-oriented

attributions, more technique-oriented adaptive responses, and higher self-reaction. Furthermore, it was hypothesized that compared to a control group, chokers who received self-regulatory skill training or anxiety reduction training would show significantly less performance anxiety prior to stressed test conditions. Finally, those chokers who received the combination of self-regulatory skill training and anxiety reduction training would, under stressed test conditions, show significantly less dart-throwing anxiety compared to all other groups. Partial support was found for the hypotheses. Most significantly, results supported the utility of self-regulatory skill training in combating choking, with those participants who received this form of training performing significantly higher than participants from all other groups on a test of dart throwing performance under stressed conditions. Chi-square analysis indicated a significant association between treatment and goal setting, attributions, and adaptive response in accordance with the hypothesis. The remaining hypotheses were not supported, although the self-regulatory skill training group came very close to meeting statistical significance on measures of self-efficacy, self-reaction, and anxiety. Findings are discussed in terms of clinical implication for coaches and athletes combating choking in athletic competition.

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Chapter I

Introduction

In contemporary American culture, sports have become more than just games; they have become a primary source of personal identity and worth. To complicate matters, winning has become the sole criterion of success even at novice levels, displacing such alternative criteria as friendship, sportsmanship, and skillful performance. The outcomes of international sporting competitions, such as World Cup Soccer or the Olympic Games, are even viewed as placing national prestige at risk; on a smaller scale, the identities of cities and towns may be tied into the ability of their sporting teams to succeed in competition. As a result, many athletes sooner or later find themselves in a position where the outcome of a competition is placed on their shoulders, and this pressure can have a devastating impact on their personal effectiveness.

The Nature of Choking

"Choking," is an often-derogatory expression used by athletes and sports commentators to describe the phenomenon of deteriorating skills under conditions of high social pressure. The origins of the metaphor are unclear, but the word choking describes a dysfunction in a well-known activity (i.e., eating) sometimes due to uncontrollable emotions, such as anger, frustration, or fear. As a label, choking can be very psychologically debilitating because athletes often attribute a failure to

perform up to expectations as evidence of inherent personal weaknesses. Indeed, some athletes gain reputations as "chokers," and their standing within the team or even society at large is seriously diminished. The experience of choking not only has the potential to negatively impact one's confidence and self-perception, but in extreme cases, it could derail professional athletic careers and prevent attainment of full potential within a sport.

There has been considerable speculation as to both the source of and the solution to the problem of choking. According to Nideffer and Sagal (1998), choking is generally behaviorally inferred when there is a progressive decline in athletic performance under pressure coupled with a seeming inability to right the ship and regain control over performance. It thus appears to be less a motivational problem than it is an emotional regulation problem because athletes seem, if anything, to be trying too hard. Excessive tension, such as tightening of muscles and increased heart rate, along with attention difficulty and feelings of helplessness are widely reported as physiological and cognitive correlates of choking. Baumeister (1984) has noted that "choking under pressure" occurs when outcomes and individual effort are high. For example, tennis professionals often choke near the end of a match, displaying poor technique and loss of concentration when they are in a position to win. The ability to control the outcome of a match at a critical moment needs to be a learned "closing" skill for many athletes.

Although choking under pressure is often associated with top-level athletes who possess well-learned skills, it is equally prevalent among novices and intermediates. Indeed, novice and intermediate athletes may be more vulnerable to choking because

their lack of self-control and perceived self-efficacy is not as well established as experts: Small impediments can derail performances with little warning. For example, it is not uncommon for young tennis players to lose their concentration when suddenly presented with an audience, such as the arrival of a parent or friend during a match. According to Baumeister (1984), the defining criteria for choking is the failure to perform up to whatever level of skill a person has at the time of task attempt due to social or psychological pressure. Emphasis is placed on the pressure of the situation, the emotional reactions of the athlete, and the decline in performance rather than the overall level of competence.

Although there is little hard evidence to date regarding the prevalence of choking or associated anxiety dysfunctions among athletes in general, researchers have speculated that most athletes have choked at one time or another (Landers & Boutcher, 1998). On a sport-specific level, there is evidence that many golfers experience the "yips," an anxiety-linked putting dysfunction characterized by jerks, tremors, and freezing, particularly during short, routine putts. Among 1031 tournament players (serious golfers with a handicap of less than twelve) who responded to a "yips" questionnaire, 541 respondents (52%) perceived they experienced the yips and choked during a short putt, adding approximately 4.7 strokes to their scores for eighteen holes of golf (Aynsley, Malo, Laskowski, Sabick, Cooney, Finnie, Crews, Eischen, Hay, Detling, & Kaufman, 2000). Incidence of choking clearly appears to be a widespread problem in dire need of a solution, affecting at least half of all competitors and likely many more according to educated estimates.

Interventions to Remediate Choking

Although there have been a paucity of studies on choking by athletes, there has been considerable research on a key emotional reaction – anxiety. To date, most interventions to control choking have focused on reducing anxiety through the use of deep breathing or relaxation techniques, but these techniques by themselves have often proved to be insufficient, and there has been a call in the sport psychology literature for more effective interventions (Woodman & Hardy, 2001). As will be discussed later, many researchers now distinguish between cognitive and physiological subcomponents of anxiety. A therapeutic implication of this distinction is the need to treat more than the physiological side of anxiety via techniques, such as relaxation or deep breathing; the cognitive subcomponents of anxiety also need to be treated by different techniques, such as thought stopping and replacement. A noted shortcoming of anxiety-oriented approaches for reducing choking is that little attention is given to cognitive and behavioral origins of anxiety – namely, an athlete's lack of self-regulatory control over the sport under challenging conditions. For example, those athletes who have unknown flaws in their motor techniques, focus on task-irrelevant information, set unrealistic competitive goals for themselves, or attribute outcomes to uncontrollable sources are going to experience greater anxiety and are more likely to choke.

An alternative intervention is to teach athletes to use self-regulatory techniques such as realistic goal setting, strategy identification and implementation, and self-evaluation using positive criteria, to enhance their performance and sense of control. Self-regulation has been defined as self-generated thoughts, feelings, and behaviors

that are planned and cyclically adapted based on performance feedback (Zimmerman, 1989). By self-regulating these powerful processes, athletes are less likely to become distracted and experience the sense of helplessness and anxiety that lead to choking.

Research has confirmed that athletes can control their anxiety and sustain satisfactory levels of performance better if they use self-regulatory processes, such as setting realistic goals (Woodman & Hardy, 2001), formulating a strategic task approach (Meyers, Cook, Cullen, & Liles, 1979), avoiding distractions (Orlick & Partington, 1988), and maintaining feelings of personal control over coping and goal attainment (Carver & Scheier, 1988). In contrast, poorly self-regulated athletes become overwhelmed by the anxiety produced during important competitive situations and tend to become distracted by self-deprecatory thoughts and feelings of powerlessness (Carver & Scheier, 1988; Ganzer, 1968). These same athletes have often been found to set unrealistic, over-ambitious goals while lacking a strategic plan that would assist them in successful task execution (Jones, Swain, & Cale, 1990; Meunier & Rule, 1967). Inability to effectively manage debilitative anxiety consistently results in negative impact on performance (Burton, 1988; Gould, Petlichkoff, & Weinberg, 1984).

A major advantage of teaching athletes to use self-regulatory techniques is that processes such as goal-setting, strategy implementation, and self-monitoring, have a positive impact on performance and on self-perceptions that support effective performance (Anshel & Singer, 1980; Bandura & Jourdan, 1991; Bandura & Wood, 1989; Epstein, 1980; Zimmerman & Kitsantas, 1997). Self-regulation of attention, skill acquisition, and persistence have all been linked to enhanced self-perception

(e.g. increased self-confidence and feelings of personal control. Beggs, 1990; Boutcher, 1990; Hardy & Nelson, 1988; Kitsantas & Zimmerman, 1996; Zimmerman, 1998). Self-efficacy beliefs mediate other influences on achievement, such as skill and ability, and increase self-confidence, the likelihood of persistence, and effort in overcoming obstacles (Bandura, 1977, 1982; Bandura & Cervone, 1983). As such, self-efficacy has been demonstrated to have a positive impact in reducing debilitative effects of anxiety (Bandura, 1977).

Conclusion

Choking appears to present a significant problem for athletes at all levels of competence, and in the next chapter I will discuss how efforts to treat this dysfunction have proved insufficient to date. Surprisingly, there has been little effort to examine the effects of self-regulatory training on choking. From this perspective, athletes need to learn how to recognize signs of choking and to self-regulate the underlying processes, such as goal setting, strategy implementation, self-monitoring, and self-reactions. The present research will compare the effectiveness of well known cognitive and somatic anxiety reduction methods, such as relaxation exercises and thought stopping and replacement, with self-regulation enhancement techniques to assess their relative as well as combined effectiveness in reducing athletes' performance anxiety and choking.

Chapter II

Literature Review

This literature review will begin with a brief history of the evolution of anxiety conceptualization and measurement. Next, the impact of anxiety on attention processes will be discussed, followed by an exploration of factors contributing to the induction of stress. The relationship of anxiety and perceptions of personal control will conclude the review of the detrimental effects of anxiety and mechanisms whereby it operates. Commonly utilized interventions for reducing somatic and cognitive anxiety will then be presented. This review will conclude with a cyclical view of self-regulation and skill development, and the positive contributions of self-regulatory processes and beliefs in combating anxiety-related factors.

Conceptualizations and Measurement of Anxiety: A Brief History

Anxiety is a complex human state that includes cognitive, affective, behavioral, and physiological reactions, attracting a considerable amount of attention by researchers over the past century. An early theory of anxiety, perhaps influenced by Yerkes and Dodson's (1908) animal studies, is the inverted-U-hypothesis. As implied by the name, the inverted-U hypothesis proposes that the relationship between arousal and performance resembles the shape of a symmetrical inverted U, such that increases in physiological arousal will result in performance improvement up until a midpoint peak, after which further arousal will result in a progressive decline in performance. The inverted-U-hypothesis held prominence in mainstream anxiety research for many years (e.g. Hebb, 1955; Broadhurst, 1957), and eventually

found its way into sport psychology as well (e.g. Anshel, 1990; Cox, 1990; Gill, 1986; Landers, 1994).

In 1966, Spielberger advanced the anxiety literature by making a distinction between state and trait anxiety, based on the degree of generality involved. Whereas state anxiety refers to a relatively temporary occurrence of anxiety related to a specific event, trait anxiety refers to a general tendency to be anxious across a variety of contexts. Because anxiety typically fluctuates based on context variations, sport psychology literature tends to focus more on state anxiety than trait anxiety. Spielberger's (1966) work was pivotal in moving anxiety research away from the concept of anxiety as a one-dimensional construct, and continues to be influential in anxiety research and measurement today (e.g. Martens, Burton, Rivkin, & Simon, 1980).

Concurrent with the evolution of anxiety theory research, changes were made in the measurement of anxiety as well. Following the work of Spielberger (1966), researchers began construction of scales measuring internal state and trait anxiety separately (e.g., Spielberger, Gorsuch, & Lushene, 1970). Along with the individual attention being given to state and trait anxiety, researchers in the 1960's began to focus on the development of measures specific to particular settings (e.g., Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960; Watson & Friend, 1969). This was an effort to extend beyond internal descriptions of anxiety to increasingly take the performance context into account when exploring anxiety. Martens (1977), developed the Sport Competition Anxiety Test, a sport-specific measure of trait anxiety, and

later developed the Competitive State Anxiety Inventory (CSAI) to measure state anxiety (Martens, Burton, Rivkin, & Simon, 1980).

An alternative view of the subcomponents of anxiety was proposed by Liebert and Morris (1967). They distinguished between worry, described as cognitive concern over performance, and emotionality, largely one's awareness of bodily tension and arousal. Based upon this distinction, Davidson and Schwartz (1976) later simply relabeled worry as "cognitive anxiety," and emotionality as "somatic anxiety," because of their greater clarity.

With distinctions made between state and trait anxiety as well as between cognitive and somatic anxiety, and with the continued focus on measures specific to particular settings, sport psychology researchers began developing sport-specific multi-dimensional measures of state and trait anxiety that took the cognitive-somatic anxiety distinction into account. In 1990, Smith, Smoll, and Schutz constructed the Sport Anxiety Scale, while Martens and his associates updated their earlier work, constructing the Competitive State Anxiety Inventory-2 (CSAI-2). The latter of these two, the CSAI-2, is widely recognized as the standard in measuring pre-competition state anxiety.

With the ability to separately measure cognitive anxiety and somatic anxiety, researchers began to explore the relationship of each with performance. Establishing a clear relationship between performance and somatic anxiety has been difficult, although there is general support for the inverted U hypothesis. In a 1984 study conducted by Gould, thirty-nine officers from a police-training institute volunteered to participate in a pistol shooting competition comprised of five separate shooting

trials. The officers were given the CSAI-2 immediately before each of the five separate shooting occasions to measure pre-competition anxiety levels. Anxiety was induced incrementally during the trials by increasing the level of competition. During the first two rounds, all thirty-nine officers shot simultaneously. During rounds three and four, the officers were placed on one of four teams that had been equalized according to ability, with all of the members of one team competing against all the members of another team, while the remaining two teams watched the competition. For the final sequence, one member of one team competed head-to-head against one member from another team until all team members had completed the sequence. Points were awarded on a target system akin to dart scoring in that accuracy in hitting the smaller targets was rewarded with higher point values. The officers were told that the top finishers would receive awards and that the scores would be publicly posted upon completion of the competition. Results indicated an inverted-U relationship between somatic anxiety and performance, such that increases in somatic anxiety resulted in increases in performance up until a midpoint, and then further somatic anxiety resulted in a progressive decline in performance.

The establishment of a relationship between cognitive anxiety and sport performance has been a lot easier and more clear-cut, with researchers consistently demonstrating a negative relationship between the two (Burton, 1988; Gould, Petlichkoff, & Weinberg, 1984). For example, Burton (1988) assessed multidimensional anxiety of two samples of competitive swimmers prior to important competitions. The first sample of twenty-eight swimmers consisted of fifteen male and fifteen female collegiate swimmers from a Big Ten swim team. These swimmers

completed the CSAI-2 one-hour before three separate events throughout the season, ranging in importance from an early season invitational meet to the Big Ten Championships, and their performance times were noted on each of these occasions. The second sample of seventy swimmers was comprised of thirty-one male and thirty-nine female swimmers who were chosen to compete at a national sports festival. These swimmers were administered the CSAI-2 on two separate occasions: once following a practice session two days before the competition, and then again one hour prior to their most important race of the festival itself; performance times were recorded for each swimmer as well. Data analysis of both samples revealed that performance times increased (i.e. slower swim times were recorded) as anxiety increased. For example, those swimmers in the second sample who displayed heightened cognitive anxiety between the practice session and the festival also logged slower performance time during the festival relative to the practice session. This finding held true in both samples across all swimming styles and distances.

Impact of Cognitive Anxiety on Attention and Self-Reactions

With the establishment of a clear negative relationship between cognitive anxiety and performance, a great number of researchers sought to clarify the role of underlying variables. Similar to Broadbent (1957) and Miller's (1956) findings that people have a limited capacity for processing information, Sarason (1984) proposed the notion of cognitive interference, wherein intrusive thoughts take up space and keep an individual from directing full attention to a particular task at hand. In models such as those proposed by Sarason (1972, 1984, 1986), and Wine (1971), worrisome thoughts are responsible for consuming the attentional resources available in working

memory, resulting in loss of task-relevant information and subsequent impairment of performance. In a sporting context, this translates into an athlete's worrying about responsibility for the outcome of a match such as during a crucial free throw in basketball or an important putt in golf. Researchers have concluded that worrying was the key factor in lowering the performance of test-anxious individuals in both laboratory (Marlett & Watson, 1968; Sarason & Stoops, 1978) and naturalistic settings (Deffenbacher & Deitz, 1978). In interviews conducted with 235 Canadian Olympic athletes, Orlick and Partington (1988), found that the largest percentage of athletes who did not perform to capacity at the Olympic Games had trained well, but were unable to overcome distractions during performance, presumably because of the pressure and significance of the competition.

In an early experiment demonstrating the effects of cognitive interference, Sarason and Stoops (1978) assessed subjects who differed in their scores on the Test Anxiety Scale as they worked on a variety of tasks presented as measures of intelligence. Task performance, estimates of elapsed time for task completion, and post-experimental reports of task-irrelevant thoughts that the subjects had during performance, as assessed by the Cognitive Interference Questionnaire (CIQ), were used as dependent measures. The CIQ is an eleven item scale that asks subjects to respond to items such as, "I thought about how poorly I was doing," and "I wondered what the experimenter would think of me," on a five-point Likert scale ranging from one (never) to five (very often). Findings indicated that the high TAS scorers displayed lower task performance and poorer estimates of elapsed time than low TAS students. Perhaps of most significance was the greater amount of cognitive

interference demonstrated by the highly anxious subjects, relative to subjects low in anxiety, as evidenced by higher CIQ scores.

Based on evidence of cognitive interference, researchers began to focus in more detail on the actual nature of task-irrelevant thoughts experienced by an individual who is anxious or under pressure. Some theorists (Humphreys & Revelle, 1984; Sarason, 1960; Wine, 1971) reported that anxious subjects' preoccupation with their own internal state leads to interference effects upon performance. Sarason (1980) has described internal attention as self-evaluative – concerned with the consequences of performing, which diverts attention from the course of action required for successful task performance. For instance, a golfer might tell himself, "This is a big putt, and I'm two strokes behind," rather than paying attention to crucial information such as recognition of a faulty technique or identification of an important strategy that would be useful for improving performance. In a study by Baumeister (1984), performance of a skill task declined as a result of directing the subject's attention to his or her internal performance processes and by dispositional self-consciousness.

Studies have shown that the self-preoccupied, self-evaluative thoughts of highly test-anxious individuals tend to be self-deprecatory in nature. For example, Ganzer (1968) investigated the effects of audience presence and test anxiety on female subjects engaged in a serial verbal learning task. Subjects were randomly assigned into either a group that was allowed to perform the task without observation by outsiders, or a second group that performed the task in front of observers. It was found that subjects in the observed condition uttered more test-irrelevant comments than subjects in the unobserved condition. These comments were more self-

evaluative, apologetic, or self-deprecatory. Others, including Wine (1971), and Meunier and Rule (1967), have noted similar results in the tendency of test-anxious persons to devalue their own performance, especially when evaluated by others. Negative self-preoccupation and focus on social-evaluation cues interfere with memory storage of task information, attention to task-relevant cues and task performance, and are associated with inaction and behavioral constriction (Wine, 1980).

Stress Induction

Instructions that emphasize the *evaluative nature of a task* have been shown to increase cognitive anxiety in test-anxious individuals; accordingly, increases in cognitive interference and task-irrelevant thoughts have been reported (Mullen, Hardy, & Tattersall, 1999; Sarason & Stoops, 1978). Subsequently, highly test-anxious individuals are most likely to perform below the level of those low in test-anxiety when evaluative instructions are given (Sarason, 1988). Evaluational stressors include any information that notifies a person that some kind of appraisal of their performance will be made as well as any information that highlights the importance of performing well (Baumeister, 1982; Sarason, 1980). Unfortunately, test-anxious persons are prone to interpretation of a relatively large number of cues as evaluative (Sieber, 1980; Wine, 1980).

Anticipation of positive or negative consequences contingent upon an audience's evaluation has been demonstrated to result in increased levels of anxiety (Baumeister, 1984; Cottrell, 1972). Based on this premise, Masters (1992) successfully induced stress in forty golfers by telling them that financial reward or penalization would be

contingent upon their putting performance as judged by a supposed golf professional. Anxiety is augmented further if the performer believes the audience has some degree of expertise (Henchy & Glass, 1968). However, even without the explicit mention of evaluation, the mere presence of an audience during test performance has been found to elicit high levels of anxiety and task-irrelevant thoughts such as self-preoccupation (Carver & Scheier, 1978, 1981) and subsequent debilitation of task performance (Cox, 1966, 1968; Ganzer, 1968). In reacting to audience presence, performers may display physiological symptoms such as sweaty palms (Cohen & Davis, 1973; Marten, 1969a, 1969b), increased heart rate, rapid breathing, or other signs of increased arousal and drive (Marten & Landers, 1972; Paulus & Cornelius, 1974; Paulus, Shannon, Wilson, & Boone, 1972; Steigleder, Weiss, Balling, Wenninger, & Lombardo, 1980; Steigleder, Weiss, Cramer, & Feinberg, 1978; Wankel, 1972; Zajonc, 1965). A high level of physiological arousal has the potential to disrupt performance either by causing greater distraction, reducing processing capacity, or diminishing effort (Deffenbacher, 1980; Dornic, 1977; Dornic & Fernaeus, 1981).

Rivalry is another factor that has been associated with increased arousal (Marten & Landers, 1972; Paulus & Cornelius, 1974; Paulus et al., 1972; Steigleder et al., 1980; Steigleder et al., 1978; Wankel, 1972; Zajonc, 1965). Flood and Endler (1980) found that track and field athletes displayed heightened levels of arousal and anxiety prior to a track meet as a function of concerns about evaluation by spectators, other competitors, and coaches. It is of importance to note that anxiety induced by rivalry does not necessitate a head-to-head encounter, but extends to situations in which there

is awareness of another competitor's score without actually seeing the performance of the rival firsthand (Wicklund & Duval, 1971).

In competition, a rival's score is an important determinant of how well one will have to perform in order to achieve success. According to Wankel (1972), a greater amount of pressure is induced when an athlete is slightly to moderately behind one's competitors than when slightly to moderate ahead of the competitors. The pressure dissipates entirely when one has already effectively lost the contest or when one is very far ahead (Seta, 1982).

Anxiety and Perceptions of Personal Control

The relationship between anxiety and perception of personal control is another relationship in anxiety research that has been thoroughly investigated. According to Carver and Scheier's (1988) control model of anxiety, *perceived control* over coping and goal attainment is an important mediator of anxiety interpretation. Anxiety is facilitative and will enhance performance when one perceives himself or herself to be in control of coping and goal attainment; however, anxiety will be debilitative if perceptions of control are unfavorable (Carver & Scheier, 1986, 1988). Those performers with the least confidence in their ability to control self and environment will experience the highest levels of debilitative anxiety relative to those who have high perceptions of personal control (Borkovec, Metzger, & Prusinsky, 1986; Carver & Scheier, 1986, 1988; Eysenck, 1992). In Carver and Scheier's model, control reflects the cognitive influence the performer is able to exert over internal and external factors (Carver & Scheier, 1990, 1994, 1998). Thus, instilling athletes with a realistic sense of control over coping and goal attainment will reduce susceptibility to

the debilitative effects of anxiety and therefore avert subsequent decline in performance.

Attributions are closely related to perceptions of personal control in that they are designations of responsibility for being able to effect changes in performance. Numerous researchers have found that highly test-anxious persons are more likely to attribute responsibility to themselves for task failure than low test-anxious persons (Doris & Sarason, 1955). These attributions of highly test-anxious persons lead to self-blame and self-deprecation reactions rather than adaptive reactions that may pinpoint factors that lead to faulty performance. This difference may be analogous to the distinction between criticism and constructive criticism, with the latter being more advantageous and preferential, as it allows opportunity for improvement through recognition of deficient features and subsequent identification of potential solutions.

A considerable amount of research has focused on an area often used interchangeably with perceptions of personal control, *expectancies* of favorable outcomes (Newsom, Knapp, & Schulz, 1996; Thompson, Collins, Newcomb, & Hunt, 1996; Thompson, Sobolew-Shubin, Galbraith, Schwankovsky, & Kruzen, 1993). Jones and Hanton (1996) assessed the relationship between competitive swimmers' perceptions of their ability to achieve goals that they had set in an important swim meet and the degree to which anxiety was facilitative or debilitative. Swimmers who had negative expectations of goal attainment did not differ in degree of anxiety intensity before the event from those swimmers who had positive expectations. An important finding, however, was that those swimmers with positive expectations reported their cognitive and somatic anxiety as less debilitative than those swimmers

who had negative expectations, thus supporting Carver and Scheier's (1988) control model of anxiety. Other research has also supported the notion that negative expectancies can bring about poor performance (Liebert & Morris, 1967).

Expectations of success are dependent to a large extent on the nature of the *goals* an athlete sets for himself or herself. Jones, Swain, and Cale (1990) noted that by setting overly ambitious goals, athletes impose excess pressure on themselves. Similarly, Earley, Connolly, and Ekegren (1989) found that goals that are beyond the ability of an athlete's skill level create excessive pressure and lead to performance decrements. The setting of unrealistic goals is expected to invariably result in failure, followed by a significant decline in self-efficacy, particularly if there had been a prior positive belief in goal attainment (Woodman & Hardy, 2001).

Certain types of goals contribute to feelings of anxiety and pressure during competitive situations. Performance goals, which encourage assessment of prior outcomes in deciding on future outcome goals, meet all of Locke and Latham's (1985) guidelines for stress-induction in that they are important, require action, and may not always be achieved (Beggs, 1990). Rarely are athletes able to perform at a consistent level throughout a whole season or even during shorter stretches of time without some degree of fluctuation. In instructional settings, learners who focus on outcomes fail to attend to task-relevant information and strategic means (Schunk & Schwartz, 1993). As noted with anxiety research, such distraction has a negative impact on performance due to poorly allocated resources. The setting of performance or product goals that place the emphasis on outcome would seem to be

counterproductive both in terms of contributing to pressure and distracting a person from important information that is needed to guide the actual performance of a task.

Interventions for Somatic and Cognitive Anxiety

Reducing somatic anxiety. Traditional interventions have concentrated on reducing the physiological arousal aspect of anxiety. Perhaps the relaxation strategy most utilized and advocated in athletic and testing situations is deep breathing exercise. In pressure-filled situations, there is tendency for athletes to either hold their breath or to breathe in a shallow, rapid manner, adding to the tension, and debilitating performance (Williams & Harris, 1998). It is reasoned that as deep breathing increases the amount of oxygen in the blood, increased energy is carried to the muscles, waste products are removed, and feelings of relaxation ensue. Advocates of deep breathing often emphasize the need for breathing that originates in the diaphragm as well as the utilization of a set routine for maximum effectiveness in reducing anxiety (Mason, 1980; Williams & Harris, 1998).

In a 1994 study, Broota and Sanghvi examined the effectiveness of both deep breathing exercise and progressive muscle relaxation in combating performance anxiety. Progressive muscle relaxation is a technique that involves systematically contracting specific muscle groups in the body, holding the contraction for several seconds, and then relaxing. The rationale behind such exercises lies in increasing bodily awareness for identifying the location of tension as well as raising one's perception that relaxation can be voluntarily induced by passively releasing tension in the various muscle groups. When compared with both a progressive relaxation group and a control group that simply had a talk session with the experimenter, the deep

breathing group was found to be most effective in decreasing the performance anxiety of the subjects; task performance was not studied in this research. While Broota and Sanghvi's (1994) study demonstrated the efficacy of a deep breathing intervention in anxiety reduction, it should be noted that other studies have shown that use of relaxation strategies alone has been ineffective in reducing cognitive anxiety (Aponte & Aponte, 1971; Cooke, 1968; Davison, 1968; Johnson & Sechrest, 1968; Lang, Lazovik, & Reynolds, 1965; Rachman, 1965, 1968; Rimm & Medeiros, 1970).

The fact that physiological approaches are often the sole intervention used to address anxiety is puzzling, especially considering that the research literature in sport psychology has reported that the effects of cognitive anxiety in debilitating performance are far greater than the effects of somatic anxiety (Burton, 1988; Gould et al., 1984).

Reducing cognitive anxiety. A popular approach utilized to address cognitive anxiety is a cognitive-behavioral technique called thought stopping. Thought stopping is a time-efficient technique that has been effectively used to eliminate intrusive thoughts (Spiegler & Guevremont, 1993). For maximum effectiveness in reducing anxiety, thought stopping is used in conjunction with another technique, cognitive restructuring, to addresses the self-deprecatory, task-irrelevant thoughts that athletes experience during competitive situations. Athletes are taught to identify negative thoughts, issue the command "Stop!" and then substitute positive self-statements that provide encouragement for successful task completion. The effectiveness of this technique is contingent upon the fact that one does not simply stop the thoughts but rather replaces them with positive ones as well. The use of self-

talk to facilitate perceptions of readiness, lower levels of cognitive anxiety, and improve self-confidence is a finding that has received some support in the research literature (Jones et al., 1990). Providing subjects with a rationale for the use of thought stopping has been found to increase the effectiveness of the technique (Burk, Randolph, & Probst, 1985).

Some researchers (Spielberger, Anton, & Bedell, 1976) have found evidence that cognitive restructuring was more effective than relaxation training in modifying cognitions. This would seem to make sense in that relaxation training addresses the physiological, and not the cognitive, experience of anxiety. A comparison of a relaxation training condition, a cognitive modification condition, and an attentional condition in which the subjects were reminded to remain task-oriented and resist intrusive thoughts was conducted. Although the cognitive modification group fared better than the relaxation training group, the attentional group reported the lowest levels of cognitive anxiety and the best performance scores (Holroyd, 1976). Both relaxation training and a cognitive modification intervention demonstrated some utility in reducing cognitive anxiety and improving performance; however, of greater importance is the finding that turning attention to the task at hand, not just simply stopping distraction and thinking positively, led to the greatest reduction in cognitive anxiety and the greatest improvement in performance. This research highlights the importance of extending beyond traditional approaches to anxiety reduction to interventions that encourage task-oriented thinking and strategies as a means of reducing anxiety and improving performance.

A Cyclical View of Self-Regulation and Skill Development

This section will provide an overview of self-regulation and a three phase self-regulatory cycle. Each of the component processes and beliefs of the three phases will be discussed along with their linkage to anxiety and choking reactions.

Ineffective athletes become overwhelmed by the anxiety produced during important competitive situations and tend to become distracted by self-deprecatory thoughts and feelings of powerlessness (Carver & Scheier, 1988; Ganzer, 1968). These same athletes have often been found to set unrealistic, over-ambitious goals devoid of having a strategic plan that would assist them in successful task execution (Jones, Swain, & Cale, 1990; Meunier & Rule, 1967). To compound matters, they are often unaware of faulty motor techniques, and lack a means for analyzing their task execution to zone in on problem areas, consistently resulting in diminished athletic performance. As such, the presence of anxiety and choking during an athletic event can be viewed as the unfortunate outcome of an athlete's inability to self-regulate their performance in stressed situations. Self-regulation models have been demonstrated to enhance an athlete's performance through the use of specific processes (e.g., strategies, goal setting) to enhance perceptions of self-efficacy. Self-efficacy is negative correlated with cognitive anxiety measures in research on academic functioning, and thus, procedures that can enhance an athlete's perception of self-efficacy have the potential for reducing anxiety and choking. Self-regulatory processes also promote effective allocation of attentional resources and are used to improve self-awareness, skill acquisition, and performance outcomes. These processes have been identified as among the most important factors that affect

success in sport participation (Hardy & Nelson, 1988, Kirschenbaum & Wittrock, 1984).

According to Zimmerman (1998), there are three sequential phases of a self-regulatory cycle: forethought (which precedes action), performance control (which occurs during motoric activity), and self-reflection (which occurs after performance). The self-reflection phase is hypothesized to cyclically influence the forethought phase for subsequent learning efforts, thus completing the self-regulatory cycle. Specific processes occur in each of these phases, including goal setting, strategy selection, and self-monitoring.

Forethought phase processes and beliefs. This phase involves two forms of task analysis: goal setting and strategic planning. Goals refer to specific intentions to engage in a particular action or attain a specific standard of proficiency, usually within a certain time frame (Locke, Shaw, Saari, & Latham, 1981). Gould, Tammen, Murphy, and May (1989) reported that *goal setting* is the psychological intervention most often used during Olympic athlete and coach consultations. For example, an Olympic diver and his coach might set a goal of having the diver extend his hands towards the water at the end of a dive, knowing that this has been a problem area in the past and recognizing its importance during a crucial dive. Specific areas in need of attention run the risk of being overlooked in pressure-filled situations unless a conscious decision is made to focus on a particular key goal. The large amount of research attention devoted to goal setting further attests to its importance. In general, research has supported the positive effects of goal setting in academic, industrial and organizational, and athletic settings (Bandura & Jourdan, 1991; Bandura & Wood,

1989; Early & Lituchy, 1991; Gist, Stevens, & Bavetta, 1991; Lee, 1988; Locke, Frederick, Lee, & Bobko, 1984; Schunk, 1984; Weinberg & Weigand, 1993; Wood, Bandura, & Bailey, 1990; Wood & Locke, 1987; Wurtele, 1986), although findings vary depending on the types of goals set. Learners who set unrealistic or counterproductive goals can undermine their performance and lead to adverse emotional reactions. Absolute goals or social outcome goals can significantly reduce one's effectiveness. For example, golfers who focus on "sinking every putt," or "making fewer three-putts" than a competitor are setting themselves up for disappointment in that even the best golfers cannot meet such goals; furthermore, utilizing attentional resources on goals that hold no productive value for task completion detracts from concentration on information that is essential for optimal performance (e.g. specific techniques or strategies).

Process goals encourage efficient use of time and energy by breaking down relatively complex behaviors into discrete, manageable processes that combine to form the whole action. The likelihood of successful execution of a target behavior is much greater if one adheres to the steps outlined by process goals (Kingston & Hardy, 1994). Due to their specific nature, process goals encourage effective allocation of attentional resources and enhanced concentration regardless of whether participants are consciously aware of it (Beggs, 1990; Boutcher, 1990; Hardy & Nelson, 1988). Although process goals have been demonstrated as effective in providing a focus for behavior, they are also useful in both retaining control or regaining control over focus that has been lost (Bull, Albinson, & Shambrook, 1996; Kingston & Hardy, 1994b, 1997). Process goals assist in increasing the degree of

control that an individual has over successful task completion as well as the equally important perceptions of control, as the focus is on specific, attainable, measurable factors (Beggs, 1990; Boutcher, 1990; Hardy & Nelson, 1988).

In a 1992 study, Kingston, Hardy, and Markland found that use of process goals was effective in reducing a performer's susceptibility to somatic anxiety in stressful competitive situations, subsequently resulting in performance improvements. Building upon these findings, Kingston and Hardy (1997) hypothesized that golfers trained in the use of process goals would be less susceptible to anxiety effects relative to golfers trained in use of performance goals. Thirty-seven club golfers of different ages and golf handicaps participated in the experiment. Of interest to note is that the treatments continued across the course of a complete competitive season and extended to the start of the following season. Nine golfers did not wish to make the time commitment necessary for the training and therefore represented the control group while the remaining twenty-eight subjects were randomly assigned to the two treatment groups. The Sport Psychology Skills Questionnaire, a Likert-type measure of seven psychological skills categories including self-efficacy, cognitive anxiety control skills, concentration skills, and motivation skills, was given before any goal setting training took place and then again at the end of the entire study. The CSAI-2 was administered on three separate occasions ten minutes before important competitions. Training in goal setting occurred during the weeks between the three competitions, such that Test 1 represented baseline data, Test 2 represented data collected after an initial training period of five weeks, and Test 3 at the end of the study after numerous weeks of training. Results indicated that those golfers in the

process-oriented group made immediate significant improvements in skill between Test 1 and Test 2, while those in the performance-oriented group did not see any positive change in performance until the end of the entire program. Of additional importance, those golfers in the process-oriented group showed significant improvements in self-efficacy, cognitive anxiety control, and concentration, all of which are thought to be skills that support effective performance.

A second task analysis process during forethought is *strategic planning*. A learning strategy refers to a cognitive method aimed at improving a specific component or components of performance. Self-regulating task strategies involves task analysis and identification of the most suitable, effective methods for learning or performing. Much like process goals, cognitive strategies focus attention on key performance elements and reduce the mental requirements of complex tasks (Kirschenbaum, 1984). For example, with the outcome of a game on the line, a basketball free throw shooter might concentrate on the verticality of his shooting forearm as a means of ensuring the correct aim of a throw. The selection of powerful strategies helps learners to enhance their ability to acquire knowledge and skills more efficiently, by reducing the haphazard reliance on techniques of varying utility (Dansereau, 1985; Singer, 1988). The scope and effectiveness of learning strategies has been demonstrated repeatedly in the research literature in academic settings (Graham & Harris, 1994; Pressley & Woloshyn, 1995; Weinstein & Mayer, 1986) as well as athletic settings (Anshel & Singer, 1980; Epstein, 1980; Kitsantas & Zimmerman, 1998; Singer & Suwanthada, 1986). In fact, successful athletes have been characterized by their ability to use cognitive strategies effectively (Meyers,

Cooke, Cullen, & Liles, 1979). According to McCombs (1989), self-regulatory strategies can contribute to the perception of self-control, and thus to the perception of being in control; furthermore, it is expected that the overall effectiveness of a learning strategy improves as a result of this dynamic.

Goal setting is linked to a key forethought self-motivation belief – self-efficacy. *Self-efficacy* refers to a person's beliefs about his or her own capabilities to learn or perform specific skills at specific levels at a given point in time (Bandura, 1986). The positive relationship between one's goals and self-efficacy beliefs may be accounted for by the feelings of personal control that come from the use of achievable goals (Beggs, 1990; Boutcher, 1990; Hardy & Nelson, 1988; Kingston & Hardy, 1997

Research has supported the positive impact of self-efficacy in various areas including academic, industrial and organizational, and athletic settings (Bandura & Jourdan, 1991; Bandura & Wood, 1989; Early & Lituchy, 1991; Gist et al., 1991; Lee, 1988; Locke et al., 1984; Schunk, 1984; Weinberg & Weigand, 1993; Wood et al., 1990; Wood & Locke, 1987; Wurtele, 1986). As already noted, self-efficacy indirectly influences performance through positive impact on personal goal levels and performance strategies (Locke et al., 1984; Wood et al., 1990). Self-efficacy also influences performance by elevating individual effort and persistence in response to challenging situations (Bandura, 1982; Bandura & Cervone, 1983). Students who are high in self-efficacy are not only more likely to persist, but they are also more motivated to apply skills on their own without external prompting (Bandura & Schunk, 1981; Schunk, 1989; Zimmerman, 1995). Strong self-efficacy beliefs are also associated with personally controllable attributions (McAuley, 1991). Based on

positive relationships that have been established between feelings of personal control and reduction of debilitative anxiety, it is no surprise that efficacy cognitions positively aid in reduction of anxiety (Bandura, 1977).

Performance phase processes. This phase involves the self-controlled use of specific strategies along with self-observations of one's *strategy implementation* (Zimmerman, 1998). By having a repertoire of strategies and a clear record of strategy implementation, any resulting failures may be attributed to poor strategy implementation, and learners will be more likely to persist until all strategies have been exhausted. Returning to the example of a basketball player shooting free throws at an important moment in the game, the shooter might attempt a free throw, keeping in mind the importance of forearm verticality in affecting the aim of the ball. The strategy might be implemented during the first throw and then adjusted for subsequent throws if needed. If the ball was on line with the basket but came up short, attention might be directed to other appropriate remedial strategies, such as adjustment of the degree of follow-through on a shot. This approach involves not only strategy implementation, but also self-observation, which will be elaborated upon shortly. Judgments of self-efficacy are recorded as well in an effort to emphasize accurate assessments of skill or knowledge, as overestimates and underestimates of confidence are detrimental to learning.

The second class of performance phase process is *self-observation* either through metacognitive monitoring (mental tracking of one's processes and/or outcomes) or self-recording (keeping written records of one's processes and or outcomes). Self-observation of one's performances and outcomes enables the athlete to adjust

strategies for optimal effectiveness. Self-monitoring calls for selective attention to specific actions and cognitive outcomes, distinctions from other actions, and discrimination of outcomes (Kirschenbaum, 1984). The feedback that one gets as a result of strategic outcome monitoring provides information that can change subsequent goals and performance efforts (Zimmerman, 1998). Research has shown that elite athletes use self-monitoring to improve performance and that non-elite sport participants may benefit from its use as well (Zimmerman & Kitsantas, 1996).

Self-recording is a version of self-monitoring that involves the formal documentation of outcomes (Watson & Tharp, 1993). Some researchers advocate keeping a sport journal for the purpose of providing a structured method to record, reflect upon, and benefit from past sport performances (Ravizza, 1998). According to a qualitative analysis of successful strategies used by 235 Canadian Olympic athletes, the best athletes had developed a procedure for extracting important lessons from every competitive experience, notably through use of a diary or log detailing goals set, strategies utilized, effectiveness of strategies, and suggestions for improvement of future efforts (Orlick & Partington, 1988).

Self-reflection phase processes and beliefs. Two key forms of self-reflective phase self-judgments are self-evaluation and attributions. *Self-evaluation* refers to comparisons of one's performance with a criterion, such as one's prior performance or the performance of a competitor. *Attributions* refer to beliefs about the causation of one's results, such as one's ability or strategy use. Self-reactions are perceptions of self-satisfaction and affective reactions, and are key for the self-reflective phase. There is a growing body of research indicating that self-reflective phase processes

and beliefs are greatly influenced by forethought and performance phase processes. For example, in a study of dart-throwing, Zimmerman and Kitsantas (1996) found that students who were trained to set more specific goals, to use more process-oriented strategies, and to make more specific strategy attributions showed higher levels of self-efficacy, intrinsic interest, and satisfaction than those trained in the use of product-oriented goals with focus on outcome. This would seem to indicate that increases in athletic technique lead to improved cognitive functioning, including more accurate self-efficacy perceptions and goal setting, as well as improved affective reactions, such as greater self-satisfaction, intrinsic task interest, and diminished anxiety. Dart-throwing mastery, positive self-reactions, and self-efficacy perceptions of competence were additively increased through use of process-goal setting and self-recording. Goal setting provides a foundation for effective self-monitoring by providing an area of focus.

In a 1998 study of motoric learning by a group of novices, Kitsantas and Zimmerman found that use of an analytic learning strategy was more effective than an imaginal strategy in enhancing self-efficacy beliefs, satisfaction with their progress, and intrinsic interest in the dart-throwing task. The analytic strategy involved teaching subjects to analyze the dart-throwing process and make necessary adjustments based on specific evaluative criteria while those in the imaginal strategy group were instructed to visualize a perfect throw before execution. In regard to goal setting, subjects who were taught to set dynamic cue goals that called attention to specific prior errors in throw verticality and follow-through improved self-efficacy beliefs and self-satisfaction more than subjects who focused exclusively on a single

cue. Finally, self-evaluative recording was found to play a role in increasing self-efficacy beliefs, self-satisfaction, and intrinsic interest in dart throwing. It also enhanced the self-efficacy of novices using an analytic strategy and those using dynamic goal setting.

In a study of expert basketball free-throw shooters who by definition were low in frequency of choking, Cleary and Zimmerman (2001) found that experts set significantly more specific goals; displayed superior strategy choice; showed significantly higher self-efficacy and intrinsic interest; made significantly greater attributions to faulty specific techniques after consecutive misses; and adopted more specific, technique-oriented strategies following consecutive misses than non-experts or novices. This study attests to the efficacy of self-regulatory approaches in positively impacting several important areas that support successful performance, achieving a higher level of technique or skill.

Chen and Singer (1992) noted that individuals generally do not utilize self-regulatory techniques on their own, and therefore they should be promoted through training. With that in mind, it is of significance to note that research supports the fact that self-regulatory techniques may easily be taught through a variety of instructional means (Schunk, 1994, 1998; Schunk & Zimmerman, 1998).

The Rationale and Purpose of This Study

"Choking" is a very psychologically debilitating condition because athletes often attribute a failure to perform up to expectations as evidence of inherent personal weaknesses. To date, relatively little research has been conducted on choking, but a key correlate of choking, anxiety, has received extensive study. Researchers have

drawn a distinction between somatic and cognitive anxiety, and research attests to the fact that, relative to somatic anxiety, cognitive anxiety plays a more significant debilitative role in affecting task performance; however, efforts to treat anxiety among athletes have largely relied on traditional relaxation strategies that target somatic anxiety. A more comprehensive intervention may be to address cognitive forms of anxiety through cognitive self-regulatory training as well as somatic forms of anxiety.

Anxiety reduction intervention is only one side of a therapeutic coin to prevent choking. Anxiety occurs when an athlete lacks effective methods and positive self-beliefs to enhance his or her control over his or her sport, and thus, an alternative intervention could focus on improving these deficiencies through self-regulation. Indeed, self-regulatory training involving enhanced strategies, goal setting, and self-evaluation has been determined to positively impact effective allocation of attentional resources, self-reactions, feelings of personal control in coping and attaining goals, attributions to strategy use, persistence, and performance. Especially in pressure-filled situations, it will be important for athletes to avoid distraction, set realistic goals, and have confidence in their ability to rise to the challenge and successfully cope and attain the goals that have been set. In order to have confidence and feelings of control, then, it is important that the skills needed are, in fact, well developed, and that there is an approach whereby one may clearly access the most important information needed for effective performance. The purpose of this study is to test the utility of anxiety reduction training and cognitive self-regulatory training as means of

addressing anxiety and the experience of "choking," with focus on the individual and potential additive benefits of both.

Hypotheses

H1: Compared to an anxiety reduction training group or a control group, chokers who receive self-regulatory skill training will, under stressed conditions, display significantly higher dart throwing, higher self-efficacy beliefs for dart throwing, more process-oriented goals, more technique-oriented attributions, more technique-oriented adaptive responses, and higher self-reaction.

H2: Compared to a control group, chokers who receive self-regulatory skill training or anxiety reduction training will show significantly less performance anxiety prior to stressed test conditions.

H3: Compared to all other groups, chokers who receive the combination of self-regulatory skill training and anxiety reduction training will, under stressed test conditions, show significantly less dart-throwing anxiety.

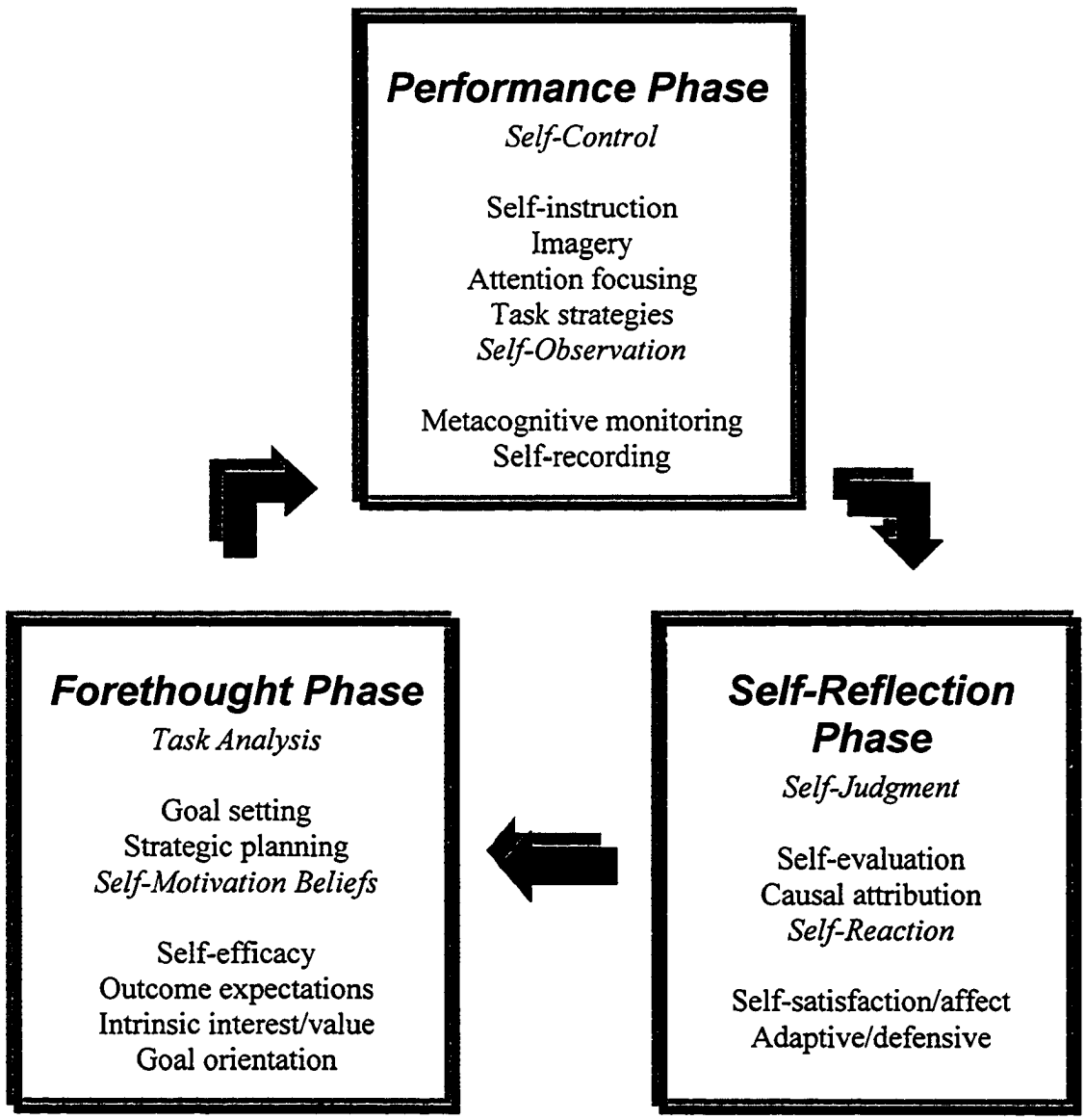


Figure 1. Phases and subprocesses of self-regulation. From "Motivating self-regulated problem solvers" by B. J Zimmerman, & M. Campillo (in press), in *The nature of problem solving,* J. E. Davidson & R. J. Sternberg (Eds.). New York: Cambridge University Press. Copyright (in press) by Cambridge University Press.

Chapter III

Methods

Subjects

This study assessed eighty undergraduate students with moderate experience in dart throwing. Subjects who participated in the study included forty-five males and thirty-five females. Thirty-three participants identified as White, twenty-two identified as Hispanic, fifteen identified as Black, five identified as Asian, and 5 identified as "other." Participants were generally evenly dispersed among different college majors ranging from twenty Graphic Design majors to twelve Animation majors. A more detailed account of this information is presented in Table 1.

All participants qualified as intermediate dart throwers, having thrown darts an average of 14.55 separate times over the year prior to the study, and having demonstrated dart throwing knowledge by being able to correctly identify at least two of the five important components of successful dart throwing as per Zimmerman and Kitsantas (1996). The average age of the participants was 23.16. See Table 2 for a detailed account of throwing experience and mean age for each treatment group. All participants reported having had some experience of their dart throwing skills rapidly declining in social situations where their personal effort and the importance of performing well were high (i.e. choking).

Participants were from a college in Houston, Texas who responded to daily announcements describing the study and who met the criteria of at least intermediate dart throwers based on their experience with dart throwing, their ability to correctly note at least two of the five important components of successful dart throwing as per

Table 1. Characteristics of the sample

Characteristic		n
Gender	Male	45
	Female	35
Ethnicity	White	33
	Black	15
	Hispanic	22
	Asian	5
	Other	5
College Major	Animation	12
	Culinary	18
	Graphic	20
	Interior	14
	MMWD	16

Table 2. Mean age and mean throwing experience for each treatment group (N = 80)

	Treatment Group				
	Self-Regulation	Anxiety Reduction	Both	Control	Total Sample
Age	21.30	22.85	23.45	25.05	23.16
Throwing experience	15.30	12.85	14.75	15.30	14.55

Note. Throwing experience is defined as the number of times the participant has thrown darts in the past year.

Zimmerman and Kitsantas (1996), and some past experience with choking under pressure. Recruitment was performed by the investigator in person in various classrooms over the course of one week. The need for participants of intermediate dart throwing status and a willingness and ability to return for assessment on two separate occasions if needed was emphasized during recruitment (see Appendix P for the full oral script utilized). Aside from the criteria regarding dart-throwing experience, component identification, and experience with choking, participants were initially selected at random, without discrimination based on age, gender, ethnicity, or college major. Participants were told that the study would be conducted over one or two sessions depending on their particular profile at the first session. Assessment at Time 1 further screened for status as an intermediate dart thrower and choker based on dart throwing performance. The eighty participants who completed the study met the criteria to qualify as intermediate dart throwers and chokers prior to and again at Time 1 (as described in procedures section) and were randomly assigned to treatment groups and assessed again at Time 2. Those participants who did not qualify as intermediate dart throwers and/or chokers at Time 1 were excused from the study, with a general explanation that they did not fit the anxiety profile needed for this study (see Appendix Q). Out of an initial pool of eighty-five respondents, only three individuals were excused from the study due to failure to meet qualifying criteria as intermediate dart throwers – respondents were overwhelmingly accurate in their self-reporting as intermediate dart throwers. Only two respondents who qualified as intermediate dart throwers did not qualify as chokers and needed to be excused, highlighting the effectiveness of the stress-inducing scenario that was arranged.

It was equally notable that respondents diligently kept their commitments with appointments at Time 1 and again within forty-eight hours at Time 2. Lack of drop-out behavior may have been largely linked to the particular culture that was fostered at the college used in this study, where an initiative had been in place over the past year to emphasize ten "employability" qualities such as responsibility, respect, and integrity.

Research Design

The eighty participants were randomly assigned to one of three experimental groups or a control group based on the presence or absence of two forms of treatment: anxiety reduction and self-regulatory skill training. Anxiety reduction training involves traditional relaxation and deep breathing as well as thought stopping techniques. Under pressure, athletes prone to choking are taught techniques to combat cognitive anxiety that interferes with optimal performance.

In contrast, self-regulatory skill training focuses on the actions and processes that foster control of the performance under difficult circumstances. Participants were trained in processes, such as goal setting, strategy implementation, and self-recording with focus on the regulation of crucial throwing components and sustaining their effectiveness. Well-developed underlying skills are expected to be effective in increasing self-efficacy for successfully completing a task and in reducing anxiety.

The participants were assigned to one of four combinations of the two treatments: *(1) a self-regulatory skill training without anxiety reduction training group, (2) an anxiety reduction training without self-regulatory skill training group, (3) a self-*

regulatory skill training and anxiety reduction training group, and (4) a control group that received neither treatment.

Task materials

The dart throwing game was comprised of a wooden-framed target board made up of seven regular concentric circles, and three steel-headed, plastic feathered darts. The bull's eye had a radius of ½ inch, with each successive outward circle increasing in radius by 1 inch. Each circle was assigned a distinct point value such that the bull's eye was worth seven points and each successive outward circle was diminished by one point until the outermost circle had a value of one. The darts were thrown at the target from a distance of 8.5 feet, with the target being positioned with its uppermost edge 5.8 feet off the ground.

Measures

Screening Form. The Screening Form consisted of three questions regarding dart throwing experience, identification of dart throwing components and history of choking. See Appendix A for form and Appendix B for scoring explanation.

Demographic Questionnaire. The Demographic Questionnaire (see Appendix C) consisted of four questions regarding subjects' backgrounds, including gender, age, ethnicity, and college major.

Dart-throwing skill. Zimmerman and Kitsantas' (1996) test of dart skill was utilized to determine the dart-throwing skill level of each participant. The participants were told to "do [their] best," and were given six darts to throw. Each participant's final score represented the average for six throws; therefore, scores fell

within a range of zero to seven points (see Appendix D for explanation of the scoring system and Appendix E for performance forms).

Self-efficacy scale. Bandura and Schunk's (1981) self-efficacy scale was modified for application to beliefs about dart-throwing capability, and successfully used in research by Zimmerman and Kitsantas (1996). All items were prefaced with the phrase, "How sure are you that you can score at least..." followed by these phrases: (1) ...7 with one dart (2) ...5 with one dart (3) ...3 with one dart (4) ...1 with one dart. Participants responded according to an efficacy scale ranging from zero to one hundred points in ten unit intervals. The following written scales were presented for clarity and points of reference: 10 (not sure), 40 (somewhat sure), 70 (pretty sure), and 100 (very sure). Each participant's score was calculated as the average self-efficacy rating for the four items. According to Cronbach's alpha test, the inter-item reliability of the four self-efficacy questions has been reported at .89 (Zimmerman & Kitsantas, 1996). See Appendix F.

Goal setting. Each participant was asked to respond to the question, "Do you have a goal when throwing the darts? If yes, what is it?" Participants' written responses were grouped according to their choice of goals. Possible categories were: outcome-oriented, process-oriented, uncertainty, and "other." A single-item was used for measurement as research has indicated that single-item reports are as informative as multi-item scales when the qualities being assessed are relatively intuitive to people (Burisch, 1994a, 1994b; Helgeson, 1992). See Appendix G for measurement form and Appendix K for explanation of scoring.

Anxiety. The Competitive State Anxiety Inventory-2 (CSAI-2; Martens et al., 1990), a multi-dimensional measure of sport anxiety, was used to assess the participants' cognitive and somatic anxiety. Examples of the nine cognitive anxiety subscale items include, "I am concerned about this competition," and "I am concerned about performing poorly." Examples of the nine somatic anxiety subscale items include, "I feel jittery," and "My body feels tense." Responses to each item were scored on a four-point Likert scale running from one ("not at all") to four ("very much so"). Internal consistency has been deemed to be adequate with Cronbach's alpha coefficients ranging from .79 to .83 for the cognitive anxiety scale, and around .82 for the somatic anxiety scale (Martens et al., 1990). See Appendix H for measurement forms and Appendix L for explanation of scoring.

Self-reactions scale. The participants' satisfaction with their dart throwing ability was assessed with a single item scale ranging from zero to one hundred in ten unit intervals. The following written scales were presented for clarity and points of reference: 10 (not satisfied), 40 (somewhat satisfied), 70 (pretty satisfied), and 100 (very satisfied). Each participant's score was representative of how satisfied he or she was about overall dart throwing performance (see Appendix I).

Attribution scale. The participants were asked to respond to the following question following the dart skill posttest: "Why do you think you didn't do as well as you could have?" Participants' written responses were grouped according to their reasons for poor performance. Possible categories were: technique, ability/confidence, effort, practice/experience, rhythm/focus/concentration, nervous/anxious/tense, task difficulty, uncertain, and "other" (see Appendix J for

measurement form and Appendix M for explanation of scoring). The attribution question was asked at the end of a trial of throws instead of immediately after a single missed bull's eye in order to avoid interruption and insertion of feedback into the trial itself. The phrasing of the question was based on the belief that participants at the intermediate level would not be able to get three bull's eyes on any given trial; in fact, this belief held true throughout the study. Attributions for failure were used as a focal point for assessment as attributions for positive outcomes have limited predictive value.

Adaptive response. After being asked to identify attributions for poor performance, participants were asked to respond to the following question: "What can you do to improve your performance?" Participants' written responses were grouped according to their perception of necessary adjustments for improving their performance. Possible categories were: technique, effort, practice/experience, rhythm/focus/concentration, nervous/anxious/tense, uncertain, and "other" (see Appendix J for measurement form and Appendix MII for explanation of scoring).

Procedures

Participants were recruited from all classes at a college in Houston, Texas via daily announcements describing the study. All students were told that a treatment study examining performance in sport was being conducted and that the investigator needed volunteers to participate. The investigator clearly stated the need for volunteers who had thrown darts on at least six separate occasions over the last year. All interested participants were screened for qualification as intermediate dart throwers and chokers prior to engaging in the study (see Appendix A for complete

description and Appendix B for scoring). Participants were told that the study would be conducted over one or two sessions depending on their particular profile at the first session. Appropriate consent forms approved by the Institutional Review Board of The Graduate Center, The City University of New York, were distributed, completed by those who wished to volunteer, and collected by the investigator. The eighty participants who completed the study met the criteria to qualify as intermediate dart throwers and chokers prior to and again at Time 1 (see description in Time 1 section below) and were then assessed at Time 2 within forty-eight hours of Time 1.

Time 1

During the first few minutes of the session, participants filled out the Demographic Questionnaire.

The participants were told the test conditions for throwing darts and the scoring system. Specifically, they were told to stand behind the white throwing line facing the target with their feet comfortably apart, and were informed that each circle was assigned a distinct point value such that the bull's eye was worth seven points and each successive outward circle was diminished by one point until the outermost circle had a value of one. Participants were then given five minutes to warm up by throwing darts on their own. After five minutes had elapsed, measures of self-efficacy for throwing darts, goal setting, and anxiety were given to each participant and then an unstressed test of dart throwing skill was given wherein the participants performed without competition. Participants were asked to "do [their] best," and were given a total of six darts to throw. Each participant's average over six throws was used to screen for intermediate dart throwing status, with acceptable qualification set

at an average score of at least 3.5 (fifty percent of a maximum score of seven). This average was set based on Kitsantas and Zimmerman's (1998) finding that novice dart throwers averaged a score of 2.6 (thirty-seven percent) out of a maximum average of seven over six dart throws. Following the first test of dart throwing skill, measures of self-reaction, attributions, and adaptive responses were administered.

Upon completion of these measures, a stressed test was given. The participant was told that he or she scored slightly lower than another player and that he or she needed to throw significantly better if he or she expected to surpass the other player in the next competitive round in order to receive a financial reward of five dollars. This was expected to simulate pressure as per research documenting the effects of social evaluation on performance (e.g. Baumeister, 1982; Sarason, 1980) along with the increase in debilitative anxiety resultant from belief in a slightly better competitor (Wankel, 1972). Measures of self-efficacy for throwing darts, goal setting, and anxiety were given, followed by the second test of dart throwing skill under the pressure-induced situation. Measures of self-reaction, attributions, and adaptive responses were given after the second test of dart throwing skill.

A twenty-five percent decline in average score between the two tests of dart throwing skill was used as an index of choking. Those participants who met this criteria were considered chokers, but not labeled as such to the participants; instead, they were told that their performance matched the profile needed for the study and were scheduled to return for a second session within forty-eight hours. Although only this experimental definition of choking was used, correlations between this criterion and self-reported choking by the participants were made. Those participants who did

not qualify as intermediate dart throwers and/or meet the experimental choking criteria were excused on the grounds of having had a different profile than the one needed for this study (see Appendix P for complete description). Upon conclusion of assessment at Time 1, all participants were told that their second round performance score narrowly missed the score of the other competitor; however, upon completion of the study, all participants were given the financial reward of five dollars including those who did not qualify at Time 1.

Time 2

Participants were randomly assigned to one of the three treatment groups or the control group, and were given twenty minutes of differential instruction based upon the condition to which the participant was assigned. All training was given on an individual basis and not in a group setting.

Training and Control Conditions

A brief overview of the impact of anxiety of sport performance and the subsequent rationale for treatment using skill development training was given to all participants in the training conditions at the outset of the session.

Participants in Group 1, *self-regulatory skill training without anxiety control training,* were told that to perform optimally during competitive dart throwing events, it was important to focus on their throwing strategy or technique rather than on their outcome score. Worrying about outcome scores would interfere with optimal execution of technique. They were then taught how to remain focused in their technique. They were told to concentrate on holding their wrist in a loose and laid slightly back position and to throw in a crisp but not a hard way. The aim was to get

the dart to the board quickly with as little trajectory as possible. After they released the dart, they were told to allow their arm to continue in its normal motion with their fingers fully extended, and follow the dart as it moved toward the target.

Participants in this first group were instructed in use of process goals which involved focusing on verticality and/or follow through component(s) of the previous trial that were performed improperly; these faulty components then became the sole focus of the subsequent trial. After each throw, the participants were told to analyze the throwing process and adjust (a) the verticality of their forearm when it varied, e.g., the dart went right or left of the target, and (b) the follow through motion when it varied, e.g., the dart went high or low. To assist in this process, participants were taught to use their non-throwing hand to support the elbow on their throwing arm, providing a brace and point of reference. Finally, those participants in the first group were instructed to record any verticality and/or follow through step(s) requiring adjustment in a log after each practice trial. See Appendix N for complete description. The investigator reminded participants that this technique would be useful in combating feelings of anxiety during performance of dart throwing.

Participants in Group 2, *anxiety control without self-regulatory skill training*, were told that to perform optimally during competitive dart throwing events, it would be important to remain relaxed. Worrying about outcome scores would interfere with optimal execution of technique, and to help them, they would receive relaxation, thought stopping, and thought replacement training. This intervention has received particular attention as it has been demonstrated as quick and easy to learn and apply (Spiegler & Guevremont, 1993). Training began with instruction and demonstration

of deep abdominal breathing focusing on maintenance of a smooth, slow pace. The investigator walked each participant through this exercise three times, and proceeded on to the next step only when the participant stated that he or she felt confident in his or her ability to use this technique.

Training next focused on an explanation of thought stopping and a demonstration of this technique. Participants were instructed to identify thoughts that interfered with clear thinking and confidence, and to immediately give the command, "Stop!" internally with a loud, commanding voice. This was followed by an explanation and demonstration of thought replacement, wherein participants were instructed to replace the negative thought with a positive, productive thought that would reduce anxiety, increase confidence, and focus attention on the throwing task. The investigator provided an example of use of the whole technique in its entirety and asked each participant to come up with an example of his or her own. That is, the investigator stated that he was feeling anxious about performing a dart throwing skill, so he began a deep breathing exercise. After following the deep breathing exercise that was taught earlier, the investigator stated that he was worried that "[He was] going to perform terribly and [wouldn't] outscore [his] opponent." The investigator stated that he was going to immediately tell himself to "Stop!" in a loud internal voice and then replace the negative thought with the statement, "I know I can do this! I just need to concentrate." Participants then came up with their own examples of both negative thoughts and positive replacement thoughts. The investigator concluded training upon the participant asserting confidence in his or her ability to successfully use this whole technique. See Appendix O for complete description.

The investigator reminded participants that this technique would be useful in combating feelings of anxiety during performance of dart throwing.

Participants in Group 3, *self-regulatory skill training and anxiety control training,* were instructed in the use of traditional relaxation techniques as per approach used with Group 2, followed by skill development training as per the approach used with Group 1. That is, instruction was sequential in that this group was instructed to relax and then begin using the skill development interventions. Instruction in the use of these techniques was covered within the same twenty minute timeframe allowed to the other groups by moving at a brisker pace and splitting the time available to address each treatment intervention. The investigator reminded participants that this technique would be useful in combating feelings of anxiety during performance of dart throwing.

Participants in Group 4, *control group,* were told to "do [their] best," without any instruction in strategy use, cues, self-evaluation, or anxiety reduction techniques.

Practice and Posttest Phases at Time 2

A practice period of another ten minutes wherein each participant implemented his or her experimental approach while throwing darts was next. After the practice period, measures of self-efficacy for throwing darts, goal setting, and anxiety were given and then an unstressed test of dart throwing skill was given wherein the participants performed without competition. Participants were asked to "do [their] best," and were given six darts to throw. Measures of self-reaction, attributions, and adaptive responses were administered after the first test of dart throwing skill.

Upon completion of these measures, a stressed test was given. The participant was told that he or she scored slightly lower than another player and that he or she would need to throw significantly better if he or she expected to surpass the other player in the next competitive round in order to receive a financial reward of five dollars. Measures of self-efficacy for throwing darts, goal setting, and anxiety were given, followed by the second test of dart throwing skill under the pressure-induced situation. Measures of self-reaction, attributions, and adaptive responses were given after the second test of dart throwing skill.

Following the conclusion of the study, all participants were debriefed about the purposes of the study, the need to keep them uninformed about the purposes until after all the data was collected, and the value of the study in helping athletes overcome the terrible experience of choking.

Chapter IV

Results

Data was collected on two separate occasions and under stressed and unstressed conditions. Manipulation checks for performance and anxiety measures at Time 1 under unstressed and stressed conditions were run to verify that choking occurred. All other analyses used the data collected at Time 2 under stressed conditions except performance data at Time 2 under unstressed conditions where noted. The data for the metric outcome measures were analyzed using a multivariate analysis of variance (MANOVA). Inter-rater reliability was calculated for categorical data to verify the psychometric properties of the measurement scales. Chi-square analyses were performed to look for associations between treatment group membership and categorical variables; in addition, frequency tables were compiled and inspected for patterns in categorical data. Correlational statistics indicating the relationships among the metric outcome measures were employed, and a multiple regression analysis was utilized to examine the impact of the combined self-regulation measures to determine the amount of variance they might predict in performance. Finally, a path model of the relationships among the variables was developed and evaluated.

Manipulation Checks

Descriptive statistics for the performance and anxiety measures are presented in Table 3. Paired samples t-tests were utilized to verify that choking occurred. A significant difference was found when comparing performance scores over six throws from Time 1 under unstressed to stressed conditions ($M = -9.60$), $t\ (79) = -36.50$, $p = .001$ (2-

Table 3. Means and standard deviations for manipulation check data (Time 1 measures)

Measure	Unstressed		Stressed	
	Mean	SD	Mean	SD
Performance	4.29	.51	2.69	.56
Anxiety	1.57	.46	1.85	.56

Note. To facilitate interpretation of the results, the means and standard deviations of the variables have been converted to adjust for differences in the number of measurement items utilized. The results reported above correspond to the means and standard deviations of each individual dart throw and each individual anxiety questionnaire item.

tailed). These data suggest that the manipulation was effective. Performance scores declined significantly from the unstressed to the stressed condition.

A significant difference was also found when cumulative anxiety scores from Time 1 unstressed and stressed conditions were compared ($M = 5.05$), $t\ (79) = 6.75, p = .001$ (2-tailed). These data suggest that the manipulation was effective. Anxiety scores increased significantly from the unstressed to the stressed condition.

Multivariate Analysis of Variance

Preliminary assumption testing was conducted to check for normality, homogeneity of variance-covariance matrices, and multi-co linearity. No serious violations were noted.

Table 4 displays the means and standard deviations of all dependent metric measures for each experimental group, taken at Time 2 under stressed conditions.

There was a statistically significant difference among the treatment groups on the combined dependent variables, $F\ (12, 193) = 3.93, p = .001$, Wilks' Lambda = .562, partial eta squared = .17. The partial eta squared value exceeds the limit of .14 recommended by Cohen (1988) as the lower limit for a large effect, and suggests a fairly large effect from the treatment manipulation.

The univariate statistics for each separate dependent variable are presented in Table 5. Of importance to note is that the assumption of equality of variance was violated for the anxiety measure, and thus a more stringent cutoff for statistical significance would be necessary; however, the anxiety measure was not significant and so the point is moot. The only separate dependent variable to show significant results is *performance,* $F\ (3) = 14.63, p = .001$. As indicated by eta squared (.37), the

Table 4. Descriptive statistics for the dependent variables by treatment group

Measure	Treatment Group	Mean	SD
Self-efficacy	Self-Regulation	66.01	21.46
	Anxiety Reduction	60.63	18.06
	Both	61.50	16.53
	Control	57.44	16.90
Anxiety	Self-Regulation	1.58	.49
	Anxiety Reduction	1.90	.43
	Both	1.68	.40
	Control	1.95	.88
Performance	Self-Regulation	4.15	.84
	Anxiety Reduction	3.03	.74
	Both	3.56	.64
	Control	2.71	.72
Satisfaction	Self-Regulation	58.65	25.42
	Anxiety Reduction	43.50	21.53
	Both	52.50	24.68
	Control	53.75	22.65

Note. To facilitate interpretation of the results, the means and standard deviations of the variables have been converted to adjust for differences in the number of measurement items utilized.

Table 5. Univariate statistics for the dependent variables

Dependent Variable	df	F	p	Eta Squared
Self-Efficacy	3	.76	.522	.03
Anxiety	3	1.82	.151	.07
Performance	3	14.63	.001	.37
Satisfaction	3	1.43	.240	.05

effect size for performance is quite large. Comparisons among the 4 treatment groups on the performance measure at Time 2 under stressed conditions are presented in Table 6. The self-regulation group differs significantly from the other three treatment groups on the performance measure. The group that received both self-regulation and anxiety reduction training also differed significantly from the control group, but not from the anxiety reduction treatment group.

Inter-rater Reliability

Table 7 contains inter-rater reliability for the categorical data. Cohen's Kappa values range from .95 to 1.00. These values indicate excellent inter-rater reliability for all of the categorical data, and may be accounted for by the thorough scoring rubric and training given to the second rater.

Chi-square Analyses

The categorical data were evaluated using a multi-step process. For descriptive purposes, categorical data were placed into multiple groups. Specifically, goal setting responses were scored in four possible categories (outcome-oriented, process-oriented, uncertainty, and "other"), and the frequency of each response across the treatment groups is presented in Table 8. Attribution reactions were scored in nine categories (technique, ability/confidence, effort, practice/experience, rhythm/focus/concentration, nervous/anxious/tense, task difficulty, uncertain, and "other"), and the frequencies are presented in Table 9. Adaptive responses were scored in seven categories (technique, effort, practice/experience, rhythm/focus/concentration, nervous/anxious/tense, uncertain, and "other"), and the frequencies for these scores are presented in Table 10. In order to avoid violations of

Table 6. Comparisons of treatment groups on performance scores

Treatment Group	Comparison	Mean Difference	Std. Error	p
Self-Regulation	vs. Anxiety Reduction	6.70	1.40	.001
	vs. Both	3.55	1.40	.080
	vs. Control	8.65	1.40	.001
Anxiety Reduction	vs. Self-Regulation	-6.70	1.40	.001
	vs. Both	-3.15	1.40	.164
	vs. Control	1.95	1.40	1.000
Both	vs. Self-Regulation	-3.55	1.40	.080
	vs. Anxiety Reduction	3.15	1.40	.164
	vs. Control	5.10	1.40	.003
Control	vs. Self-Regulation	-8.65	1.40	.001
	vs. Anxiety Reduction	-1.95	1.40	1.000
	vs. Both	-5.10	1.40	.003

Table 7. Inter-rater reliability (Cohen's Kappa) for categorical variables

Measure	Cohen's Kappa
Goals – Time 1 Unstressed	.97
Goals – Time 1 Stressed	.95
Goals – Time 2 Unstressed	1.00
Goals – Time 2 Stressed	.95
Attributions – Time 1 Unstressed	.97
Attributions – Time 1 Stressed	.97
Attributions – Time 2 Unstressed	1.00
Attributions – Time 2 Stressed	.98
Adaptive Response – Time 1 Unstressed	.98
Adaptive Response – Time 1 Stressed	.97
Adaptive Response – Time 2 Unstressed	.98
Adaptive Response – Time 2 Stressed	.98

Table 8. Frequency of goal-setting data by treatment group (Time 2 – Stressed)

	Treatment Group			
Goal	Self-Regulation	Anxiety Reduction	Both	Control
Outcome-Oriented	1	18	5	18
Process-Oriented	19	0	13	1
Uncertain	0	0	0	1
Other	0	2	2	0
Total	20	20	20	20

Table 9. Frequency of attribution data by treatment group (Time 2 – Stressed)

Attribution	Treatment Group: Self-Regulation	Anxiety Reduction	Both	Control
Technique	15	7	4	6
Ability/Confidence	0	0	4	0
Effort	1	1	0	0
Practice/Experience	0	0	1	1
Rhythm/Focus/Concentration	3	4	5	4
Nervous/Anxious/Tense	0	3	3	3
Task Difficulty	0	2	0	0
Uncertain	0	0	0	2
Other	1	3	3	4
Total	20	20	20	20

Table 10. Frequency of adaptive response data by treatment group (Time 2 – Stressed)

	Treatment Group			
Attribution	Self-Regulation	Anxiety Reduction	Both	Control
Technique	17	4	6	5
Effort	0	0	1	0
Practice/Experience	1	6	1	5
Rhythm/Focus/Concentration	1	8	5	5
Nervous/Anxious/Tense	1	1	6	3
Uncertain	0	1	1	1
Other	0	0	0	1
Total	20	20	20	20

chi-square principles (i.e. low frequency cells in the results) and to test the specific hypotheses of this study, it was necessary to regroup data. Table 11 displays the contingency table for the goal setting data after responses were collapsed into process and non-process categories. Chi-square analysis indicates that there is a significant association between treatment and goal setting, X^2 (3, N = 80) = 53.38, p = .001. Inspection of the contingency table indicates that participants in Group 1, self-regulatory skill training, overwhelmingly set more process-oriented goals for themselves relative to all three other groups. Those in Group 3, the combination of both self-regulatory skill training and anxiety reduction training, also set more process than non-process-oriented goals for themselves; however, not to the extent of those in Group 1. In direct contrast, those participants in Group 2 (anxiety reduction) and Group 4 (control) largely set non-process goals for themselves.

Table 12 displays the contingency table for the attribution data after responses were collapsed into technique and non-technique categories. Chi-square analysis indicates that there is a significant association between treatment and attributions, X^2 (3, N = 80) = 14.58, p = .002. Inspection of the contingency table indicates that participants in Group 1, self-regulatory skill training, were much more likely to make attributions based on technique whereas the opposite held true for the other three groups: Groups 2 (anxiety reduction training), 3 (combination of self-regulatory skill training and anxiety reduction training) and 4 (control) accounted for inaccuracy by non-technique related factors. Of interest to note is that the greatest differences between the actual attribution data and the expected attribution data occurred in the self-regulatory skill training group. The actual and expected attributions for the other

Table 11. Actual and expected frequencies of process and non-process goals by treatment group

		Treatment Group				
Goal	Values	Self-Regulation	Anxiety Reduction	Both	Control	Total
Non-Process	Actual	1.0	20.0	7.0	19.0	47.0
	Expected	11.8	11.8	11.8	11.8	47.0
Process	Actual	19.0	0.0	13.0	1.0	33.0
	Expected	8.3	8.3	8.3	8.3	33.0
Total		20.0	20.0	20.0	20.0	80.0

Table 12. Actual and expected frequencies of technique and non-technique attributions by treatment group

		Treatment Group				
Attribution	Value	Self-Regulation	Anxiety Reduction	Both	Control	Total
Technique	Actual	15.0	7.0	4.0	6.0	32.0
	Expected	8.0	8.0	8.0	8.0	32.0
Non-technique	Actual	5.0	13.0	16.0	14.0	48.0
	Expected	12.0	12.0	12.0	12.0	48.0
Total		20.0	20.0	20.0	20.0	80.0

three groups are relatively close. Not surprisingly, a similar pattern emerged with the adaptive response data. The contingency table for the grouped adaptive responses is presented in Table 13. Chi-square analysis indicates that there is a significant association between treatment and adaptive responses, X^2 (3, N = 80) = 22.91, p = .001. Inspection of the contingency table indicates that participants in Group 1 were much more likely to focus on the need to adjust part of their throwing technique to deal with inaccuracy; participants in Groups 2, 3, and 4 were much more likely to address non-technique oriented reasons for inaccuracy as a means of adapting for future dart throws. Again, a pattern similar to that from the attribution data is noted with regard to the actual and expected values. The greatest differences between the actual adaptive response data and the expected adaptive response data occurred in the self-regulatory skill training group. The actual and expected attributions for the other three groups are close. The parallels between attribution and adaptive response data would seem to make sense in that those who attribute inaccuracy to technique would then focus on it for adaptive purposes and those who attribute inaccuracy to non-technique-oriented factors would remain focused on those factors for adaptive purposes.

Correlational Statistics

The relationships between unstressed performance, self-efficacy beliefs, anxiety, stressed performance, and satisfaction were explored using Pearson correlations (see Table 14). The relationships between these variables and the treatment groups were explored using Spearman correlations. The results indicate significant correlations between many of the variables. Unstressed performance at Time 2 was significantly

Table 13. Actual and expected frequencies of technique and non-technique adaptive responses by treatment group

		Treatment Group				
	Value	Self-Regulation	Anxiety Reduction	Both	Control	Total
Technique	Actual	17.0	4.0	6.0	5.0	32.0
	Expected	8.0	8.0	8.0	8.0	32.0
Non-technique	Actual	3.0	16.0	14.0	15.0	48.0
	Expected	12.0	12.0	12.0	12.0	48.0
Total		20.0	20.0	20.0	20.0	80.0

Table 14. Correlations among the variables used in path analysis (N = 80)

	Variables					
	TXGRP	PERF3	SEFF	ANX4	PERF4	SATIS4
Treatment Group (TXGRP)	—					
Unstressed Performance (PERF3)	.39**	—				
Self-Efficacy (SEFF)	.18	.39**	—			
Anxiety (ANX4)	-.19	-.05	-.16	—		
Stressed Performance (PERF4)	.60**	.54**	.29*	-.23*	—	
Satisfaction (SATIS4)	.11	.32**	.24*	-.25*	.44**	—

Note. Correlations involving Treatment Group (TXGRP) are Spearman correlations. All other correlations are Pearson correlations.
* $p < .05$
** $p <. 01$

related to self-efficacy ($r = .39, p < .01$), stressed performance at Time 2 ($r = .54, p < .01$), and satisfaction ($r = .32, p < .01$). Stressed performance at Time 2 was significantly related to self-efficacy ($r = .29, p < .05$), anxiety ($r = -.23, p < .05$), and satisfaction ($r = .44, p < .01$). Satisfaction was also significantly related to self-efficacy ($r = .24, p < .05$), and anxiety ($r = -.25, p < .05$). In terms of treatment group, there was a significant relationship with both unstressed ($r = .39, p < .01$), and stressed performance at Time 2 ($r = .60, p < .01$).

The correlations between unstressed performance and anxiety ($r = -.05, p > .05$), and between self-efficacy and anxiety ($r = -.16, p > .05$) were both non-significant. In terms of treatment group, non-significant correlations were found with self-efficacy ($r = .18, p > .05$), anxiety ($r = -.19, p > .05$), and satisfaction ($r = .11, p > .05$).

Multiple Regression Analysis of Self-Regulatory Processes and Beliefs

Multiple regression analysis was used to assess predictions of variance in the performance at Time 2 under stressed conditions, using a combination of self-regulatory processes (self-efficacy, satisfaction, goals, attributions, and adaptive response) as predictors. The statistical assumptions for multiple regression analysis were evaluated and appropriately met. All of the independent variables were entered simultaneously.

The results of the multiple regression analysis are presented in Table 15. The multiple R for the overall equation was statistically significant ($R = .66$), and the multiple R^2 indicates that the combined independent variables accounted for 44% of the variance in performance. Both satisfaction and goal-setting made significant

Table 15. Summary of simultaneous regression analysis for variables predicting dart-throwing performance (Time 2 – Stressed, N = 80)

Variable	*r*	B	SE B	β
Satisfaction	.44**	0.08	0.02	.35***
Goals	.53**	4.66	1.08	.42***
Self-efficacy	.29*	0.01	0.01	.10
Attributions	-.19	-0.48	1.04	-.04
Adaptive response	.34**	-0.77	1.09	-.07

Note. $R^2 = .44$ ($p < .001$).

***$p < .001$.

unique contributions to the variance in performance, with goal setting making the greater contribution of the two. Although self-efficacy and adaptive responses did not make unique contributions to the prediction of performance because of inter-correlation with goal setting and self-satisfaction, they were significant predictors when considered individually (see correlation coefficients in Table 15). Attribution measures did not predict performance significantly in these analyses.

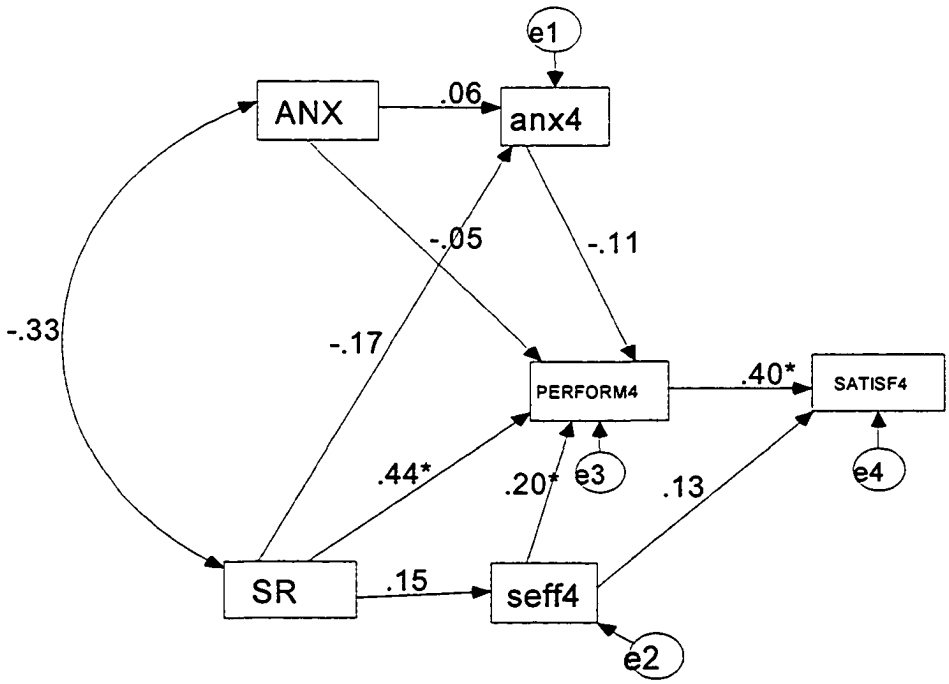
Path Analysis

A path model was designed to assess the influence of self-regulatory skill training and anxiety reduction training on dart throwing performance under stressed conditions as well on the mediating variables of self-efficacy beliefs and anxiety. Although metric measures are generally used when performing path analyses, nominal measures can be used when examining the effects of treatments. According to Cohen and Cohen (1983), analysis of variance (involving nominal independent variables) is simply a case of regression analysis with nominal classification variables, and path analysis is merely an elaboration of regression analyses. Each of the four treatment groups were coded using dummy variables with classification based on whether or not the treatment group included self-regulatory skill training or anxiety reduction training.

In terms of the mediating variables, self-regulatory training is hypothesized to enhance perceptions of self-efficacy because students who improve their self-regulatory capability are expected to perceive themselves as more competent. Self-efficacy is, in turn, hypothesized to influence students' self-satisfaction reactions because students who perceive themselves as more capable should experience greater

self-satisfaction with their performance outcomes. Past research has shown that self-efficacy is positively correlated with satisfaction (Zimmerman & Kitsantas, 1997). Self-efficacious students are also hypothesized to experience less anxiety because perceived capability reduces emotional distress. Anxiety reduction training is hypothesized to reduce anxiety, which in turn is expected to improve performance. Performance at Time 2 under unstressed conditions was included in the original model; however, this variable was dropped from the final model because of a covariate role. It should be noted that because participants were randomly assigned to treatment groups, no other background variables were included in the model.

Figure 2 presents the path model for the relationships among the variables discussed above. This model provided a satisfactory statistical fit for the results (CFI = .98). Both self-regulatory skill training and self-efficacy exerted significant influences on stressed performance, as evidenced by the significant path coefficients (standardized regression weights) of .44 and .20 respectively ($p < .05$). Stressed performance, in turn, exerted a significant influence on satisfaction, with a path coefficient of .40 ($p < .05$). The path between self-efficacy and satisfaction nearly attained significance ($p < .10$). Of importance to note is that the path coefficient between self-regulatory skill training and self-efficacy also narrowly missed significance at .15 ($p < .10$); furthermore, self-regulatory training had a near significant impact on participants' anxiety level, with a path coefficient of -.17 ($p < .10$). Taken together, these last two findings indicate that self-regulatory training may be effective in reducing athletes' anxiety and increasing their self-efficacy. Interestingly, anxiety reduction training failed to significantly impact either stressed



Note. N = 80, CFI = .98

*Path coefficients of .20 or above are statistically significant beyond $p < .05$.

The curved linkage between ANX and SR is a non-causal relationship.

Figure 2. Path analysis examining the impact of self-regulatory skill training and anxiety reduction training on dart throwing performance under stressed conditions along with the mediating functions of self-efficacy and anxiety.

performance or anxiety level. Anxiety level itself was negatively correlated with performance under stressed conditions, but statistical significance was not reached. The model accounted for a significant proportion of the variance in stressed performance (Multiple $R^2 = .31$) and in satisfaction (Multiple $R^2 = .21$).

Chapter V

Discussion

This study sought to test the effectiveness of two different approaches as well as their combination in assisting athletes to combat choking in a pressure-filled situation. To investigate this choking hypothesis, it was necessary to create conditions of stress. The data revealed that choking did in fact occur; participants' performance scores declined significantly and anxiety scores increased significantly when they were placed in the stress-inducing scenario. In accordance with the literature, the presence of the investigator as an evaluating audience by whom level of reward would be judged and the belief in a slightly better competitor were sufficient to raise the pressure of the situation and negatively impact performance. In fact, as noted earlier, out of an initial pool of eighty-five respondents, only two respondents who qualified as intermediate dart throwers did not exhibit choking behavior while under pressure.

The first hypothesis tested the efficacy of self-regulatory skill training at Time 2 under stressful conditions as compared to the utility of anxiety reduction training or no treatment intervention at all. Specifically, it was postulated that the participants receiving self-regulatory skill training would report higher levels of self-efficacy for dart throwing, higher satisfaction with their performance compared to participants receiving anxiety reduction training or no skill training at all, and attain higher scores on dart throwing performance. It was further expected that those receiving self-regulatory skill training would set more process-oriented goals, make more technique-oriented attributions, and give more technique-oriented adaptive responses relative to the other two groups.

The results provided some support for the first hypothesis. Participants who received self-regulatory skill training showed higher dart throwing performance than participants in the other two groups. Self-regulatory skill development would seem to have contributed to the relative success and imperviousness to choking of the participants who received this form of training. Maintaining high levels of performance while under pressure is of paramount importance to athletes engaged in competition.

Unexpectedly, participants who received self-regulatory skill training did not significantly differ significantly from participants in the other two groups in self-efficacy or degree of satisfaction. The mean scores of the self-regulatory skill training group on measures of self-efficacy and self-reaction were higher numerically than the scores on these same measures for the groups receiving anxiety reduction training or no training at all, but these differences were not statistically reliable. However, chi-square analyses indicated a significant association between self-regulatory training and goal setting, attributions, and adaptive response. Participants who received self-regulatory skill training set more process-oriented goals, made more technique-oriented attributions, and gave more technique-oriented adaptive responses than participants in the other two groups. Clearly this training enhanced these key self-regulatory processes.

The second hypothesis proposed that participants in both the self-regulatory skill training group or the anxiety reduction training group would show lower anxiety scores than participants in the control group who received no treatment intervention at all. Surprisingly, the results failed to support the second hypothesis. No statistically

significant difference was found among the three groups on the measure of anxiety at Time 2 under stressed conditions; however, it is of importance to note that the self-regulatory group did report the lowest mean anxiety levels of the three groups. The anxiety reduction group and the control group were nearly identical on this measure. Although the anxiety reduction training was based on widely used techniques that had been effective in prior research, they were not effective in the present research. It is possible that anxiety reduction training was helpful in lowering physiological aspects of anxiety, but did little to assist participants in feeling confident about their abilities to successfully perform the dart throwing task. As previously noted, those participants who received self-regulatory skill training showed relatively lower mean anxiety levels and higher mean self-efficacy levels than the participants who received anxiety reduction training. Lack of feelings of personal control has been shown to be a precursor to the experience of debilitative anxiety.

The third hypothesis stated that participants who received a combination of self-regulatory skill training and anxiety reduction training would fare better than all three other groups on the measure of anxiety, reporting the lowest anxiety scores overall. It was speculated that the additive effects of the two approaches would be most effective in ensuring lower anxiety levels. As would be expected based on the weak effects of anxiety training, the results failed to show an additive effect when anxiety training was included with self-regulatory training. Participants in the self-regulatory training group also scored just slightly lower than the participants from the combination group on the anxiety measure. In addition, participants in the self-

regulatory training group reported the lowest anxiety scores compared to the anxiety reduction and control groups.

As noted above, participants in the self-regulation training group displayed significant improvements in key methods of learning, namely they displayed more process-oriented goals, more technique-oriented strategies, and more adaptations that focused on throwing techniques than participants in the other three experimental groups. It could be asked, how effective were the self-regulatory process and belief measures in predicting the performance of the participants? Regression analyses revealed that 44% of the variance (a multiple R of .66) was predicted using these combined measures. Self-satisfaction and goal setting proved to provide the best prediction of the participants' performance under stress however, when considered separately, all measures except for attributions, were significant predictors of performance outcomes. This suggests a major role of self-regulatory processes and beliefs in the participants' ability to function under stress.

The results of the path model used in this study confirmed that self-regulatory skill training had a significant impact on performance under stressed conditions. Self-regulatory training emphasized setting attainable process goals, using effective strategies, and increasing awareness of performance deficits in need of remediation, helping keep level of performance high even as the stress of a performance situation increases. The influence of self-regulatory training on anxiety and self-efficacy narrowly missed attaining significance. In contrast, the path analysis revealed the ineffectiveness of anxiety training on reported anxiety reactions as well as on dart throwing performance under stress. Interestingly, self-regulation training had a larger

reductive effect on the participants' anxiety reactions than anxiety training, suggesting that self-regulation training may not need to include anxiety reduction training components to reduce competitors' stress levels. In future research, longer treatment interventions might produce stronger effects, however, it is notable that self-regulatory training produced significant positive effects on dart-throwing performance under the present levels of training. These results are in accordance with numerous other studies that have documented the positive effect of self-regulatory skill training on performance; however, this study particularly highlights the utility of this training under conditions of stress.

Self-efficacy also exerted a significant effect on performance under stressed conditions. Rising levels of self-efficacy indicate greater personal beliefs in attaining successful task performance. This finding is consistent with a great deal of past research indicating the positive effects of self-regulatory processes on increasing feelings of self-efficacy. The present findings indicate the positive effects of self-regulatory training are linked to increased feelings of personal control, confidence in goal attainment, and maintenance of high levels of performance under conditions of stress.

Overall, the results of this study indicate support for the use of training in self-regulatory skills as a means of combating choking. Participants who were given training in goal setting, strategy implementation, and self-recording fared much better than those participants who received anxiety reduction training, a combination of self-regulatory and anxiety reduction training, or no training at all on a test of dart throwing skill under pressure-filled circumstances. This outcome would seem

understandable based on the documented damaging effects of anxiety and the positive impact of self-regulatory skill training on the separate components that lead to performance decline.

Limitations and Future Research

As with all research, there are limitations to this study. First, the findings of this study only generalize to intermediate athletes of college age. Future research might focus on a larger population of athletes, particularly those with more experience than the participants in this study such as competitive collegiate athletes, minor league players, or professional athletes. The nearly significant findings of this study may achieve significance if a larger sample were studied.

Second, while the amount of stress induction was suitable for this study, higher levels of stress could be expected concordant with the increase in competitive (i.e. professional) level of competition and the coinciding increase in stakes. Studies based on performance in natural settings could obviously allow a more realistic and perhaps even higher amount of anxiety than that generated for the purposes of this study. While this study demonstrated the effective of the stress induction scenario, it lacked the potential for negative outcomes such as benching or loss of a job that might come with choking during a higher level of competition.

Third, a relatively brief period of time was used for the purposes of instruction, limiting the amount of practice time and repetition that might improve fluidity of treatment usage. In view of the several path findings that nearly attained significance, future researchers should significantly increase the length of training. Additional

performance feedback regarding the effectiveness of self-regulatory techniques may enhance the size of training effectiveness even further.

Last, while the CSAI-2 is broadly used and helpful in research dealing with anxiety in athletic competition, a more context-specific measure of anxiety as directly related to dart throwing may prove more useful as a means of taking a micro-analytic approach to anxiety assessment.

Contributions to Existing Literature

This study contributes to the existing literature on choking, athletic anxiety, and self-regulation. To date, interventions have proved unsuccessful in helping athletes manage their feelings of anxiety to the degree where their athletic performance did not decline under pressure and result in the phenomenon of choking. This study is one of the few that investigated the effectiveness of interventions not only on impacting anxiety, but on maintenance of performance level as well. Although not all hypotheses were supported, the finding that self-regulatory instruction can help an individual maintain a high level of performance while under pressure is an important one.

Conclusions

Choking can have a devastating effect on athletes' lives – lowering their self-confidence, disrupting social, professional, and financial areas of one's life, and increasing their anxiety. As such, on an applied level, the implications of the study are encouraging. Anecdotally, it would seem that the oft-prescribed remedy for dealing with stress in athletic competition of "taking a few deep breaths and think positively" is unlikely to produce lasting effects. Coaches, sport psychologists, or any

other individuals involved in the training of athletes should concentrate on teaching reliance on goal setting, strategy implementation, and self-recording as a means of dealing with pressure-filled situations. Instead of focusing on anxiety reduction per se, the focus should be on the specific skill areas in need of attention. This information will be vital for coaches and athletes who are struggling to avoid choking and reach their full athletic potential.

Appendix A
Screening Form

Name: _____

How many times have you thrown darts within the last year? ___

Have you ever had your dart throwing skills rapidly decline in social situations where your personal effort and the importance of performing well were high? (Please check one). Yes___ No___

What are the three most important components of effective dart throwing?

1. _____

2. _____

3. _____

Appendix B
Scoring Instructions
Screening Form

The participants will be asked to respond to the following questions as a means of screening for status as intermediate dart throwers and chokers: "How many times have you thrown darts within the last year?" "Have you ever had your dart throwing skills rapidly decline in social situations where your personal effort and the importance of performing well were high?" and "What are the three most important components of effective dart throwing?"

Participants who qualify as intermediate dart throwers will have thrown darts on at least six separate occasions within the last year, and will have had dart throwing skills rapidly decline in social situations where personal effort and the importance of performing well were high; in addition, they will have been able to correctly list at least two of the following five components of effective dart throwing.

Participants' written responses will be grouped according to beliefs about the most important components of effective dart throwing. Possible categories are: grip, stance, sighting, throw, and follow through.

1. **Grip** – any response that indicates attention to the way the dart is grasped.

2. **Stance** – any response that indicates attention to placement of the feet.

3. **Sighting** – any response that indicates placement of the dart prior to throwing to assist in aiming correctly.

4. **Throw** – any response that indicates the importance of the throwing motion, including mention of the use of a smooth arc-like throw that is crisp and gets to the board with as little trajectory as possible. Acceptable responses may also indicate the need to keep the body still or specific bodily motions used to create a proper throw such as holding the elbow steady and keeping it parallel to the floor, keeping the wrist loose and laid slightly back, or use of only the lower part of the arm and wrist to throw.

5. **Follow Through** – any response that indicates allowing the arm to continue in its normal motion after release of the dart.

Appendix C
Demographic Questionnaire

Name: _____

Gender: Male ___ Female ___

Age: ___

Ethnicity: _____

What is your major? _____

Appendix D
Explanation of the Scoring System

SCORE	PLACE
7	Center
6	line 6
5	line 5
4	line 4
3	line 3
2	line 2
1	line 1
0	Outside the ring

Appendix E
Dart-Throwing Performance

Name: _____

Condition: _____

Time 1

Unstressed Trial 1

Throw 1 _____ Throw 2 _____ Throw 3 _____ Total _____

Unstressed Trial 2

Throw 1 _____ Throw 2 _____ Throw 3 _____ Total _____

Stressed Trial 1

Throw 1 _____ Throw 2 _____ Throw 3 _____ Total _____

Stressed Trial 2

Throw 1 _____ Throw 2 _____ Throw 3 _____ Total _____

Time 2

Unstressed Trial 1

Throw 1 _____ Throw 2 _____ Throw 3 _____ Total _____

Unstressed Trial 2

Throw 1 _____ Throw 2 _____ Throw 3 _____ Total _____

Stressed Trial 1

Throw 1 _____ Throw 2 _____ Throw 3 _____ Total _____

Stressed Trial 2

Throw 1 _____ Throw 2 _____ Throw 3 _____ Total _____

Appendix F
Self-Efficacy Measure for Dart Throwing

Name: _____

Using the scale below, answer the following questions by placing a number from 0 to 100 in the space provided.

10	20	30	40	50	60	70	80	90	100
NOT SURE			**SOMEWHAT SURE**			**PRETTY SURE**			**VERY SURE**

1. How sure are you that you can score at least 7 with one dart? _____
2. How sure are you that you can score at least 5 with one dart? _____
3. How sure are you that you can score at least 3 with one dart? _____
4. How sure are you that you can score at least 1 with one dart? _____

Appendix G
Goal Setting Measure

Name: _____

Please read carefully and answer the following questions:

1. Do you have a goal when throwing the darts? If yes, what is it?

_____

_____

_____

_____

_____

Appendix H (I)
CSAI-2

Name: _____

A number of statements that athletes have used to describe their feelings before a practice session are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate *how you feel right now* – at this moment. There are no right or wrong answers. Do *not* spend too much time on any one statement, but choose the answer which describes your feelings *right now*.

	Not At All		**Somewhat**		**Moderately So**		**Very Much So**
1. I am concerned about this practice session	1		2		3		4
2. I feel nervous	1		2		3		4
3. I have self doubts	1		2		3		4
4. I feel jittery	1		2		3		4
5. I am concerned that I may not do as well in this practice session as I should	1		2		3		4
6. My body feels tense	1		2		3		4
7. I am concerned about losing future competitions	1		2		3		4
8. I feel tense in my stomach	1		2		3		4

9. I am concerned about

choking under pressure...1.....2.....3.....4...

10. My body feels

relaxed.....1.....2.....3.....4...

11. I'm concerned about

performing poorly.....1.....2.....3.....4...

12. My heart is racing....1.....2.....3.....4...

13. I'm concerned about

reaching my goal.....1.....2.....3.....4...

14. I feel my

stomach sinking.....1.....2.....3.....4...

15. I'm concerned that

others will be disappointed

with my performance.....1.....2.....3.....4...

16. My hands are clammy1.....2.....3.....4...

17. I'm concerned I won't

be able to concentrate.....1.....2.....3.....4...

18. My body feels tight...1.....2.....3.....4...

Appendix H (II)
CSAI-2

Name: _____

A number of statements that athletes have used to describe their feelings before competition are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate *how you feel right now* – at this moment. There are no right or wrong answers. Do *not* spend too much time on any one statement, but choose the answer which describes your feelings *right now*.

	Not At All		**Somewhat**		**Moderately So**		**Very Much So**
1. I am concerned about this competition	1		2		3		4
2. I feel nervous	1		2		3		4
3. I have self doubts	1		2		3		4
4. I feel jittery	1		2		3		4
5. I am concerned that I may not do as well in this competition as I should	1		2		3		4
6. My body feels tense	1		2		3		4
7. I am concerned about losing	1		2		3		4
8. I feel tense in my stomach	1		2		3		4
9. I am concerned about choking under pressure	1		2		3		4

10. My body feels

relaxed……..…..1……2……..3……4…

11. I'm concerned about

performing

poorly……..……1……2……..3……4…

12. My heart is

racing……..1……2……..3……4…

13. I'm concerned about

reaching my goal……1……2……..3……4…

14. I feel my

stomach

sinking……1……2……..3……4…

15. I'm concerned that

others will be disappointed

with my performance…….1……2……..3……4…

16. My hands are clammy.1……2……..3……4…

17. I'm concerned I won't

be able to concentrate……1……2……..3……4…

18. My body feels tight….1……2……..3……4…

Appendix I
Self-Reactions Measure

Name: _____

Using the scale below, answer the following question by placing a number from 0 to 100 in the space provided.

10	20	30	40	50	60	70	80	90	100
NOT SATISFIED		**SOMEWHAT SATISFIED**				**PRETTY SATISFIED**			**VERY SATISFIED**

1. How satisfied are you with your dart scoring today? _____

Appendix J
Attribution and Adaptive Response Scales

Name: _____

Please read carefully and answer the following questions:

1. Why do you think you didn't do as well as you could have?

_____

_____

_____

_____

_____

2. What can you do to improve your performance?

_____

_____

_____

_____

_____

Appendix K
Scoring Instructions
Goal Setting

Each participant will be asked to respond to the question, "Do you have a goal when throwing the darts? If yes, what is it?"
Participants' written responses will be grouped according to their choice of goals. Possible categories are: outcome-oriented, process-oriented, uncertainty, and "other."

1. **Outcome-Oriented** – a response that focuses on a specific or general result of dart throwing.
   Examples: "To hit the bulls eye on 50% of my throws."
   "To hit the bulls eye every time."
   "To get each throw within two rings of the bulls eye."
   "To get a lot in the bulls eye."
   "To throw well."
   "To make as many good throws as possible."
   "To get each throw close to the center."
   "To avoid missing the rings altogether."
   "To beat my opponent."
   "To win money."

2. **Process-Oriented** – a response that focuses on a strategy or dart throwing technique. The strategy may relate to one or more of the following techniques or involve a general strategy:
   Examples: "To hold the dart between my first and second finger and thumb."
   "To stand with my right foot slightly ahead of my left foot."
   "To keep my arm close to my body."
   "To keep my body still when I throw."
   "To hold my elbow steady and keep my upper arm parallel to the floor."
   "To adjust the verticality of my throw."
   "To improve my throwing motion."
   "To practice my form."
   "To follow the same routine for every throw."
   "To work on grip, stance, throw, or follow through."

3. **Uncertainty** – a response that indicates lack of clarity or absence of a goal while throwing the darts. A lack of response to this question will be included in this category as well.
   Examples: "I don't know."
   "I really don't have any goals."
   "The darts go wherever."

4. **Other** – the participant's response does not fit into any of the first three categories. The response may include areas relating to focus, concentration, general motoric speed of the throwing motion or physiological responses.
   Examples: "To focus on the dart."
   "To concentrate on the dartboard."
   "To concentrate when throwing the dart."
   "To focus."
   "To focus on throwing."
   "To take my time."
   "To relax before I throw."
   "To take a couple of deep breaths."

Appendix L
Scoring Instructions
CSAI-2

The CSAI-2 is scored by computing a separate total for each subscale, with scores ranging from a low of 9 to a high of 36. The higher the score, the greater the cognitive or somatic anxiety.

The cognitive subscale is scored by totaling the responses for the following 9 items: 1, 3, 5, 7, 9, 11, 13, 15, 17.

The somatic subscale is scored by totaling the responses for the following 9 items: 2, 4, 6, 8, 10, 12, 14, 16, 18.

Scoring for item 10 must be reversed in calculating the score for the somatic subscale such that: 1=4, 2=3, 3=2, and 4=1.

Appendix MI
Scoring Instructions
Attributions

The participants will be asked to respond to the following question following the first trial wherein a bull's eye has been missed after 3 minutes of practice have elapsed: "Why do you think you didn't do as well as you could have?"
Participants' written responses will be grouped according to their reasons for poor performance. Possible categories are: technique, ability/confidence, effort, practice/experience, rhythm/focus/concentration, nervous/anxious/tense, task difficulty, uncertain, and "other."

1. **Technique** – an attribution that involves identifying one or more of specific or general throwing techniques/forms. Also include items that are related to the need to adjust technique based on dart location.
   Examples: Improper grip.
   Improper stance.
   Improper throw.
   Improper follow-through.
   "I did not use the correct dart throwing form."
   "I need to aim better."
   "I intentionally aimed outside of the bull's eye."
   "I need to work on hand-eye coordination."
   "I need to throw harder."
   "I threw too high/low/left/right."

2. **Ability/Confidence** – an attribution related to ability, efficacy, confidence, or skill level.
   Examples: "I stink."
   "I have very little skill in dart throwing."
   "I wasn't sure that I could make a good throw."
   "I need to build my confidence."
   "I have terrible coordination."

3. **Effort** – an attribution that indicates degree of effort, including not trying as hard as possible, trying too hard, or motivational concerns.
   Examples: "I did not try."
   "I was getting lazy."
   "I was getting tired."
   "I tried too hard."
   "I have to do my best."
   "I have to find some motivation."
   "I don't care."
   "I was just throwing for fun."

4. **Practice/Experience** –an attribution that involves amount of practice the subject has engaged in, the experience he or she has with dart throwing, or the amount of practice that one needs to do.
   Examples: "I have very little experience with dart throwing."
   "I've never practiced dart throwing."
   "Practice will help me improve consistency."

5. **Rhythm/Focus/Concentration/Distractions** – an attribution that describes how environmental stimuli, internal thoughts, or pace impacts the dart throws.
   Examples: "I need to take my time."
   "I rushed the throws."
   "I was not focusing on the throw."
   "I lost my focus."
   "I was not concentrating."
   "I have to pay attention."
   "I was getting careless."
   "I was thinking of too many things."
   "I couldn't concentrate because I was thinking too much."
   "I need to think positive."
   "I need to clear my mind."
   "I was self-conscious about you watching me throw."
   "I have to just do it."
   "I have to not think about it."
   "I was thinking about the possibility of failure."

6. **Nervous/Anxious/Tense** – an attribution that related to physical or emotional reactions to perceived stress, and/or the need to address these areas in order to improve.
   Examples: "I was feeling nervous."
   "I was feeling anxious."
   "My body was too tense."
   "I just need to take a few deep breaths."
   "I need to relax."

7. **Task Difficulty** – an attribution related to the degree of difficulty of the task.
   Examples: "It is a very hard task."
   "It's impossible."

8. **Uncertainty** – a response that indicates lack of clarity or absence of a reason for missing the bull's eye. A lack of response to this question will be included in this category as well.
   Examples: "I don't know."
   "I really don't have any idea why I missed."
   "I'll just try again."
   "There's nothing I can do."

9. **Other** – the participant's response does not fit into any of the first eight categories. The response may include areas relating to luck or circumstances.
   Examples: "It was luck."
   "I can picture things in my mind."
   "I wish I had my own darts."

Appendix MII
Scoring Instructions
Adaptive Response

The participants will be asked to respond to the following question following the first trial wherein a bull's eye has been missed after 3 minutes of practice have elapsed and following a question about attributions for poor performance: "What can you do to improve your performance?"
Participants' written responses will be grouped according to their perception of necessary adjustments for improving their performance. Possible categories are: technique, effort, practice/experience, rhythm/focus/concentration, nervous/anxious/tense, uncertain, and "other."

1. **Technique** – an attribution that involves identifying one or more of specific or general throwing techniques/forms. Also include items that are related to the need to adjust technique based on dart location.
   Examples: Improper grip.
   Improper stance.
   Improper throw.
   Improper follow-through.
   "I did not use the correct dart throwing form."
   "I need to aim better."
   "I intentionally aimed outside of the bull's eye."
   "I need to work on hand-eye coordination."
   "I need to throw harder."
   "I threw too high/low/left/right."

2. **Effort** – an attribution that indicates degree of effort, including not trying as hard as possible, trying too hard, or motivational concerns.
   Examples: "I did not try."
   "I was getting lazy."
   "I was getting tired."
   "I tried too hard."
   "I have to do my best."
   "I have to find some motivation."
   "I don't care."
   "I was just throwing for fun."

3. **Practice/Experience** –an attribution that involves amount of practice the subject has engaged in, the experience he or she has with dart throwing, or the amount of practice that one needs to do.
   Examples: "I have very little experience with dart throwing."
   "I've never practiced dart throwing."
   "Practice will help me improve consistency."

4. **Rhythm/Focus/Concentration/Distractions** – an attribution that describes how environmental stimuli, internal thoughts, or pace impacts the dart throws.
   Examples: "I need to take my time."
   "I rushed the throws."
   "I was not focusing on the throw."
   "I lost my focus."
   "I was not concentrating."
   "I have to pay attention."
   "I was getting careless."
   "I was thinking of too many things."
   "I couldn't concentrate because I was thinking too much."
   "I need to think positive."
   "I need to clear my mind."
   "I was self-conscious about you watching me throw."
   "I have to just do it."
   "I have to not think about it."
   "I was thinking about the possibility of failure."

5. **Nervous/Anxious/Tense** – an attribution that related to physical or emotional reactions to perceived stress, and/or the need to address these areas in order to improve.
   Examples: "I was feeling nervous."
   "I was feeling anxious."
   "My body was too tense."
   "I just need to take a few deep breaths."
   "I need to relax."

6. **Uncertainty** – a response that indicates lack of clarity or absence of a reason for missing the bull's eye. A lack of response to this question will be included in this category as well.
   Examples: "I don't know."
   "I really don't have any idea why I missed."
   "I'll just try again."
   "There's nothing I can do."

7. **Other** – the participant's response does not fit into any of the first eight categories. The response may include areas relating to luck or circumstances.
   Examples: "It was luck."
   "I can picture things in my mind."
   "I wish I had my own darts."

Appendix N
Self-Regulatory Skill Training Instructions

People who have high levels of anxiety seem to do poorer on tests of motor skills than those with low to moderate levels of anxiety. There is evidence to suggest that the reason they feel anxious is because they set unrealistic goals for themselves and feel that they do not have the ability to cope and to achieve those goals; in fact, they may indeed lack the skills needed for successful task performance. Today, I'm going to teach you how to use a three-part strategy to address the problems I just mentioned, which will then allow you to combat feelings of anxiety and perform at you highest level at dart throwing.

In brief, the three-part strategy involves setting goals, using powerful strategies to help you perform the task, and monitoring the effectiveness of your strategy implementation. I will discuss each of these in more detail, one at a time starting with goal setting.

Goal setting involves choosing the parts of the task that you will focus on. In this case, you will focus on the verticality and follow through components of your throws. These two components have been shown to be very important in dart throwing and proper form will result in significantly better dart throwing performance. Verticality refers to the degree to which the forearm of your throwing arm is upright upon release of the dart. Follow through refers to the degree to which your arm continues moving in the direction of your throw after you release the dart.

Now that a goal has been set and you know what you will be concentrating on, you will need an effective strategy to help you perform properly. Here is a simple, powerful strategy that will assist you in consistently performing the dart throwing task: Analyze the throwing process and adjust the verticality of your forearm when the dart goes right or left of the target. The objective is to try to keep your forearm perpendicular to the floor. Once you have control of left and right, you can focus on up and down. If the dart goes too high or too low, adjust the follow through of your throw. After you release the dart, simply allow your arm to continue in its normal motion. Let your hand, with fingers fully extended follow the dart as it moves toward the target. To assist you in implementing the strategy, use your non-throwing hand to support the elbow on your throwing arm. This will provide you with a brace and give you a point of reference.

The third part of our skill training, self-monitoring, is incorporated into what I just mentioned, but I will ask you to go about it in a certain way. After each throwing trial, that is, after every three dart throws, record any verticality and/or follow through steps requiring adjustment in a log (the investigator will hand out copies of the self-monitoring log). After you have completed each trial, write down the number of steps that you MISSED, if any (0 if you didn't miss any, 1if you missed the first step, and/or 2 if you missed the second step) for each throw, on the space provided.

Look at the steps during the previous trial that were performed improperly. These faulty components would then become the sole focus of the subsequent trial.

Take some time to practice throwing darts. If you become anxious while you are throwing the darts, use the skill techniques we have just reviewed to get you back on track.

Appendix O
Anxiety Reduction Training Instructions

People who have high levels of anxiety seem to do poorer on tests of motor skills than those with low to moderate levels of anxiety. There is evidence to suggest that the reason they do poorly is because anxiety interferes with their thinking. When you feel your heart pounding, your palms sweating, and you start worrying about failing, you can't concentrate on motor skills such as throwing darts. Today, I'm going to teach you some techniques that can help you feel more relaxed before you start throwing darts, as well as techniques that you can use while actually throwing the darts that can reduce your anxiety and help you to focus on the task.

First, we will talk about preparing yourself before you throw darts. The first thing you want to do is learn to relax. A simple technique that has been used in various types of yoga, and used by athletes, is deep abdominal breathing.
Here's how to do it:

1. Breathe only through your nostrils, as breathing through the mouth is not relaxing.
2. Inhale very slowly. As you do, push your abdomen out as if it were a balloon expanding. As a result, your abdomen will move downward, allowing full expansion of your lower lungs.
3. When the abdomen reaches full expansion, smoothly draw your shoulders back, raising your head, and continue to fill the upper part of your lungs.
4. After you've entirely filled your lungs, hold your breath for 5 seconds.
5. Release, after exhaling slowly through the nostrils. Draw in the abdomen. When the process is complete, hold for 2 seconds before resuming your next deep breath.
   (Each step will be modeled and then the participant will be asked to immediately repeat the steps. Once the participant is capable, the investigator will move on to the next 2 steps, again modeling each).
6. Repeat this exercise for 5 breaths, and as you do, count down 5-4-3-2-1, saying one number on each exhalation.
7. To end this exercise, count slowly 1-2-3-4-5. At 5, say, "I am relaxed, alert, and ready."

(The investigator will walk the participant through this exercise three times, and proceed on to the next step only if the participant states that he or she feels confident in his or her ability to use this technique. Training will then focus on thought stopping and replacement).

Now that you know how to relax using deep abdominal breathing, I'm going to show you a simple technique that you can use when you have thoughts that interfere with your dart throwing. Say, for example, that while you are throwing darts you begin to think, "I'm throwing poorly and my score is too low." This thought would interfere with your thinking and your confidence, creating anxiety. The first thing you want to say to yourself is, "Stop!" You want to say it as though you mean it. In your own head, you're saying it in a loud, commanding voice. You want to stop the

thought immediately, before it makes you feel too anxious and takes away valuable time that you should be using to attend to throwing darts. The next thing you are going to do is replace that negative thought with a positive or productive thought. Choose one that will reduce your anxiety, give you confidence, and get you to focus on throwing darts, such as, "I know I can do this. I just need to concentrate." Try to keep your thinking on the dart throwing and try to use statements to yourself that will make you feel more confident and relaxed.

(The investigator will provide an example of use of the whole technique in its entirety and will ask each participant to come up with an example of his or her own). The investigator will state that he is feeling anxious about performing a dart throwing skill, so he will begin a deep breathing exercise. After following the deep breathing exercise that was taught earlier, the investigator will state that he is worried that "[He] is going to perform terribly and won't outscore [his] opponent." The investigator will state that he is going to immediately tell himself to "Stop!" in a loud internal voice and then replace the negative thought with the statement, "I know I can do this! I just need to concentrate." (Participants will then come up with their own examples of both negative thoughts and positive replacement thoughts. The investigator will conclude training upon the participant asserting confidence in his or her ability to successfully use this whole technique).

(The combined treatment will skip the next section and go right into Self-Regulatory Skill Training).

Take some time to practice throwing darts. Use the deep abdominal breathing to relax before you begin throwing. Once you feel relaxed, go ahead and start throwing. If you become anxious while you are throwing the darts, use the thought stopping and thought replacement techniques.

Appendix P
Oral Script

Hello! My name is Gerard Nuesell and I am currently a student in the Educational Psychology Ph.D. Program at CUNY Graduate School and University Center, and Principal Investigator of this project, entitled "Cognitive and Affective Reactions During Motor Skills Tasks." My graduate school advisor, Dr. Barry Zimmerman, and I are conducting a research study with students who are intermediates at dart throwing. We want to determine what various students think and feel while practicing their dart throwing under different conditions. You will be asked to attempt several dart-throwing trials in one of the classrooms here at your school, and will be asked questions about your thoughts and feelings about your dart throwing. Sample categories include confidence, goals, and beliefs about dart throwing. I will record your responses on several questionnaires. You will be assessed on an individual basis and without any interference from others.

In order for you to participate in this study, there are certain qualifications that must be met. First, we will need to screen all interested participants to determine if they meet certain criteria that we have established to qualify as an intermediate dart thrower. We will need individuals who have thrown darts on at least six separate occasions over the last year; furthermore, you will be asked a question that will allow you to briefly demonstrate your knowledge of the important components of effective dart throwing. It is important to note that your ability or inability to qualify for this study is nothing more than an indicator of how well you meet some arbitrary guidelines set by this study, and is not a reflection of your intelligence, competence, worth, or any other evaluative variables.

Those participants who qualify as intermediate dart throwers may be asked to throw darts on two separate occasions, each lasting approximately thirty minutes, with the whole process taking approximately one hour. In order to participate in this study, you must be willing and able to return for the second period of dart throwing within forty-eight hours of your initial period of dart throwing. Again, we are seeking a particular participant profile that would be most beneficial for our study. In general terms, this profile relates to your ability to perform dart throwing under different circumstances. While I am unable to elaborate on this profile at this time, there will be a full debriefing of all participants after the entire study is completed. Please let me again assure you that it does not relate to your intelligence, competence, worth, or other evaluative variables.

There are no foreseeable risks in this study. Safety with darts will be addressed by running the study in a controlled fashion. The benefit of this study is that it may give us some important information about the relative success of approaches used by individuals during execution of motor skills under varying conditions. This knowledge is important because it can be used by coaches to help athletes improve their overall performance. Following the completion of the study, the researchers will offer feedback to all subjects about the use of the most effective means of throwing darts.

There will be approximately eighty participants from this school taking part in this study.

In order for you to participate, you need to give us written permission. If you would like to participate in the research study, then please sign the assent form that I will give to you now. It is important to note that your participation is completely **voluntary** and refusal to

participate will not result in any negative actions or discrimination against you in any way. If you choose to participate, you are free to withdraw from the study at any time. All of your verbalizations, behaviors, feelings, and performance will remain **strictly confidential** and will be stored in a locked file cabinet to which only I and my advisor will have access. In order for you to participate, we will also need written permission from your parents. An informed consent form will be provided for you to bring to your parents, outlining the same information that I am giving to you now. It will need to be signed and returned before your participation can begin.

If this report is published in the future, your name and any identifying characteristics will not be used in any of the publications. All information concerning the outcomes of this study will be made available to you upon request. If you would like a copy of the study, please provide me with your address and I will send you a copy in the future.

If you have any questions about this research, you can contact me at (713) 662-0288 or gnuesell@yahoo.com, or my advisor, Dr. Barry Zimmerman, at (212) 817-8291 or bzimmerman@gc.cuny.edu. If you have any questions about your rights as a participant in this study, you can contact Hilry Fisher, Sponsored Research, Graduate Center/City University of New York, (212) 817-7523, hfisher@gc.cuny.edu.

Thank you for your time and your participation in the study. I will give you a copy of the screening form to fill out, and will contact you if you meet our initial criteria as intermediate dart throwers. Pending your qualification, I will then give you a consent form to take with you.

Appendix Q
Statement to Excuse Participants

Thank you for participating in the study on anxiety in sport. We have examined a number of variables in creating an overall anxiety profile for each person who has participated. This profile is not viewed as good or bad, but rather a particular manner of reacting to pressure. Our study is interested in a very specific profile; however, this profile does not match the one you presented. Your participation, nonetheless, was very beneficial to the study, as it has allowed us to view one of many possible reactions to pressure. At this time, you are excused from the study, with our gratefulness for your assistance.

Bibliography

Anshel, M.H. (1990). Toward a validation of a model for coping with acute stress in sport. *International Journal of Sport Psychology, 21,* 58-83.

Anshel, M.H., & Singer, R.N. (1980). Effect of learner strategies with modular versus traditional instruction on motor skill learning and retention. *Research Quarterly for Exercise and Sport, 51,* 451-462.

Aponte, J.F., & Aponte, C. (1971). Group preprogrammed systematic desensitization without the simultaneous presentation of aversive scenes with relaxation training. *Behaviour Research and Therapy, 9,* 337-346.

Aronson, E., & Carlsmith, J.M. (1962). Performance expectancy as a determinant of actual performance. *Journal of Abnormal and Social Psychology, 65,* 178-182.

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

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 7,* 122-147.

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

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28,* 117-148.

Bandura, A., & Cervone, D. (1983). Self-evaluative and self-efficacy mechanisms governing the motivational effects of goal systems. *Journal of Personality and Social Psychology, 45,* 1017-1028.

Bandura, A., & Jourdan, F.J. (1991). Self-regulatory mechanisms governing the impact of social comparison on complex decision making. *Journal of Personality and Social Psychology, 60,* 941-951.

Bandura, A., & Schunk, D.H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology, 41,* 586-598.

Bandura, A., & Wood, R.E. (1989). Effect of perceived controllability and performance standards on self-regulation of complex decision making. *Journal of Personality and Social Psychology, 56,* 805-814.

Baumeister, R.F. (1982). A self-presentational view of social phenomena. *Psychological Bulletin, 91,* 3-26.

Baumeister, R.F. (1984). Choking under pressure: Self-consciousness and paradoxical effects of incentives on skillful performance. *Journal of Personality and Social Psychology, 46,* 610-620.

Baumeister, R.F., Cooper, J., & Skib, B.A. (1979). Inferior performance as a selective response to expectancy: Taking a dive to make a point. *Journal of Personality and Social Psychology, 37,* 424-432.

Beggs, A. (1990). Goal setting in sport. In G. Jones & L. Hardy (Eds.), *Stress and performance in sport.* Chichester, UK: John Wiley.

Borkovec, T.D., Metzger, R.I., & Prusinsky, T. (1986). Anxiety, worry, and the self. In I.M. Hartman & K.R. Blankstein (Eds.), *Perception of self and emotional disorder and psychotherapy.* New York: Plenum.

Boutcher, S. (1990). The role of performance routines in sport. In G. Jones & L. Hardy (Eds.), *Stress and performance in sport.* Chichester, UK: John Wiley.

Broadbent, D.E. (1957). A mechanical model for human attention and immediate memory. *Psychological Review, 64,* 205-215.

Broadhurst, P.L. (1957). Emotionality and the Yerkes-Dodson law. *Journal of Experimental Psychology, 54,* 345-352.

Broota, A., & Sanghvi, C. (1994). Efficacy of two relaxation techniques in examination anxiety. *Journal of Personality and Clinical Studies, 10,* 29-35.

Bull, S.J., Albinson, J.G., & Shambrook, C.J. (1996). *The mental game plan: Getting psyched for sport.* Eastbourne, England: Sports Dynamics.

Burisch, M. (1994a). Approaches to personality inventory construction: A comparison of merits. *American Psychologist, 39,* 214-227.

Burisch, M. (1994b). You don't always get what you pay for: Measuring depression with short and simple versus long and sophisticated scales. *Journal of Research in Personality,18,* 81-98.

Burk, E.M., Randolph, D.L., & Probst, C. (1985). Effects of several thought stopping treatments on worry cognitions. *Psychology, A Quarterly Journal of Human Behavior, 22,* 31-41.

Burton, D. (1988). Do anxious swimmers swim slower? Reexamining the elusive anxiety-performance relationship. *Journal of Sport Psychology, 10,* 45-61.

Carver, C.S., & Scheier, M.F. (1978). Self-focusing effects of dispositional self-consciousness, mirror presence, and audience presence. *Journal of Personality and Social Psychology, 36,* 324-332.

Carver, C.S., & Scheier, M.F. (1981a). *Attention and self-regulation: A control theory approach to human behavior.* New York: Springer-Verlag.

Carver, C.S., & Scheier, M.F. (1986). Functional and dysfunctional responses to anxiety: The interaction between expectancies and self-focused attention. In R.Schwarzer (Ed.), *Self-related cognitions in anxiety and motivation.* Hillsdale, New Jersey: Erlbaum.

Carver, C.S., & Scheier, M.F. (1988). A control process perspective on anxiety. *Anxiety Research, 1,* 17-22.

Carver C.S., & Scheier, M.F. (1990). Principles of self-regulation: Action and emotion. In E.T. Higgins & R.M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp.3-52). New York: Guilford.

Carver, C.S., & Scheier, M.F. (1994). Optimism and health-related cognition: What variables actually matter? *Psychology and Health, 9,* 191-195.

Carver, C.S., & Scheier, M.F. (1998). *On the self-regulation of behavior.* New York: Cambridge University Press.

Chen, D., & Singer, R.N. (1992). Self-regulation and cognitive strategies in sport participation. *International Journal of Sport Psychology, 23,* 277-300.

Cleary, T.J., & Zimmerman, B.J. (2001). Self-regulation differences during athletic practice by experts, non-experts, and novices. *Journal of Applied Sport Psychology, 13,* 185-206.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: Erlbaum.

Cohen, J.L., & Davis, J.H. (1973). Effects of audience status, evaluation, and time of action on performance with hidden-word problems. *Journal of Personality and Social Psychology, 27,* 74-85.

Cooke, G. (1968). Evaluation of the efficacy of the components of reciprocal inhibition psychotherapy. *Journal of Abnormal Psychology, 73,* 464-467.

Cottrell, N.B. (1972). Social facilitation. In C.G. McClintock (Ed.), *Experimental social psychology.* New York: Holt, Rinehart, & Winston.

Cox, F.N. (1966). Some effects of test anxiety and presence or absence of other persons on boys' performance on a repetitive motor task. *Journal of Experimental Child Psychology, 3,* 100-112.

Cox, F.N. (1968). Some relationships between test anxiety, presence or absence of male persons, and boys' performance on a repetitive motor task. *Journal of Experimental Child Psychology, 6,* 1-12.

Cox, R.H. (1990). *Sport psychology: Concepts and applications.* Dubuque, IA: Brown & Benchmark.

Dansereau, D. (1985). Learning strategy research. In J. Segal, S. Chipman, & R. Glaser (Eds.), *Thinking and learning skills: Relating instruction to basic research:* (Vol. 1, pp.209-240). Hillsdale, NJ: Erlbaum.

Davidson, R.J., & Schwartz, G.E. (1976). The psychobiology of relaxation and related states: A multiprocess theory. In D. Mostofsky (Ed.), *Behavioral control and modification of physiological activity* (pp. 399-442). Englewood Cliffs, NJ: Prentice-Hall.

Davison, G.C. (1968). Systematic desensitization as a counterconditioning process. *Journal of Abnormal Psychology, 73,* 91-99.

Deffenbacher, J.L. (1980). Worry and emotionality in test anxiety. In I.G. Sarason (Ed.), *Test anxiety: Theory, research, and applications* (pp. 111-128). Hillsdale, NJ: Erlbaum.

Deffenbacher, J.L., & Deitz, S.R. (1978). Effects of test anxiety on performance, worry, and emotionality in natural occurring exams. *Psychology in the Schools, 15,* 446-450.

Doris, J., & Sarason, S.B. (1955). Test anxiety and blame assignment in a failure situation. *Journal of Abnormal and Social Psychology, 50,* 335-338.

Dornic, S. (1977). Mental load, effort, and individual differences. *Rep. Department Psychol Univ. Stockholm,* No. 509.

Dornic, S., & Fernaeus, S.E. (1981). Individual differences in high-load tasks: The effect of verbal distraction. *Rep. Department Psychol Univ. Stockholm,* No. 569.

Earley, P.C., Connolly, T., & Ekegren, G. (1989). Goals, strategy development, and task performance: Some limits on the efficacy of goal setting. *Journal of Applied Psychology, 74,* 24-33.

Early, P.C., & Lituchy, T.R. (1991). Delineating goal and efficacy effects: A test of three models. *Journal of Applied Psychology, 74,* 81-98.

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.

Eysenck, M.W. (1992). *Anxiety: The cognitive perspective.* Hove: Lawrence Erlbaum.

Flood, M., & Endler, N.S. (1980). The interaction model of anxiety: An empirical test in an athletic competition situation. *Journal of Research and Personality, 14,* 329-339.

Ganzer, V.J. (1968). Effects of audience presence and test anxiety on learning and retention in a serial learning situation. *Journal of Personality and Social Psychology, 8,* 194-199.

Gill, D.L. (1986). *Psychological dynamics of sport.* Champaign, IL: Human Kinetics.

Gist, M.E., Stevens, C.K., & Bavetta, A.G. (1991). Effects of self-efficacy and post-training intervention on the acquisition and maintenance of complex interpersonal skills. *Personnel Psychology, 44,* 837-861.

Gould, D. (1993). Goal setting for peak performance. In J. Williams (Ed.), *Applied sport psychology* (2nd Ed., pp. 158-159). London: Mayfield Publishing.
Gould, D., Petlichkoff, L., Simmons, J., & Vevera, M. (1987). Relationship between Competitive State Anxiety Inventory-2 subscale scores and pistol shooting performance. *Journal of Sport Psychology, 9,* 33-44.

Gould, D., Petlichkoff, L., & Weinberg, R.S. (1984). Antecedents of, temporal changes in, and relationships between CSAI-2 subcomponents. *Journal of Sport Psychology, 6,* 289-304.

Gould, D., Tammen, V., Murphy, S., & May, J. (1989). An examination of U.S. Olympic sport psychology consultants and the services they provide. *The Sport Psychologist, 3,* 300-312.

Graham, S., & Harris, K.R. (1994). The role and development of self-regulation in the writing process. In D.H. Schunk & B.J. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications* (pp. 203-228). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Hardy, L., & Fazey, J. (1987). *The inverted-U hypothesis: A catastrophe for sport psychology?* Paper presented at the annual conference of the North American Society for the Psychology of Sport and Physical Activity, Vancouver, Canada.

Hardy, L., Jones, J.G., & Gould, D. (1996). *Understanding psychological preparation for sport: Theory and practice of elite performers.* Chichester, UK: John Wiley.

Hardy, L., Mullen, R., & Jones, J.G. (1996). Knowledge and conscious control of motor actions under stress. *British Journal of Psychology, 87,* 621-636.

Hardy, L., & Nelson, D. (1988). Self-control training in sport and work. *Ergonomics, 31,* 1573-1585.

Hebb, D.O. (1955). Drives and the CNS (conceptual nervous system). *Psychological Review, 62,* 243-254.

Helgeson, V.S. (1992). Moderators of the relation between perceived control and adjustment to chronic illness. *Journal of Personality and Social Psychology, 63,* 656-666.

Henchy, T., & Glass, D.C. (1968). Evaluation apprehension and the social facilitation of dominant and subordinate responses. *Journal of Personality and Social Psychology, 4,* 446-454.

Holroyd, K.A. (1976). Cognition and desensitization in the group treatment of test anxiety. *Journal of Consulting and Clinical Psychology, 44,* 991-1001.

House, W., & Perney, V. (1974). Valence of expected and unexpected outcomes as a function of locus of goal and type of expectancy. *Journal of Personality and Social Psychology, 29,* 454-463.

Humphreys, M.S., & Revelle, W. (1984). Personality, motivation, and performance: A theory of the relationship between individual differences and information processing. *Psychological Review, 91,* 153-184.

Johnson, S.M., & Sechrest, L. (1968). Comparison of desensitization and progressive relaxation in treating test anxiety. *Journal of Consulting and Clinical Psychology, 32,* 280-286.

Jones, G., & Hanton, S. (1996). Interpretation of anxiety symptoms and goal attainment expectations. *Journal of Sport and Exercise Psychology, 18,* 144-158.

Jones, J.G., Swain, A., & Cale, A. (1990). Antecedents of multidimensional competitive state anxiety and self-confidence in elite intercollegiate middle-distance runners. *The Sport Psychologist, 4,* 107-118.

Kingston, K. & Hardy, L. (1994a). Factors affecting the salience of outcome, performance and process goals in golf. In A.J.Cochran and M.R. Farrally (Eds.),

Science and golf II: Proceedings of the second World Scientific Congress of Golf. London: E. & F.N. Spon.

Kingston, K.M., & Hardy, L. (1994b). When are some goals more beneficial than others? *Journal of Sports Sciences, 12,* 198-199.

Kingston, K.M., & Hardy, L. (1997). Effects of different types of goals on processes that support performances. *The Sport Psychologist, 11,* 277-293.

Kingston, K., Hardy, L., & Markland, D. (1992). Study to compare the effect of two different goal orientations and stress levels on a number of situationally relevant performance subcomponents. *Journal of Sport Sciences, 10,* 610-611.

Kirschenbaum, D.S. (1984). Self-regulation and sports psychology: Nurturing and emerging symbiosis. *Journal of Sports Psychology, 6,* 159-183.

Kirschenbaum, D.S., & Wittrock, D.A. (1984). Cognitive-behavioral interventions in sport: A self-regulatory perspective. In J.M. Silva & R.S. Weinberg (Eds.), *Psychological foundations of sport* (pp. 81-88). Champaign, IL: Human Kinetics.

Kitsantas, A., & Zimmerman, B.J. (1998). Self-regulation of motoric learning: A strategic cycle view. *Journal of Applied Sport Psychology, 10,* 220-239.

Landers, D.M. (1994). Performance, stress, and health: Overall reaction. *Quest, 46,* 123-135.

Lang, P., Lazovik, A., & Reynolds, D. (1965). Desensitization, suggestibility, and pseudotherapy. *Journal of Abnormal Psychology, 70,* 395-402.

Lee, C. (1988). The relationship between goal setting, self-efficacy, and female field hockey team performance. *International Journal of Sport Psychology, 20,* 147-161.

Liebert, R.M., & Morris, L.W. (1967). Cognitive and emotional components of test anxiety: A distinction and some initial data. *Psychological Reports, 20,* 975-978.

Locke, E.A., Frederick, E., Lee, C., & Bobko, P. (1984). Effect of self-efficacy, goals, and task strategies on task performance. *Journal of Applied Psychology, 69,* 241-251.

Locke, E.A., & Latham, G.P. (1985). The application of goal setting to sports. *Journal of Sports Psychology, 7,* 205-222.

Locke, E., Shaw, K., Saari, L., & Latham G. (1981). Goal setting and task performance: 1969-1980. *Psychological Bulletin, 90,* 125-152.

Lowe, R., & McGrath, J.E. (1971). *Stress, arousal and performance: Some findings calling for a new theory.* Project Report, AF 1161-1167, AFOSR.

Marlett, N.J., & Watson, D. (1968). Test anxiety and immediate or delayed feedback in a test-like avoidance task. *Journal of Personality and Social Psychology, 8,* 200-203.

Martens, R. (1969a). Effect of an audience on learning and performance of a complex motor skill. *Journal of Personality and Social Psychology, 12,* 252-260.

Martens, R. (1969b). Palmar sweating and the presence of an audience. *Journal of Experimental Social Psychology, 5,* 371-374.

Martens, R. (1977). *Sport Competition Anxiety Test.* Champaign, IL: Human Kinetics.

Martens, R., Burton, D., Rivkin, F., & Simon, J. (1980). Reliability and validity of the Competitive State Anxiety Inventory (CSAI). In C.H. Nadeau, W.C. Halliwell, K.M. Newell & G.C. Roberts (Eds.), *Psychology of motor behavior and sport-1979* (pp. 91-99). Champaign, IL: Human Kinetics.

Martens, R., Burton, D., Vealey, R.S., Bump, L.A., & Smith, D.E. (1990). Development and validation of the Competitive State Anxiety Inventory-2. In R. Martens, R.S. Vealey, & D. Burton (Eds.), *Competitive anxiety in sport* (pp. 117-190). Champaign, IL: Human Kinetics.

Martens, R., & Landers, D.M. (1972). Evaluation potential as a determinant of coaction effects. *Journal of Experimental Social Psychology, 8,* 347-359.

Mason, L.J. (1980). *Guide to stress reduction.* Culver City, CA: Peace Press.

Masters, R.S.W. (1992). Knowledge, knerves, and know-how: The role of explicit versus implicit knowledge in the breakdown of a complex motor skill under pressure. *British Journal of Psychology, 83,* 343-358.

McAuley, E. (1991). Efficacy, attributional, and affective responses to exercise participation. *Journal of Sport and Exercise Psychology, 13,* 382-393.

McClintock, J. (1977). *The book of darts* (1st Ed.). New York: Random House.

McCombs, M.L. (1989). Self-regulated learning and academic achievement: A phenomenological view. In B.J. Zimmerman & D.H. Schunk (Eds.), *Self-regulated learning and academic achievement theory, research, and practice.* New York: Springer-Verlag.

McLeod, R.T. (1977). *Darts unlimited.* New York: Grosset & Dunlap.

Meunier, C., & Rule, B.G. (1967). Anxiety, confidence, and conformity. *Journal of Personality, 35,* 498-504.

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,* 331-336.

Miller, G.A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63,* 81-97.

Mullen, R., Hardy, L., & Tattersall, A.J. (1999). State anxiety and motor performance: The role of heart rate variability as an index of effort. *Journal of Sport Sciences, 17,* 62-63.

Newsom, J.T., Knapp, J.E., & Schulz, R. (1996). Longitudinal analysis of specific domains of internal control and depressive symptoms on patients with recurrent cancer. *Health Psychology, 15,* 323-331.

Nideffer, R.M., & Sagal, M. (1998). Concentration and attention control training. In J.M. Williams (Ed.), *Applied Sport Psychology: Personal Growth to Peak Performance* (pp. 296-315). Mountain View, CA: Mayfield Publishing Company.

Orlick, T. & Partington, J. (1988). Mental links to excellence. *The Sport Psychologist, 2,* 105-130.

Paulus, P.B., & Cornelius, W.L. (1974). Analysis of gymnastic performance under conditions of practice and operative observation. *Research Quarterly, 45,* 56-63.

Paulus, P.B., Shannon, V.C., Wilson, D.L., & Boone, T.D. (1972). The effects of operator presence on gymnastic performance in a field situation. *Psychonomic Science, 29,* 88-90.

Pressley, M., & Woloshyn, V. (1995). *Cognitive strategy instruction that really improves children's academic performance* (2nd Ed.). Cambridge, MA: Brookline.

Rachman, S. (1965). Studies in desensitization: The separate effects of relaxation and desensitization. *Behaviour Research and Therapy, 3,* 245-252.

Rachman, S. (1968). The role of muscle relaxation in desensitization therapy. *Behaviour Research and Therapy, 6,* 159-166.

Ravizza, K. (1998). Increasing awareness for sport performance. In J.M. Williams (Ed.), *Applied sport psychology: Personal growth to peak performance* (pp. 171-181). Mountain View, CA: Mayfield Publishing Company.

Rimm, D., & Medeiros, D. (1970). The role of muscle relaxation in participant modeling. *Behaviour Research and Therapy, 8,* 127-132.

Sarason, I.G. (1972). Experimental approaches to test anxiety: Attention and the uses of information. In C.D. Spielberger (Ed.), *Anxiety: Current trends in theory and research* (Vol. 2). New York: Academic Press.

Sarason, I.G. (1978). The Test Anxiety Scale: Concept and research. In C.D. Spielberger & I.G. Sarason (Eds.), *Stress and anxiety* (Vol. 5, pp. 193-216). Washington, DC: Hemisphere.

Sarason, I.G. (1980). Introduction to the study of test anxiety. In I.G. Sarason (Ed.), *Test anxiety: Theory, research, and applications* (pp. 5-14). Hillside, NJ: Erlbaum.

Sarason, I.G. (1984). Stress, anxiety, and cognitive interference: Reactions to tests. *Journal of Personality and Social Psychology, 46,* 929-938.

Sarason, I.G. (1986). Test anxiety, worry, and cognitive interference. In R. Schwarzer (Ed.), *Self-regulated cognitions in anxiety and motivation.* Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Sarason, I.G. (1988). Anxiety, self-preoccupation, and attention. *Anxiety Research, 1,* 3-7.

Sarason, I.G., & Stoops, R. (1978). Test anxiety and the passage of time. *Journal of Consulting and Clinical Psychology, 46,* 102-109.

Sarason, S.B., Davidson, K.S., Lighthall, F.F., Waite, R.R., & Ruebush, B.K. (1960). *Anxiety in elementary school children.* New York: Wiley.

Scanlan, T.K., & Passer, M.W. (1978). Factors related to competitive stress among male youth sport participants. *Medicine and Science in Sport, 10,* 103-108.

Schunk, D.H. (1984). Self-efficacy perspective on achievement behavior. *Educational Psychologist, 19,* 48-58.

Schunk, D.H. (1989). Self-efficacy and achievement behavior. *Educational Psychology Review, 1,* 173-208.

Schunk, D.H. (1994). Self-regulation of self-efficacy and attributions in academic settings. In D.H. Schunk & B.J. Zimmerman (Eds.), *Self-regulation of learning and*

performance: Issues and educational applications (pp. 75-99). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Schunk, D.H. (1998). Teaching elementary students to self-regulate practice of mathematical skills with modeling. In D.H. Schunk & B.J. Zimmerman (Eds.), *Self-regulated learning: From teaching to self-reflective practice* (pp. 137-159). New York: Guilford.

Schunk, D.H., & Schwartz, C.W. (1993). Goals and progress feedback: Effects on self-efficacy and writing achievement. *Contemporary Educational Psychology, 18,* 337-354.

Schunk, D. H., & Zimmerman, B. J. (1994). *Self-Regulation of learning and performance.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Schunk, D.H., & Zimmerman, B.J. (1998). *Self-regulated learning: From teaching to self-reflective practice.* New York: Guilford.

Seta, J.J. (1982). The impact of comparison processes on coactors' task performance. *Journal of Personality and Social Psychology, 42,* 281-291.

Sieber, J.E. (1980). Defining test anxiety: Problems and approaches. In I.G. Sarason (Ed.), *Test anxiety: Theory, research, and applications* (pp. 15-40). Hillside, NJ: Erlbaum.

Simon, J.A., & Martens, R. (1977). SCAT as a predictor of A-states in varying competitive situations. In D.M. Landers & R.W. Christina (Eds.), *Psychology of motor behavior and sport-1976* (Vol. 2, pp. 146-156). Champaign, IL: Human Kinetics.

Singer, R.N. (1988). Strategies and metastrategies in learning and performing self-paced athletic skills. *The Sport Psychologist, 2,* 49-68.

Singer, R.N., & Suwanthada, S. (1986). The Generalizability Effectiveness of a Learning Strategy on Achievement in Related Closed Motor Skills. *Research Quarterly for Exercise and Sport, 57,* 205-214.

Smith, R.E., Smoll, F.L., & Schutz, R.W. (1990). Measurements and correlates of sport-specific cognitive and somatic trait anxiety. *Anxiety Research, 2,* 263-280.

Spiegler, M.D., & Guevremont, D.C. (1993). *Contemporary behavior therapy.* Pacific Grove, CA: Brooks/Cole.

Spielberger, C.D. (1966). Theory and research on anxiety. In C.S. Spielberger (Ed.), *Anxiety and behavior* (pp. 3-20). New York: Academic Press.

Spielberger, C.D., Anton, W.D., & Bedell, J. (1976). The nature and treatment of test anxiety. In M. Zuckerman & C.D. Spielberger (Eds.), *Emotions and anxiety: New concepts, methods, and applications.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Spielberger, C.D., Gorsuch, R.L., & Lushene, R.E. (1970). *STAI manual for the State-Trait Anxiety Inventory.* Palo Alto, CA: Consulting Psychologists.

Steigleder, M.K., Weiss, R.F., Balling, S.S., Wenninger, V.L., & Lombardo, J.P. (1980). Drivelike motivational properties of competitive behavior. *Journal of Personality and Social Psychology, 38,* 93-104.

Steigleder, M.K., Weiss, R.F., Cramer, R.E., & Feinberg, R.A. (1978). The motivating and reinforcing functions of competitive behavior. *Journal of Personality and Social Psychology, 36,* 1291-1301.

Thompson, S.C., Collins, M.A., Newcomb, M.D., & Hunt, W. (1996). On fighting versus accepting stressful circumstances: Primary and secondary control among HIV-positive men in prison. *Journal of Personality and Social Psychology, 70,* 1307-1317.

Thompson, S.C., Sobolew-Shubin, A., Galbraith, M.E., Schwankovsky, L., & Kruzen, D. (1993). Maintaining perceptions of control: Finding perceived control in low-control circumstances. *Journal of Personality and Social Psychology, 64,* 293-304.

Wankel, L.M. (1972). Competition in motor performance: An experimental analysis of motivational components. *Journal of Experimental Social Psychology, 8,* 427-437.

Watson, D., & Tharp, R. (1993). *Self-directed behavior: Self-modification for personal adjustment* (6th Ed.). Pacific Grove, CA: Brooks/Cole.

Watson, G.G., & Friend, R. (1969). Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology, 33,* 448-457.

Weinberg, R., & Weigand, D. (1993). Goal setting in sport and exercise: A reaction to Locke. *Journal of Sport and Exercise Psychology, 15,* 88-96.

Weinstein, C.E., & Mayer, R.E. (1986). The teaching of learning strategies. In M.C. Wittrock (Ed.), *Handbook of research on teaching* (pp. 315-327). New York: Macmillan.

Wicklund, R.A., & Duval, S. (1971). Opinion change and performance facilitation as a result of objective self-awareness. *Journal of Experimental Social Psychology, 1,* 319-342.

Williams, J.W., & Harris, D.V. (1998). Relaxation and energizing techniques for regulation of arousal. In J.M. Williams (Ed.), *Applied sport psychology: Personal growth to peak performance* (pp. 219-236). Mountain View, CA: Mayfield Publishing Company.

Wine, J.D. (1971). Test anxiety and the direction of attention. *Psychological Bulletin, 76,* 92-104.

Wine, J.D. (1980). Cognitive-attentional theory of test anxiety. In I.G. Sarason (Ed.), *Test anxiety: Theory, research, and applications* (pp. 349-385). Hillside, NJ: Erlbaum.

Wine, J.D. (1982). Evaluation anxiety: A cognitive-attentional construct. In H.W. Krohne & L. Laux (Eds.), *Achievement, stress, and anxiety* (pp. 207-219). Washington, DC: Hemisphere.

Wood, R.E., Bandura, A. & Bailey, T. (1990). Mechanisms governing organizational performance in complex decision-making environments. *Organizational Behavior and Human Decision Processes, 46,* 181-201.

Wood, R.E., & Locke, E.A. (1987). The relation of self-efficacy and grade goals to academic performance. *Educational and Psychological Measurement, 47,* 1013-1024.

Woodman, T., & Hardy, L. (2001). Stress and anxiety. In R.N. Singer, H.A. Hausenblas, & C.M. Janelle (Eds.), *Handbook of sport psychology* (2nd Ed. pp. 290-318). Chichester, UK: John Wiley & Sons, Inc.

Wurtele, S.K. (1986). Self-efficacy and athletic performance: A review. *Journal of Social and Clinical Psychology, 4,* 290-301.

Yerkes, R.M., & Dodson, J.D. (1908). The relation of strength of stimulus to rapidity of habit formation. *Journal of Comparative Neurology and Psychology, 18,* 459-482.

Zajonc, R.B. (1965). Social facilitation. *Science, 149,* 269-274.

Zanna, M., Sheras, P., Cooper, J., & Shaw, C. (1975). Pygmalion and Galatea: The interactive effects of teacher and student expectancies. *Journal of Experimental Social Psychology, 11,* 279-287.

Zimmerman, B. J. (1995). Self-regulation involves more than metacognition: A social cognitive perspective. *Educational Psychologist, 30,* 217-221.

Zimmerman, B.J. (1998). Academic studying and the development of personal skill: A self-regulatory perspective. *Educational Psychologist, 33,* 73-86.

Zimmerman, B.J., & Campillo, M. (in press). Motivating self-regulated problem solvers. In J. E. Davidson & R. J. Sternberg (Eds.), *The nature of problem solving.* New York: Cambridge University Press. Copyright (in press) by Cambridge University Press.

Zimmerman, B.J., & Kitsantas, A. (1996). Self-regulated learning of a motoric skill: The role of goal setting and self-monitoring. *Journal of Applied Sport Psychology, 8,* 60-75.

Zimmerman, B.J., & Kitsantas, A. (1997). Developmental phases in self-regulation: Shifting from process to outcome goals. *Journal of Educational Psychology, 89,* 29-36.

Zimmerman, B.J., & Schunk, D.H. (1989). *Self-regulated learning and academic achievement: Theory, research, and practice.* New York: Springer-Verlag.