# AN EXAMINATION OF THE RELATIONSHIPS AMONG PREPARATORY EFFICACY, PRACTICE EFFORT, AND PERFORMANCE

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A DISSERTATION

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

DOCTOR OF PHILOSOPHY

Kinesiology

2011

## ABSTRACT

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Under most circumstances, high self-efficacy results in high effort; however, Bandura has predicted that when efficacy is measured during preparation for a competition, lower efficacy beliefs may actually be beneficial to preparatory effort because the accompanying self-doubt induces motivation to put forth greater effort in preparation for the competition (Bandura, 1997). Despite Bandura's predictions regarding preparatory efficacy, no evidence existed to test his suppositions (Feltz & Wood, 2009).

This dissertation comprises two studies designed to test Bandura's (1997) predictions and examine the concept of preparatory efficacy. In each of the studies in this dissertation, participants competed individually in golf putting competitions that included both a preparation and competition phase. Participants used a golf putter to putt balls at three targets of varying difficulty: high, medium, and low efficacy targets. The number of practice putts taken out of 30 total was used as the effort measure. It was hypothesized that participants would spend the most practice effort putting at the low efficacy (i.e., high difficulty) target, moderate effort at the medium efficacy (i.e., medium difficulty) target, and the least effort at the high efficacy target (i.e., low difficult) target.

Results of both studies indicated the high efficacy target resulted in the lowest preparatory effort in comparison to preparatory effort at the medium and low efficacy targets ($p < .001$). Additionally in both studies, preparatory effort was highest at the low efficacy

target but did not differ significantly from effort at the medium efficacy target. Thus, across both studies, lower preparatory efficacy was associated with higher preparatory effort, supporting Bandura's prediction. Self-efficacy and performance were significantly related at the medium efficacy targets in both studies. The obtained efficacy-performance correlations were similar to those obtained in meta-analyses on this topic (Moritz, Feltz, Fahrbach, & Mack, 2000). In Study 2, which provided more opportunities for exploratory analyses, efficacy changes from preparation to performance were significantly related to practice quality at all three targets and practice satisfaction at the low and medium efficacy targets.

## DEDICATION

Emerson, you have inspired and amazed me since the day you were born. Dream big, beautiful dreams, my girl, and love what you do. You will do wonderful things with your life.

Celeste, you made this dissertation possible. You sacrificed as much as I did to make it a reality for us. You supported my pursuit of this goal from day one, despite many difficulties. You always gave me exactly what I needed, be it time, support, or motivational fire. You made it happen. Words cannot express my gratitude.

To my family, who has supported my education for many years. Mom, Grandma June, Grandpa Moe, Grandma Cinny, Grandpa Bill, and Pat, this dissertation is dedicated to you and the sacrifices you have made for me for my entire life.

## ACKNOWLEDGMENTS

To my committee: Thank you all for your input and work on my dissertation. Your feedback has been invaluable, and I only hope I did justice to your knowledge, experience, and support.

Dr. Feltz: You took on a project me, and I thank you for that. I know I was not the typical graduate student, and my situation presented special challenges. Thank you for always taking time for me. I have loved my experience at Michigan State, and I owe it largely to your guidance. This dissertation certainly would not have possible without you. For the way you have conducted not just my doctoral education, but all aspects of your career, your professionalism inspires me.

Dr. Boster: Frank, thank you for always finding time to work with me. You certainly have given me more time than I had a right to expect. Your teaching has been invaluable to me over the years in both my education and career. Every time I meet with you I learn something new. Of my 23 or so years of formal education classes, the two classes I took from you were my favorites.

Dr. Gould: Having you as a professor and committee member has been a source of confidence and inspiration to me. Your passion for your profession is evident and sets you apart in sport psychology. I am very fortunate for having worked with you. Thank you for your serving on my committee.

Dr. Wong: Thank you for being willing and able to fill in the place of Dr. Brophy on my committee. Your input to my proposal was extremely helpful in crafting a better dissertation project.

In remembrance of Dr. Jere Brophy: Dr. Brophy taught the first class I ever attended at Michigan State University and set the stage for the world class education I received in sport psychology, motivation, and learning. Twice in my work with Dr. Brophy, I was somehow able to please him greatly with motivational plans I created. Because of who he was and how he conducted his work, his feedback on my plans was the source of the greatest self-efficacy boost of my career. Dr. Brophy always made time to read and give me thoughtful feedback on whatever I sent him, including my initial draft of a preparatory efficacy study and several drafts of motivation questionnaires I created at work. Not a day goes by that I do not think of Dr. Brophy or something I learned from him.

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# CHAPTER 1

## Introduction

### Overview

Efficaciousness and doubt are on opposite sides of a spectrum in self-efficacy research in sport. The extant research consensus suggests that athletes should aim for high efficacy levels and eliminate as much doubt as possible from their minds. Despite this pervasive idea, poor performances by highly skilled athletes are often blamed on overly confident efficacy beliefs, and all competitive athletes, even those who win the most, must improve their performance after losses and other setbacks that have the potential to cause them to doubt their own capabilities or those of their team. Therefore, an important question persists: Can self-doubt ever be beneficial to performance?

Ample research supports the conventional wisdom in sport psychology that doubt is not beneficial to performance (Bandura, 1997; Feltz, Short, & Sullivan, 2008), yet the question of whether doubt can be beneficial to performance remains relevant because researchers have not studied broad samples of efficacy beliefs and behavior across a preparation-performance cycle (Feltz & Wood, 2009). Athletes spend the majority of their time (i.e., their time devoted to sports) in practice, not in actual competitions, yet the vast majority of research focuses on self-efficacy measurements taken just prior to competitive performance. Thus, sport psychologists can be certain about how efficacy judgments affect performance only in the time period immediately prior to competition. When efficacy beliefs are measured immediately prior to competition, usually within 24 hours of a competition, the efficacy measurement has been termed performance efficacy (Bandura, 1997).

In contrast to performance efficacy, preparatory efficacy is measured during the preparation, or practice phase of athletic competition (Bandura, 1997). To be sure, both preparatory efficacy and performance efficacy ratings measure what one believes one can do in an upcoming competitive performance; however, the timing of the measurements and the functions of the phases of competition may create differential effects on proximal behaviors. During preparation, Bandura (1997) suggests that a sense of some doubt may be beneficial to practice behaviors and ultimately lead to stronger performance. Although this seems counterintuitive based on the extant research, Bandura's suggestion is logically related to field observations. For example, without the idea that doubt may be beneficial, coaches would always favor the practice of preparing their athletes to be as confident as possible throughout their training; however, as Bandura (1997) has observed, coaches do not always favor this philosophy. They often attempt to manipulate efficacy levels through various sources of efficacy information, sometimes raising efficacy beliefs but sometimes lowering them. This seems to make logical and intuitive sense. After all, why would anyone expend much effort preparing for something that one is certain to accomplish? Some sense of doubt must be beneficial for summoning preparatory effort. However, how much doubt can be tolerated before weakening motivation to prepare has not been metered.

Furthering the observational support for preparatory efficacy, the term overconfidence persists as a seemingly valid way of explaining why some athletes underachieve against less capable opponents. Weinberg and Gould (2007) have suggested that when overconfidence occurs, the problem originates in haphazard preparation by overconfident athletes. Thus, Weinberg and Gould imply that, during the preparation phase of competition, overconfident

athletes would actually benefit from being somewhat doubtful about how they will perform in an upcoming contest.

Given the significant amount of evidence suggesting that doubt harms the competitive execution of athletic skills (Bandura, 1997; Feltz et al., 2008), one of the major tasks in determining whether doubt can be beneficial to performance is developing a testable theory that explains its relationship to behavior and resulting performance. Based on Bandura's (1997) and Weinberg and Gould's (2007) observations, it is logical to start with the idea that doubt may be beneficial for enhancing the motivation to practice athletic skills during the preparation phase of performance. In a conceptual article on the topic of preparatory efficacy, Feltz and Wood (2009) suggest that researchers begin to examine preparatory efficacy through exploratory and confirmatory studies that test the idea that lower efficacy leads to increased effort during the preparatory stage of athletic performance. The higher effort should in turn lead to increases in performance and efficacy over time. A series of studies testing the Feltz and Wood's suppositions would increase the understanding of the doubt-effort relationship.

Following this line of reasoning, to test the differential relationship between preparatory efficacy and performance and performance efficacy and performance, one must show how the preparation phase differs from the performance phase. Therefore, for the purposes of this dissertation, the preparation phase of competition will be separated from the performance phase. The split between these two phases is reasonable because athletic competition progresses through practice and performance cycles. Before the first competition of a sport season, athletes begin a competitive season in a preparation phase. This initial

preparation phase for the first competition includes a series of practices, preparation meetings, and in some cases, exhibition competitions. Following the first competition of the season, athletes typically have another preparation phase before their next competitive performance and so forth. Game plans, strategies, and the importance of specific athletic skill execution often vary depending on the opponent, venue, or stakes of the competition; therefore, coaches and athletes typically choose preparation activities according to the challenges of the upcoming competitive performance. In this way, sport seasons progress through series of preparation-performance cycles.

The objectives and demands of competition vis a vis preparation are important to consider when contemplating the contributions of preparation and performance to athletes' goals. Although goals may be numerous, most athletes have goals regarding winning, placing, or executing at a certain skill level. Competitions generally last only a few hours, and actual playing time may last only minutes. Game time performance typically involves limited time to choose strategy, react to opponents or game conditions, and execute skills. The demands of performance place a premium on effective execution of well-learned skills and strategies. Therefore, performance efficacy is most importantly related to the behaviors that contribute to competitive athletic performance. Accordingly, the performance efficacy-performance relationship has been studied using efficacy scales designed to tap efficacy judgments regarding available metrics of competitive performance. In the main, the performance efficacy-performance relationship has been demonstrated to be positive, moderate, and temporally recursive (Feltz et al., 2008). In a meta-analysis of the literature, Moritz et al. (2000) found a performance efficacy-performance correlation of .38, and even

higher, .43, for studies that demonstrated concordance between the efficacy and performance measures such as game scores, judges' ratings, win-loss records, and game statistics. Feltz et al. (2008), noted that, given the number of factors that influence performance, the Moritz et al., data demonstrate an ample meaningful relationship. Given this relationship, sport psychology researchers and practitioners have largely advocated for a more is more approach to performance efficacy: the higher the performance efficacy, the higher the likelihood of strong performance.

The main objective of preparation is to prepare for competition, yet, as explained previously, the demands of specific competitions may vary according to opponents, game conditions, and specific skills likely to be emphasized during competition. Coaches, athletes, and sport psychologists often vary preparation activities according to the specific demands of the upcoming contests. Effort on tasks, choice of activities, and persistence on tasks and activities -- three mechanisms through which efficacy exerts its effect on performance (Bandura, 1997) -- are extremely important factors in the preparation phase. To the extent that preparatory efficacy is important to performance, it is likely that preparatory efficacy exerts its influence on performance through its motivational effects on effort, choice, and persistence factors. Therefore, in addition to studying the relationships between efficacy and the usual metrics of performance, investigation into preparatory efficacy should focus on the relationships between preparatory efficacy and preparatory effort, choice, and persistence.

Time factors are another key demand that vary between preparation and performance. While specific practice times are often scheduled during preparation, athletes are often involved in physical and mental preparation outside of prescribed practice times. When the

entire duration of the preparation phase is considered, athletes have a relatively long time to adjust efficacy beliefs prior to competition. Based on the idea that some sense of doubt may be beneficial during the preparation phase of performance but high efficacy beliefs benefit competitive performance, it seems reasonable to suggest that multiple efficacy measurements over a preparation-performance cycle optimally should reflect an initial sense of doubt and gradually rise to a peak just prior to the competitive performance for optimal performance to occur. The proposed process would work in the following way: (a) during preparation, self-doubt increases effort; (b) the increased effort then leads to improved execution of skills; (c) which then leads to efficacy-increasing feedback through known sources of efficacy information, such as performance accomplishment, modeling, verbal persuasion, imaginative experiences, physical states, and emotional states (Feltz et al., 2008).

Whereas performance efficacy in sport is most importantly related to metrics of performance, preparatory efficacy is most importantly related to preparatory effort, choice, and persistence: however, these relationships have not been established empirically (Feltz et al., 2008; Feltz & Wood, 2009). As noted previously, Bandura (1997) and Weinberg and Gould (2007) have suggested that the highest efficacy levels may not be optimal for preparation. Likewise, no theory suggests that a strong sense of doubt would be optimal for preparation. A strong sense of doubt is more likely to cripple effort during preparation. Instead, some moderate level of doubt, and therefore moderate level of efficaciousness, is a reasonable suggestion for the optimal level of preparatory efficacy. Thus, as suggested by Feltz and Wood (2009), the proposed preparatory efficacy-performance relationship resembles the inverted-U relationship of the arousal-performance relationship (Yerkes &

Dodson, 1908) in which the optimal influence of arousal on performance occurs at a moderate level of arousal.

Given the model proposed by Feltz and Wood (2009), preparatory efficacy should be related to effort, choice, persistence, and performance in an inverted-U shape, or a skewed inverted-U shape with the optimal preparatory efficacy level occurring toward the most difficult tasks and opponents. All of the dependent measures should be related to one another in a relatively positive, linear shape. However, given that optimal efficacy should be high before athletes begin competition (i.e. performance efficacy), efficacy levels should gradually increase from the start of preparation to the competitive performance. Thus, the strength of relationship between preparatory efficacy and performance should become stronger as time approaches the competitive performance.

The end of the preparation phase and the beginning of the performance phase is not always clear; however, the author's personal experience suggests that coaches often share expectations regarding a timeline for their athletes' completion of all game-specific physical practice, game plans, mental training, and other preparation. Any research addressing these topics needs to make a clear distinction between the preparation and performance phases. In practice, most efficacy research has established 24-hours prior to competition as the end of the preparation phase (Feltz et al., 2008); however, for the purposes of the studies in this dissertation, and depending on the sport, other definitions for the delineation between preparation and performance may be appropriate.

The studies in this dissertation examined the question of whether doubt can be beneficial to preparatory effort. To examine this idea, a distinct separation of preparation and

performance was created for a golf putting task that was likely to improve with repeated practice (i.e., determining the proper speed or pace with which to strike a putt so that it lands within or as close as possible to a target). Preparatory efficacy measurements were compared to practice effort to examine the effect of preparatory efficacy on effort and explore the nature of the relationship between these concepts. Although preparatory efficacy should be related to effort, choice, persistence, and performance in an inverted-U shape, this dissertation was not designed to delineate the point at which doubt becomes debilitating to effort, and thus does not test this relationship.

Secondarily, the studies explored the effects of preparatory efficacy on subsequent performance efficacy and competitive performance. Finally, performance efficacy measurements were compared to competitive performance.

**Research Hypotheses**

**Study 1**. The following research hypotheses were established for Study 1:

1) The low efficacy condition, representing the highest sense of doubt, would lead to the highest preparatory effort (i.e., greatest number of practice putts). The medium efficacy condition, representing a moderate level of doubt, would lead to the second highest preparatory effort. The high efficacy condition, representing the least doubt, would lead to the lowest preparatory effort. Thus, an inverse relationship would be observed between preparatory efficacy level and effort.

2) Low effort at the high efficacy target would lead to worse than expected performance. Higher effort at the medium and low effort targets would yield performance within sampling error of expectations.

3) Performance efficacy strength would be related to performance.

4) Feedback regarding capabilities (i.e., make percentage, or the percentage of putts that land in the correct target zone during preparation) would be positively related to efficacy change from the preparation phase to performance phase.

5) Practice make percentage for each target would be negatively related to effort in that target zone.

**Study 2**. The following research hypotheses were established for Study 2:

1) Participants would spend the most effort (i.e., greatest number of practice putts) at the farthest, low efficacy, target. The effort spent at this target would be significantly greater than the effort spent at both the medium length target (i.e., medium efficacy target) and the shortest target (i.e., high efficacy target). Furthermore, the effort spent at the medium target would be significantly greater than the effort spent at the shortest, high efficacy, target.

2) Performance efficacy strength would be negatively related to performance at each target (note: negatively related because lower performance numbers indicate better performance).

3) High practice quality would result in increases in self-efficacy and low practice quality would result in decreases in self-efficacy. Given that shorter distances from the target indicate better practice quality, the relationship between efficacy change and practice quality should be negative.

4) High post-practice satisfaction would lead to increases in self-efficacy, and low post-satisfaction would lead to decreases in efficacy. Thus, the relationship between post-practice satisfaction and efficacy change would be positive.

5) Practice putt satisfaction at each target would be negatively related to effort at that target.

**Delimitations**

This study is delimited to the two samples of golfers. Study 1 required golfers to have more than 3 years experience. Study 2 required only 1 year of experience. The golfers had varying degrees of competitive experience and skill levels, but all were competitive against their own best scores; thus, they were accustomed to trying to perform against a standard.

**Assumptions**

A basic assumption of these two studies is that the study participants reacted to the study methods similarly to the population of golfers. Further, it is assumed that the mechanisms of preparatory efficacy on effort operate similarly in golfers and other athletes.

More specifically to the methodology employed in the studies, it is assumed that performance on a putting pacing task is typically improved with practice. That is, participant pacing of putts should improve with more practice effort.

**Limitations**

The two studies in this dissertation are limited by the convenience sampling techniques used to recruit research participants. Convenience sampling was used to reduce the scope of the recruitment process for study participants. A further limitation of these studies is inherent in self-efficacy theory's prediction that doubt can become debilitating to effort at some level. These studies are neither attempting to dispute this idea nor delineating the point at which doubt becomes debilitating as opposed to being beneficial. Thus, the leveling of doubt in this study was limited by the study methods to include only one low

efficacy condition for each study. Although a study of the limitations of doubt and efficacy on effort may be necessary to a meaningful understanding of preparatory efficacy, it is beyond the scope of these two studies. The goal of this dissertation is to test the idea that doubt can be beneficial to effort under certain conditions.

**Definitions**

Effort: The energy or resources one puts forth to accomplish a task. In the studies in this dissertation, effort was measured by the number of practice putts taken at each target.

High Efficacy Target: In Study 1, the target for which efficacy is rated 5 out of 5 putts. In Study 2, the 5 ft target.

Low Efficacy Target: In Study 1, the target for which efficacy is rated 1 out of 5 putts. In Study 2, the 15 ft target.

Medium Efficacy Target: In Study 1, the target for which efficacy is rated 3 out of 5 putts. In Study 2, the 10 ft target.

Performance: Execution of sport-specific skills during the performance phase of competition, the objective of which is obtaining a score that can be compared to other competitors' scores. In Study 1, performance was defined as the number of putts landing in each target zone. In Study 2, performance was defined as (a) the number of putts landing in the target zone, and (b) the total distance from the target of all five competitive putts.

Performance Phase: The performance or competition phase of the preparation-performance cycle that characterizes most competitive sports. The performance phase is characterized by rules and scoring for competitive performance. Comparison to others' performance is typically the main objective of the performance phase.

Practice: For the purposes of this dissertation, practice is synonymous with preparation.

Preparation: Practice activities undertaken with the goal of improving performance for competition. Preparation for competition is the main objective of the preparatory phase. In the studies in this dissertation, preparation took place when participants took practice putts in preparation for later competitive putts.

Preparatory Phase: The practice phase of the preparation-performance cycle that characterizes most competitive sports. The preparatory phase is characterized by practice of already learned tasks. Official or formal scoring for competition is absent from this phase.

Putting Pacing Task: In a putting pacing task, the objective is to putt the ball with the correct pace for it to stop rolling within a target zone. Putting to stop the ball near a target, rather than within the hole or cup, is often referred to as putting for pace or speed.

Putts Landing in the Target Zone: In a putting pacing task, the objective is to putt the ball with the correct pace for it to stop rolling within a target zone. Balls that stop rolling in the target zone are considered to have landed within the target zone.

Self-Efficacy: Beliefs about what one can accomplish. Bandura's (1997, p. 3) formal definition follows: "Beliefs in one's capabilities to organize and execute courses of action required to produce given attainments."

# CHAPTER 2

## Literature Review

### Introduction

The common term overconfidence describes a relatively frequent occurrence in sport: A favored athlete, or team, puts forth a lackadaisical effort and ends up being defeated by a motivated underdog opponent who puts forth great effort. The term persists in the sports vernacular despite its obvious opposition to conventional wisdom and research in self-efficacy that suggests that high confidence in one's abilities is beneficial to sport performance. In their description of the mechanism through which overconfidence may harm performance, Weinberg and Gould (2007) suggested that high confidence may harm performance because is often leads to slackened preparatory activities and effort. Therefore, according to Weinberg and Gould, overconfidence is a problem in the preparation phase of competition but not necessarily in the performance phase.

Bandura's (1997) concept of preparatory efficacy aligns closely with this idea. Preparatory efficacy theory posits that, although self-doubt is harmful to skilled performance, some sense of doubt may be beneficial to preparatory effort for a contest. Given that competitive athletes spend the majority of their time and repetitions in the preparatory phase of sport, as opposed to the performance phase, determining whether overconfidence can lead to slackened effort is a meaningful, practical pursuit for sport psychologists.

Bandura's (1997) description of preparatory efficacy holds further importance for sport psychology researchers because the examples he provided for preparatory efficacy were based on common observations in sport. Bandura wrote:

> Thus, some self-doubt about one's efficacy provides incentives to acquire the knowledge and skills needed to function successfully. In applying skills already developed, however, a strong belief in one's efficacy is essential to mobilize and sustain the effort needed to succeed in difficult tasks. One cannot execute well what one knows while wrestling with self-doubt. In short, self-doubt creates the impetus for acquiring knowledge and skills, but it hinders proficient use of developed skills. The social management of preparatory and performance efficacy is standard practice in athletic activities. Coaches inflate the capabilities of their opponents and underscore deficiencies of their own team to motivate their players to practice earnestly for upcoming contests. But at the time of the contest, coaches do not send their teams out on the playing field racked with self-doubt. Rather, they dispatch them in an efficacious frame of mind to get them to play to the best of their abilities (Bandura, 1997, p. 76).

Bandura (1986, 1997) and others (Feltz et al., 2008; Feltz & Wood, 2009) have differentiated efficacy beliefs taken during the preparatory phase of athletic from those taken just before performance. Although both are measures of efficacy for performance in an upcoming sport contest, preparatory efficacy measures are taken during a clearly defined preparatory phase; performance efficacy measures are taken as close as possible to the competitive performance. Performance efficacy has been shown to have a beneficial, linear shaped effect on performance effort (Feltz et al., 2008). In contrast, Bandura (1997) has suggested that some sense of doubt in efficacy beliefs may have a beneficial impact on

preparatory effort. Therefore, the relationship between preparatory efficacy and preparatory effort is not likely to resemble the positive linear effect of performance efficacy on performance effort, rather it may resemble an inverted U (Feltz et al., 2008; Feltz & Wood, 2009). Although the relationship between efficacy and effort has been studied empirically in the performance phase of athletics (Weinberg, Gould, & Jackson, 1979; Weinberg, Gould, Yukelson, & Jackson, 1981; Bandura & Cervone, 1983; Bandura & Cervone, 1986), few empirical studies have tested the predictions for the relationship between efficacy and effort during the preparatory phase of sport. Given that the preparatory phase makes up a greater portion of time compared to the performance phase at higher competitive levels of all sports, the lack of research on the preparatory phase represents an important lacuna in empirically derived knowledge.

The relationship between preparatory efficacy and preparatory effort is the main focus of this dissertation. The remainder of this literature review will begin with a brief overview of self-efficacy theory in sport before expounding on a more thorough review of relevant research on the topic of efficacy and effort in sport.

**Overview of Self-Efficacy Research in Sport**

Self-efficacy is defined as, "Beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments," (Bandura, 1997, p. 3). Self-efficacy theory was developed within the broader theory of social cognitive theory (Bandura, 1977, 1997, 2001), in which a person's personal factors (e.g., efficacy beliefs), behaviors (e.g., their effort), and environment (e.g., coach, teammates, or opponents) interact and influence one another in a process of triadic reciprocal causation. The capability of humans to act

proactively on their environment and self-regulate their motivation and behavior is known as an agentic perspective (Bandura, 1997, 2001). Within an agentic perspective, humans use thoughts to generate behaviors intended to influence their environment, and in turn, they are influenced by the feedback they receive from that behavior (e.g., mastery of a sport task at a certain level of execution) or from others' reactions to their behavior (e.g., verbal or nonverbal feedback about correct execution). Self-efficacy beliefs are a person's judgment of what he or she can do. Thus, efficacy beliefs are a personal factor regarding behavioral capability, and the environmental feedback received from that behavior is an outcome of that behavior. Bandura (1997) uses the term efficacy beliefs to describe beliefs about behavior, whereas he uses the term outcome expectancies to describe beliefs about the outcomes of behavior. Outcome expectancies include the physical, social, and self-evaluative outcomes one expects to follow from behavioral attainments (Bandura, 1997).

Self-efficacy has been a major influence on sport psychology for over 30 years (Feltz et al., 2008). Self-efficacy theory describes, explains, and predicts how athletes and coaches choose activities and goals, put forth effort toward goals, and persist in the face of adversity. At its core, self-efficacy theory explains that confidence in one's capabilities matters, which seems intuitively appealing to athletes, coaches, sport psychologists, and others who strive to improve athletic performance.

In the main, self-efficacy researchers have focused on how self-efficacy affects performance and vice versa. In order to study the relationship between efficacy and performance properly, certain qualifying conditions must occur. Bandura (1997) has

suggested that the efficacy performance relationship is properly observed when people have sufficient incentive to perform, requisite skills, a clearly understood task, concordant efficacy and performance measures, and properly timed measurements.

Bandura (1977) described the relationship between efficacy and performance as temporally recursive, meaning that changes in efficacy influence performance, which in turn has a subsequent influence on efficacy. Thus, performance and efficacy influence one another in cycles or spirals, and this relationship has been demonstrated in both team and individual sports through both path analysis and structural equation modeling (Feltz, 1982; Feltz, 1988; Feltz & Mugno, 1983; George, 1994; McAuley, 1985; Myers, Feltz, & Short, 2004; Myers, Payment, & Feltz, 2004). The direction of the relationship is positive and moderate (Moritz et al., 2000). Increases in efficacy lead to improvements in performance and vice versa. The converse also tends to be true. The relationship is characterized as moderate based on obtained correlations in studies of efficacy and performance. In a meta-analysis of 45 studies using 102 correlations, Moritz et al. (2000) found a significant efficacy-performance correlation of .38. A higher correlation (.43) was obtained for studies with concordant efficacy and performance measures. Efficacy is hardly the only predictor of sport performance; however, when interpreted in the context of other influences on performance, the strength of the correlation indicates a significant and meaningful relationship between the concepts (Feltz et al., 2008).

Efficacy beliefs are generated and shaped through various sources of information. Bandura (1997) defined four sources: mastery experiences (i.e., past accomplishments),

vicarious experiences (i.e., modeling), verbal persuasion, and physical and emotional states. Other researchers have suggested a separate category for emotional states (Maddux, 1995; Schunk, 1995) and imaginal vicarious experiences (Maddux, 1995). In the most comprehensive review of efficacy research in sport, Feltz et al. (2008) described the previously mentioned six categories (i.e., mastery experiences, vicarious experiences, verbal persuasion, physical states, emotional states, and imaginal states) when describing the sources of efficacy in sport.

**Effects of Efficacy on Performance and Proximal Behaviors**

On the other side of the temporally recursive relationship, one of the most meaningful features of self-efficacy theory applied to sport is its explanation of the mechanisms through which efficacy influences performance. Efficacy has been shown to influence performance directly and also through its effects on other determinants of behavior such as choice of activities and goals, effort, persistence, thought patterns, and emotional reactions (Feltz et al., 2008). Choice of activities and goals, effort, and persistence will be reviewed here in more detail for relevance to this dissertation.

**Choice of activities and self-set goals.** Good coaches typically plan their athletes' preparation according to the tasks required for the upcoming contest. The activities they choose to practice and the goals they set for a contest are an important part of the preparation process. In contrast to the more limited choices available in the performance phase, the choices of activities are varied and plentiful in the preparation stage. The activities athletes choose determine which aspects of technical execution will be the focus of attempts to improve, and the athlete's performance on these activities will influence subsequent efficacy

beliefs. Well-planned activities at the proper level of difficulty are likely to increase efficacy, while haphazard and overly difficult or simple activities are likely to have little effect, or even a negative one, on efficacy. Thus, choice of activities is an important component of efficacy change during the preparatory phase of competition.

Further, in many sports, athletes are capable of deciding to put extra effort into preparation through choices over which the coach has limited influence or control. For example, players often make a conscious choice about whether to engage in activities such as additional conditioning training, maintaining a proper diet, setting personal goals, and studying game plans to the point of mastery. Because these activities are relegated to the preparation stage, it stands to reason that preparatory efficacy would have an important influence over choices regarding how much time one devotes to these activities.

Goals are an important mediator of the efficacy-performance and efficacy-effort relationships. This is particularly true when goals are combined with feedback regarding progress toward goal achievement. Bandura and Cervone (1983, 1986) found that, even among high efficacy individuals, goals and feedback have a significant effect on effortful performance over and above goals alone, feedback alone, and control conditions. Reviews of research in goal theory and self-efficacy theory have indicated that research supports two fundamental principals consistently across both goal theory and self-efficacy theory: Efficacy has a linear, positive relationship with self-set goal difficulty, and goal difficulty has a linear, positive relationship with performance (Locke & Latham, 2002; Bandura & Locke, 2003). Thus, efficacious individuals tend to choose difficult goals, and difficult goals tend to lead to high performance.

**Effort.** Regardless of whether an athlete self-selects activities or follows a coach's prescribed training regimen, the athlete has control over the amount of effort put forth in those activities. The athlete who sets challenging goals and has a determined attitude toward skill improvement has a much different motivational mindset regarding effort and persistence than the athlete who takes the attitude that practice is over in two hours no matter what type of effort is given toward skill improvement. Based on Bandura's (1997) conceptualization of preparatory efficacy, an athlete who has some doubt about the ultimate outcome of an upcoming contest is likely to have more incentive for putting forth a greater preparatory effort in comparison to an athlete who feels assured of victory or self-satisfied with preparation.

In general, research has supported a positive, linear relationship between efficacy and effort. Reviews of research have supported this conclusion (Bandura, 1997; Moritz et al., 2000; Feltz et al., 2008). Later in this review, specific research will be reviewed in detail to support this notion with relevant research methodology to the proposed study.

**Persistence.** In the efficacy literature, persistence is differentiated from effort. Typically, effort is operationally defined as the intensity dimension of motivated behavior, and persistence is the duration dimension of motivated behavior. In other words, effort pertains to behavior in relatively short time frames, and persistence pertains to effortful behavior applied across relatively longer periods of time. Research indicates that efficacious individuals persist longer across time in pursuit of goals (Bandura, 1997; Feltz et al., 2008). This finding is strongest when one must overcome an obstacle in order to achieve the targeted goal (Bandura, 1997; Feltz et al., 2008).

To be sure, research on persistence in the preparatory stage is needed; however, the current studies do not include measures of persistence. The current review of persistence was included in this review to differentiate clearly between effort and persistence.

## Preparatory Efficacy Literature Review

**Comparisons and contrasts with performance efficacy.** Following the introduction of sources of efficacy beliefs and mechanisms through with efficacy influences proximal behavior, it is necessary to clarify the similarities and differences between preparatory and performance efficacy. On the similarity side, both concepts measure one's belief in their own, or their team's, capabilities regarding upcoming performance. Within a cycle of preparation followed by performance, as is the case with each of the studies in this dissertation, respective preparatory efficacy and performance efficacy measures pertain to a singular competitive performance. Additionally, both concepts have the same sources and the same mechanisms of influence on behavior; therefore, both concepts are proposed to have a temporally recursive relationship with proximal behavior. Finally, both concepts have the same necessary conditions for efficacy to predict performance.

While comparisons are important for understanding that certain important findings from performance efficacy research should generalize to preparatory efficacy research, several contrasts are necessary for understanding why the two are distinct concepts. The first major difference between preparatory and performance efficacy is the timing of measurement. During most sport seasons, the sequence of the season begins with a purely preparatory preseason that leads up to the first competition. The first competition is then followed by

alternating periods of preparation (i.e., practice) and performance (i.e., competitive contests such as games and matches), and this cycle repeats throughout the regular and post-seasons.

During the preparatory phases of a competitive cycle, efficacy beliefs regarding the upcoming competition are considered to be preparatory efficacy beliefs, whereas just prior to each competition, efficacy beliefs regarding the competition are considered to be performance efficacy beliefs. Although sport-specific distinctions between the two phases are unclear at this stage in the research, Feltz et al. (2008) and Feltz and Wood (2009) have noted that the performance phase is typically defined as the period of time within 24 hours prior to performance. Practical experience appears to be consistent with this guideline; however, careful examination of the specific situation should be used when determining whether an athlete is in preparation or performance. For example, on many occasions, teams hold practice sessions within 24 hours of a contest. In the studies in this dissertation, both the preparatory and performance phases take place within the same hour; however, they are clearly demarcated by explanations and announcements regarding whether the participant is in a practice session or a competition. In other words, the phase of competition is not ambiguous. Many coaches use a practical application of this strategy by stating clear expectations regarding when preparation ends and performance begins.

Concordance is a second important difference between preparatory and performance efficacy. Concordance is the degree of agreement or alignment between the efficacy and performance measures being correlated. For example, an efficacy measure tapping a runner's efficacy beliefs regarding running a specific time is more concordant with the performance metric of time than it is with the performance metric of place (e.g., first, second, third). As

noted previously, in a meta-analysis of efficacy research Moritz et al. (2000) found an overall correlation of .38 for efficacy and performance, but in studies in which the efficacy measure was concordant with the performance measure, the correlation increased to .43. Certainly, concordance between efficacy and performance is important in both preparatory and performance efficacy research; however, in addition to requiring concordance between efficacy and performance, preparatory efficacy research has the additional burden of requiring concordance between effort and performance. Concordance between effort and performance exists when increases in effort are highly likely to result in improved performance.

In the studies in this dissertation, the effort of taking practice putts is presumed to improve putting performance. The idea is based on the observation that golfers tend to putt best when the speed of the greens (i.e. putting surface) is consistent from one green to the next on the golf course and when the speed of the greens is familiar in comparison to the majority of greens typically played. Although many golfers can adjust relatively quickly to the speed of any particular putting surface, more practice on the specific speed of the competition putting surface should typically result in better putting strokes that produce putts that land closer to the intended target.

A third major difference between preparatory and performance efficacy is that the relationships with effort and performance are proposed to be different between the two efficacy concepts. As Moritz et al. (2000) and Feltz et al. (2008) have noted, ample evidence suggests that the relationship between performance efficacy and performance is temporally recursive, positive, linear, and moderate. In contrast, the hypothesized relationships between

preparatory efficacy and both effort and performance are inverted-U shaped (Feltz et al., 2008; Feltz & Wood, 2009).

Regarding the inverted-U relationship between preparatory efficacy and effort, at the extremes, very low and very high efficacy, effort is not expected to be high. The conventional wisdom behind this prediction is mostly based on a synthesis of research rather than a specific finding. As Bandura (1997) theorized, one is not prone to give effort on tasks for which the outcome is not in doubt, which is the case with both extremely easy and extremely difficult tasks. In the middle, where doubt is moderate, effort should be relatively high.

The relationship between preparatory efficacy and performance should also be strongest at moderate levels of efficacy. The reasoning behind this prediction is that when effort is high, the presence of efficacy enhancing feedback (e.g., performance accomplishments, similarity to correct performing models, verbal persuasion and praise, etc.,) is increased, efficacy is likely to increase, and subsequently, a stronger performance is more likely to occur. At the extremes of efficacy beliefs, where effort is low, efficacy is not likely to change through effort, and performance is not likely to be strong. Thus, the best performances should be related to moderate preparatory efficacy beliefs.

**Review of studies on the effects of efficacy on effortful performance.** In lieu of specific research on preparatory efficacy and effort, four studies of efficacy and effortful performance will be highlighted for pertinent methodology and findings. In the first study, Weinberg et al. (1979) studied the effects of self-efficacy beliefs on a muscular endurance competition (i.e., a leg extension). Because the muscular endurance task required no skilled movement, the performance measure could also be termed an effort measure. The researchers

enlisted a confederate competitor to help manipulate efficacy beliefs regarding the competition. The confederate was portrayed as either injured, to raise the participants' competitive efficacy beliefs, or a varsity athlete, to lower the participants' competitive efficacy beliefs. Further, the competitions were always rigged so that the confederate won. Results revealed that the participants manipulated to have high efficacy outperformed those manipulated to have low efficacy in both of two trials. Further, the high efficacy group increased their performance in the second trial, whereas the low efficacy group's performance decreased in the second trial.

In a follow-up study, Weinberg et al. (1981) used the same general methods, task, and measure of performance. The only difference in the study was the addition of a baseline task efficacy measure taken prior to the efficacy manipulation for the competition against the confederate. A median split was used to partition the subjects into high and low efficacy groups. Results indicated that the high pre-existing efficacy group significantly outperformed the low pre-existing efficacy group on Trial 1 but not on Trial 2. The manipulated high efficacy group significantly outperformed the manipulated low efficacy group on Trial 2 but not on Trial 1. It was noted that in both condition comparisons that did not reach significance, pre-existing efficacy in Trial 2 and manipulated efficacy in Trial 1, the high efficacy group did outperform the low group, albeit at a level that did not reach statistical significance.

Bandura and Cervone (Bandura & Cervone, 1983; Bandura & Cervone, 1986) used a Schwinn Air-Dyne ergometer to measure effortful performance in two studies of motivation. In both studies, performance on the ergometer was tested in three 5 min sessions on the ergometer. The first session served as a baseline measure of performance, and it was

followed by two performance sessions. Also in both studies, researchers gathered efficacy data and self-evaluative data for satisfaction in their previous performance and satisfaction if the same level of performance were obtained in the subsequent trial. All feedback on performance was given via a television monitor that displayed information printed and written on cards.

In the first study, Bandura and Cervone (1983) compared performance across four groups: Goals and feedback, feedback only, goals only, and a control group that received no goals or feedback but filled out the efficacy and satisfaction scales. The two goals groups were given a pre-selected goal of a 40% increase from baseline performance. Following the first performance session, each participant in a feedback condition was informed, "Your performance score for the last sessions was 24% above your first session." In the goals only condition, each participant was simply reminded of the performance goal, "The goal you were aiming for is + 40 %." In the goals and feedback condition, participants received both the goals and feedback information.

Results indicated that the highest performance as a percentage increase from baseline occurred in the goals and feedback condition. The goals only and feedback only conditions resulted in moderate increases in performance, whereas the control condition had the lowest performance increase from baseline. Moreover, the efficacy and self-satisfaction measures mediated performance in the goals and feedback condition. Participants with high self-efficacy and high self-dissatisfaction with performance had the greatest performance improvements on the next performance session. Those with high self-efficacy and low self-dissatisfaction and those with low self-efficacy and high self-dissatisfaction performed

similarly, with both groups making moderate improvements in subsequent performance. Those with low self-efficacy and low self-dissatisfaction had the lowest improvements in performance.

Bandura and Cervone concluded that goals serve a motivational function through self-efficacy and self-evaluation mechanisms when feedback on goal progress is available for cognitive comparison. Regarding the proposed study, the results of this study suggest that self-efficacy measures alone are not enough to predict effortful, goal-directed behavior. Goals, or at least some type of defined outcome, and feedback are important features of studies of efficacy and effort. Further, self-dissatisfaction is an important factor in predicting the efficacy-effort relationship.

In a subsequent study, Bandura and Cervone (1986) used similar methods to determine if differential discrepancies between goals and performance attainments had differential effects on effortful performance. In this study, Bandura and Cervone manipulated feedback so that performance levels were described as 26% substandard, 14% substandard, 4% substandard, or 4% suprastandard. Self-dissatisfaction was highest in the 26% substandard condition and decreased linearly across the respective conditions. Self-efficacy beliefs reflected an opposite pattern. Efficacy beliefs were lowest in the 26% substandard condition and increased across the respective conditions. The percentage increase in effortful performance was greatest in the 26% substandard condition, next greatest in the 14% substandard condition, and lowest in the 4% substandard condition. The fact that the 4% suprastandard condition did not result in the lowest increase in effort suggested that some of the participants in that condition increased their self-set performance goals, creating a greater

discrepancy between previous performance and goal standard. Self-set goal data supported this conclusion.

Efficacy served as a motivator across all conditions, regardless of the discrepancy between goals and performance. Self-dissatisfaction served as a motivator when performance attainments fell substantially below goal standards. Likewise, even though achieved goals resulted in relatively high satisfaction, participants in the 4% suprastandard condition often set higher subsequent performance goals, which created a new goal-performance discrepancy and resulted an increase in effortful performance in the next session.

In contrast, satisfaction with nearly achieved goals often did not result in increased effort. In the 4% substandard condition, researchers noticed what they termed overcomplacency in about a quarter of the participants. Despite being efficacious in their beliefs about their capabilities, the subjects did not increase their effort toward the goal in a subsequent trial. Bandura and Cervone concluded, "Motivation is perhaps best maintained by a strong sense of self-efficacy to withstand failure, coupled with some uncertainty (construed in terms of the challenge of the task, rather than fundamental doubt about one's capabilities) to spur the effort needed to fulfill personal challenges. It remains a problem of future research to delineate the factors that contribute to overcomplacency," (Bandura and Cervone, 1986, p. 110). They concluded the article by noting that, "Life without elements of challenge can be rather dull" (Bandura & Cervone, 1986, p. 111).

The studies by Weinberg and colleagues (Weinberg et al., 1979; Weinberg et al., 1981) support the idea that efficacy tends to benefit effortful performance. The studies by Bandura and Cervone (Bandura & Cervone, 1983; Bandura & Cervone, 1986) indicate that

the relationship between efficacy and performance is also mediated by goals, feedback, and self-dissatisfaction. Although the Weinberg and colleagues studies appear not to have addressed goals, feedback, and self-dissatisfaction, it is likely that these elements were present and consistent across the two studies. Goals were clearly present in the form of other-selected goals. The goal presented was to win the competition. Feedback was present in the face-to-face competition, and the feedback was consistent in that the confederate always won the competition. Results from a back-to-back competition (Weinberg, Yukelson, & Jackson, 1980) were lower in magnitude and produced lower efficacy-performance correlations in comparison to the results from the face-to-face study (Weinberg et al., 1979), suggesting that the availability of feedback in the face-to-face competition indeed had an effect on performance. Finally, because the confederate always won, self-dissatisfaction was likely to be relatively high in all conditions across the two studies. Taken together, the Weinberg and colleagues studies appear to have been very consistent in terms of goals of the task, performance feedback, and self-dissatisfaction with performance. Thus, meaningful differences in those key variables were likely minimized across the two studies.

In summarizing the information from all four studies, the results suggest that efficacy beliefs have a positive impact on effortful performance, and this is especially true when goals and performance feedback are present and when self-dissatisfaction with performance is high. This much seems relatively clear from the four studies. Given that these were studies of performance only, what remains unclear is whether the findings hold true for the preparation stage of competition.

**Review of studies on the effects of efficacy on effort in learning tasks.** Although his discussion of self-doubt being beneficial to effort combines elements of preparation and learning, Bandura (1997) has been careful to point out that learning and preparation are not the same. Learning involves the acquisition of new knowledge and skills, whereas preparation involves getting prepared for an upcoming event. Although learning may be part of preparation for sport (e.g., learning of game plans and strategies for an upcoming opponent), not all learning occurs in preparation for a specific event. Thus, a separation between learning and preparation is necessary.

To the point that findings from research on learning may be relevant to research on preparation, several notable studies have supported the idea that a sense of self-doubt is beneficial to learning. The following studies were chosen because the task involved in each study required effortful activity in order to improve performance. Thus, the study tasks were characterized by concordance between effort and performance.

In a reading study, Salomon (1984) found that students high in learning efficacy put forth more effort and learned a greater amount of content from a learning task they considered difficult in comparison to one they considered easy. In his conclusion, Salomon suggested that a sense of doubt, which produced lower efficacy levels, signaled to the students that a greater effort was needed to master the perceived more difficult task.

In a study involving a complex-decision making task for a simulated business, Bandura and Jourden (1991) found that a low-efficacy group of participants who had to persevere through difficulties to achieve mastery set higher goals than a comparison group of high efficacy participants. Further, performance decrements in the high efficacy group led the

researchers to conclude that the high efficacy condition was detrimental to long-term performance.

Stone (1994) found similar results for a complex cognitive task. Participants induced to have high efficacy did not show increases in effort, attention, or performance in comparison to groups induced to have mildly negative and strongly negative efficacy beliefs. Of the two negative efficacy groups, the mildly negative group increased effort, attention, and performance in comparison to strongly negative group.

In a noteworthy study of motor learning performance, Eyal, Bar-Eli, Tenebaum, and Pie (1995) manipulated efficacy levels to create high, medium, and low efficacy groups for various novel motor learning tasks. They found that the medium efficacy group performed the best, demonstrating the greatest learning on the tasks. Although the researchers did not take adequate measurements to properly study preparatory efficacy, the results supported the idea that under learning conditions, some sense of doubt in self-efficacy percepts led to the best performance.

Review of sport psychology professional practice knowledge of preparatory efficacy. As an applied field, sport psychology places special emphasis on professional practice knowledge. Weinberg and Gould (2007) note six sources of professional practice knowledge for sport psychology: Scientific method, systematic observation, single case study, shared public experience, introspection, and intuition. Each of these sources of knowledge will be reviewed for possible support of preparatory efficacy as a distinct concept from performance efficacy.

***Scientific method.*** Taken together, a modest amount of evidence that supports Bandura's conceptualization of preparatory efficacy has been gathered through the scientific method, the most reliable source of professional practice knowledge for sport psychology researchers (Weinberg and Gould, 2007). Study 1 of this dissertation specifically tested the effects of preparatory efficacy on effort and performance across a preparation-performance cycle, and the findings support the idea that a sense of doubt about one's capabilities to execute a task benefits effort toward that task in the preparation stage of competition. The studies by Salomon (1984), Bandura and Jourden (1991), and Stone (1994) support the idea that some self-doubt benefits effort applied toward learning cognitive tasks, and the study by Eyal et al. (1995) provides support for the notion that self-doubt can be beneficial to effort in learning a motor task. Further, evidence from Weinberg et al. (1979) and Weinberg et al. (1981) indicates that efficacy beliefs are important to effort on proximal tasks when effort is a measure of performance. Bandura and Cervone (1983, 1986) provided evidence that goals, feedback, and satisfaction are also important factors to consider when examining the relationship between efficacy and effort: the higher the efficacy beliefs and the higher the dissatisfaction with current or imagined future performance, the higher the effort applied toward a task with clear goals and feedback.

***Systematic observation.*** As noted in Chapter 1, both Bandura's (1997) conceptualization of preparatory efficacy and Weinberg and Gould's (2007) conceptualization of the related construct, overconfidence, serve as evidence of systematic observation of preparatory efficacy in action. As evidenced by their respective prodigious teaching, researching, and consulting experience within their respective fields of study, each of these

men is a leader and expert capable of making an effective systematic observation of behavior. Thus, their collective systematic observation that a sense of doubt benefits preparatory effort lends support to the conceptualization of preparatory efficacy as a distinct construct from performance efficacy.

Bandura's (1997) description of preparatory efficacy suggests that in order to summon the greatest level of preparatory effort, optimal preparatory efficacy levels should reflect some sense of doubt. In other words, something less than a maximum efficacy belief is desired during the preparatory phase; however, a maximum or near maximum performance efficacy level is desired just before competition. Presumably, as Bandura (1997) and Feltz and Wood (2009) have suggested, in order for doubt to lead to improved performance, the increased preparatory effort, perhaps in combination with efficacy enhancing feedback from coaches or others, would need to eventually engender increased efficacy beliefs from the preparatory stage to the performance phase.

Weinberg and Gould's (2007) description of overconfidence aligns very closely with Bandura's conceptualization of preparatory efficacy. Their description of overconfidence suggests that a very high sense of confidence may harm performance if it leads to slackened preparatory activities and effort. Therefore, according to Weinberg and Gould, overconfidence is a problem in the preparation phase of competition but not necessarily in the performance phase.

***Single case study***. Seligman (1998) described a single field case study in which he and a group of coaches manipulated swim times for a group of elite swimmers. The swimmers were led to believe that their times were worse than they actually were, in essence

creating a situation in which the swimmer's should have doubted their capabilities. Seligman did not measure efficacy beliefs, but he did measure optimism. He found that the optimists on the team swam faster times in their next timed swim whereas the pessimists did not experience a similar improvement. Given that the entire study took place during a preparatory phase of competition, Seligman's case study provides support for the idea that some sense of doubt can influence proximal behavior, and at least in the case of optimists, be translated into sport specific improvement.

***Shared public experience***. Weinberg and Gould (1997) use of the term overconfidence is appropriate and easily understood because it is commonly known to athletes and coaches. The shared public experience of watching a cocksure favorite lose to an inspired underdog creates knowledge of a rule of thumb: if a team or individual is so confident that they do not prepare adequately, they are ripe for an upset.

The documentary Do You Believe in Miracles? The Story of the 1980 U.S. Hockey Team (2001), which chronicled the 1980 U.S. Olympic Hockey Team's defeat of the vaunted Russian Red Army Team, revealed this process in eloquent detail, helping create shared public experience of overconfidence. In interview after interview, the U.S. team members described their concerted effort to win a rematch with the Russians following a humiliating defeat in a previous exhibition competition. The U.S. Head Coach, Herb Brooks, described how he systematically broke down the team's confidence before building them up, peaking their confidence just before the semi-final with the Russians. In describing how he built up his team's confidence, Brooks noted specific tactics he used to denigrate the image of the Russians as the greatest hockey players on Earth, such as comparing Russian players to

American comedians Oliver Hardy and Stan Laurel. On the Russian side, the team member interviews reveal complacency and a lack of competitive respect for their American competitors. In the end, the U. S. team's effortful and inspired preparation helped them win the semi-final against the Russians before ultimately winning the 1980 gold medal.

***Introspection***. Reflecting on my own experience as a collegiate football player, the head coach of my team frequently attempted to manipulate our team's efficacy beliefs. During preparation, he would constantly provide us with feedback about the opponent's strengths and their capabilities to defeat us. Because we were very good (39-3 record over 4 years), our coach's attempts to bolster the other teams' strengths often reached the point of absurdity; however, his message was not lost. We knew that our coach was taking our opponents' chances to beat us seriously, and his preparation reflected his belief. Therefore, we knew we needed to match his effort lest we suffer a humiliating upset.

***Intuition***. Intuitively, the concept of preparatory efficacy seems logical. At its core, the concept of preparatory efficacy explains that we do not put great effort into preparatory activities when the outcome is already assured and the task we are charged with is not worthy of our effort. In almost all conceivable circumstances of this type, it seems intuitively logical that we would put our limited resources into other meaningful activities.

**Summary of the Evidence on the Effects of Efficacy on Effort**

The above cited research provides evidence suggesting that efficacy is an important influence on effort (Weinberg et al., 1979; Weinberg et al., 1981; Bandura & Cervone, 1983; Bandura & Cervone, 1986), and doubt regarding the difficulty of a task is beneficial to effort applied toward learning a task (Salomon, 1984; Bandura & Jourden, 1991; Stone, 1994; Eyal

et al., 1995). Further, other sources of knowledge add to sport psychology's professional practice knowledge that some sense of preparatory doubt is beneficial to combating the negative effects of overconfidence. Despite the confluence of information on this topic, the idea that self-doubt may be beneficial to preparatory effort remains unsupported by empirical evidence in sport, and the effects of preparatory efficacy on effort and performance remain unclear. The next two respective chapters describe Study 1 and Study 2 of this dissertation, which were designed to test the general hypothesis: Relative doubt is beneficial to preparatory effort.

# CHAPTER 3

## Study 1

### Purpose and Hypotheses

The purpose of Study 1 was to determine whether participants allocated differential effort when practicing putting at a high, medium, or low efficacy target. Further purposes included testing the ideas that efficacy beliefs and performance are related across a preparation-performance cycle and that efficacy-enhancing feedback at a specific target leads to improvements in self-efficacy strength for that target and a greater allocation of effort at other targets. The following hypotheses were proposed:

1) The low efficacy condition, representing the highest sense of doubt, would lead to the highest preparatory effort (i.e., greatest number of practice putts). The medium efficacy condition, representing a moderate level of doubt, would lead to the second highest preparatory effort. The high efficacy condition, representing the least doubt, would lead to the lowest preparatory effort. Thus, an inverse relationship would be observed between preparatory efficacy level and effort.

2) Low effort at the high efficacy target would lead to worse than expected performance. Higher effort at the medium and low effort targets would yield performance within sampling error of expectations.

3) Performance efficacy strength would be related to performance.

4) Feedback regarding capabilities (i.e., make percentage, or the percentage of putts that land in the correct target zone during preparation) would be positively related to efficacy change from the preparation phase to performance phase.

5) Practice make percentage for each target would be negatively related to effort in that target zone.

## Method

**Participants.** Male participants (N = 24) were recruited from a golf training program and a golf league in an Oakland County, MI suburb. A flier was emailed to the training center's client contact group, and the league participants were solicited through direct contact by the researcher. Participants needed to have only 3 years of golf experience, even non-competitive experience, to qualify for the study. The average age of study participants was 38.7 years (SD = 8.8). The minimum age was 19 years, and the maximum age was 69 years. Study participants had an average 20.7 years golf experience (SD = 8.6). Highest level of official competitive experience data indicated 14 non-competitive participants (i.e., non-competitive against other competition but not against their own best scores or foursome playing partners), 8 league level competitors, and 2 high school level competitors.

**Design.** The study employed a single factor model with a repeated measures experimental design. Three levels of the independent variable, preparatory task efficacy level, were chosen for study: High efficacy zone, medium efficacy zone, low efficacy zone. The levels corresponded to the number of putts out of five total the participant indicated he was capable of landing in the target zone: five out of five putts (high efficacy), three out of five putts (medium efficacy), and one out of five putts (low efficacy). Four dependent variables were measured for each level of the independent variable. The dependent measures were preparatory efficacy strength, effort (i.e., number of total putts and makes was recorded for each target), performance efficacy strength, and performance.

**Materials.**

***Golf equipment.*** The golf equipment used in this study included 30 regulation golf balls and a blade putter. Blade style putters are flat on both sides; therefore, using a blade putter allowed for the same putter to be used for both left-handed and right-handed participants.

***Putting surface.*** The putting surface used in this study was Astroturf style indoor-outdoor carpeting. The surface was 24 ft (7.32 m) long. Twenty ft (6.10 m) of the surface was marked into 1 ft (0.30 m) long zones. White painted stripes marked the beginning of each successive zone. Zones were labeled in white paint to help participants identify them by name. The first zone was labeled Zone 1, the second Zone 2, and so forth up to Zone 20. Two ft (0.61 m) at the front end of the putting mat were used as a place for participants to stand, while 2 ft (0.61 m) at the end gave depth to the playing surface, which helped players judge how far their putts rolled past the last zone. A small white circle 6 in. (0.15 m) from the start of Zone 1 marked the starting point to place the ball for each putt. The starting point was 1 ft (0.30 m) from the center of Zone 1; therefore, the number for each zone indicated the number of feet from its center to the starting point. Figure 1 illustrates the putting surface layout.

***Self-efficacy measures.*** Preparatory (Appendix A) and performance (Appendix B) self-efficacy strength beliefs were rated on an 11-point scale (0 -10) with the anchors Complete Uncertainty, Moderate Certainty, and Complete Certainty set at 0, 5, and 10 respectively (see Appendix A). For each of the three targets, each golfer was asked to rate his belief in his capability to land at least one out of five, at least three out of five, and all five

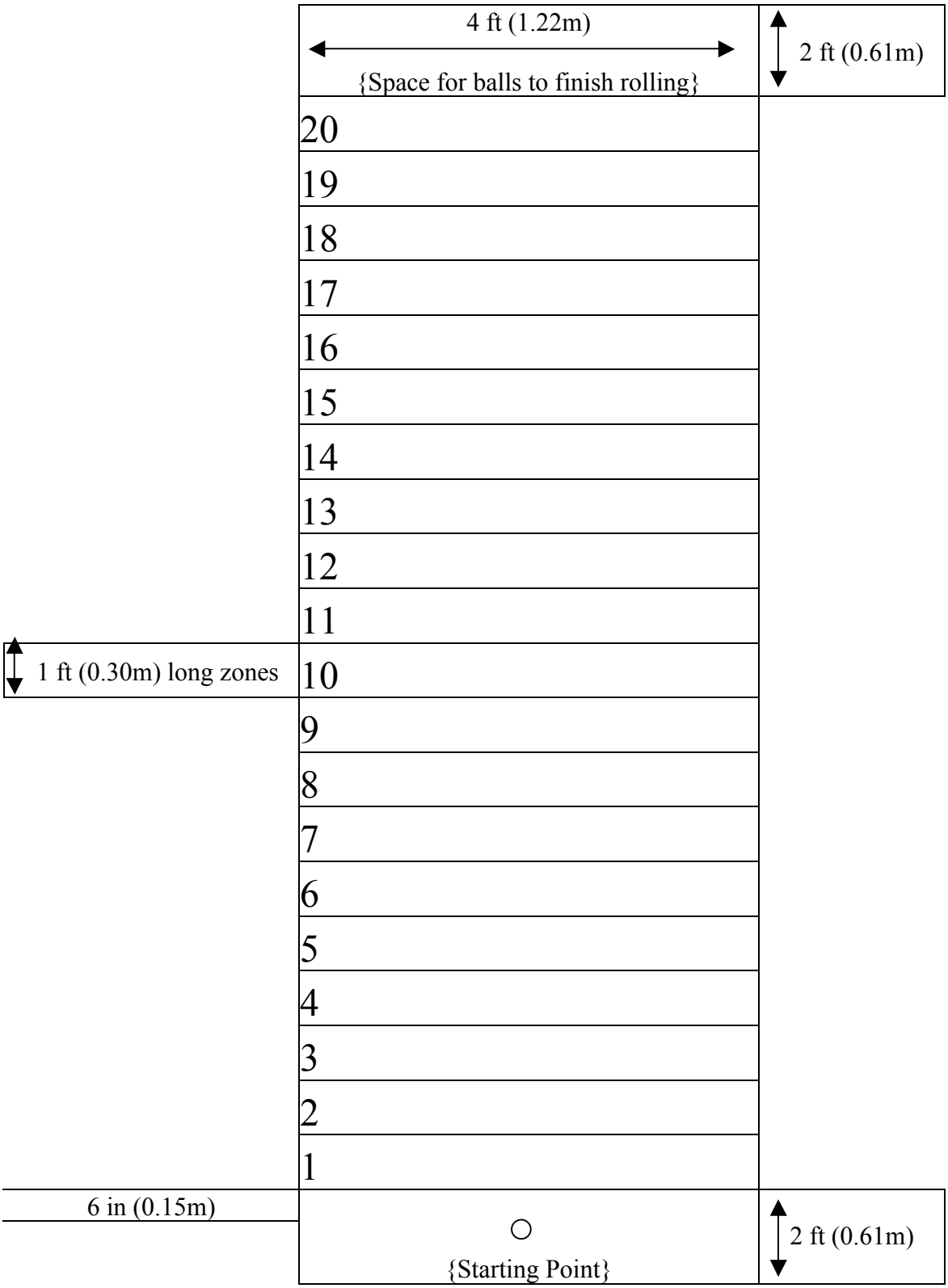


*Figure 1*. Putting surface for Study 1. The figure is not drawn to scale.

putts in the correct target zone. Preparatory and performance efficacy strength scores were obtained for each target by summing across the three items for each target and then dividing by three. The preparatory and performance efficacy measures were identical except for their respective labels and the timing of the measurement.

**Procedures.** After giving consent (Appendix C) and demographic information, participants were given a warm-up session to acquaint themselves with the speed of the putting surface. Twenty practice putts were used during this period. The objective of the task was to putt a ball with the correct pace so that it stopped rolling in the correct target zone. The warm-up procedure required participants to practice putting to each target zone. Zone 20 was the first target, and each successive putt was aimed at the next closest zone until finally the participant took the last practice putt at Zone 1. Following the participant striking each putt, the examiner allowed the putt to stop rolling before collecting the ball. This procedure gave the participant an opportunity to judge the quality of the putt.

Following the warm-up, the examiner determined the participant's efficacy for various length putts. The examiner instructed, "Given a reasonable number of practice putts, how many putts out of five can you correctly land, or properly putt to roll to a stop, in Zone 1?" Following the participant response, the examiner continued by asking the same question for each successive zone. After the participant finally answered that he could only pace one putt out of five to stop in the given zone, the examiner asked, "Which is the farthest zone in which you can correctly pace only one out of five putts?" The target zones were marked in the follow manner: The farthest zone in which the participant indicated he could correctly pace five out of five putts was marked with a poker chip labeled 5. This was the high efficacy

zone. The farthest zone indicated for three out of five putts was marked with a chip labeled 3, indicating the medium efficacy zone. The farthest zone in which the participant indicated he could only pace one out of five putts was marked with a chip labeled 1, indicating the low efficacy zone.

When the markers were in place, the task was standardized for efficacy level. In other words, by allowing the task to vary by distance according to the efficacy level of each participant, it was possible to standardize efficacy so that efficacy levels of five out of five (i.e., high efficacy zone), three out of five (i.e., medium efficacy zone), and one out of five (i.e., low efficacy zone) were achieved for each participant. With the efficacy level standardized, it was possible to use it as an independent variable in the study.

Following the standardization of the efficacy targets, participants were taught the task procedures. An instructional script was used for this purpose. After the instructions were read and questions were answered, participants were given the preparatory efficacy strength scale to complete. After completing the scale, participants were given time to allocate preparatory effort in the form of practice putts at the three targets. Each participant was given the opportunity to take 30 practice putts. This number of putts was chosen based on pilot testing of free choice putting practice for the same task. Given that each putt could only be directed at one target, participants had to choose the target of each practice putt. After participants indicated the target zone for each putt and putted the ball, the examiner charted each attempt and noted whether the ball landed in the correct target zone. Effort was measured according the number of practice putts taken at each zone.

Essentially, participants were faced with a relatively easy putting target (i.e. high efficacy target), a moderately difficult putting target (i.e. medium efficacy target), and a relatively difficult putting target (i.e. low efficacy target), and they had to choose to how to allocate their practice putts. Thus, allocation of effort was observed across difficulty levels to determine whether participants spent most of their effort on tasks for which they had high, medium, or low levels of efficacy beliefs. Practice putts that landed in the correct target zone were recorded as made putts in order to calculate make percentage.

Effort was measured through the allocation procedure rather than a simple sum of free choice putting because it prevented participants from simply treating the practice phase as a warm-up rather than a learning trial in which more practice resulted in greater learning of the pacing task. Further, in athletics, in which coaches largely determine practice activities, athletes are typically faced with a choice of allocating various degrees of effort to the specific coach-chosen activities. When practicing a certain number of repetitions of each activity, athletes must largely self-determine the degree of effort put into each repetition prescribed by the coach. Their only free choice for practice activities and number of repetitions typically exists only outside of prescribed practice times. Thus, through the allocation of effort method, it was possible to observe whether participants tended to put the most effort into high, medium, or low efficacy tasks.

The last practice putt was considered the end of practice phase. Thus, following the 30th practice putt, the performance phase began. First in the performance phase, participants were given the performance efficacy strength scale. When finished with this scale, participants took five performance putts at each zone. All five putts were taken at a single

zone before moving on to the next zone. Zone targets were presented in various, systematically chosen rotations that were randomized to the participant. Randomization was achieved by pre-writing the rotation on the data form then shuffling the forms into a stack with no particular order, similar to a deck of shuffled cards. When participants arrived at the study, the form from the top of the pile was assigned to them; thus, each participant had the same chance of being assigned to any of the orders as it was drawn from the top of the pile. The zone rotations included, 1-5-3, 5-1-3, 3-1-5, and 3-5-1. Zone rotations 1, 3, 5 and 5, 3, 1 were eliminated because of the possibility that the task would be easier in a simple, linear increasing or decreasing sequence of difficulty. Putts were recorded as either in or out of the target zone, and a point was awarded for each putt in the target zone. After finishing the performance putts, participants were debriefed and given the informational pamphlet on confidence in golf (Appendix D).

**Treatment of the data.** Means and standard deviations were determined for the dependent variables. Two other sets of data were calculated from the study data. First, the make percentage was calculated for practice putts that landed in the correct target zone. The make percentage for each target was calculated by dividing the number of practice makes (i.e., the number of practice putts that came to rest in the correct target zone) by the total number of practice putts taken at each target zone. A second calculated variable, efficacy strength change, was calculated by subtracting preparatory efficacy from performance efficacy.

The main dependent variable in the study, the number of practice putts taken at each putting target, was analyzed with a repeated measures ANOVA to determine differences

among the groups. Follow-up paired samples *t*-tests were used to determine significance of differences between each of the groups. Correlation coefficients were calculated in a matrix for the following variables: preparatory efficacy, effort, performance efficacy, performance, and efficacy change. Polynomial regression analyses were calculated for effort and preparatory efficacy to determine if the data were significant for a curvilinear relationship for the main variables under study. ANOVA was also used to rule out order effects on performance.

Consistent with the effect size recommendations offered by Bond, Wiitala, and Richar (2003), when data are easily understood, raw mean differences are the preferred metric to effect size. In this case, the mean differences between average putts in each condition seem to be easily understood. Therefore, mean differences were chosen as the metric for describing the magnitude of preparatory efficacy's effect on effort. An additional effect size metric [ES = (*M*1-*M*2)/pooled *SD*] will be used for ease of comparison to previous and future research.

**Results**

**Manipulation check.** Table 1 contains *M* and *SD* data for preparatory efficacy strength, performance efficacy strength, and performance. The study design required that participants perceive three targets of distinct difficulty, and participant self-efficacy strengths and performance data confirmed this manipulation check.

Mean preparatory efficacy strengths were lowest at the low efficacy target, moderate at the medium efficacy target, and highest at the high efficacy target. Mauchly's Test of Sphericity, $W = .89, \chi^2 (2) = 2.69, p = .261$, was not significant. Results of the ANOVA, $F(2,46) = 90.77, p < .001$, were significant. Paired *t*-tests indicated significant differences

Table 1

*Means and Standard Deviations for Preparatory Efficacy, Performance Efficacy, and Performance at Each Target*

| | | Efficacy | | | | | |
|---|---|---|---|---|---|---|---|
| | | Preparatory | | Performance | | Performance | |
| Target | *n* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| High Efficacy | 24 | 8.3 | 1.7 | 8.2 | 1.5 | 4.2 | 1.1 |
| Medium Efficacy | 24 | 5.9 | 1.2 | 5.8 | 1.4 | 2.7 | 1.2 |
| Low Efficacy | 24 | 4.1 | 1.0 | 3.6 | 1.2 | 1.1 | 0.9 |

between the high and medium efficacy conditions, $t(23) = 7.75, p < .001$, the high and low efficacy conditions, $t(23) = 11.72, p < .001$, and the medium and low efficacy conditions, $t(23) = 6.86, p < .001$.

In comparison to preparatory efficacy beliefs, performance efficacy strengths were slightly lower at each target but followed the general pattern. Significance test results were similar to those of preparatory efficacy. Mauchly's Test of Sphericity, $W = .94, \chi^2 (2) = 1.38, p = .502$, was not significant. ANOVA results, $F(2, 46) = 93.30, p < .001$, were significant. Paired t-tests indicated significant differences between the high and medium efficacy conditions, $t(23) = 7.62, p < .001$, the high and low efficacy conditions, $t(23) = 12.23, p < .001$, and the medium and low efficacy conditions, $t(23) = 6.96, p < .001$. Average efficacy change from preparation to performance was not significant, $F(2, 46) = 0.60, p = .555$.

Absolute performance was best at the high efficacy target, moderate at the medium efficacy target, and worst at the low efficacy target. Mauchly's Test of Sphericity, $W = .94$, $\chi^2 (2) = 1.32, p = .517$, was not significant. ANOVA results, $F(2, 46) = 54.81, p < .001$, were significant. Paired t-tests (Table 2) indicated significant differences between the high and medium efficacy conditions, $t (23) = 5.09, p < .001$, the high and low efficacy conditions, $t (23) = 9.53, p < .001$, and the medium and low efficacy conditions, $t(23) = 6.05, p < .001$. ANOVA results, $F(3, 19) = 0.29, p = .83$, indicated no significant order effect on performance.

**Hypothesis 1.** Hypothesis 1 stated: The low efficacy condition, representing the highest sense of doubt, would lead to the highest preparatory effort (i.e., greatest number of practice putts). The medium efficacy condition, representing a moderate level of doubt, would lead to the second highest preparatory effort. The high efficacy condition, representing the least doubt, would lead to the lowest preparatory effort. Thus, an inverse relationship would be observed between preparatory efficacy level and effort.

Effort data are listed in Table 2. Repeated measures ANOVA results, $F(2, 46) = 10.50$, $p < .001$, revealed significant differences between the targets. Mauchly's Test of Sphericity, $W = .49, \chi^2(2) = 15.52, p < .001$, was significant; however, results of Greenhouse-Geisser, $F(1.33, 30.53) = 10.50, p = .001$, and Huynh-Feldt, $F(1.38, 31.68) = 10.50, p = .001$, corrections remained highly significant. Paired *t*-tests indicated significant differences between the low and high efficacy targets $t(23) = 4.24, p < .001$, and the medium and high efficacy targets $t(23) = 4.28, p < .001$. The difference between the low and medium efficacy targets was not significant, $t(23) = 1.76, p = .092$. Thus, the high efficacy condition resulted in significant less practice effort ($M = 6.5$ practice putts, $SD = 3.0$) compared to the low and medium efficacy targets.

Regarding effect size recommendations for data that are easily understood as simple raw scores differences (Bond, Wiitala, & Richar, 2003), on average, out of 30 putts, participants putted 6.9 more balls at the low efficacy target than they did at the high efficacy target. Thus, on average, participants took more than twice as many putts at the low efficacy target than at the high efficacy target. Only four participants took more putts at the high efficacy target than at the low efficacy target. Participants took 3.3 more putts at the low

Table 2

*Means and Standard Deviations for Effort at Each Target*

| | Effort | | |
|---|---|---|---|
| Target | *n* | *M* | *SD* |
| High Efficacy | 24 | 6.5 | 3.0 |
| Medium Efficacy | 24 | 10.1 | 3.9 |
| Low Efficacy | 24 | 13.4 | 5.5 |

efficacy condition compared to the medium efficacy target. Finally, participants took an average of 3.6 more putts at the medium efficacy target than at the high efficacy targets.

An additional measure of effect size [ES = (*M*1-*M*2)/pooled *SD*] indicates large meaningful differences between all targets. The difference between the low and high efficacy targets obtained the largest effect size, ES = 1.67, followed by the difference between the medium and high efficacy targets, ES = 0.87, and the difference between the low and medium efficacy targets, ES = .80.

**Hypothesis 2.** Hypothesis 2 stated: Low effort at the high efficacy target will lead to worse than expected performance. Higher effort at the medium and low effort targets will yield performance within sampling error of expectations. As suggested in this hypothesis, the performance for each target is most meaningful in the context of the predicted level of success for each target (i.e., putts that came to rest in the correct target zone). It will be recalled that the predicted level of success for the low, medium, and high efficacy targets were one made putt, three made putts, and five made putts respectively. In comparison to expected performance at each target, the greatest average difference between obtained and expected values occurred at the high efficacy target, where participants underperformed by an average of 0.8 putts ($M$ = - 0.8, $SD$ = 1.1). The next largest difference occurred at the medium efficacy target, where participants underperformed by 0.3 putts on average ($M$ = - 0.3, $SD$ = 1.2). At the low efficacy target, participants over-performed in comparison to expectations by an average of 0.1 putts ($M$ = 0.1, $SD$ = 0.9). ANOVA results were significant, $F(2, 46) = 4.86$, $p = .012$, indicating significant differences in performance respective to expectations at the various targets. Mauchly's Test of Sphericity, W = .94, $\chi^2$ (2) = 1.32, $p = .517$, was not

significant. One-sample *t*-tests indicated that the differences in observed minus expected putts in the target zone were significantly different from 0.0 at only the high efficacy target, $t(23) = -3.65, p = .001$. Observed minus expected putts in the target zone were not significant at either the medium efficacy target, $t(23) = -1.16, p = .258$ or low efficacy target $t(23) = -0.68, p = .503$. Thus, Hypothesis 2 was supported.

**Hypothesis 3.** Hypothesis 3 stated: Performance efficacy strength would be related to performance. Obtained correlations for performance efficacy strength and performance were significant in only the medium efficacy target, medium efficacy target ($r = .41, p = .046$). Correlations between preparatory efficacy and performance were not significant at either the low efficacy target ($r = .09, p = .680$) or the high efficacy target ($r = .17, p = .420$). Thus, Hypothesis 3 was significant for the relationship between performance efficacy and performance only at the medium efficacy target.

An exploratory analysis was performed to determine correlations between preparatory efficacy-performance at the three targets. No significant correlations were obtained for preparatory efficacy strength and performance: low efficacy target ($r = .19, p = .367$), medium efficacy target ($r = .23, p = .271$), and high efficacy target ($r = .06, p = .781$).

**Hypothesis 4.** Hypothesis 4 stated: Feedback regarding capabilities (i.e., make percentage, or the percentage of putts that land in the correct target zone during preparation) would be positively related to efficacy change from the preparation phase to performance phase. Practice putt make percentage was highest at the high efficacy target ($M = 0.65, SD = 0.26$), decreased at the medium efficacy target ($M = 0.52, SD = 0.24$), and decreased further at the low efficacy target ($M = 0.19, SD = 0.15$). Mauchly's Test of Sphericity, $W = .98, \chi^2$ (2)

= .45, $p$ = .798, was not significant. ANOVA results, $F(2, 46) = 26.71$, $p < .001$, were significant. Paired t-tests indicated significant differences between the high and low efficacy conditions, $t(23) = 7.20$, $p < .001$, and the medium and low efficacy conditions, $t(23) = 5.34$, $p < .001$, but not between the high and medium efficacy conditions, $t(23) = 1.93$, $p = .066$.

Correlation coefficients between make percentage and efficacy strength change were positive only at the high efficacy target: high efficacy target ($r = .59$, $p = .002$), medium efficacy target ($r = .26$, $p = .220$), and low efficacy target ($r = .09$, $p = .683$). Thus, results supported Hypothesis 4 at only the high efficacy target.

**Hypothesis 5.** Hypothesis 5 stated: Practice make percentage for each target would be negatively related to effort in that target zone. This hypothesis was significant at only the medium efficacy target ($r = -.61$, $p = .002$). The high efficacy target ($r = -.07$, $p = .764$) and the low efficacy target ($r = -.16$, $p = .451$) were not significant for this hypothesis. Therefore, practice make percentage was negatively related to effort only at the medium target.

**Exploratory analyses.** Given that the increases in effort from the high preparatory efficacy condition through the low preparatory efficacy condition appeared to be linear, a linear contrast ANOVA was performed to test the data for a significant linear effect. The linear effect was indeed significant, $F(1,69) = 31.45$, $p < .001$, while the deviation from linear was not significant, $F(1, 69) = .031$, $p = .86$. Thus, effort increased in a linear trend from lowest in the high preparatory efficacy condition, to moderate in the medium preparatory efficacy condition, to highest in the low preparatory efficacy condition.

**Discussion**

Consistent with the prediction in Hypothesis 1, participants spent more effort on tasks in which they had some self-doubt than on tasks in which they had more self-assuredness. This finding supports the idea that some doubt is beneficial to preparatory effort toward tasks. Specifically, participants spent significantly more effort at the medium and low efficacy targets than at the high efficacy target. Further, participants spent 3.3 more putts at the low efficacy target than at the medium efficacy target. Although this result did not quite reach significance, the effect size obtained from 3.3 putts may very well be meaningful for applied and future research considerations, ES = 0.80. However, the peaking of effort is consistent with the prediction that preparatory efficacy and effort are related in an inverted-U. At some point in the inverted-U shaped relationship, effort has to peak, and the nonsignficant difference in effort at the medium and low efficacy targets may represent measures near the peak of effort. Past the peak in effort, further decreases in efficacy (i.e., increases in doubt) are predicted to produce lower effort.

Hypothesis 2 was supported. Low effort at the high efficacy target led to significantly worse than expected performance. The same was not true for the medium and low efficacy targets at which participants spent more effort. Thus, consistent with preparatory efficacy tenets proposed by Feltz and Wood (2009), practice effort is important to performance. The results of Hypothesis 2 indicated low effort can have a detrimental impact on performance.

The data provided less clear support for Hypothesis 3. The only significant correlation between efficacy beliefs and performance was obtained at the medium efficacy target. One possible explanation for this finding is that the performance measure did not allow for as

much variance as other procedures for measuring putt quality. For example, although the task of putting to zones provided a task that allowed for participants to state efficacy expectations by level for each target zone, thus allowing the use of efficacy level as non-manipulated independent variable, putting to target zones is not the best indicator of putting performance. For example, while many putts that land outside the target zone miss by several feet, some very good putts that land just inches short of the target zone are still counted as a miss toward the total performance. When evaluating a putt for speed or accuracy, a better measure of putting performance, one that allows for a high degree of variance, would be to measure absolute distance from a small, specific target. Thus, as a consideration for future research, choosing a performance measure with a relatively high degree of possible variance is recommended.

Further, given that participants underperformed in comparison to expectations at the high efficacy target, the lack of a significant self-efficacy-performance correlation is not surprising for the high efficacy target. However, the lack of a significant correlation between self-efficacy and performance at the low efficacy target is not clear.

In regard to Hypothesis 4, make percentages were positively associated with efficacy strength change at only the high efficacy target. Thus, efficacy beliefs may be more resistant to change for more difficult tasks. As evidenced by the obtained correlations between make percentage and efficacy change, it appears that when efficacy is already high, a relatively small amount of feedback, such as practice makes, is capable of influencing efficacy significantly, but this might not be the case when athletes have more doubt about a task. However, when interpreted in light of the significant decrease in self-efficacy strength from

preparation to performance at the high efficacy target, the modest positive relationship between self-efficacy and make percentage may have occurred because efficacy beliefs remained consistent for makes but decreased with misses. Thus, whether efficacy beliefs are more influenced by misses or makes is difficult to determine from the data in Study 1.

Hypothesis 5 stated practice make percentage for each target would be negatively related to effort in that target zone. In other words, the higher the make percentage for a target zone, the less effort that would be given in that zone because makes would lead participants to choose to practice putting at other targets. This finding was not significant at either the high or low efficacy targets but was significant at the medium efficacy target. When practice make percentage was relatively high at the medium efficacy target, it appears that participants decreased effort at that target and the high efficacy target and allocated more effort toward the low efficacy target. In other words, when participants made practice putts at the medium efficacy targets, it appears that effort was then directed away from the medium and high efficacy target practice in favor of practicing the low efficacy target. Practice make percentage at the high efficacy target was also positively, albeit non-significantly, related to practice effort at the low efficacy target.

The effect of make percentage on effort is similar to an idea presented in Bandura and Cervone (1983, 1986): Self-satisfaction matters to effort. The more satisfied one is with the obtained results, the less effort that tends to be put forth in that pursuit. With that in mind, satisfaction appears to be an important consideration for future preparatory efficacy studies. However, in Study 1, satisfaction was not measured directly, only assumed through the proxy measure of make percentage. Given the possible importance of this finding, direct

measurement of satisfaction is recommended for future research studies on preparatory efficacy.

Based on the evidenced obtained, analyzed, and interpreted in Study 1, several suggestions are offered for future research in preparatory efficacy, including Study 2 of this dissertation. First, it appears that some sense of doubt about one's capability to execute a task successfully is beneficial to preparatory effort. This idea needs replication. Second, although there are many ways to quantify performance, one that maximizes the possible variance among participants is recommended. The increased variance should allow for a more accurate measure of performance. Third, self-satisfaction may be an important factor in preparatory effort. Direct measurement of self-satisfaction is an important consideration for future research in preparatory efficacy. Fourth, and lastly, the sample size for Study 1 was relatively small and the sample was relatively homogenous in terms of golf skill level and experience. A larger, more diverse sample size in regard to golf skill level and experience is recommended.

# CHAPTER 4

## Study 2

### Purposes and Hypotheses

The purpose of Study 2 was to replicate the basic task used in Study 1 while improving the study design and measures. In response to both problematic aspects and important findings of Study 1, several notable changes were made from Study 1 to Study 2. First, a larger sample with a broader range of golf experience was recruited in an effort to increase the variance of efficacy beliefs and golf skills. Second, the task was changed from putting to land the ball in a foot-long target to putting to land the ball as close as possible to a small specific target (i.e., a bullseye). The change in the performance measure allowed for a ratio-scale measure of performance in contrast to the more limited interval scale used in Study 1. Thus, differences in the performance measure indicate true proportional differences in actual performance. Third, given that feedback, such as make percentage, was important in Study 1 and other studies of self-efficacy and effort (Bandura & Cervone, 1983, 1986), concentric circles, or target rings, were evenly spaced around the center bullseye target to provide participants with simple visual feedback on the quality of each putt. Along the same line of reasoning, measures of practice putt quality and satisfaction should impact preparation and performance; therefore, measures of practice putt quality and satisfaction were added to Study 2.

The following hypotheses were proposed for Study 2:

1) Participants would spend the most effort (i.e., greatest number of practice putts) at the farthest, low efficacy, target. The effort spent at this target would be significantly greater

than the effort spent at both the medium length target (i.e., medium efficacy target) and the shortest target (i.e., high efficacy target). Furthermore, the effort spent at the medium target would be significantly greater than the effort spent at the shortest, high efficacy, target.

2) Performance efficacy strength would be negatively related to performance at each target (note: negatively related because lower performance numbers indicate better performance).

3) High practice quality would result in increases in self-efficacy and low practice quality would result in decreases in self-efficacy. Given that shorter distances from the target indicate better practice quality, the relationship between efficacy change and practice quality should be negative.

4) High post-practice satisfaction would lead to increases in self-efficacy, and low post-satisfaction would lead to decreases in efficacy. Thus, the relationship between post-practice satisfaction and efficacy change would be positive.

5) Practice putt satisfaction at each target would be negatively related to effort at that target.

## Method

**Participants.** Male participants ($N = 33$) were recruited from a golf training program and a golf league in an Oakland County, MI suburb. In order to recruit a sample of participants with broader putting efficacy ratings relative to Study 1, only 1 year of golf experience was required for participants in Study 2. The average age of participants in Study 2 was 35.0 years ($SD = 6.4$ years) with an average playing experience of 17.4 years ($SD = 6.7$ years). The age range spanned from 18 to 44 years of age. Highest level of competitive

experience included 14 league, 8 high school, 1 college, and 1 local professional competitor. Nine participants indicated having no competitive experience. Eighteen participants indicated a current handicap index ($M$ = - 10.0, $SD$ = 7.2). The handicap indices ranged from +2.2 to -28 (note: positive handicaps indicate higher golf skill, negative handicaps indicate lower golf skill).

**Design.** As with Study 1, Study 2 utilized a single factor model with a repeated measures experimental design. Again, three conditions of the independent variable were created for the study: High efficacy target, medium efficacy target, and low efficacy target. The high efficacy target was the shortest (5 ft, 1.52 m). The medium efficacy target was intermediate (10 ft, 3.05 m), and the low efficacy target was the farthest (15 ft, 4.57 m). Dependent measures of effort were again recorded as the number of practice putts taken at each target. Additional measures included: baseline efficacy strength; preparatory and performance efficacy strength; baseline, practice, and performance putt quality; and baseline, practice, and performance satisfaction.

**Materials.** The golf equipment used for Study 2 was the same blade putter used in Study 1 and Titleist Pro V1 and Pro V1x golf balls. The use of the blade putter allowed both left and right-handed players to use the same putter.

The putting surface was created on Astroturf style indoor-outdoor carpeting. The main putting surface was raised slightly (less than 1 in., 2.54 cm) above the rest of the floor, which was also made out of Astroturf style carpeting. Both surfaces were used in Study 2. The main surface was extremely fast. In other words, balls did not need to be struck with much force in order to roll very easily over the surface. Additionally, to create more difficulty

in the medium and long putts, the starting points to those respective putts were placed on the adjacent slower speed green. The combination of the different speeds and the right to left break created by the raised surface increased the difficulty of the medium and long putts. On the surface, three starting points were marked with small strips of tape, and three bullseye targets were each marked with a 1 in. (2.54 cm) circle. The targets were spaced at 5 ft (1.52 m), 10 ft (3.05 m), and 15 ft (4.57 m) from the respective starting point. Each of the bullseye targets was surrounded by four concentric circles that served as outer targets. The bullseye was the center of the circles, and respectively, the outer target circles were 1 ft (0.30 m), 2 ft (0.61 m), 3 ft (0.91 m), and 4 ft (1.22 m) in diameter; therefore, the outer target circles indicated points 6 in. (0.18 m), 1 ft (0.37m), 1 ft 6 in. (0.46 m), and 2 ft (0.61 m) from the center of the bullseye targets. A diagram of the putting surface is depicted in Figure 2.

**Measures.**

***Effort.*** Effort was the main variable being studied. It was measured as the total number of practice putts for each target.

***Performance.*** Performance was defined as the distance of each putt from its intended target. The baseline and competitive performance scores were defined as the sum of the distances of the putts from the target. Separate performance scores were calculated for each target as well as the total for all 15 putts in both the baseline and performance phases of the study. Practice putt quality was measured in the same way as performance.

Several scales were used to measure the other study variables. Descriptions of scale items and construction follow in the sections below. All scale items were constructed on an

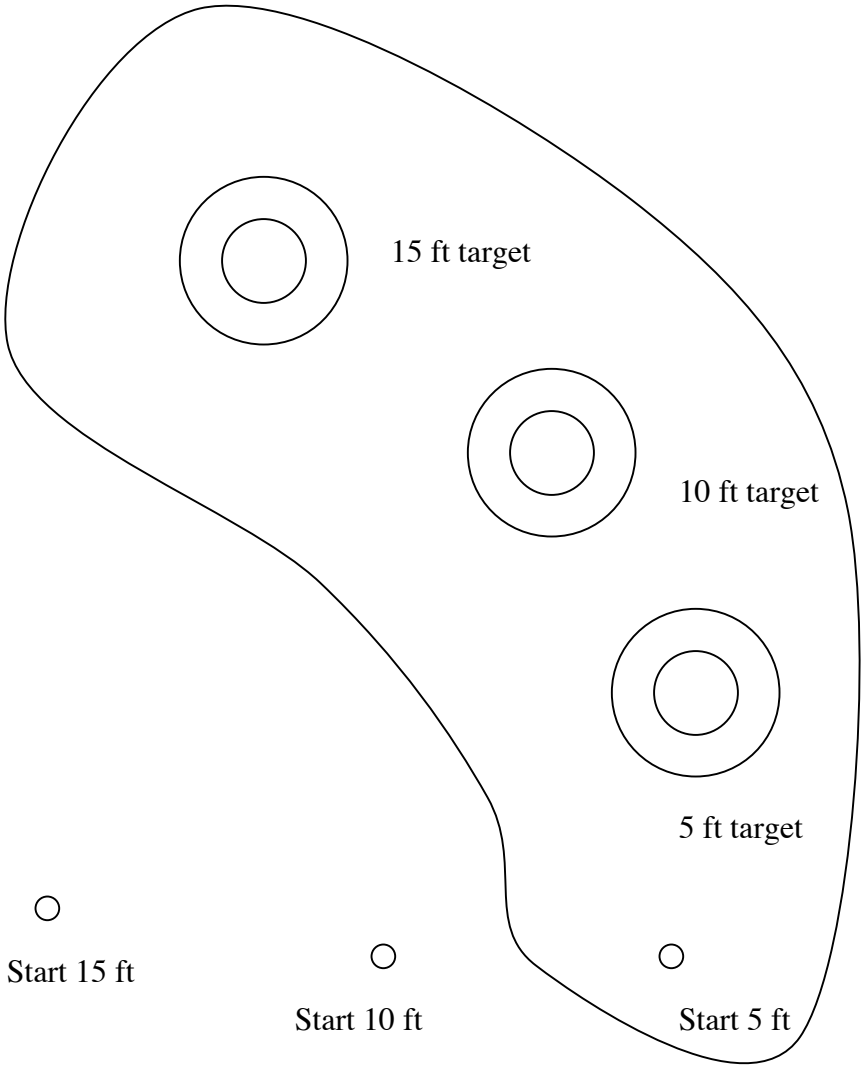


*Figure 2*. Putting surface for Study 2. The figure is not drawn to scale. Not all concentric target rings are shown.

11-point format with 0 being the lowest response option and 10 being the highest response option. Scale anchors are noted below.

***Baseline efficacy scale***. The baseline efficacy scale (Appendix E) was constructed to obtain baseline information regarding a participant's efficacy for controlling putting speed (i.e., distance) and accuracy (i.e., accuracy left to right). Efficacy judgments were rated for both speed and accuracy for each of the target lengths. Baseline self-efficacy scale anchors were: Complete Uncertainty, Moderate Certainty, and Complete Certainty.

An additional baseline efficacy scale (Appendix F) was created to assess participant efficacy for general putting skill. The scale required participants to make an efficacy judgment on the following statement: "I can putt as skillfully as." The response anchors were: a beginner 20+ Handicap Amateur, 20-10 Handicap Amateur, 9-0 or + Handicap Amateur, and Pro Golfer.

***Preparatory and performance efficacy strength scales***. The preparatory (Appendix G) and performance efficacy (Appendix H) scales were identical, differing only in time of measurement. The efficacy scales required participants to rate efficacy beliefs regarding ability to land putts within a specified distance of the target. For each target, participants ranked efficacy strength for being able to obtain an average putt length within 2 ft, 1 ft 6 in., 1 ft, and 6 in. of the target. Responses to the four items were summed to obtain an efficacy strength score for each target. Preparatory and performance efficacy scale anchors were: Complete Uncertainty, Moderate Certainty, and Complete Certainty.

***Satisfaction***. Satisfaction with performance was measured with the same scale at three different points in the study: after baseline performance, after practice, and following

practice. The scales were labeled according to their timing in the study, Baseline Putting Satisfaction (Appendix I), Practice Putting Satisfaction (Appendix J), and Performance Putting Satisfaction (Appendix K). The respective scales assessed participant satisfaction with putting performance in regard to speed, accuracy, and overall baseline performance. Response anchors were: Not At All Satisfied, Moderately Satisfied, and Completely Satisfied. The scores were summed and divided by three to obtain a single satisfaction score. Another set of questions, used only following the baseline putts, required participants to rate anticipated satisfaction if practice effort resulted in no improvement in performance from baseline. A sample question was stated, "I will be satisfied if my performance is equal to (but does not exceed) my baseline putts at the 5 ft target." The same anchors were used for the anticipated satisfaction scale.

Additionally, in the practice phase of the competition, participants rated satisfaction with each practice putt (Appendix L). The rating scale used the same point system and anchors as the other satisfaction scale. Participants responded privately to the prompt: "Rate your satisfaction with the quality of your putt." The items on the scale were numbered from 1 to 30 to correspond with each practice putt. Items were summed and divided by the number of practice putts taken at the respective target to obtain a mean practice satisfaction rating for each target. Response anchors were: Not At All Satisfied, Moderately Satisfied, and Completely Satisfied.

**Procedures.** Consent (Appendix M) and demographic information were gathered at the beginning of the study. As incentive, participants were informed that the top four performers in the contest would receive $25 gift certificates to a local golf store. The

objective of the putting contest was then explained: to get the putted balls to land as close to the bullseye target as possible. Additionally, it was noted that good competitive performances avoided bad putts near or over 100 cm from the target. Following the general explanation of the task, the sequence of putting stages (i.e., baseline, practice, and competitive performance), starting points, targets, and concentric outer targets were explained.

To begin, participants completed the baseline putting efficacy scales. After completing the scales, participants took five baseline putts at each target. Participants took all five putts at each target in a row, first at the 5 ft target followed by the 10 ft and 15 ft targets. The same order was followed with all baseline and competitive performance putts. Each putt was measured to the nearest tenth of a centimeter. The measurements were spoken aloud to provide feedback on putt quality. Additionally, the concentric target circles provided visual feedback of putt quality. The distance of the putts from each target were summed and divided by five to obtain an average for each target, and all 15 distances were summed and divided by 15 to obtain a total score.

Following the baseline putts, participants completed the baseline satisfaction and preparatory efficacy scales. After completing the scales, participants took 30 free choice putts at the three targets similar to the procedure in Study 1. However, unlike in Study 1, the examiner directly assessed practice putt quality by measuring the distance of each practice putt from the target, and participants privately recorded a satisfaction rating following each putt. The distances were announced to the participants, and the outer target circles allowed for simple visual feedback on the closeness, or quality, of the putt in relation to its intended

target. As in Study 1, the number of practice putts at each target was recorded as a measure of effort at each target.

When participants finished putting all 30 practice putts, the examiner announced that the practice phase had ended and the competitive performance phase had begun. Participants then took the performance efficacy and the post-practice satisfaction scales. After finishing the scales, participants took five performance putts at each target. The same order and measurement procedures used in the baseline were used for the competitive putts. Before being debriefed (Appendix N) and ending the study, participants completed the performance satisfaction scale.

**Results**

**Manipulation check.** In general, efficacy data indicated that the participants perceived the three targets to be of different difficulties, and performance data substantiated these perceptions. Results are listed in Table 3. Preparatory and performance efficacy strengths were highest, and baseline and competitive performance were best at the high efficacy target (i.e., the 5ft target). At the medium efficacy target (i.e., 10ft target), preparatory and performance efficacy strengths were moderate, and baseline and competitive performance were also moderate. Preparatory and performance efficacy were lowest, and baseline and competitive performance were worst at the low efficacy target (i.e., the 15ft target).

ANOVA analyses indicated significant differences among preparatory efficacy strengths, $F(2, 64), = 150.50, p < .001$, performance efficacy strengths, $(2, 64), = 104.89, p < .001$, baseline performance, $F(2, 64), = 50.28, p < .001$, and competitive performance,

Table 3

*Efficacy, Performance, and Effort Data by Target*

| | Targets | | | | | |
|---|---|---|---|---|---|---|
| | High Efficacy | | Medium Efficacy | | Low Efficacy | |
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Preparatory Efficacy | 7.4 | 1.4 | 5.6 | 1.7 | 4.3 | 1.7 |
| Performance Efficacy | 7.3 | 1.7 | 4.8 | 1.7 | 3.8 | 2.0 |
| Baseline Performance | 25.9 | 8.8 | 59.7 | 18.4 | 73.8 | 25.5 |
| Competitive Performance | 20.2 | 7.3 | 49.2 | 19.5 | 66.0 | 22.5 |
| Practice Effort | 7.4 | 2.5 | 10.9 | 2.7 | 11.7 | 3.5 |

$F(2, 64), = 63.99, p < .001$. Although Mauchly's Test of Sphericity revealed violations for each of these variables, $p$ values were unchanged after Greenhouse-Geisser and Huynh-Feldt corrections.

Post-hoc $t$-tests were used to evaluate specific differences between the targets. Within preparatory efficacy, $t$-tests revealed significant differences between preparatory efficacy strengths at the high efficacy and medium efficacy targets, $t(32) = 12.06, p < .001$, the high efficacy and low efficacy targets, $t(32) = 14.12, p < .001$, and the medium efficacy and low efficacy targets, $t(32) = 7.87, p < .001$. $T$-tests indicated significant differences between performance efficacy strengths for the high and medium efficacy targets, $t(32) = 10.50, p < .001$, the high and low efficacy targets, $t(32) = 11.56, p < .001$, and the medium and low efficacy targets, $t(32) = 5.01, p < .001$.

$T$-tests indicated significant differences between baseline putting performances at the high and medium efficacy targets, $t(32) = -9.39, p < .001$, the high and low efficacy targets, $t(32) = -9.43, p < .001$, and the medium and low efficacy targets, $t(32) = -2.43, p = .021$. Similar significant differences were found for competitive performance at the high and medium efficacy targets, $t(32) = -7.93, p < .001$, the high and low efficacy targets, $t(32) = -10.96, p < .001$, and the medium and low efficacy targets, $t(32) = -3.81, p = .001$.

From the preparatory stage to performance, efficacy beliefs deceased yet competitive performance improved. Significant efficacy decreases were found between preparatory and performance efficacy at the medium, $t(32) = 3.11, p = .004$, and low efficacy targets, $t(32) = 2.33, p = .026$, but not at the high efficacy target, $t(32) = .833, p = .411$. Significant improvements in competitive performance from baseline were found at the high efficacy

target, $t(32) = -2.75$, $p = .010$, and medium efficacy target, $t(32) = -2.22$, $p = .033$, but not at the low efficacy target, $t(32) = -1.51$, $p = .142$.

**Hypotheses.**

***Hypothesis 1.*** Hypothesis 1 stated: Participants would spend the most effort (i.e., greatest number of practice putts) at the farthest, low efficacy, target. The effort spent at this target would be significantly greater than the effort spent at both the medium length, moderate efficacy, target and the shortest, high efficacy, target. Furthermore, the effort spent at the medium target would be significantly greater than the effort spent at the shortest, high efficacy, target. Effort results are listed along with efficacy and performance data in Table 3.

Repeated measures ANOVA results showed significant differences in effort at the three targets, $F(2) = 13.32$, $p < .001$, Although Mauchly's Test of Sphericity, $W = .82$, $\chi^2(2) = 6.17$, $p = .046$, was significant, Greenhouse-Geisser, $F(1.69, 54.22) = 13.32$, $p < .001$, and Huynh-Feldt, $F(1.78, 56.93) = 13.32$, $p < .001$, corrections remained significant at the same level. As hypothesized, effort was significantly lower at the high efficacy target compared to the medium, $t(32) = -5.13$, $p < .001$, and low efficacy targets, $t(32) = -4.58$, $p < .001$. However, effort was not significantly different between the medium and low efficacy targets, $t(32) = -.84$, $p = .406$.

Using a simple effect size calculation, [ES = ($M1$ - $M2$)/pooled $SD$], the largest effect size for effort occurred between the low and high efficacy targets, ES = 1.5, and the second largest effect size occurred between the medium and high efficacy targets, ES = 1.2, both of which were large effects. The lowest effect size occurred between the low and medium efficacy targets, ES = 0.3.

***Hypothesis 2.*** Hypothesis 2 stated: Performance efficacy strength would be negatively related to performance at each target (note: negatively related because lower performance numbers indicate better performance). Correlations between performance efficacy and performance follow for the respective targets: high efficacy target ($r$ = -.32, $p$ = .068), medium efficacy target ($r$ = -.46, $p$ = .006), and low efficacy target ($r$ = -.22, $p$ = .217). As composite scores, performance efficacy was moderately correlated with overall performance ($r$ = -.35, $p$ = .042). Regarding the hypothesis, significant relationships were found for only the medium efficacy target and the composite.

***Hypothesis 3.*** Hypothesis 3 stated: High practice quality would result in increases in self-efficacy and low practice quality would result in decreases in self-efficacy. Given that shorter distances from the target indicate better practice quality, the relationship between efficacy change and practice quality should be negative. Indeed, efficacy change from the preparatory to performance stage was moderately and negatively related to practice putt quality at each target. The relationship was strongest at the high efficacy target ($r$ = -.53, $p$ = .001) followed by the low efficacy ($r$ = -.43, $p$ = .014) target and the medium efficacy target ($r$ = -.40, $p$ = .023). Considering all targets, the correlation between efficacy change and practice putt quality was -.47 ($p$ = .005). Thus, the better the practice putt quality, the more efficacy increased from the preparation stage to the performance stage.

***Hypothesis 4***. Hypothesis 4 stated: High post-practice satisfaction would lead to increases in self-efficacy, and low post-satisfaction would lead to decreases in efficacy. Thus, the relationship between post-practice satisfaction and efficacy change would be positive. The correlations between efficacy change and post-practice satisfaction were significant at the

medium efficacy target ($r$ = .63; $p$ < .001) and the low efficacy target ($r$ = .42; $p$ = .015). The relationship between efficacy change and post-practice satisfaction obtained a moderate correlation but failed to reach significance at the 5ft target ($r$ = .34; $p$ = .056). Thus, the fourth hypothesis was supported at the medium and low efficacy targets.

***Hypothesis 5***. Hypothesis 5 stated: Practice putt satisfaction at each target would be negatively related to effort at that target. Effort was moderately, negatively related to satisfaction at the low efficacy target ($r$ = -.36; $p$ = .042). In contrast, a weak negative effort-satisfaction correlation was obtained in the medium efficacy condition ($r$ = -.10; $p$ = .594). The correlation between effort and satisfaction was weak and positive for the high efficacy target ($r$ = .07; $p$ = .703). Therefore, the results of Study 2 only support Hypothesis 5 at the low efficacy target.

**Exploratory effort analyses.** Grouping practice trials into six blocks of five across all 30 practice putts, the mean frequency and standard deviations of putts at high, medium, and low efficacy targets is presented in Table 4. Effort at each target over the six blocks revealed a significant interaction, $F$ (10, 320) = 3.27, $p$ < .001. Mauchly's Test of Sphericity, $W$ = .01, $\chi^2$ (54) = 136.83, $p$ < .001, was significant, but Greenhouse-Geisser, $F$(4.99, 159.52) = 3.27, $p$ < .008, and Huynh-Feldt, $F$(6.02, 192.49) = 3.27, p < .004, corrections remained significant. As seen in Table 4, high efficacy target putts were relatively frequent initially, decreased in the middle blocks, and increased again in the later blocks, resembling a U shape. A substantial difference was found across blocks, $F$(5, 160) = 5.23, $p$ < .001, $\eta^2$ = .13, and subsequent analysis indicated that the shape of this function was quadratic, $F$(1,32) = 19.65, $p$ < .001,

Table 4

*Putt Frequency as a Function of Distance and Block*

| Target | Block | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| 15 | 1.91 | 2.28 | 2.06 | 2.36 | 2.45 | 2.11 | 1.64 | 2.04 | 1.64 | 2.21 | 2.03 | 1.81 |
| 10 | 0.94 | 1.69 | 1.94 | 2.30 | 1.91 | 1.94 | 3.06 | 2.12 | 2.03 | 1.94 | 1.00 | 1.09 |
| 5 | 2.15 | 2.28 | 1.00 | 1.82 | 0.64 | 1.39 | 0.30 | 0.92 | 1.33 | 1.74 | 1.97 | 1.90 |

$\eta^2$=.13. Moreover, the deviation from the quadratic function was trivial, $F(4, 128) = <1.00$, $ns, \eta^2 = .01$.

From Table 4, medium efficacy target putts were relatively infrequent in the early trials, increased markedly in the middle blocks, and decreased to initial levels in the later trials, resembling an inverted U shape. A substantial difference was found across blocks, $F(5, 160)=5.00, p < .001, \eta^2=.13$, and subsequent analysis indicated that the shape of the function was quadratic, $F(1,32) = 18.95, p < .001, \eta^2 = .10$. Moreover, the deviation from the quadratic function was trivial, $F(4, 128) = 1.38, ns, \eta^2 = .03$.

From Table 4, it also appears that the frequency of low efficacy target putts was relatively uniform across blocks. Indeed, subsequent analyses were consistent with this conjecture, $F(5, 160) = < 1.00, ns, \eta^2 = .02$.

Given the theory and hypotheses tested in this study, relatively consistent effort at the low efficacy target was not unexpected; however, the inverted U shape of effort at the medium efficacy target and the U shape of effort at the high efficacy target were not expected. In Block 1, participants took significantly more putts at the high efficacy target than at the medium efficacy target, $t (32) = 2.11, p = .043$. Participants also took more putts at the high efficacy target than at the medium efficacy target in Block 6, $t (32) = 2.22, p = .033$.

In the middle blocks, as the U shapes diverged with more putts taken at the medium efficacy target than at the high efficacy target, the differences bordered on significance in

Block 2, t (32) = -1.579, p = .124, and Block 5, *t* (32) = -1.35, *p* = .186. In the middle blocks, at the troughs of the U shapes, significantly more putts were taken at the medium efficacy target than at the high efficacy target during Block 3, *t* (32) = -2.77, *p* = .009, and block 4, *t* (32) = -6.21, *p* < .001.

Further, as with Study 1, a linear effect for effort was tested, and also similar to Study 1, the effect was significant. The linear effect was significant, F(1, 69) = 16.03, p < .001, while the deviation from linear was not, F(28, 69) = 1.24, p = .24. Again the effect was lowest in high preparatory efficacy condition, moderate in the medium preparatory efficacy condition, and highest in the low preparatory efficacy condition.

**Discussion**

Effort results support only part of the main hypothesis, Hypothesis 1. Effort at the medium and low efficacy targets were both significantly greater than effort at the high efficacy target and had large effect sizes. Thus, the basic premise of this dissertation was supported: Some self-doubt was beneficial to preparation. However, efforts at the low and medium efficacy targets were not significantly different. A small effect size of 0.3 was obtained for the difference in effort at these two targets. Thus, higher levels of doubt may not always lead to significantly greater preparatory effort, which fits with Feltz and Wood's (2009) conjecture that preparatory efficacy and effort are related in an inverted-U. If the nature of the relationship between efficacy beliefs and effort is indeed an inverted-U, effort has to peak at some point. The non-significant difference between effort at the medium and low efficacy targets in this study may be a manifestation of this peak.

A similar result was obtained in Study 1 in that effort was not significantly different at the medium and low efficacy target zones. Despite this lack of significance, the effect size between effort at the medium and low efficacy targets in Study 1 was 0.8. Although effort differences between the medium and low efficacy target were not significant in either study, the difference in effort ES may be related to the difficulty of the medium target in comparison to the low efficacy target. In Study 1, the difference in self-efficacy strength between the low and medium efficacy targets was 1.8 for preparatory efficacy strength and 2.2 for performance efficacy strength. In contrast, in Study 2, the self-efficacy strength differences between the low and medium efficacy targets were 1.3 for preparatory efficacy strength and 1.0 for performance efficacy strength. This finding is consistent with the conjecture that increased task difficulty raises self-doubt, which increases preparatory effort. In other words, when two tasks differ in difficulty, as evidence by self-efficacy measures, discrepancies in allocated effort are likely to be commensurate to the discrepancies in difficulty. Further research is needed to determine the exact shape of the relationship between preparatory efficacy and effort.

Hypothesis 2 was only partially supported. Performance efficacy was significantly correlated with performance only at the medium efficacy target. When the same result was obtained in Study 1, it was attributed to a design artifact caused by interval scale practice quality and performance measures. The improved practice quality and performance measures improved the performance efficacy-performance correlations at each target in Study 2, but as stated above, only the medium efficacy target correlation reached significance. In the context of the limitations of self-efficacy theory (Bandura, 1997), the result is consistent with the

theory. The lack of significant performance efficacy-performance correlations at the high and low efficacy targets should be expected when the design of the study is considered in the context of self-efficacy theory, and it reveals the importance of preparatory efficacy.

The correlation between performance efficacy and performance likely fails to reach significance at the high efficacy target because individuals need the proper motivation and familiarity with the task to perform at their best (Bandura, 1997). As evidenced in Study 1, low preparatory effort at an easy task can be a detriment to performance. Thus, the low correlation between performance efficacy and performance at the high efficacy target was likely related to worse than expected performance, which was at least partly caused by low preparatory effort.

At the low efficacy target, performance efficacy is lowest and self-doubt is highest. As Bandura (1997) cautioned regarding doubt, doubt should be eliminated to the fullest extent prior to performance. Although effort was high at the low efficacy target, participants were only allowed limited practice, and at the end of the preparation phase (i.e., the beginning of performance), participants were still filled with self-doubt for executing the putting task at the low efficacy target, as evidenced by performance efficacy strengths. According to self-efficacy theory (Bandura, 1997, Feltz et al., 2008), the high doubt affected performance, again resulting in worse than expected performance. Thus, the lack of a significant performance efficacy-performance correlation at the low efficacy target serves as a reminder that although doubt is beneficial to preparatory effort, it is detrimental to performance.

At the medium efficacy target, a salutary combination of preparatory effort and self-assuredness resulted in a significant performance efficacy-performance correlation. It was at

the medium efficacy that the concept of preparatory efficacy is optimized, but it takes all three targets to illustrate why both preparatory effort and absence of doubt at the time of performance are important to performance.

The astute critic could argue that performance efficacy and performance should be significantly correlated at each target regardless of underperformance caused by doubt or low effort. After all, individuals with high efficacy beliefs should underperform less than those with low efficacy beliefs. This argument is not without merit, but it ignores the particular design of Study 2 and the impact of effort and doubt across efficacy levels. To the point that efficacy beliefs should related to performance across all targets, the composite performance efficacy-performance correlation was significant, -.35, $p = .042$. Further supporting this notion, the correlation between the 1-item baseline efficacy measure and performance was -.43, $p = .013$. However, the correlations between self-efficacy and composite performance does not imply or prevent different strengths of relationship from occurring at different points along the self-efficacy-performance continuum. The differentiation of the self-efficacy-performance relationship into targets of differential difficulty helps emphasize the differential relationships along the continuum.

The important implication of Hypothesis 2 is this: Athletes are not likely to perform to their expectations after giving a low practice effort or when filled with doubt at the time of performance. Athletes are most likely to perform up to their expectations when the combination of preparatory effort and self-efficacy are optimal. This optimal point is likely to occur at a moderate level of self-efficacy.

Regarding Hypothesis 3, efficacy change was significantly negatively related to practice putt quality at each target. Thus, efficacy increased when practice putt quality was relatively high. This finding is consistent with the preparatory efficacy proposition that efficacy should increase from preparation to performance when practice quality is high and efficacy enhancing information is readily available and vice versa.

Similar to the results for the previous hypothesis, results for Hypothesis 4 indicate that efficacy change was significantly related to post practice satisfaction with practice putt quality at the medium and low efficacy targets. Furthermore, it narrowly missed reaching significance at the high efficacy target. Thus, similar to the results for Hypothesis 3 in which efficacy change was significant related to practice putt quality, efficacy change was significantly related to practice putt satisfaction for two out of three targets.

Results for Hypothesis 5 were not as clear. Practice putt satisfaction was negatively related to effort at only the low efficacy target. Considering that the effort measure in this experiment was based on allocation of effort, in which case effort measures at each target are not completely independent of each other, and considering that some participants likely never reached satisfaction with the practice putting at any of the targets, perhaps it was very unlikely that a significant result would have been obtained for Hypothesis 5.

Ultimately, the lack of support for Hypothesis 5 led to some interesting exploratory analyses. In Study 2, participants seem to have been motivated to putt more at the more difficult targets, the medium and low efficacy targets. Further, the pattern of putts across the preparation phase indicates that participants tended to putt relatively consistently at the low efficacy target across the preparation phase, but they putted inconsistently at the medium

efficacy target across the preparation phase. More specifically, participants putted at the medium efficacy target in an inverted-U pattern across the preparation phase, with fewer putts being taken in the early and late blocks of putts and more being taken in the middle blocks Another important practice pattern was found for the high efficacy target. The putting pattern at the high efficacy target resembled that of a U, with the majority of putts being taken in Blocks 1 and 6 and relatively few putts taken in between.

The practice putting effort patterns seem to follow two tendencies of athletic preparation. First, the consistent putting at the low efficacy target, and the largely consistent putting at the medium efficacy target (minus the low putting in Blocks 1 and 6) follow the tendency of athletes to take on challenges. Challenges are exciting, motivating, and worthy of effort. This notion seems to explain the putting pattern at the low efficacy target and the medium efficacy target in Blocks 2 through 5.

Second, the practice putting effort pattern at the high efficacy target, which was characterized by high effort in Blocks 1 and 6, follows the tendencies of athletes to warm up with relatively simple tasks for which self-efficacy is high and to end practice with high quality skill execution. Warm-ups to prepare the mind and body for practice are widely practiced, and most include a heavy emphasis on tasks for which athletes have high self-efficacy. A proper warm-up seems to explain high effort at the high efficacy target in Block 1. Further, the maxim, "End on a good one," is frequently heard at athletic practices, and it seems to explain high effort at the high efficacy target in Block 6. Athletes want to end on good execution to keep efficacy enhancing feedback recent in mind; therefore, ending with

good execution is a reasonable strategy for building self-efficacy. It is a strategy that athletes seem to intuitively grasp or are taught by a coach.

Although these explanations for the observed practice effort patterns are parsimonious, it is acknowledged that no empirical evidence from either study in this dissertation supports any explanation of the observed effort pattern. The interpretation of the results is offered for future consideration and study.

One of the pertinent findings in Study 2 is that efficacy beliefs decreased from preparation to performance at all targets, significantly so at the medium and low efficacy targets, yet performance improved at all targets, significantly so at the medium and high efficacy targets. Therefore, at the medium efficacy target, a significant decrease in efficacy was accompanied by a significant improvement in performance. Ultimately, the medium efficacy target's correlation between efficacy and performance improved from a correlation between preparatory efficacy and baseline performance of -.14 to a correlation between performance efficacy and competitive performance of -.46. This increase from a non-significant to significant correlation likely represented improved accuracy in judgment of personal capability through familiarity and practice with the specific task at hand, in this case, the speed of the putting green. However, based on preparatory efficacy propositions, a decrease in efficacy judgment does not predict an improvement in performance under any circumstances. In this case, it seems likely that the limited chronological snapshot of this study is distorting the reality of the long-term relationship between efficacy and performance.

For example, in this study, participants were introduced to a putting task, and their efficacy judgments of their capabilities were more accurate following a practice period. This

understanding of the task and its requirements is in line with Bandura's (1997) precursors for studying the efficacy-performance relationship. If the study were repeated, it is likely that participants would carry with them this improved accuracy in judgment of personal capability into the next preparation period, and it seems reasonable to expect that the efficacy-performance relationship would normalize, or fit with previous empirical findings, moving forward from that point. However, whether or not this normalizing of the efficacy-performance relationship would be observed is an empirical question that needs to be researched in future studies.

In support of this future prediction, efficacy change from preparation to performance was significantly related to practice quality ($r$ = -.47, $p$ = .005). While some 21 participants had a decrease in efficacy strength from preparation to performance, 11 increased efficacy strength, and overall, the efficacy changes resulted in improved accuracy in judgment of performance capability from a preparatory efficacy-performance correlation of -.14 ($p$ = .436) to a performance efficacy-performance correlation of -.36 ($p$ = .042). This finding is consistent with preparatory efficacy theory. Over time, the relationship between practice quality and efficacy change from preparation to performance should lead to improved performance when effective practice habits are executed with the proper effort. In preliminary support of future exploration of this idea, on average, the performance of the 11 participants who increased efficacy from preparation to performance (M = 39.8, SD = 9.8) was better than the performance of the 21 participants who decreased efficacy from preparation to performance (M = 47.7, SD = 11.7) by an effect size of 0.73. Again, the limited timeframe of the studies in this dissertation did not allow for observation of this

relationship over time, and it is suggested that longer term studies of efficacy-practice-performance cycles be undertaken to examine the relationship over periods of time extending across at least one sport season and perhaps longer.

# CHAPTER 5

## General Discussion

### Findings

This dissertation began with the question: Can self-doubt be beneficial to preparatory effort? With the evidence gathered in this dissertation, this question can now be answered. Self-doubt can be beneficial to preparatory effort; however, caution is warranted when extolling the benefits of self-doubt. Despite its beneficial effect on preparatory efficacy under the circumstances presented in the studies in this dissertation, self-doubt has been shown to be detrimental to performance (Bandura, 1997; Feltz et al., 2008), and results from both studies in this dissertation support this assertion. The counterpart of self-doubt, self-efficacy, has been shown to be beneficial to performance, effort, persistence, choice of activities, and thought patterns (Bandura, 1997; Feltz et al., 2008). By attempting to tap into the preparatory benefits of doubt, one risks losing the beneficial effects of self-efficacy. Therefore, to properly understand the possible benefits of doubt in preparation for athletic competition, it is important to place it in the context of self-efficacy theory.

Bandura (1997) limited the proposed possible beneficial role of self-doubt to the preparatory phases of sport. He hypothesized that some sense of doubt, manifested in relatively lower preparatory self-efficacy beliefs, would be beneficial to preparatory effort. However, he cautioned that higher efficacy beliefs, free from as much doubt as possible, should be built prior to sending athletes into competition. Feltz and Wood (2009) reasoned that several pieces of evidence would be needed to support Bandura's description of the preparatory efficacy as a distinct concept from performance efficacy. Supporting evidence

would demonstrate: 1) a beneficial effect of doubt on preparatory effort, 2) better performance associated with lower efficacy levels, and 3) effort-related efficacy increases from preparation to performance. Evidence from both studies will be highlighted to demonstrate how the dissertation results supported preparatory efficacy as a concept.

First, in both studies, effort was higher at the low and medium efficacy targets in comparison to effort at the high efficacy targets, and a significant linear increase was seen in effort across all three targets from low effort at the high preparatory efficacy target, moderate effort at the medium preparatory efficacy target, to high effort at the low preparatory efficacy target. This finding was consistent and obtained large effect sizes across both studies.

Second, in Study 1, participants performed better relative to expectations at the low and medium efficacy targets than at the high efficacy targets. Thus, following preparation, which resulted in significantly higher preparatory effort at the low and medium efficacy targets, participants performed better at the two targets that received the most effort. Thus greater effort paid off in better performance. Further, although Study 2 was not specifically designed to show evidence of this effect, on average participants showed almost twice as much absolute improvement from baseline to performance at the medium efficacy target (10.5 cm) than at the high efficacy target (5.7 cm).

Third, in Study 2, efficacy increases from preparation to performance were highly related to practice quality and satisfaction. Although Study 1 was not specifically designed to show evidence of this process, efficacy increases from preparation were associated with make percentage at the high efficacy target. Further supporting this process, in Study 2, participants

who increased efficacy beliefs from preparation to performance outperformed those who decreased in efficacy by a moderate effect size.

**Applications**

Taken together, the two studies in this dissertation provide preliminary support for the concept of preparatory efficacy as described by Bandura (1997), Feltz et al. (2008), and Feltz and Wood (2009). Yet in light of the possible drawbacks of applying doubt to athletic preparation, caution needs to be exercised before applying what was learned, and future studies are needed to address unresolved questions.

In applying the preparatory efficacy concept with athletes, coaches and sport psychology consultants must be wary of introducing doubt into athletic preparation. In the studies in this dissertation, moderate efficacy levels resulted in increased effort, strong performance, and efficacy-performance correlations consistent with past research (Moritz et al., 2000). The introduction of high levels of doubt may not create a substantial increase in preparatory effort, yet it will reduce the beneficial effects of high self-efficacy on performance (Bandura, 1997; Feltz et al., 2008) while risking the overt negative effects of doubt, such as choking (Beilock, 2010).

Perhaps a reasonable guideline would be not to introduce any doubt unless a boost in effort is needed and a high sense of self-efficacy exists, and even then, it would be possible to introduce doubt into the preparation process by assisting the athlete in adopting an increased performance standard rather than by lowering the athlete's self-efficacy beliefs. Further, by adopting a higher standard, it is possible to simultaneously raise an athlete's efficacy beliefs while introducing a challenging standard.

For example, given an athlete's performance in a particular contest, a coach could start the next preparation cycle with a statement similar to this: "You performed very well in our last game. I can see the progress you have made since the beginning of the season. I would like to start setting some higher goals for you, goals more worthy of your increased skills." This statement, especially when accompanied by specific examples of improvement, reminds the athlete of past accomplishment, which is the most important source of efficacy beliefs and should raise efficacy levels in this case (Bandura, 1997; Feltz et al., 2008), while raising the level of expectations for future performance, which should decrease satisfaction with current performance. Thus, in order to introduce some dissatisfaction with current performance, the second suggestion for applying preparatory efficacy concepts should read: reinforce past accomplishment while raising the bar for future expectations.

**Limitations**

Three specific limitations should be noted. First, the study sample is small and homogenous compared to the range of athletic skills and experience. Therefore, application and generalization of the findings should be employed with caution. The studies in this dissertation are preliminary, not confirmatory, and should be treated as such.

Second, along similar lines, the study samples consisted of experienced golfers having, on average, roughly 2 decades of experience. At this stage of experience, golfers are more likely to have established practice routines, and, in general, having practiced golf for many years, experienced golfers are less likely to be able to improve golf putting accuracy in a short period of time, such as that afforded by the 30 practice balls in the studies. Thus, both in terms of practice routines and capacity to improve, experienced golfers may have practiced

and performed differently from novices, and this may have had an effect on practice effort and performance. Certainly the tendency to practice in familiar ways was observed in some comments made by the golfers in Study 2. For example, some participants noted preferring to spend equal practice time at each target no matter the results of the practice putts, while another noted a preference for concentrating on short putts because, in general, sinking short putts is effective for scoring well in golf, even though actually sinking a putt into a cup was not part of the experiment.

Third, effort is not easily defined in sport research, and the definition chosen in this dissertation has both strengths and weaknesses. For that matter, any study of preparatory efficacy requires an operational definition for effort, and given the existence of the broad range of effortful activities in sport, the specific definition of effort in any study creates limitations for generalization and application. In this study, the allocation method used to define effort limits its interpretation. The same results may not be obtained when using different measures and definitions for effort or persistence. Furthermore, overtraining in sport is possible; therefore, the idea that more is better is not always the case with the effort and persistence. Optimal effort may not always be synonymous with maximal effort. Specific limitations of the measurement of effort and persistence cannot necessarily be overcome entirely in any study, but as noted earlier, the important aspect of the effort measure in preparatory efficacy research is its concordance with performance.

Fourth actual preparatory phases vary between sports and within seasons. The limited time frame of Study 1 and Study 2 clearly delineated between preparation and performance, but the time frame did not mimic that of any sport. While a longer time frame might create

some difficulties in the measurement of effort (i.e., observation or measurement of all effort that might impact performance), it would enhance understanding of efficacy, effort, and performance over an accurate time frame for sport preparation.

**Future Directions**

Turning to needed future research, several unanswered issues need to be addressed. Is the relationship between preparatory efficacy and effort an inverted-U? The inverted-U has been theorized (Feltz et al., 2008; Feltz & Wood, 2009), but the studies in this dissertation were not designed to clearly establish the shape of this relationship. To be sure, the lack of significant differences in effort between the medium and low efficacy targets in both studies seems to suggest that effort may peak at some level of efficacy; however, in order to adequately gather data to address the shape of the relationship, effort measures corresponding to efficacy extremes ranging from extremely high to extremely low will need to be tested.

Second, does doubt also lead to increased effort when the doubt is associated with competitive efficacy? The doubt addressed in this dissertation was associated with capabilities for executing a specific task, not necessarily with competing relative to others. It is not prudent to assume that the same efficacy-effort relationship exists for competitive efficacy (also referred to as comparative efficacy, Feltz et al., 2008) and performance. Future research needs to address whether relative doubt increases preparatory effort when the doubt is associated with capabilities relative to defeating an opponent.

Third, how do the relationships between efficacy, effort and persistence, and performance behave over a longer time frame such as that of an entire competitive season? According to preparatory efficacy theory, if the suggestions contained in this discussion are

applied appropriately, over time, the systematic introduction of doubt, self-dissatisfaction, and the subsequent increase of efficacy beliefs should result in improved performance relative to control groups. Because it may not be practical or ethical to manipulate efficacy beliefs in comparison groups over a sport season, future research should consider intervention studies designed to apply preparatory efficacy theory over an entire sport season. Careful consideration of efficacy, goals, satisfaction, effort, persistence, and performance measures are recommended, with special attention being afforded to concordance between efficacy beliefs and performance and effort and performance.

Along the same lines, how do different methods of measuring effort and persistence affect the results of preparatory efficacy studies? For example, in this study, effort did not necessarily measure the intensity of effort, and it was measured through allocation of effort at different targets. It will be important to study how doubt affects intensity of effort and free choice of effort and persistence.

Fourth, what are the most effective methods for introducing self-dissatisfaction? Do discrepancies between accomplishments and goals translate into self-dissatisfaction that is beneficial to effort? Given that efficacy has a linear, positive relationship with self-set goal difficulty, and goal difficulty has a linear, positive relationship with performance (Bandura & Locke, 2003; Locke & Latham, 2002), research variables addressing goals should be included in future studies of preparatory efficacy.

Lastly, the studies in this dissertation were completed with relatively homogenous groups of experienced golfers. The generalization of the findings is unknown for various groups such as elite athletes and beginners. It is quite possible that athletes at different

experience levels would have differential tolerances for doubt, and research is needed to explore the application of preparatory efficacy with disparate samples.

**Conclusion**

In conclusion, given the enormous time and energy investment athletes spend in preparation for competition, study of the preparatory stage of athletics is important. Swings in efficaciousness, and its counterpoint, self-doubt, surely affect all athletes following the wins, losses, setbacks, and successes during a season and off-season training, and the impact on practice behaviors and subsequent self-efficacy beliefs remain an important, yet understudied phenomena. Perhaps the most important finding from this dissertation is support for the idea that self-doubt does not have to be viewed as a detriment to athletic performance. When framed appropriately, self-doubt, something all athletes deal with from time to time, can be an essential component of an athlete's motivation, and it can be channeled into productive effort. Perhaps, moving forward, sport psychology consultants may begin to view self-doubt as a natural state of being that can be harnessed and applied effectively to increase an athlete's effort, persistence, goals, self-efficacy, and performance over time.

**APPENDICES**

## APPENDIX A

Preparatory Efficacy

Efficacy Questionnaire

One of your scores for this task will be the total number of putts that land in the target zone. For each number of putts below, indicate how confident you are that you can place the given number of putts in the target zone.

Marker 1/Zone_____

Certainty Rating

| Number of putts in target zone | **Complete Uncertainty** | | | | | | **Moderate Certainty** | | | **Complete Certainty** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Marker 3/Zone_____

Certainty Rating

| Number of putts in target zone | **Complete Uncertainty** | | | | | | **Moderate Certainty** | | | **Complete Certainty** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Marker 5/Zone_____

Certainty Rating

| Number of putts in target zone | **Complete Uncertainty** | | | | | | **Moderate Certainty** | | | **Complete Certainty** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX B

### Performance Efficacy

Efficacy Questionnaire

One of your scores for this task will be the total number of putts that land in the target zone. For each number of putts below, indicate how confident you are that you can place the given number of putts in the target zone.

Marker 1/Zone_____

Certainty Rating

| Number of putts in target zone | **Complete Uncertainty** | | | | | | **Moderate Certainty** | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Marker 3/Zone_____

Certainty Rating

| Number of putts in target zone | **Complete Uncertainty** | | | | | | **Moderate Certainty** | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Marker 5/Zone_____

Certainty Rating

| Number of putts in target zone | **Complete Uncertainty** | | | | | | **Moderate Certainty** | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX C

Consent Form

Date: _____

Title of Project: Preparatory Efficacy and Motor Task Performance

This research study is being conducted to learn more about confidence during golf tasks by collecting some data on your putting performance and your confidence. Your participation in the study is voluntary. You may refuse to participate or discontinue participation at any time without penalty or loss of benefit.Y our total time in the study is estimated to be less than one hour, closer to 30 minutes in most cases. The study involves having you take golf putts as well as indicating your confidence in your putting ability. As a last step in the study, you will be asked to putt in a short competition against another golfer's score, but the other golfer will not be present when you take your putts.

The risks of participation in the study are no greater than your risks putting in a competition at a mini golf course. Your confidentiality will be protected to the maximum extent allowable by law. All of the data collected will be deidentified, or coded, so that your name is not on the data, and it will be stored in locked cabinets in secure rooms. In other words, the record forms will not identify you as a participant, and they will be locked from access to anyone but the researcher.

As a benefit to you for your participation in the study, you will receive a debriefing about that study that will give you some helpful information on the mental game of golf. Your participation in the study may help you understand the information to the fullest extent. You still are entitled to the information even if you choose to withdraw at any point in the study. Further, even if you refuse to participate in the study, you are still entitled to receive the information.

If you have any concerns or questions about this research study, such as scientific issues, how to do any part of it, or to report an injury, please contact the researcher:. If you have any concerns or questions about this research study, such as scientific issues, how to do any part of it, or to report an injury, please contact the researcher (Deborah L. Feltz, Ph.D., Professor and Chairperson, Department of Kinesiology, Michigan State University, East Lansing, MI 48824; email at dfeltz@msu.edu; or call at (517) 355-4732). If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824.

I voluntarily agree to participate in this study.

_____

Signature

## APPENDIX D

Debriefing for Participants

Title of Project: Preparatory Efficacy and Motor Task Performance

Dear Participant,

Thank you for your time/consideration of our research study. As mentioned in the consent form, the study is being conducted to collect data on golfers' confidence during putting tasks. You confidence ratings and putts will be used as data for the study; however, unlike the information mentioned in the consent, your data will not be used in a competition against another golfer. We told you that you would be competing because we wanted you to take the task as seriously as you have for a real competition.

The concept we are studying is called self-efficacy. You can think of self-efficacy as a type of confidence. Self-efficacy is a judgment about your confidence to perform a certain behavior. In this study, we had you rate your self-efficacy for putting. We then had you putt as many practice strokes as you wanted to a given target. Finally, we had you rate your self-efficacy again and take your final putts for a score. In most cases in sports, golf included, self-efficacy should be as high as possible because it is important in task choice, persistence, and effort. However, it is also possible that when self-efficacy is too high or too low, one does not give as much effort or persistence to practicing a task as when self-efficacy is at a medium level. The thought behind this idea is that most of us do not choose to waste effort on things at which we are very likely to succeed or very likely not to succeed. It is quite possible that we give the most effort and persistence to tasks in which we have a medium level of confidence.

In other words, it might be possible that some medium self-doubt actually motivates us to persist longer in practice and give a better effort. In contrast, if we completely lack self-doubt or are completely filled with self-doubt, we are not likely to put much effort into practice for a performance.

In this study, we want to examine how many practice putts players took from various levels of self-efficacy. We hypothesized that those assigned to the extremely high and extremely low self-efficacy levels would take fewer practice putts than those assigned to medium efficacy levels. Further, we want to see if your practice had any effect on your confidence and performance.

As a benefit to you, you can take away from this study the knowledge that confidence is very important to your execution of a task like golf putting. In most cases, you want to do things that help you gain confidence. On the other hand, if you find yourself lacking confidence or filled with doubt, you can reassure yourself that the doubt may actually be beneficial to you if you can use it to motivate yourself to practice the right way, to prepare for competition with the correct effort and persistence needed to improve your play. Regardless of your current confidence level or the outcome of our study, proper attention to your practice routine and effort will most likely improve your confidence. The following guidelines are research-based suggestions for improving confidence:

- Seek opportunities to always improve your skills and accomplishments. When you do improve, allow your noticeable improvement in your physical play to improve your mental confidence as well.

- Talk to yourself in ways that boost your confidence. Be optimistic and positive. Believe in yourself.
- Seek others who provide examples and encouragement that improve your confidence. If you have videotape of yourself playing well, watch it and let your confidence grow. If you can vividly imagine yourself playing well, this will also likely improve your confidence.
- Finally, figure out how to "psych up" or relax to improve your confidence. Most players have a preferred level of physical activation. If you need to psych up to feel more confident, try imagining scenes that excite you and give you confidence. If you need to relax to feel more confidence, breathe deeply and slowly and imagine scenes that relax you. Just like physical skills, these psyching up and relaxing techniques work best when practiced daily, so make sure that you practice them before you need these techniques in a competition.

## APPENDIX E

Baseline Putting Efficacy

Rate your confidence on the following statements:

I can control the speed of my putts at a 15 ft target:

| **Complete Uncertainty** | | | | **Moderate Certainty** | | | | **Complete Certainty** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can control the accuracy (i.e., left right in relation to target) of my putts at a 15 ft target:

| **Complete Uncertainty** | | | | **Moderate Certainty** | | | | **Complete Certainty** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can control the speed of my putts at a 10 ft target:

| **Complete Uncertainty** | | | | **Moderate Certainty** | | | | **Complete Certainty** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can control the accuracy (i.e., left right in relation to target) of my putts at a 10 ft target:

| **Complete Uncertainty** | | | | **Moderate Certainty** | | | | **Complete Certainty** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can control the speed of my putts at a 5 ft target:

| **Complete Uncertainty** | | | | **Moderate Certainty** | | | | **Complete Certainty** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can control the accuracy (i.e., left right in relation to target) of my putts at a 5 ft target:

| **Complete Uncertainty** | | | | **Moderate Certainty** | | | | **Complete Certainty** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX F

Comparative Baseline Efficacy

I can putt as skillfully as:

| A beginner | | 20+ Handicap Amateur | | 20-10 Handicap Amateur | | | 9-0 or + Handicap Amateur | | Pro Golfer | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX G

Preparatory Efficacy

Rate your confidence in your capability to putt within the given distances:

I can land (roll to a stop) my putts within an average of ___# in/ft___ of the 15ft target:

| #in/ft to target | **Complete Uncertainty** | | | | | **Moderate Certainty** | | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1ft 6in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6 in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can land (roll to a stop) my putts within an average of ___# in/ft___ of the 10ft target:

| #in/ft to target | **Complete Uncertainty** | | | | | **Moderate Certainty** | | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1ft 6in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6 in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can land (roll to a stop) my putts within an average of ___# in/ft___ of the 5ft target:

| #in/ft to target | **Complete Uncertainty** | | | | | **Moderate Certainty** | | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1ft 6in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6 in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX H

Performance Efficacy

Rate your confidence in your capability to putt within the given distances:

I can land (roll to a stop) my putts within an average of ___# in/ft___ of the 15ft target:

| #in/ft to target | **Complete Uncertainty** | | | | | **Moderate Certainty** | | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1ft 6in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6 in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can land (roll to a stop) my putts within an average of ___# in/ft___ of the 10ft target:

| #in/ft to target | **Complete Uncertainty** | | | | | **Moderate Certainty** | | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1ft 6in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6 in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I can land (roll to a stop) my putts within an average of ___# in/ft___ of the 5ft target:

| #in/ft to target | **Complete Uncertainty** | | | | | **Moderate Certainty** | | | | **Complete Certainty** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1ft 6in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 ft | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6 in | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX I

Rate your satisfaction with your baseline putting.

I am satisfied with my baseline putting in terms of speed:

| **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my baseline putting in terms of left/right accuracy:

| **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my baseline putting overall:

| **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my baseline putts at the ___#___ ft target:

| #ft target | **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I will be satisfied if my performance is equal to (but is not better than) my baseline putts at the # ft target:

| #ft target | **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX J

Rate your satisfaction with your practice putting.

I am satisfied with my practice putting in terms of speed:

| **Not At All Satisfied** | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my practice putting in terms of left/right accuracy:

| **Not At All Satisfied** | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my practice putting overall:

| **Not At All Satisfied** | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my practice putts at the ___#___ ft target:

| #ft target | **Not At All Satisfied** | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX K

Rate your satisfaction with your performance putting.

I am satisfied with my performance putting in terms of speed:

| **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my performance putting in terms of left/right accuracy:

| **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my performance putting overall:

| **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

I am satisfied with my performance putts at the ___#___ ft target:

| #ft target | **Not At All Satisfied** | | | | **Moderately Satisfied** | | | | **Completely Satisfied** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX L

Practice Putt Satisfaction

I am satisfied with __#__practice putt.

| Putt# | **Not At All Satisfied** | | | | | **Moderately Satisfied** | | | | | **Completely Satisfied** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 4 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 7 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 8 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 9 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 12 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 13 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 14 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 15 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 16 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 17 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 18 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 19 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 20 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 21 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 22 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 23 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 24 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 25 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 26 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 27 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 28 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 29 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX M

*Research Participant Information and Consent Form*

You are being asked to participate in a research project. Researchers are required to provide a consent form to inform you about the study, to convey that participation is voluntary, to explain risks and benefits of participation, and to empower you to make an informed decision. You should feel free to ask the researchers any questions you may have.

**Study Title:** Competitive Preparatory Efficacy
**Researchers and Title:** Deborah Feltz, Ph.D. and Jared Wood, M.A.
**Department and Institution:** Department of Kinesiology, Michigan State University
**Address and Contact Information:** Deborah L. Feltz, Ph.D., Professor and Chairperson, Department of Kinesiology, Michigan State University, East Lansing, MI 48824; dfeltz@msu.edu; (517) 355-4732

**PURPOSE OF RESEARCH**

You are being asked to participate in a research study of golf putting and self-efficacy (i.e. confidence). The study is being conducted with the cooperation and facility use of the Marc White Golf Training Studio. You have been selected as a possible participant in this study because you responded to advertising for the study and identified yourself as a golfer with more than three years experience. From this study, the researchers hope to learn more about how confidence affects golf putting. In the entire study, about 60 people are being asked to participate.

**WHAT YOU WILL DO**

In the study, you will be asked to take several golf putts then answer some questions regarding your confidence about putting and competing in a putting contest. You will then be given time to practice before completing another confidence questionnaire. Finally, you will take five competitive putts. At the end of the study, you will be debriefed about the purpose of the study, and you will receive an informational handout that describes the study and provides information about the mental side of golf. Your participation in this study will take about 15 to 20 minutes.

**POTENTIAL BENEFITS**

As a benefit to you for your participation in the study, you will receive a debriefing about the study that will give you some helpful information on the mental game of golf. Your participation in the study may help you understand the information to the fullest extent. You still are entitled to the information even if you choose to withdraw at any point in the study. Further, even if you refuse to participate in the study, you are still entitled to receive the information.

**POTENTIAL RISKS**

The risks of participation in the study are no greater than your risks while putting in a competition at a mini golf course. There are no further foreseeable risks associated with participation in this study.

**PRIVACY AND CONFIDENTIALITY**

Your confidentiality will be protected to the maximum extent allowable by law. The data for this project are being collected on de-identified forms. In other words, even though you sign a consent form to participate in the study, no information will match your consent form to your data form. Neither the researchers nor anyone else will be able to link data to you. The data will be stored in a

locked filing cabinet in the office of researcher Deborah Feltz, Ph.D., for at least three years. Only the researchers and the Internal Review Board (IRB) will have access to the data and consent forms. The results of this study may be published or presented at professional meetings, but the identities of all research participants will remain anonymous.

**YOUR RIGHTS TO PARTICIPATE, SAY NO, OR WITHDRAW**
Participation in this research project is completely voluntary. You have the right to say no. You may change your mind at any time and withdraw. You may choose not to answer specific questions or to stop participating at any time. Choosing not to participate or withdrawing from this study will not make any difference in the benefits to which you are otherwise entitled.

**COSTS AND COMPENSATION FOR BEING IN THE STUDY**
There are no costs to participating in the study. For your participation in the study, you will receive a debriefing pamphlet about the study that will give you some helpful information on the mental game of golf. The pamphlet contains helpful information about confidence in golf. Also, winners of the competition will have their phones numbers put into a drawing to win a $50 dollar gift certificate. Four gift certificates will be awarded.

**CONTACT INFORMATION FOR QUESTIONS AND CONCERNS**
If you have concerns or questions about this study, such as scientific issues, how to do any part of it, or to report an injury, please contact the researcher (Deborah L. Feltz, Ph.D., Professor and Chairperson, Department of Kinesiology, Michigan State University, East Lansing, MI 48824; dfeltz@msu.edu; (517) 355-4732).

If you have questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Michigan State University's Human Research Protection Program at 517-355-2180, Fax 517-432-4503, or e-mail irb@msu.edu or regular mail at 207 Olds Hall, MSU, East Lansing, MI 48824.

**DOCUMENTATION OF INFORMED CONSENT**
Your signature below means that you voluntarily agree to participate in this research study.

Signature_____Date_____

You will be given a copy of this form to keep.

## APPENDIX N

Debriefing for Participants

Title of Project: Preparatory Efficacy and Motor Task Performance

Dear Participant,

Thank you for your time/consideration of our research study. As mentioned in the consent form, the study is being conducted to collect data on golfers' confidence during putting tasks. You confidence ratings and putts will be used as data for the study; however, unlike the information mentioned in the consent, your data will not be used in a competition against another golfer. We told you that you would be competing because we wanted you to take the task as seriously as you have for a real competition.

The concept we are studying is called self-efficacy. You can think of self-efficacy as a type of confidence. Self-efficacy is a judgment about your confidence to perform a certain behavior. In this study, we had you rate your self-efficacy for putting. We then had you putt as many practice strokes as you wanted to a given target. Finally, we had you rate your self-efficacy again and take your final putts for a score. In most cases in sports, golf included, self-efficacy should be as high as possible because it is important in task choice, persistence, and effort. However, it is also possible that when self-efficacy is too high or too low, one does not give as much effort or persistence to practicing a task as when self-efficacy is at a medium level. The thought behind this idea is that most of us do not choose to waste effort on things at which we are very likely to succeed or very likely not to succeed. It is quite possible that we give the most effort and persistence to tasks in which we have a medium level, or even a relatively low level, of confidence. In other words, it might be possible that some medium self-doubt actually motivates us to persist longer in practice and give a better effort. In contrast, if we completely lack self-doubt or are completely filled with self-doubt, we are not likely to put much effort into practice for a performance.

In this study, we want to examine how many practice putts players took based on your efficacy regarding defeating your opponent. We hypothesized that those assigned to the extremely high self-efficacy levels would take fewer practice putts than those assigned to the lower and medium efficacy levels. Further, we want to see if your practice had any effect on your confidence and performance.

As a benefit to you, you can take away from this study the knowledge that confidence is very important to your execution of a task like golf putting. In most cases, you want to do things that help you gain confidence. On the other hand, if you find yourself lacking confidence or filled with doubt, you can reassure yourself that the doubt may actually be beneficial to you if you can use it to motivate yourself to practice the right way, to prepare for competition with the correct effort and persistence needed to improve your play. Regardless of your current confidence level or the outcome of our study, proper attention to your practice routine and effort will most likely improve your confidence. The following guidelines are research-based suggestions for improving confidence:

- Seek opportunities to always improve your skills and accomplishments. When you do improve, allow your noticeable improvement in your physical play to improve your mental confidence as well.
- Talk to yourself in ways that boost your confidence. Be optimistic and positive. Believe in yourself.
- Seek others who provide examples and encouragement that improve your confidence. If you have videotape of yourself playing well, watch it and let your confidence grow.

If you can vividly imagine yourself playing well, this will also likely improve your confidence.

- Finally, figure out how to "psych up" or relax to improve your confidence. Most players have a preferred level of physical activation. If you need to psych up to feel more confident, try imagining scenes that excite you and give you confidence. If you need to relax to feel more confidence, breathe deeply and slowly and imagine scenes that relax you. Just like physical skills, these psyching up and relaxing techniques work best when practiced daily, so make sure that you practice them before you need these techniques in a competition.

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