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Self-Theories of Mental Skill Abilities in Collegiate Athletes

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SELF-THEORIES OF MENTAL SKILL ABILITIES IN COLLEGIATE ATHLETES

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This dissertation is dedicated to all of the individuals who helped me get to this point in my life; to those who have provided me with the love, support, and opportunities I needed in order to pursue my academic goals. I could not have done this on my own, and I am forever grateful to those who assisted, guided, and pushed me along the way. Thank you.
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ABSTRACT

For more than two decades, implicit theory research has focused on the self-beliefs of individuals in a variety of domains, including intelligence and morality (see Dweck, 2000 for a complete overview) and more recently athletic ability (Biddle, Wang, Chatzisarantis, & Spray, 2003; Cury, Da Fonseca, Rufo, & Sarrazin, 2002; Spray, Wang, Biddle, Chatzisarantis, & Warburton, 2006). The original theory, developed by Dweck and Leggett (1988), gained empirical support through this research by highlighting the differences between incremental (attributes are malleable) and entity theorists (attributes are stable). Coinciding with the development and exploration of implicit theory has been the rapidly-developing fields of sport and performance psychology. To date, however, research has not examined the implicit beliefs of mental skills abilities in athletes, and insight into these beliefs may provide valuable insight into the motivational processes of athletes. The purposes of the present study were to examine whether collegiate athletes employ dominant implicit beliefs of mental skills abilities, whether these beliefs can be manipulated, and whether these beliefs influence the response to failure.

Participants of this study were varsity and club student-athletes from a large southeastern university. Implicit beliefs were measured at the onset of the study, followed by an incremental or entity beliefs intervention reading, which was either congruent or incongruent with initial implicit beliefs. Implicit beliefs were re-examined immediately following the intervention to determine if the manipulations were successful. Each participant then completed one trial of a brief relaxation mental skills task while biofeedback technology recorded HR and SCL. Upon completion of the task, all participants were told that they performed poorly on the relaxation task, and post-task questionnaires attempted to capture differences in responses to failure between intervention groups.
Overall, the vast majority (92.1%) of participants displayed dominant implicit beliefs at the initial assessment. However, contrary to expectations, the sample was overwhelmingly incremental in nature (89.5%), and entity and unclassified participants were excluded from final analyses, yielding a total sample of 68 incremental theorists and two groups for comparison (n = 34 incremental congruent; n = 34 incongruent). A RM ANOVA revealed a significant main effect for Intervention Congruency on post-intervention implicit beliefs scores, providing evidence that the intervention was successful in temporarily manipulating the implicit beliefs of participants. Differences did not emerge between intervention groups on a host of additional variables, however, including goal adoption prior to and following failure feedback, attributions for failure, mental skills task choice, remediation choice, and likelihood for pursuing a mental skills training program in the future.

This study provides the first evidence on the implicit beliefs of mental skills abilities in athletes, further extending decades of implicit theory research conducted by Dweck and colleagues into an untapped domain. Though the study was limited by the incremental nature of the final sample, it still provides researchers and practitioners potentially valuable information on the nature of athletes’ perceptions of mental skills. It was revealed that collegiate athletes’ implicit beliefs can be manipulated, shedding light on the malleability of implicit beliefs themselves. Future research should attempt to address the limitations of this study and continue to explore the motivational processes underlying athletes’ self-theories of mental skills.
CHAPTER ONE

INTRODUCTION

Consider a scenario of two collegiate athletes whose training, practice habits, and competition performance were tracked from the beginning of their collegiate careers until they graduated as seniors. Athlete A was highly recruited out of high school and earned an athletic scholarship at the university for his athletic achievements. He was highly skilled with raw talent and everything seemed to come naturally to him. Against lesser opponents, he shined. However, he did not work hard during practices or in the off-season, he seemed concerned only with his individual statistics, and his performance severely declined against quality and superior opponents. As soon as he was confronted with a challenge or experienced the slightest failures, it seemed as though he would “throw in the towel” and give up. He laughed at his coach’s suggestion for him to speak with a sports psychology consultant, stating, “I already know how to concentrate and relax. That stuff isn’t going to help me. I’m just not as good as I used to be.” Further, Athlete A did not display any true improvement over the course of his collegiate career and eventually lost his role in the starting lineup.

Athlete B was an above average high school player but did not receive a scholarship to the university for athletics. He “walked on” to the team and earned a spot on the roster due to hard work, determination, and constant effort inside and outside of practices and competitions. Things did not come naturally to him, so he put a lot of time into improving his skills and was driven to continue to get better. He even began to see a sports psychology consultant to improve the mental aspect of his game. Over the course of his collegiate career, Athlete B’s performance improved steadily each year and he eventually earned an athletic scholarship with the university and a starting position on the team.
Although this scenario is not based on fact, situations such as this occur frequently in sports settings. Tales of collegiate and professional athletes showing up for pre-season workouts overweight and out-of-shape seem to be a reoccurring theme. Are these individuals so confident in their abilities that they feel they can take extended periods of time off, only to return to form whenever they please? Meanwhile, there are players working tirelessly in the offseason to improve even the slightest bit in an attempt to get the upper hand. What is it that makes these individuals continue to believe that they can always improve?

Why or how, one may ask, are athletes so different? Why does Athlete A seemingly choose to “waste” his talent by not putting in the effort to improve his game? What drives Athlete B to put in so much effort, despite not being naturally talented? Psychological theory, namely implicit theory, attempts to explain the individual motivational patterns described above. Beliefs about the consistency of one’s own attributes and abilities have been termed implicit theories of self (Dweck & Leggett, 1988). Carol Dweck and colleagues have spent more than two decades researching how self-beliefs differentially orient individuals to think, feel, and behave in distinctive ways, primarily from an intellectual and academic context (e.g., Dweck, Chiu, & Hong, 1995; Dweck, Hong, & Chiu, 1993; Dweck & Leggett, 1988). More recently researchers have begun to study the self-beliefs of individuals’ athletic abilities (e.g., Biddle, Wang, Chatzisarantis, & Spray, 2003; Cury, Da Fonseca, Rufo, & Sarrazin, 2002; Spray, Wang, Biddle, Chatzisarantis, & Warburton, 2006), but there has yet to be any research on whether or not athletes believe that they can improve their sport-specific mental skill abilities.

Over the course of the last several decades, the role of psychological skills and mental preparation in sports has increased dramatically (Vealey, 2007). More so than ever, athletes (Wrisberg, Simpson, Loberg, Withycombe, & Reed, 2009), coaches (Wrisberg, Loberg,
Simpson, Withycombe, & Reed, 2010), and administrators (Wrisberg, Withycombe, Simpson, Loberg, & Reed, 2012) understand the importance and potential impact of mental skills training on performance. Paralleling this trend has been the increased awareness and interest of researchers in the fields of psychology and sports sciences (see Vealey, 2007 for a historical overview of mental skills training and research). Psychological skills have been evaluated in research on a variety of different sports and skill levels. The findings indicated that athletes generally perceive mental skills to be important and contribute to performance success, and that a trend exists toward more athletes practicing mental skills than in years past (e.g., Dolan Houston, & Martin, 2011; Frey, Laguna, & Ravizza, 2003; Goulby & Sheard, 1994; Heishman & Bunker, 1989). Researchers describe how specific mental skills training programs are effective for specific sports and populations, including experienced golfers (Kirschenbaum, Owens, & O’Connor, 1998), collegiate tennis players (Daw & Burton, 1994), Olympic speed skaters (Beauchamp, Harvey, & Beauchamp, 2012), and elite senior and junior wrestlers (Gould, Petlichkoff, Hodge, & Simons, 1990).

Despite the advances made about athletes’ perceptions of and the effectiveness of psychological skills in sports, still not all athletes (that have the resources) practice mental skills, despite the overwhelming evidence that supports using psychological skills for performance enhancement (Wrisberg et al., 2009). Examining this dilemma through an implicit theory lens may shed light on the motivational processes involved in athletes’ decisions to practice psychological skills in sports. What if, for example, Athlete A does not believe that he can get any better in his sport? He may truly believe that he has maximized his ability in his sport, as well as his mental skills capabilities, and thus he cannot improve. This explains his lack of effort, unwillingness to meet with a sport psychology consultant, and giving up in the face of difficulty.
Athlete B, however, seems to believe that if he works hard enough, he can continue to improve both physically and mentally, so he behaves in a completely different manner.

In sum, previous implicit theory research has explored the self-beliefs of individuals in a variety of settings, namely academics and athletics, but there has yet to be research conducted on athletes’ self-beliefs of mental skills. With mental skills playing such a large role in sports today, it seemed necessary to begin to examine some of the potential roots for why many athletes choose to practice mental skills while others do not. The purpose of this research was to extend implicit belief research to a domain that has yet to be studied, as well as to gain a better understanding of how athletes perceive their own capacity to enhance mental skills. If this purpose was to be fulfilled, a large gap in extant sport psychology literature would be filled that could inform athletes, coaches, and practitioners how self-beliefs can impact the choice to pursue and engage in psychological skills training in sports.
CHAPTER TWO
LITERATURE REVIEW

In this chapter, implicit theory is presented in order to provide the theoretical background and investigative rationale for this study. Implicit theory concepts are presented in detail before a discussion of the extant literature within this domain. What follows is a discussion on how implicit theory research has transitioned into the domain of sports, concluding with a section discussing the gap in sport psychology literature that this study addresses. This chapter concludes with the purposes, research questions, and hypotheses of the research study.

Implicit Theory

Dweck and Leggett (1988) examined what motivates individuals in the same situation to work towards different intellectual achievement goals. For example, why do some individuals seem to be more concerned with earning satisfactory marks and avoiding “looking dumb”, while others are less concerned with grades and praise and seem motivated by the challenge of learning? Dweck and Leggett addressed this question by proposing that individuals are motivated to pursue either performance goals or learning goals. Individuals pursuing performance goals are concerned with how their competence will be evaluated by reference to social comparison, whereas individuals striving for learning goals are concerned with enhancing their competence according to self-referenced standards. In other words, individuals seeking performance goals feel as though they must prove their abilities and competence to others, while those seeking learning goals attempt to improve their abilities and competence to themselves.

Dweck and Leggett (1988) associate goal orientations with their cognition-affect-behavior research. Specifically, they believe that performance goals can lead to maladaptive or helpless responses characterized by challenge avoidance and a decrease in performance when
faced with obstacles. *Learning goals* are associated with mastery-oriented responses, which involve confronting challenges and maintaining effort despite failure. It is important to note that the terms “maladaptive” and “adaptive” are in reference to an achievement context. Maladaptive behaviors consist of behaviors such as exerting low effort, not persisting in the face of difficulty, or giving up on a task altogether. Although the individuals performing these behaviors believe that they are behaving adaptively by protecting their egos and self-worth, they are limiting their own potential to succeed in the achievement context, which is the reason they are considered maladaptive behaviors. Adaptive behaviors, in opposition, include exerting high levels of effort, pursuing in the face of difficulty, and accepting challenges and failures as parts of the learning process. Exhibiting these behaviors is considered to be adaptive in the achievement context because these behaviors increase the likelihood of success.

What determines whether an individual will adopt performance goals or learning goals? Dweck and Leggett (1988) state that individuals hold implicit theories of self that inherently and differentially orient them to work toward different goals. If the individual believes that a trait is a fixed entity (i.e., *entity implicit theory*), he or she would be more likely to pursue performance goals and exhibit the helpless response in the face of challenges and obstacles. Individuals who believe a trait is malleable are said to have an *incremental implicit theory* and are more likely to behave in a manner consistent with the mastery-oriented response. Previous research in intellectual abilities has shown that approximately 40% of participants develop entity beliefs, 40% develop incremental beliefs, and as much as 20% of participants remain “unclassified” (according to measurement tools) and fall somewhere “in the middle” (Dweck et al., 1995). Cognitive, affective, and behavioral processes drive how an individual thinks, feels, and acts during the goal achievement process regardless of which beliefs develop. These processes
develop over time as a result of one’s environment. Thus, incremental and identity theorists may think, feel, and act differently in identical achievement situations, which may lead them to formulate and pursue different achievement goals. Before discussions on incremental and implicit theories and their underlying components, however, it may be useful to address more specifically how these self-beliefs develop within individuals.

The Development of Self-Theories

Dweck’s (2000) review of implicit theory research provides details of a number of studies highlighting how individuals’ implicit beliefs effect the type of goals they choose, how beliefs predict their achievement orientation, and how vulnerable they will be when confronted with difficulty and failure. It was not until the late 1990s, however, that researchers began looking into how implicit beliefs were developed. The majority of the research, to that point, had been focused on children in grade school or high school. Dweck (2000) described throughout her review the developmental process of beliefs at very young ages – perhaps as early as three years old. Children this young have not developed an understanding or the essence of intelligence and thus the method of investigation considered this limitation. Research has shown that at these young ages, children are beginning to develop implicit beliefs of what it means to be a “bad” or a “good” girl or boy. Once they enter school, they begin to develop their theories of intelligence. This research examined the underlying roots of the development of these beliefs to conclude that there is likely a portion of these beliefs that can be attributed to heredity, and an individual’s implicit beliefs (of badness or goodness, or of intelligence) are fostered by the type of praise and feedback that children receive from parents, guardians, or teachers. If children are constantly praised in a trait-like manner, in which the focus is on their goodness (or their intelligence), they begin to associate success with performance. For example, if children are told by a teacher that
they received an A on a test because they are smart, the children begin to think that they are smart (i.e., have high abilities) due to their performance on the test, not due to other variables such as effort or strategies. In other words, these children develop a sense of contingent self-worth and the belief that “your traits can be measured from your failures and that your traits are for all time” (Dweck, 2000; p. 105). If children are praised for effort or strategies, instead, they begin to build a framework that success is not dependent on performance, but rather the effort they exert and strategies they employ. Research findings have continually shown that the children (from very young ages into and through elementary school and high school) who receive effort- or strategy-dependent feedback and praise outperform those who receive performance- and person-oriented feedback and praise, even when controlling for initial abilities (Dweck, 2000). Thus, it is through feedback and praise that children develop their specific implicit beliefs, which are described in more detail in the following sections.

**Entity Implicit Theory**

An individual who develops an entity implicit theory of self (i.e., an entity theorist) through a history of performance- and person-oriented feedback will likely adopt a differentiated concept of ability in which perceived ability is highly relevant. Entity theorists’ personal theories of achievement (i.e., their beliefs about how to succeed in an achievement context) are task-dependent, because whether or not people believe that they can be successful depends on the difficulty of the task, their perceived competence on the task, the perceived ability levels of others, and their personal history of successes and failures at similar tasks (Dweck & Leggett, 1988). Their beliefs of achievement predispose them to be ego-oriented and thus they behave in an ego-involved manner. Entity implicit theorists approach a task with cognitions and questions relating to their ability and the ability of their opponents, the difficulty of the task, and how much
effort is required to complete the task. These cognitions are in place to help preserve their ego and self-esteem, and their behavior (i.e., task choice, task engagement, etc.) will reflect these cognitions.

Entity implicit theorists maintain a “static” worldview, as described by Whitehead (1938 as cited in Dweck et al., 1995). An advantage of claiming a static, entity worldview is that the direct relationship between traits and behaviors affords an individual to anticipate his or her behaviors. For example, if individuals believe that they are incompetent in social situations based on a particularly negative experience, they will avoid social endeavors and focus their attention on more solitary activities that they are highly competent in. A disadvantage of entity implicit theory is that individuals often “self-stigmatize” and limit their opportunities for growth because of ineffective goal orientation striving (Dweck et al., 1995). From the previous example, because the individuals believe that they cannot improve their social skills, they may refuse to try new social activities or they may develop anxiety when placed in social situations.

Dweck and colleagues have focused specific commentary on how entity and incremental implicit theorists judge outcomes and predict future events (Dweck et al., 1993; Dweck et al., 1995). Individuals are classified as entity implicit theorists if they believe that traits are fixed and, accordingly, they are prone to committing the fundamental attribution error, in which situational variables are ignored and intrapersonal characteristics become the focal point of judgment. Furthermore, entity implicit theorists are likely to make global judgments about themselves and others based on partial or incomplete information. Entity implicit theorists believe that behaviors are directly associated with traits and as a result predict how an individual will behave in future situations. Not only do entity implicit theorists believe that traits are stable, but they also believe that traits are consistent across different domains and situations. For
example, if an entity implicit theorist were to judge an individual as being dishonest based on a specific situation, he or she would predict this individual to act dishonestly in the short-term and long-term future in the same situation and across domains.

**Incremental Implicit Theory**

An individual who develops an incremental implicit theory of self (i.e., an *incremental theorist*) through a history of effort and strategy praise and feedback is expected to hold a more undifferentiated concept of ability in which perception of ability is considered secondary to learning through effort. In other words, regardless of whether or not an incremental theorist has high or low perceived ability, his or her beliefs of achievement will reflect the notion that improvement can be achieved through exhibiting high effort during a task. Success, in this case, is measured through improvement and learning. Incremental implicit theorists with such a notion of achievement are more inclined to be task-oriented towards achievement goals, and they will display task-involved behaviors, which are adaptive in the achievement context. These theorists will approach tasks with intrinsic motivation and determination. If an incremental implicit theorist fails at a task, he or she will attempt to learn and improve from the setback for future challenges. Finally, an individual with an incremental implicit theory of self is more apt to choose challenging or difficult tasks regardless of perceived ability, because these yield the greatest learning opportunities.

Incremental implicit theorists hold a more flexible and dynamic worldview in which traits are malleable attributes that are continuously developed (Dweck et al., 1995). These theorists place more emphasis on mediational analyses and attempt to dissect the underlying “psychological processes that mediate behaviors and the behavioral processes that mediate outcomes” (Dweck et al., 1995, p. 283). Advantages to adopting this worldview include a belief
that there is room to change or develop and the promotion of mastery-oriented coping. If the individual from the above example were to adopt this worldview, he or she would not be deterred by a specific negative instance in social situations and would continue to practice social skills in order to improve ability. A disadvantage to this theory is the uncertainty in making predictions about future behavior. Further, adopting this worldview requires more effortful and complex analyses in order to make provisional predictions. For example, perhaps it would take the individual many years of experiences to realize that he or she may not be as competent as others within the social sphere, thus wasting time and energy.

In regards to judgments and inferences, entity implicit theorists’ beliefs are in stark contrast to incremental implicit theorists, who are more careful to consider situational and mediational factors when making judgments about behavior (Dweck et al., 1993; Dweck et al., 1995), and thus they are less susceptible to committing the fundamental attribution error. Incremental implicit theorists maintain a more holistic perspective and tend to consider specific events as only minor instances within a much larger and broader context when judging themselves and others. In other words, incremental implicit theorists would predict future behavior based on a specific instance and would also consider alternative explanations for behavior across domains. From the example presented above, an incremental theorist would be less likely to label the individual as having a dishonest disposition in either the short- or long-term future, would consider mediational factors to explain the individual’s behavior, and would likely provide an optimistic, provisional prediction of how the individual would act in future situations, both within and across domains. In other words, incremental theorists do not believe that one specific instance defines an individual’s traits or characteristics for the future.
Cognitive, Affective, and Behavioral Components of Implicit Theories

**Cognitions.** According to Dweck and Elliott (1983) an individual’s goals influence his or her concerns, questions, and tactics when approaching an achievement situation. An individual seeking a performance goal is likely to approach a task questioning his or her abilities (e.g., “Can I do it?”) and whether the abilities are adequate enough to complete the task. Individuals seeking performance goals are also concerned with the amount of effort required to achieve a goal. These individuals believe that if a task requires high effort it reflects low ability, because struggling to complete a task is related to incompetence. Similarly, the ability to complete problems quickly and easily (i.e., little effort) means that one will be judged to be highly competent. It is no surprise, then, that such negative cognitions in pursuit of a performance goal may lead to the helpless response if the task is interpreted as too difficult or above the individual’s perceived competence level.

**Affect.** The affect component is directly related to one’s cognitions (Dweck & Leggett, 1988). If individuals perceive a task as too difficult or deem themselves as incompetent, they may feel that their self-esteem is being threatened, which may lead to a sense of anxiety or shame. Further, individuals may completely “shut down” and adopt a more defensive stance to the point that they convey boredom or contempt to the task. Those who embrace learning goals, however, experience failure as a challenge requiring additional effort and an opportunity to learn a new way to solve a problem and develop mastery. Learning goals also develop determination, intrinsic rewards, pleasure, and pride.

**Behavior.** Dweck and Leggett (1988) state that cognitions and affect stemming from goal orientation also influence behavior, namely task choice. According to Dweck and Elliott (1983), the ideal task is that which maximizes achievement opportunities and positive affect
while minimizing the potential for goal failure and negative affect. Individuals with performance goal orientation are concerned with competency judgments, and the ideal tasks for these individuals are tasks that enhance positive judgment and pride in ability, while reducing negative judgments and shame (Dweck & Leggett, 1988; Dweck, et al., 1995; Dweck & Elliot, 1983). Hence, an individual seeking a performance goal would likely choose an easy task over a more challenging task that poses a threat and may lead to negative judgment and anxiety. Individuals striving for learning goals would choose the more challenging task because it may yield a learning opportunity and maximize the pride and satisfaction of mastering the task (Dweck & Leggett, 1988; Dweck et al., 1995; Dweck & Elliot, 1983).

**Implicit Theory Research**

Research has provided evidence that an individual’s implicit theory of self can be manipulated through reading passages to the extent that those who read entity implicit theory passages displayed helplessness behavioral reactions (e.g., Hong, Chiu, Dweck, Lin, & Wan, 1999). In this research, Hong et al. (1999) used a simple reading passage to manipulate participants’ implicit beliefs, and results showed that those in the entity condition who received negative feedback were significantly less likely than those in the incremental condition (who also received negative feedback) to pursue a remedial course in the future. Additionally, entity condition participants were more likely to choose an easy task over a difficult task, and they rated a pretend student that did not work hard and got high marks as being smarter than a student who worked hard and earned high marks. The latter result highlights how entity theorists seem to believe that exerting effort reflects lower levels of ability (Hong et al., 1999).

Blackwell, Trzesniewski, and Dweck (2007) took implicit theory research a step further when they studied whether teaching incremental implicit theory concepts as an intervention
would have a positive effect on 7th grade students compared to a control group. The incremental implicit theory intervention consisted of weekly 25-minute lessons over an eight-week period. Materials included readings, activities, and discussions on topics such as, “you can grow your intelligence” and “learning makes you smarter” (p. 255). Students in the experimental group that adopted entity implicit theories of self at the beginning of the study displayed positive motivational changes and classroom grades increased after the incremental implicit theory intervention. Alternatively, students in the control group that expressed entity implicit theories early in the study continued a downward trajectory in classroom achievement, highlighting the positive effects of the incremental implicit theory intervention.

**Implicit Theory Research in Sport**

Although Connaughton, Wadley, Hanton, and Jones (2008) did not specifically study implicit beliefs of mental skill capacity in sport; they researched the development and maintenance of mental toughness in athletes. The athletes in the study reported that mental toughness continued to develop with experience through a combination of several factors throughout the early, middle, and later years of their careers. Once mental toughness had fully been developed (which according to the athletes was after approximately three years of competing at their highest level of competition), three main factors contributed to the maintenance of their mental abilities. These factors included being intrinsically motivated, having a strong sport and non-sport support structure, and utilizing psychological skills. Again, although this research does not specifically touch on implicit beliefs of mental skill acquisition in athletes, it describes how athletes perceive the development of mental toughness to be a long-term and progressive process, which may be interpreted as paralleling incremental implicit theory. It may also be argued, though, that incremental implicit theorists would not believe that
mental toughness could “fully” be developed, and therefore, these athletes endorsed entity implicit theory. However, because the athletes’ implicit theories of mental skills were not assessed, one must be tentative in drawing conclusions of either sort.

Spray, Wang, Biddle, Chatzisarantis, and Warburton (2006) conducted a study on the implicit beliefs of golf putting ability in an adolescent sample. Results revealed that entity intervention participants were more likely to adopt performance goals, while the incremental intervention was more likely to orient individuals toward learning goals. Additionally, entity theorists attributed their poor performance on the golf putting task to ability more so than incremental theorists, though no differences emerged between groups on effort attributions. Finally, non-significant effects emerged for affective measures and the likelihood to participate in a golf putting training program in the future.

Biddle, Wang, Chatzisarantis, and Spray (2003) conducted research on implicit theories of athletic ability in youth. Based on the results of the study, the authors proposed a model describing the relationships between implicit beliefs, goal orientations, and enjoyment that was consistent with the model suggested by Dweck and Leggett (1988) and Harwood, Cumming, and Fletcher (2004 as cited by Vealey, 2007). Incremental implicit beliefs of athletic ability directly predicted enjoyment of sport, and young athletes with incremental implicit beliefs also displayed task goal orientations, which also predicted enjoyment. Entity implicit beliefs predicted ego goal orientations in young athletes, but ego orientations interestingly did not predict enjoyment. Finally, evidence was not found that perceived competence of athletic ability moderated these relationships. In other words, regardless of how competent individuals may feel about their athletic abilities, if they hold incremental implicit beliefs, then they are more likely to find
enjoyment in athletics. This research is important because it highlights how implicit theories can be applied to sport, which is the focus of this study.

**Extending Extant Research: Implicit Beliefs of Mental Skills in Sports**

To date, specific research on athletes’ self-beliefs of their mental skills abilities has yet to be examined. If research findings were to parallel those in other domains (e.g., theories of intelligence and athletic ability), practitioners could learn quite a bit about the motivational processes underlying athletes’ choices to practice mental skills. If one has ever participated in sports or been to a live sporting event or practice, he or she has likely heard statements coming from coaches and parents such as, “Relax out there!” or “You need to focus!” If these statements are followed by successful performances, the athletes are likely praised for having successfully “relaxed” or “focused.” Without even being cognizant of this influence, these coaches and parents are potentially providing the seeds of implicit theories of mental skills abilities in these athletes. As discussed, implicit beliefs develop as a product of the motivational environment around them, and praise, criticism, and feedback are instrumental in this developmental process. If implicit beliefs of mental skills research were to parallel the findings of other domains, researchers can expect to see a normal distribution of athletes who believe that mental skills are a fixed entity (i.e., entity theorists) and an equal amount who believe that mental skills can be developed over time (i.e., incremental theorists). These beliefs should thus orient athletes to think and act in different ways, such as the type of goals they choose and pursue, the amount of effort they exert on tasks (or perhaps whether they choose to engage in mental skills tasks at all), and how they respond to setbacks and failures. Should this prove true, extensive research can be conducted on athletes’ perceptions of their mental skills abilities, including researching different populations (e.g., different age ranges, sports, experience levels, etc.), when and how these
beliefs develop over time, and perhaps how to properly detect entity theorists and implement incremental theory interventions. This study should provide a breakthrough into research in this domain and aimed to answer some of these questions.

**Conclusion**

**Purpose of the Study**

There has been no research on implicit beliefs of mental skill abilities in a sport setting, and improving knowledge of athletes’ mental skills perceptions should help practitioners and coaches understand why certain athletes do not practice mental skills training. This research could also potentially help coaches and sport psychology consultants understand how interventions can be employed to help athletes reach peak performance by employing mental skills training programs. This gap in sport psychology research led to a number of research questions to be considered by this study, including whether or not athletes have different perspectives on their ability to enhance their mental skills abilities in sport. The purpose of this study, therefore, was to extend implicit theory research so that practitioners and coaches can better understand how athletes perceive their own mental skills abilities (i.e., whether mental skills abilities are a fixed or malleable attribute). Using implicit theory research as the theoretical basis, the specific purposes of the study were to determine whether collegiate student-athletes employ dominant implicit theories of their mental skill capacity (as has been shown repeatedly in other domains), and if these beliefs could be manipulated in a manner similar to research in other domains. The final purpose of the study was to examine how implicit theories influence responses to failure in student-athletes.

For this study, the experimental manipulation was in the form of a reading passage that provided emphatic research and anecdotal evidence either in support of (incremental beliefs) or
against (entity beliefs) the effectiveness of sports psychology and mental skills training for athletes. The manipulation was further strengthened by condition-specific mental skills task descriptions and purposes. Participants had the opportunity to select either “easy” or “difficult” versions of the mental skills task. They also had the option to watch a tutorial video on how to effectively use deep breathing methods to achieve relaxation during the mental skills task, and finally, whether or not they would like to pursue a mental skills training program or see a sport psychology consultant in the future. These behavioral markers, combined with a perceive competence measure, were established to provide information about the response patterns of participants, which were analyzed and interpreted according to implicit beliefs.

Based on implicit theory research a number of hypotheses were generated for the study. The first set of predictions was based on the implicit beliefs manipulation. Conditions in which implicit beliefs match manipulation conditions were referred to as congruent theory interventions. When implicit beliefs did not match the manipulation condition, it was considered an incongruent theory intervention. It was hypothesized that theory congruency would effect post-assessment implicit beliefs. Particularly, it was hypothesized that theory congruent conditions would strengthen implicit beliefs (or remain stable), but theory incongruent conditions would weaken original implicit beliefs at post-manipulation (e.g., become less entity at post-manipulation). A final exploratory research question was whether or not groups (entity vs. incremental) would differ on their mental skills task performance (i.e., their ability to effectively control their HR and arousal levels). Because this question was strictly exploratory in nature, there were no theoretically- or research-based predictions on performance between groups.
Hypotheses

(1) Athletes would display dominant implicit beliefs and would fall into relatively equal proportions of entity and incremental theorists.

(2) Theory congruency would have an effect on post-assessment implicit beliefs.
   (2a) Congruent conditions would strengthen implicit beliefs.
   (2b) Incongruent conditions would weaken original implicit beliefs.

(3) Post-manipulation entity beliefs would lead to choosing performance goals, while post-manipulation incremental beliefs would lead to choosing learning goals, both before and after failure.

(4) Post-manipulation entity beliefs would lead to attributing failure more to ability than effort, while post-manipulation incremental beliefs would lead to attributing failure more to effort than ability.

(5) Post-manipulation entity theorists would be less likely to (a) choose the “difficult” version of the mental skills task (b) watch the tutorial video, and (c) pursue a mental skills training program in the future, while post-manipulation incremental theorists would be more likely to (a) choose the “difficult” mental skills task (b) watch the tutorial video and (c) seek sport psychology consultation.
CHAPTER THREE

METHODS

Participants

G*Power 3.1.3 was used to perform an a priori power analysis with repeated measurement ANOVA (RM ANOVA) and within-between subjects interactions as the statistical test. Based upon a standard alpha level (i.e., $\alpha = .05$), desired power of .80, it was revealed that it would require a minimum sample size of 76 to detect significant medium effect size (i.e., $f = .20$ or equivalently a Cohen’s $d$ of .50) differences if four groups and two measures at pre- and post-manipulation were used where correlations among repeated measures were $r = .50$ using a nonsphericity correction of $\varepsilon = 1$. Sixty-eight participants scored between 1-3 on the TMS and were classified as incremental theorists. Two participants were classified as entity theorists (with scores ranging from 4-6). Six participants scored between 3.1-3.9 and were considered unclassified. Due to the unequal nature of group sizes, only incremental participants were included in the final sample ($n = 68$).

Participants were male ($n = 28$) and female ($n = 40$) Florida State University (FSU) varsity and club-level student athletes (age $M = 20.4$ years, $SD = 2.2$). Participants were current members of a varsity or club-level athletic team. These athletes took part in a variety of sports (40 Track and Field, 13 Cross Country, 6 Dance, 4 Basketball, 1 Tennis, 1 Baseball, 1 Cycling, 1 Lacrosse, and 1 Bowling) and had various years of experience in their respective sports ($M = 8.8$ years, $SD = 4.0$). Recruitment occurred in person and by contacting coaches and managers of teams at FSU for permission to study their athletes. Based on the nature of the data collected, and the exclusion of eight participants’ data, a post-hoc power analysis with RM ANOVA (two groups, two measures) and within-between subjects interactions was performed to determine
achieved power. Based on a standard alpha level ($\alpha = .05$), correlations among repeated measures $r = .50$, and a nonsphericity correction of $\varepsilon = 1$, a power of .90 was achieved. All participants were also entered into a lottery for a chance to win one of three $10 gift cards to local businesses (e.g., Starbucks, Chipotle, Chick-fil-a).

**Study Design**

After the initial implicit beliefs assessment, participants were placed into one of two intervention conditions that were either congruent or incongruent with their original beliefs. Because entity participants were excluded from analyses, the final sample for testing hypotheses consisted incremental congruent ($n = 34$; males $n = 13$, females $n = 21$) and incremental incongruent ($n = 34$; males $n = 15$, females $n = 19$) groups.

**Experimental Manipulation**

To manipulate implicit beliefs, participants read one of two (i.e., incremental or entity) condition-specific *Psychology Today*-type articles developed for the purposes of this study. Each article contained allegedly scientific claims that were supported by celebrity commentary to establish a position that mental skills are either a fixed entity (entity condition) or an attribute that can be developed over time (incremental condition). The incremental belief passage (Appendix A) was titled “Sport Psychology: The New Key to Performance Enhancement” and discussed how research supports the notion that mental skill abilities can increase by up to 70-80% if athletes practice them regularly. The entity belief passage (Appendix B) was entitled “Sport Psychology: The New Fad of Performance Enhancement” and included statistics on how mental skills abilities cannot be improved by a substantial amount (only 2-3%). Both articles included sections on research, as well as more opinion-based portions that included “real life” examples of how sport psychology either can (incremental) or cannot (entity) make a difference.
for performance. Additionally, the articles were very similar in length (approximately two pages of text, between 710-740 words), structure and organization (formatted identically, each included two pictures), as well as the prose used by the “author”, to the point that the only glaring difference between the articles lied in the active message.

**Mental Skills Task**

Participants read the same set of instructions regarding the mental skills task, with minor condition-specific variations. All participants read the following:

You will now complete a few trials of a mental skills task involving relaxation.

Relaxation is an extremely important mental skill that is relevant for athletes of all sports and ability levels. An athlete’s inability to effectively relax and regulate arousal levels can lead to disastrous performances in any sport. The task will involve the equipment that you see in front of you. You will be hooked up to the equipment and sensors will “read” your heart rate (HR) and skin temperature. This technology is called biofeedback and it measures your body’s natural physiological responses.

Incremental condition participants read these condition-specific instructions: “The purpose of this session is to introduce you to relaxation and this new technology, and the general goal of the task will be to relax so that your heart rate and arousal levels remain as low as possible.” Entity group participants read essentially the same instructions, with the following changes: “The purpose of this session is to find student-athletes with impressive mental skills abilities, and the general goal of the task will be to relax so that your heart rate and arousal levels remain as low as possible.” Participants in both groups were also told that their performance on the task would be compared to data on other student-athletes in their age range, which foreshadowed that they would receive feedback on their performance. Once participants noted that they had read and
understood the purpose and goal of the task, they were “connected” to the biofeedback equipment. After a brief moment to get comfortable with the equipment, all participants listened to the same relaxation script via headphones. The script (approximately 4 min 40 s long) was recorded by a male colleague and instructed participants to close their eyes and practice deep breathing exercises for relaxation.

After the mental skills task, the experimenter noted the participant’s HR and skin conductance level (SCL) and provided failure feedback. The experimenter stated:

For Trial 1, your average HR was X. Your average SCL was X. Based on these results, you fall into the 23rd percentile of other student athletes, which is considered “poor.” This means that you performed better than only 23% of all other college athletes, on average, in this same relaxation task.

Failure feedback was set artificially low (23rd percentile) to ensure that participants felt as though they truly failed and performed quite poorly on the task. Though this particular percentage feedback was not based on extant literature, it was expected to elicit feelings of failure that would provide clear response patterns of participants.

**Instruments & Measures**

**Informed Consent Form**

The informed consent form (Appendix C) provided participants with the background information, general procedures, potential risks and benefits, and the confidential nature of the study, among other information. Because there was minor deception involved in the experimental design, the details and nature of the manipulation were not included, but were addressed in the study debriefing form.
Demographic Information and Mental Skills Strategies Form

To assess demographic information, a short questionnaire (Appendix D) was implemented to acquire age, gender, sport, and experience (i.e., time spent in respective sport) information. To assess the mental skills strategies that participants use, athletes were asked to rate how often they use psychological skills of relaxation, imagery, goal setting, and self-talk both during and outside of competition. A description of “mental skills in sport” was also included so that respondents clearly understood the questionnaire, as some may not have had familiarity with the term “mental skills” (see Appendix E for description). The description of mental skills included examples of “basic psychological skills” (e.g., relaxation, goal setting, imagery, self-talk) to provide a broad spectrum of skills that participants could relate to (Hardy, Jones, & Gould, 1996). Items were rated on a 5-point Likert-type scale ranging from 1 (never) to 5 (always). Participants were also asked to report their agreement on one item that stated, “Mental skills are extremely important for achieving peak performance in my sport.” Responses were scored on a 5-point Likert-type scale ranging from 1 (strongly agree) to 5 (strongly disagree).

Implicit Beliefs

To assess implicit beliefs of mental skill abilities in sport, the Theories of Mental Skills Scale (TMS; Appendix F) was used, which is an adapted version of the Theories of Intelligence Scale (TIS) created for this study. The TIS was developed by Levy and Dweck\(^1\) (1997 as cited in Hong et al., 1999) and has been widely used in implicit theory research on intelligence, and has also been adapted to measure implicit beliefs of personality and morality of the self and others (Dweck, 2000). The TMS is comprised of eight statements (four entity statements, four

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\(^1\) Levy and Dweck (1997) is raw, unpublished data, hence second-source citation.
incremental statements) that participants respond to on a 6-point Likert-type scale from 1 (strongly agree) to 6 (strongly disagree). Composite scores can range from 8 (high incremental) to 48 (high entity), and are divided by the number of items to yield an implicit beliefs score from 1 to 6, after reverse scoring where necessary (Levy, Stroessner, & Dweck, 1998). Scores from 1 to 3 were considered to represent incremental beliefs, while scores from 4 to 6 were considered to signify entity beliefs. Initial scores between 3.1 and 3.9 were considered “unclassified” and not placed into experimental conditions for further testing. Analyses of the internal consistency of TMS scales revealed adequate reliability for entity and incremental scales at pre- and post-measurement, with Cronbach’s α values ranging from .81 to .93. Dweck, Chiu, and Hong (1995) provided a considerable amount of evidence for the reliability and validity of three-item implicit beliefs scales in which only entity items are presented. Implicit beliefs scales of intelligence, morality, and person theory showed high internal consistency reliability (α ranged from .85 to .98 between the three scales), and 2-week test-retest reliabilities ranged from .80 to .82 between the scales. An 8-item scale was later developed and tested by Levy and Dweck (1997, as cited in Levy et al., 1998). Analyses showed that there was a strong negative correlation between original entity items and new incremental items (r from -.69 to -.86), providing evidence that disagreement with entity items also represents agreement with incremental items. Furthermore, scores between the 3-item and 8-item measures were highly correlated (r between .83 and .92), and 1-week and 4-week test-retest reliabilities of the 8-item scale were .82 and .71, respectively (Levy et al., 1998).

**Heart Rate (HR) and Skin Conductance Level (SCL) Devices**

These devices measured physiological responses during the mental skills task. They consisted of one HR and two SCL sensors that connected to a laptop (to provide a visual display
of sensor readings) via a coder box. HR and SCL have been shown to have an inverse relationship (Kaushik, Kaushik, Mahajan, & Rajesh, 2006), and beyond simply providing two indices of one’s arousal levels, they provided an interesting and novel visual display for participants. Tomarken (1995) noted that the reliability of psychophysiological measures (such as HR and SCL) within a single session have been shown to be acceptable ($\alpha \geq .80$). It was important to ensure that participants had the sensors attached to their fingers properly and that they remained in place for the duration of the mental skills task. Were the sensors to shift while physiological responses were being recorded, it would likely influence the sensors’ readings.

**Perceived Competence**

Participants’ perceived competence of the mental skills task was assessed through two items: “I expect myself to do well in the mental skills task today” and “I expect myself to be among one of the best in the mental skills task.” These items were scored on 6-point Likert-type scales ranging from 1 (*not at all*) to 6 (*very much so*). Scores on the two items were summed and averaged; higher scores represented more perceived competence for the mental skills task. Providing this information protected against the confounding variable of perceived ability between groups. Because perceived ability to complete the task is considered, differences on dependent variables of interest may not be attributed to differing ability levels between groups. Perceived competence is also an important factor in determining whether or not an individual is exhibiting the helpless- or mastery-oriented pattern. Items were based on research of Spray et al. (2006), who used “I expect myself to do well in the golf putting test today” and “I expect myself to be among one of the best in the golf putting test” to assess perceived competence of a golf putting task. Sarrazin, Roberts, Cury, Biddle, and Famose (2002) developed similar items for perceived ability in climbing and found high internal consistency ($\alpha = .88$).
Goal Adoption Before Failure Feedback

The present study used one item (adapted from Dweck, 2000) to assess participants’ goals before the mental skills task. The item stated “In regards to the mental skills task, if I had to choose between doing better than other student-athletes and learning a challenging new mental skill, I would choose…”. Participants were instructed to circle either “doing better than other student-athletes”, which represented a performance goal, and “learning a challenging new mental skill”, which represented a learning goal. Spray et al. (2006) used two items to assess goals before failure, including “I intend to do the golf putting test today in school to do better than others” and “I intend…to learn from the golf putting task”. Using one item provided a quick assessment of goals, and this particular item effectively pitted a clear performance goal against a well-defined learning goal. Though assessing performance and learning goals independent of one another is also a technique used in research, pitting the goals against each other is when clear differences arise between entity and incremental believers (Dweck, 2000).

Goal Adoption After Failure Feedback

A task choice goal measure was used in the study to assess goals following failure feedback. Instructions read, “There may be more time later to perform additional mental skills tasks. If there is more time, which kind of task would you like to work on most? Please mark only one answer.” The item stated “I would like to work on…” and provided four choices. To prevent the potential social desirability of selecting a learning goal, three performance goal choices were pitted against one learning goal (Dweck, 2000). Two of the performance goal items resembled performance-avoidance goals, where there was an emphasis on not looking incompetent. These items were: “Mental skills tasks that aren’t too difficult, so I don’t make too many mistakes” and “Mental skills tasks that are pretty easy, so I’ll do well.” Another item
represented a performance goal with a challenge: “Mental skills tasks that I’m pretty good at, so I can show that I’m good at mental skills.” Finally, the learning goal item read “Mental skills tasks that I’ll learn a lot from, even if I won’t be very good at them at first.” Spray and colleagues (2006) also used four items to assess goals after failure feedback. Their items included three performance goal items, such as “I like to play levels that are not too hard, so I don’t get bad scores”, “I like levels that are hard enough to show that I am good in golf”, and “I like levels that are fairly easy, so I will do well”. A fourth item assessed learning goals: “I like to try difficult and challenging levels so that I can try to learn from the task, even if I won’t do well”. Task choice goal measures have been used successfully in earlier research and in other achievement contexts (Dweck & Leggett, 1988; Mueller & Dweck, 1998; Sarrazin et al., 1996), and exploratory factor analyses may be conducted in order to determine the true factor structure of the items (Spray et al., 2006).

**Attributions**

To measure attributions for poor performance, participants responded to two items with the stem “My performance on the mental skills task today was because of my…” They were instructed to indicate the extent to which lack of ability and lack of effort contributed to their inability to effectively perform the mental skills task. The question is also similar to that used in the study by Spray et al. (2006), who used the stem “I didn’t do well on the golf putting test today because…” and participants indicated the extent to which lack of effort and lack of ability influenced their performance on a golf putting task. Various measures of attributions have been used throughout implicit beliefs research, but Spray et al. (2006) found a significant main effect for group using this format, which provides internal validity evidence for this particular format.
Behavioral Markers

Three items served as behavioral markers. After reading the mental skills task description, participants were asked to mark whether they would like to complete an “easy” or “difficult” version of the mental skills task. Immediately following the mental skills task, participants were asked “Would you now like to watch a short video on how to properly use the deep breathing technique before you begin the remaining trials? Learning this technique may help you further understand how to control your HR and arousal levels more effectively.” If participants noted that they wanted to watch the deep breathing tutorial, the experimenter played a YouTube video (approximately 2 min 30 s) entitled “Diaphragmatic Breathing Part 1.” If they chose to opt out of the tutorial video (or once the tutorial video was finished), they were given the final questionnaire set. The final item of the third questionnaire set asked participants how likely they would be to seek a sport psychology consultant or mental skills training program in the future on a 6-point Likert-type scale ranging from 1 (not at all likely) to 6 (very likely).

A single item task-choice measure was piloted and yielded no significant results when correlated with implicit beliefs. However, combining the task-choice item with other measures (i.e., the tutorial-choice and sport psychology-consultant items, perceived competence items, and attributions) in a large sample yielded a breadth of information that afforded stronger inferences of response patterns following failure. Though internal consistencies of these single item measures could be measured, they were included for their predictive validity in helping to make claims about implicit beliefs and response patterns.

Debriefing Form

The study debriefing form (Appendix G) provided participants with further information regarding the true nature of the study, including how the research questions and hypotheses were
tested, why this topic is important and relevant to study, as well as information on how to learn how about the topic. There was also information on how participants could choose to withhold their data from analyses, and contact information of the primary researcher as well as the Institutional Review Board (IRB) was provided.

**Procedures**

Participants were recruited in person after receiving permission from coaches of various FSU sports teams. Student-athletes interested in participating in the research study signed up for scheduled time slots to complete the study in a small office room of the Student-Athlete Academic Services Center (SAASC) of a university building on the FSU main campus.

Upon entering the experiment room, participants were instructed according to a prepared script (Appendix H). Participants were first asked to read and sign the informed consent form. If they agreed to participate, they were told that the study dealt with student-athletes’ perceptions of mental skills in sport, and they should read the “Definition of Mental Skills in Sports” sheet to ensure that they fully understood what the term “mental skills” would refer to throughout the experiment. When participants acknowledged that they had read and understood the definition of mental skills, they were asked to complete a brief set of questionnaires, which included questions on demographics information and mental skills strategies, as well as the TMS.

Participants were assigned to either incremental or entity interventions based on TMS scores, and congruent-incongruent conditions were randomly assigned. They were then be asked to read their condition-specific manipulation articles, complete the TMS for post-manipulation implicit beliefs, followed by a brief “quiz” to ensure that they had thoroughly read the passage. Participants had the article in front of them while they completed the quiz and referred back to it for answers, as needed. The quiz items stated: “According to the article, how much (in
percentage) can an individual increase his or her mental skills abilities?” and “To what extent do you agree with the stance presented by the author in the article in regards to mental skills?” A final item read, “In your own words, how would you summarize the main idea of this article? Please write 1-2 sentences.” The experimenter quickly “graded” the quiz upon completion, and those who missed more than one question were excluded from further testing. Following the TMS and quiz, participants were told that it was time to prepare for the mental skills task. The first step was to have them read the condition-specific mental skills task description and to choose which version (i.e., easy or difficult) they wanted to complete. The experimenter then attached the HR and SCL devices to the participants’ first three fingers of their left hand via Velcro straps. Once the sensors were secured and comfortable for the participants, the experimenter began recording HR and SC to show participants how the equipment worked. After a few brief moments, the experimenter stopped recording and asked the participants if they were comfortable and ready to begin the task. Perceived competence and goal adoption before failure feedback questions were filled out at this time. Participants were then instructed to put the headphones on and to listen to the instructions of the relaxation script, and then the script was played.

After the mental skills task, participants’ HR and SCL were immediately recorded, they received failure feedback, and they were asked if they would like to complete the deep breathing tutorial. The experimenter recorded responses to the tutorial question. If they chose to watch the tutorial, it was played immediately. If they wished to pass the tutorial and continue (and once the tutorial was finished for those who opted to watch it), the final set of questionnaires was administered, which included questions on goal adoption after failure feedback, attributions, and the final behavioral marker.
Upon completion of the questionnaires, participants were told that there was not time to practice further trials of the mental skills task and that they were finished with the study. They were asked if they would like to keep a copy of the debriefing form for their reference or if they would prefer to discuss the general nature of the study with the experimenter. Participants were thanked for their participation and dismissed.

**Analyses**

**Pre-Intervention Analyses**

Preliminary analyses included collecting descriptive information on participants’ mental skill use, along with a number of additional variables of interest. These variables included: pre- and post-manipulation implicit beliefs scores, perceived competence, attributions for failure, and likelihood of pursuing a mental skills training program in the future. Frequency data was also recorded for categorical data, including: experimental task choice, goal adoption prior to and following failure feedback, and tutorial choice. All pre-intervention data are reported by intervention condition and include information on effect sizes. Effect size magnitudes throughout this document are based on Cohen (1988, 1992), and should be interpreted as follows: small ($d = 0.20; \eta_p^2 = 0.0099$), medium ($d = 0.50; \eta_p^2 = 0.0588$), and large ($d = 0.80; \eta_p^2 = 0.1379$).

**Post-Intervention Hypothesis Testing**

To test Hypothesis 1, participants’ implicit beliefs scores were computed from the TMS by summing and averaging item responses to yield a score between 1-6. Scores ranging from 1-3 were considered incremental beliefs, and all other scores were excluded from analyses.

To test Hypothesis 2, a RM MANOVA was conducted to determine if interventions had an impact from pre- to post-manipulation implicit belief scores. Within- and between-subjects
effects and interactions were tested and interpreted from Cohen’s $d$ effect sizes. Means and standard deviations were computed and recorded by intervention, as well.

Hypotheses 3 was tested using binary logistic regression (due to the categorical nature of the dependent variable items) to determine if there were differences in goal adoption before and after failure feedback between incremental participants in congruent and incongruent groups. Chi-square values and frequency data were computed and recorded. Though standard $R^2$ values were not obtained due to the nature of the statistical test performed, Nagelkerke pseudo-$R^2$ values were recorded for the interpretation of results.

Hypothesis 4 was tested by separate one-way ANOVAs for ability and effort to determine if the manipulation had an effect on incremental participants’ attributions for failure. Again, effects were computed and interpreted using Cohen’s $d$ effect sizes. Means and standard deviations were computed, as well.

Hypothesis 5a and 5b were tested using binary logistic regression models to determine if incremental participants’ intervention congruency impacted the likelihood to choose the “difficult” version of the experimental task and to watch the tutorial video. For both analyses, chi-square values, frequency data, and Nagelkerke $R^2$ values were computed and recorded. For Hypothesis 5c, a one-way ANOVA was also performed to determine if congruency predicted willingness to see a sport psychology consultant. Main effects were computed similar to the aforementioned hypotheses.

**Exploratory Analyses**

Finally, exploratory performance analyses were conducted on HR and SCL data. Due to the exploratory nature of the original research question of physiological performance during mental skills, a 2 (Gender) × 2 (Intervention Congruency) MANOVA was used to analyze HR
and SCL data to determine if there was a difference in performance of the mental skills task between males and females and congruent and incongruent manipulations. Descriptive statistics were computed, along with effect sizes and interaction effects.
CHAPTER FOUR

RESULTS

The following commentary on statistical analyses is divided into three subsections. First, descriptive statistics along with one-way ANOVAs are presented for the pre-intervention phase to insure equality at the outset, prior to the interventions. The second section, post-intervention hypothesis testing, provides inferential statistical analyses information organized by hypothesis. Finally, an exploratory analyses section provides information on HR and SCL analyses.

Pre-Intervention Analyses

The means and standard deviations for participants’ self-reported use of basic psychological skills, as well as their agreement on whether mental skills are important for peak performance in sport, are presented in Table 1 along with inferential statistics for $F$-tests. This data is presented to insure pre-intervention equality between the two groups. Based on omnibus $F$-tests, there were no significant differences between incremental intervention and entity intervention participants in mental skill use during or outside of competition, agreement that mental skills are important for peak performance, or perceived competence for the mental skills task, though several small effects were revealed. One-way ANOVAs also tested differences between gender on the same set of variables, and effects were found for imagery during competition, $F(1, 66) = 4.45, p = .04, d = .52$, and perceived competence, $F(1, 66) = 14.64, p < .01, d = .93$. For both variables, males reported significantly more imagery during competition ($M = 4.43, SD = .69$) than females ($M = 4.00, SD = .91$), and more perceived competence in their ability to perform the mental skills task ($M = 2.29, SD = .90$) than females ($M = 3.06, SD = .77$). Despite these effects, these differences did not impact performance on the mental skills task (see Exploratory Analyses).
Table 1.

*Mental Skill (MS) Use During and Outside of Competition and Importance Agreement of Entity v. Incremental Intervention Participants.*

<table>
<thead>
<tr>
<th>Variable (df)</th>
<th>Entity Intervention</th>
<th>Incremental Intervention</th>
<th>F</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MS During competition (1, 66)</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxation</td>
<td>3.65 (1.04)</td>
<td>3.91 (.87)</td>
<td>1.30</td>
<td>.26</td>
<td>.27</td>
</tr>
<tr>
<td>Imagery</td>
<td>4.09 (.93)</td>
<td>4.26 (.75)</td>
<td>.74</td>
<td>.39</td>
<td>.20</td>
</tr>
<tr>
<td>Goal setting</td>
<td>4.18 (.93)</td>
<td>4.26 (.90)</td>
<td>.16</td>
<td>.69</td>
<td>.09</td>
</tr>
<tr>
<td>Self-talk</td>
<td>4.32 (.77)</td>
<td>4.09 (1.08)</td>
<td>1.07</td>
<td>.31</td>
<td>.24</td>
</tr>
<tr>
<td><strong>MS Outside competition (1, 64)</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxation</td>
<td>3.29 (.94)</td>
<td>3.13 (.83)</td>
<td>.60</td>
<td>.44</td>
<td>.18</td>
</tr>
<tr>
<td>Imagery</td>
<td>3.32 (1.20)</td>
<td>3.31 (1.20)</td>
<td>.001</td>
<td>.97</td>
<td>.01</td>
</tr>
<tr>
<td>Goal setting</td>
<td>3.85 (.93)</td>
<td>4.09 (.96)</td>
<td>1.07</td>
<td>.30</td>
<td>.25</td>
</tr>
<tr>
<td>Self talk</td>
<td>3.53 (1.11)</td>
<td>3.78 (1.18)</td>
<td>.80</td>
<td>.38</td>
<td>.23</td>
</tr>
<tr>
<td>Importance agreement&lt;sup&gt;c&lt;/sup&gt; (1, 64)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.71 (1.43)</td>
<td>1.66 (1.49)</td>
<td>.019</td>
<td>.89</td>
<td>.03</td>
</tr>
<tr>
<td>Perceived competence</td>
<td>2.91 (.96)</td>
<td>2.57 (.83)</td>
<td>2.43</td>
<td>.12</td>
<td>.38</td>
</tr>
</tbody>
</table>

*Note.*<sup>a</sup>All 68 participants responded to the MS during competition questions, yielding equal intervention groups (*n* = 34 entity, *n* = 34 incremental).

<sup>b</sup>Two incremental intervention participants did not complete the MS outside competition and Importance agreement questions, yielding data from 66 participants and unequal groups (*n* = 34 entity, *n* = 32 incremental).

<sup>c</sup>Participants reported their agreement to one item stating that mental skills are extremely important for achieving peak performance in their sport.
Post-Intervention Hypothesis Testing

Hypothesis 1 stated that athletes would display dominant implicit beliefs and would fall into relatively equal proportions of entity and incremental theorists. The vast majority of participants displayed dominant implicit beliefs (92.1% of the original sample were classified as incremental or entity participants before exclusion), thus Hypothesis 1 is partially supported. However, because participants did not fall into relatively equal proportions of entity and incremental theorists, the hypothesis could not be fully supported.

Table 2.

*Pre- and Post-Intervention TMS Scores by Intervention.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Entity Intervention</th>
<th>Incremental Intervention</th>
<th>F</th>
<th>p</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre- TMS scores</td>
<td>2.06 (.60)</td>
<td>2.09 (.57)</td>
<td>.05</td>
<td>.82</td>
<td>.05</td>
</tr>
<tr>
<td>Post- TMS scores</td>
<td>2.52 (.95)</td>
<td>1.50 (.50)</td>
<td>31.26</td>
<td>&lt;.001</td>
<td>1.34</td>
</tr>
</tbody>
</table>

Hypothesis 2 stated that intervention congruency would have an effect on post-assessment implicit beliefs. Specifically, it was predicted that congruent interventions would strengthen implicit beliefs, while incongruent interventions were predicted to weaken implicit beliefs. A RM ANOVA was conducted to determine if the intervention impacted post-manipulation implicit belief scores. Table 2 lists descriptive statistics for pre- and post-intervention TMS scores, as well as effect sizes for between-subjects comparisons. RM multivariate tests revealed a non-significant effect for Time, $F(1, 66) = .43, p = .52, \eta^2_p = .006$, but a significant Time × Congruency interaction, $F(1, 66) = 27.65, p = <.01, \eta^2_p = .30$ (see Figure 1). Also a significant between-subjects effect for Congruency, $F(1, 66) = 14.72, p = <.01, \eta^2_p =$
.18 emerged. These results provide support for Hypothesis 2 and reveal that the interventions did have a significant effect on post-assessment TMS scores. The congruent intervention strengthened incremental theorists’ beliefs (pre- $M = 2.09$, $SD = .57$; post- $M = 1.50$, $SD = .50$; $d = 1.10$), whereas the incongruent intervention weakened incremental theorists’ beliefs (pre- $M = 2.06$, $SD = .60$; post- $M = 2.52$, $SD = .95$; $d = .58$), thus the manipulation was largely successful in influencing participants’ implicit beliefs.

![Graph showing TMS Mean Scores at Pre- and Post-Manipulation by Intervention Condition.](image)

Figure 1. TMS Mean Scores at Pre- and Post-Manipulation by Intervention Condition.

Hypothesis 3 stated that post-intervention entity beliefs would lead to choosing performance goals, while post-intervention incremental beliefs would lead to choosing learning goals, both before and after failure. Though this hypothesis could not be fully tested, logistic regression models were conducted to determine if there were differences in goal adoption before and after failure feedback between incremental participants in congruent and incongruent interventions. Results revealed that goal adoptions before, $\chi^2 (1, N = 68) = .99, p = .32$, Nagelkerke $R^2 = .03$, and after failure feedback, $\chi^2 (1, N = 68) = .36, p = .56$, Nagelkerke $R^2 =
.02, were not predicted by intervention congruency (see also Table 3). In other words, the interventions failed to reveal a significant effect on incremental theorists’ goal adoption before or after receiving failure feedback, therefore Hypothesis 3 was not supported. For goal adoption before failure, 83.8% of participants chose the learning goal compared to 16.2% of participants who chose the performance goal. Similarly, 95.6% participants chose the lone learning goal item after failure, while only 4.4% of participants chose the performance goal item stating, “Tasks that aren’t too difficult, so I don’t make too many mistakes.” Thus, the sample was quite homogenous in its goal selection, both before and after receiving feedback on the mental skills task.

Table 3.

*Post-Intervention Behavioral Markers and Goal Choice Frequencies by Intervention.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Entity Intervention</th>
<th>Incremental Intervention</th>
<th>$\chi^2$</th>
<th>$p$</th>
<th>Nagelkerke $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental task choice</td>
<td></td>
<td></td>
<td>2.17</td>
<td>.14</td>
<td>.05</td>
</tr>
<tr>
<td>Difficult version</td>
<td>29</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy version</td>
<td>5</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal adoption before failure</td>
<td></td>
<td></td>
<td>.99</td>
<td>.32</td>
<td>.03</td>
</tr>
<tr>
<td>Doing better than others</td>
<td>7</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning a new mental skill</td>
<td>27</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tutorial choice</td>
<td></td>
<td></td>
<td>.26</td>
<td>.61</td>
<td>.005</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>21</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Entity Intervention</th>
<th>Incremental Intervention</th>
<th>( \chi^2 )</th>
<th>( p )</th>
<th>( \text{Nagelkerke } R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal adoption after failure</td>
<td>.36</td>
<td>.56</td>
<td>.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tasks that aren’t too difficult…</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tasks that I’ll learn a lot from…</td>
<td>32</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For Hypothesis 4, it was predicted that post-intervention entity theorists would attribute failure more to ability than effort, while post-intervention incremental theorists would attribute failure more to effort than ability. This hypothesis could also not be fully tested. However, one-way ANOVAs were conducted to determine if interventions had an effect on incremental participants’ attributions for failure. Results revealed no significant differences in attributions for failure on either lack of effort, \( F(1, 65) = .09, p = .77, d = .07 \), or lack of ability items, \( F(1, 65) = 1.30, p = .26, d = .35 \), so Hypothesis 4 was not supported. Participants after both congruent and incongruent interventions did not seem to believe that lack of effort nor lack of ability was the reason for their poor performance on the mental skills task (see also Table 4).

Table 4.

*Post-Intervention Attributions for Failure and Future Mental Skills Likelihood by Intervention.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Entity Intervention</th>
<th>Incremental Intervention</th>
<th>( F )</th>
<th>( p )</th>
<th>( d )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort</td>
<td>4.85 (1.06)</td>
<td>4.91 (.67)</td>
<td>.086</td>
<td>.77</td>
<td>.07</td>
</tr>
</tbody>
</table>
Table 4. Continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Entity Intervention</th>
<th>Incremental Intervention</th>
<th>$F$</th>
<th>$p$</th>
<th>$d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability</td>
<td>3.73 (1.18)</td>
<td>4.09 (.88)</td>
<td>1.30</td>
<td>.26</td>
<td>.35</td>
</tr>
<tr>
<td>Future mental skills$^a$</td>
<td>2.34 (.81)</td>
<td>2.50 (1.05)</td>
<td>.42</td>
<td>.52</td>
<td>.16</td>
</tr>
</tbody>
</table>

*Note.* $^a$Participants responded to how likely they would be to seek a sport psychology consultant or mental skills training program in the future.

Hypothesis 5 stated that post-intervention entity theorists would be less likely to (a) choose the “difficult” version of the mental skills task and (b) watch the tutorial video, while post-intervention incremental theorists would be more likely to (a) choose the “difficult” mental skills task and (b) watch the tutorial video. Hypotheses 5a and 5b could not be fully tested. Results of binary logistic regression models (see Table 3) yielded no significant differences between intervention groups in experimental task choice, $\chi^2(1, N = 68) = 2.17, p = .14$, Nagelkerke $R^2 = .05$, or to watch the tutorial video, $\chi^2(1, N = 68) = .26, p = .61$, Nagelkerke $R^2 = 0.005$, thus Hypothesis 5a and 5b were not supported. In general, participants were much more likely to choose the difficult version of the mental skills task (77.9%) compared to the easy version (22.1%), and were more likely to watch the tutorial video (64.7%) than opt out of watching the video (35.3%).

Hypothesis 5c stated that post-manipulation entity theorists would be less likely than incremental theorists to pursue a mental skills training program or sport psychology consultation in the future. A one-way ANOVA revealed non-significant differences between participants who underwent congruent and incongruent interventions in their likelihood to seek a sport psychology consultant or participate in a mental skills program in the future, $F(1, 66) = .42, p = .52, d = .16$, and subsequently Hypothesis 5c was also not supported. Participants largely reported being
“likely” to “somewhat likely” willing to seek a sport psychology consultant or participant in mental skills training program in the future (Table 4).

**Exploratory Analyses**

Table 5 presents descriptive statistics of physiological variables (HR and SCL) measured during the mental skills task by gender and intervention congruency. Values recorded were the average HR and SCL for the duration of the mental skills task. Multivariate analyses of a 2 (Gender) × 2 (Intervention Congruency) MANOVA on physiological variables are displayed in Table 5. Overall, non-significant multivariate effects for Gender, Wilks’ $\delta = .97, F(2, 61) = .88, p = .42, \eta^2_p = .03$, Intervention Congruency, Wilks’ $\delta = 1.00, F(2, 61) = .10, p = .91, \eta^2_p = .003$, and Intervention Congruency × Gender interaction, Wilks’ $\delta = .93, F(2, 61) = 2.49, p = .09, \eta^2_p = .08$ emerged.

Table 5.

**Heart Rate (HR) and Skin Conductance Levels (SCL) Between-Subjects Effects for Gender, Congruency, and Condition.**

<table>
<thead>
<tr>
<th>Physiological Variable</th>
<th>Between-Subjects Effects</th>
<th>$F$</th>
<th>$\eta^2_p$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Congruency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Congruent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>84.38 (23.29)</td>
<td>.09</td>
<td>.001</td>
<td>.77</td>
</tr>
<tr>
<td>SCL</td>
<td>4.16 (4.00)</td>
<td>.12</td>
<td>.002</td>
<td>.74</td>
</tr>
<tr>
<td></td>
<td>Incongruent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>86.03 (22.85)</td>
<td>.09</td>
<td>.001</td>
<td>.77</td>
</tr>
<tr>
<td>SCL</td>
<td>4.49 (3.92)</td>
<td>.12</td>
<td>.002</td>
<td>.74</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>88.06 (22.82)</td>
<td>1.01</td>
<td>.02</td>
<td>.32</td>
</tr>
<tr>
<td>SCL</td>
<td>4.76 (3.92)</td>
<td>.79</td>
<td>.01</td>
<td>.38</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>82.35 (22.79)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCL</td>
<td>3.89 (3.91)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physiological Variable</td>
<td>Between-Subjects Effects</td>
<td>$F$</td>
<td>$\eta^2_p$</td>
<td>$p$</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------</td>
<td>-----</td>
<td>------------</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td><strong>Congruency × Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male Congruent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>80.86 (15.18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCL</td>
<td>4.65 (5.08)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female Congruent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>87.90 (27.10)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCL</td>
<td>3.67 (2.98)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male Incongruent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>95.27 (23.71)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCL</td>
<td>4.87 (3.62)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female Incongruent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td>76.80 (21.04)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCL</td>
<td>4.11 (4.10)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interaction Effect</td>
<td>5.04</td>
<td>.08</td>
<td>.03</td>
</tr>
<tr>
<td>HR</td>
<td>.01</td>
<td>.00</td>
<td>.91</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Analyses were based on the following group sizes: male congruent ($n = 13$), female congruent ($n = 20$), male incongruent ($n = 15$), and female incongruent ($n = 18$).

For the follow-up univariate ANOVAs, there were also non-significant between-subjects effects for Congruency on HR, $F(1, 62) = .09, p = .77, \eta^2_p = .001$, Congruency on SCL, $F(1, 62) = .12, p = .74, \eta^2_p = .021$, as well as Gender effect on HR, $F(1, 62) = 1.01, p = .32, \eta^2_p = .02$, and Gender on SCL, $F(1, 62) = .79, p = .38, \eta^2_p = .01$. However, there was a significant Congruency × Gender between-subjects interaction for HR (highlighted in Figure 2), $F(1, 62) = 5.04, p = .03, \eta^2_p = .08$, though there was not a significant between-subjects interaction for SCL, $F(1, 62) = .01, p = .91, \eta^2_p = .00$. Because the multivariate analyses were not statistically significant, the significant Congruency × Gender between-subjects interaction for HR should be interpreted cautiously.
Figure 2. Intervention Congruency × Gender Interaction on Average HR.
CHAPTER FIVE

DISCUSSION

The purposes of this study were to determine whether collegiate student-athletes employ dominant implicit theories of their mental skill abilities, whether these beliefs can be manipulated, and whether these beliefs influence one’s response to failure. This study has revealed that collegiate athletes do have dominant implicit beliefs in regards to their mental skills abilities in sports. However, unlike existing studies on implicit beliefs in other domains, the sample was so predominantly incremental in nature that only participants exhibiting incremental beliefs were included in the final analyses. These individuals, who believe that their mental skills abilities are malleable and can be developed over time, were significantly influenced by the manipulation reading article according to their post-intervention implicit beliefs. Though there was not evidence that the intervention significantly impacted incremental theorists’ responses to failure, the purposes of the study were nonetheless achieved. Furthermore, the exploration of physiological responses in an experimental study of implicit beliefs of mental skills should provide future research with a framework for successfully merging the fields of social psychology and sports and performance psychology.

To determine whether collegiate student-athletes employ dominant implicit theories of their mental skill abilities, the TMS (adapted from Dweck’s TIS) was issued to participants prior to receiving the study manipulation to obtain a baseline of implicit beliefs. The distribution of incremental to entity participants was overwhelmingly incremental, straying from much of the extant research on implicit beliefs, which has often reported more normally distributed samples. It was hypothesized that athletes would exhibit dominant implicit beliefs, distributed relatively evenly between incremental and entity theorists. The results provide partial support for this
hypothesis because athletes did display dominant implicit beliefs. However, due to the incrementally skewed distribution of beliefs, the hypothesis could not be fully supported. This hypothesis was based on extant literature, but due to the nature of the results, researchers should perhaps consider that implicit beliefs of mental skills abilities are unique from other domains and may not follow the same incremental to entity base rate distributions as intelligence, morality, or athletic ability. Further investigations are required in order to establish a true incremental to entity base rate for implicit beliefs of mental skills abilities to guide subsequent research questions.

Analyses revealed that the intervention articles significantly influenced participants’ implicit beliefs at post-assessment. Incremental theorists who read a theory-congruent article reported stronger incremental beliefs following the manipulation, while incremental theorists who read an article reflecting an entity mindset reported weakened incremental beliefs, which provided full support for Hypothesis 2 and provides insight into the flexible nature of individuals’ beliefs. The malleability of implicit beliefs themselves has been noted by previous research (see Dweck, 2000 and Spray et al., 2006), but it is useful to discuss this finding and its implications for applied sport psychology in some detail. The fact that a two-page Psychology Today-type article was able to temporarily alter the beliefs of collegiate athletes should raise a certain level of concern from practitioners and coaches. Collegiate-level athletes are in constant contact with members of their teams’ coaching staff, support personnel (including strength and conditioning, nutrition, athletic training, academic specialists and more), as well as peers and family members on a daily basis. What the findings of this study potentially highlight is the ease at which athletes’ beliefs can be influenced. Even if an athlete has expressed interest to seek the services of a sport psychology consultant or become more involved in a pre-existing mental
skills training program, potentially all it takes is for one individual to devalue the importance of mental skills training to alter the beliefs of this athlete and impede his or her growing interest in mental skills training. Perhaps one instance of this sort (similar to the method of this study) would not be enough to change incremental beliefs to a complete entity mindset, but what happens if the same message is delivered repeatedly or by an individual that has significant influence over the athlete, such as a coach who determines playing time? The true malleability of these beliefs will only be determined by future research in this area.

The implications for coaches and practitioners on the malleability of implicit beliefs are not all negative, however. Just as incremental theorists who read an incongruent article were manipulated, those who read the congruent intervention article were influenced, as well. Though this study was focused on strictly incremental theorists and cannot speak to the malleability of entity theorists beliefs, if future research can reveal that these individuals’ beliefs are also impressionable, then practitioners can design mental skills training programs to include specific educational components aimed to teach athletes that mental skills abilities can improve with effort and practice, similar to the educational materials developed by Blackwell et al. (2007) in their implicit beliefs intervention study. These programs can and should be available to all athletes, but may also be targeted more specifically to entity theorists for additional and specialized education. Too often practitioners begin working with athletes under the assumption that the group is eager to learn and practice mental skills without ever even assessing whether the athletes believe that mental skills abilities are fixed or malleable qualities. The TMS can be used as a quick measurement tool to assess these beliefs in athletes, and this knowledge should serve as a guide to practitioners as they implement mental skills training programs with individuals or
groups of athletes. It should be noted, however, that additional research is necessary in order to provide support to these claims.

Because the study was limited to incremental theorists, it was not entirely surprising to find that there were not significant differences between intervention congruency groups in the types of goals that they chose prior to and following failure feedback, their attributions for failure on the mental skills task, or any of the behavioral markers. Although the interventions were successful in altering the beliefs of the incremental theorists at post-assessment, the impact of the interventions was likely only momentary. Furthermore, despite the impact of the incongruent article in weakening incremental theorists’ beliefs, it was not enough to sway the sample completely toward the entity end of the continuum, and on average incongruent intervention participants were still considered incremental in nature according to post-TMS scores. Thus, Hypotheses 3, 4, and 5 were essentially comparing incremental theorists to incremental theorists and no differences between groups should have been expected to surface. Prior research has shown that participants receiving an incremental intervention displayed greater motivation and self-efficacy and less negative affect than those in entity interventions (Kasimatis, Miller, & Marcussen, 1996). Future research may consider measuring the affect of participants, as well, to see if intervention and feedback congruency differentially influences emotional responses, similar to past research (Kasimatis et al., 1996; Plaks, Grant, & Dweck, 2005; Plaks & Stecher, 2007). Had this been examined in this study, perhaps affective differences would have arisen between incremental theorists receiving theory-violating information (i.e., the incongruent intervention) and those receiving theory-congruent information.

Though Hypotheses 3, 4, and 5 could not be fully tested, it is worth recognizing that incremental theorists did act in a manner mostly consistent with previous research and as the
hypotheses predicted. In this study, incremental theorists adopted learning goals both prior to and following failure feedback, similar to the adolescent incremental theorists in the Spray et al. (2006) study. These results are also consistent with the original implicit theory framework presented by Dweck and Leggett (1988), however, without a true entity group for comparison, it is difficult to determine whether it was truly implicit beliefs or the social desirability of responses that led to incremental participants learning goal choices.

For attributions, all participants did not seem to believe that effort or ability were the causes of their poor performance on the mental skills task. There was a small-medium effect for ability between groups, though inferential analyses revealed this difference to be non-significant. Prior research on attributions for failure has been inconsistent. For example, Hong et al. (1999) found that incremental theorists attributed their failure to effort more so than ability. In the same study, no between-subjects effects were found between incremental and entity theorists on ability attributions. However Spray et al. (2006) found no effects between groups on effort, but ability attributions between groups emerged. In light of mixed results reported in extant literature and the inability for incremental-entity comparisons within this study, future research must be conducted in order to determine the true nature of the implicit beliefs-attributions framework, and new methods for determining attributions for failure (e.g., open-ended responses) should be explored.

As would be expected according to implicit theory, incremental participants were more likely to choose the “difficult” mental skills task over the “easy” version. Choosing the difficult version of the mental skills task is consistent with the mastery-oriented response outlined in implicit theory, as the difficult version of the task would likely be seen as a challenge and would yield the better learning opportunity for incremental theorists. Likewise, more participants opted
to watch the tutorial video than not, and all participants reported being at least “somewhat likely” to seek sport psychology consultation or to participate in a mental skills training program in the future. The motivation of incremental theorists to take remedial action has emerged in prior research (Hong et al., 1999; Spray et al., 2006) and remains consistent with the implicit theory framework and the aforementioned mastery-oriented response pattern (Dweck 2000; Dweck & Leggett, 1988). Furthermore, the expressed openness to see a sport psychology consultant in the future, combined with the samples’ overall attitude that mental skills are important for reaching peak performance in sports, is consistent with previous research on collegiate athletes’ attitudes towards sport psychology services (Wrisberg et al., 2009).

Despite the inability to compare the achievement patterns of incremental and entity theorists, this study provided a breadth of information on the motivational processes of incremental theorists in a new domain, and this information has shown to be quite consistent with extant literature on implicit theory. The exploration of implicit beliefs of mental skills abilities in athletes should offer future researchers a wealth of empirical opportunities and provide useful insight for coaches and applied sport psychology practitioners.

**Limitations and Future Research**

The study’s findings and its potential implications to inform applied sport psychology and coaching education are not without its limitations. Perhaps the most glaring of these limitations was the absence of entity theorist groups to compare to the incremental theorists and the inability to fully test several hypotheses. Implicit theory is branded on its notions that individuals either develop a “fixed” mindset (entity beliefs) or a “growth” mindset (incremental beliefs) and these opposing beliefs are almost always compared to one another in extant research. However, of the original 76 participants sampled for the study, only two individuals were
classified as clear entity theorists; at this sampling rate, it would have taken an impractical amount of participants to obtain a proper sample for group comparisons. To counter the loss of these groups (entity congruent and entity incongruent), sizes of the remaining groups (incremental congruent and incremental incongruent) were increased to achieve adequate power.

Prior research by Dweck and colleagues has revealed that, on average, about 80% of individuals display dominant implicit beliefs (approximately 40% incremental and 40% entity), so the findings of this study may seem extreme. However, because the base rate for implicit beliefs of mental skills in collegiate athletes has yet to be established, one must be careful not to completely reject the current findings. Future research must be conducted with different populations in order to gain more insight into the implicit beliefs of mental skills in athletes. For example, the present study was focused on collegiate athletes at an elite NCAA Division I university. Athletes of this caliber devote their lives to improving their craft on a daily basis, often training relentlessly year-round to achieve even the smallest gains. It may be of no surprise then, for it to be revealed that the vast majority of the present sample displayed dominant incremental beliefs for their mental skills abilities. In fact, the sample as a whole generally agreed that mental skills are essential for achieving peak performance in their respective sports, so they may recognize that just as their technique and physical capabilities may be cultivated with practice, so too can their mental skills abilities. Future research, consequently, should explore the implicit beliefs of athletes of various experience and competitive levels.

It also must be recognized that Florida State University has a significant sports psychology presence on campus, with many varsity and club athletic teams utilizing the free consulting services offered from graduate students and faculty. Accordingly, the vast majority of participants may have been quite familiar with mental skills, and some had likely even sought
individual consulting to further develop their mental skills, which may have influenced results of the study. Future research should therefore seek to explore the implicit beliefs of collegiate (and other) athletes with no prior exposure to sports psychology services, and perhaps even younger populations, as well. Studying the implicit beliefs of mental skills in coaches would also provide interesting insight from a different perspective.

Future research should also strive to improve upon the experimental procedures outlined in the present study. Specifically, the HR and SCL data has limited implications because no baselines were recorded prior to the mental skills task. Had baseline data been documented, it would have eliminated potential confounds between groups on the physiological variables from the outset of the study, as well as provided further insight into how the interventions may have affected the HR and SCL of participants. Furthermore, recording physiological responses during and after receiving failure feedback would provide another indicator of how individuals respond to such information, and additional analyses could determine if groups differed in their subsequent physiological responses. Future studies may also wish to simplify procedures even further by recording HR via simple HR monitors rather than biofeedback equipment, which is often expensive and cumbersome. Though using HR monitors would not record SCL, this information may not be necessary, as it is often difficult to explain and interpret to participants.

Though this study had its limitations, its potential implications for applied sport psychology practice and future sports psychology research cannot be understated. It was the first study of its kind to examine the implicit beliefs of mental skills in an athlete population and was further strengthened because implicit beliefs were measured prior to and following a manipulation. Extant research has typically focused on one method or the other – either issuing a manipulation without an initial assessment of beliefs, or assessing beliefs without a manipulation
– but not both. The key finding to take away from this study is that regardless of an athlete’s implicit beliefs of his or her mental skills in sports, coaches and practitioners must be mindful that athletes are constantly absorbing information that may be strengthening or weakening their belief systems for mental skills. Therefore, it is the responsibility of coaches and practitioners to educate their athletes on the importance of developing and maintaining an incremental mindset in which the growth and refinement of mental skills is considered an integral stepping stone on the path to peak performance in sports.
There is a new performance enhancement craze sweeping the nation (and the world, for that matter). No, it’s not Human Growth Hormone (HGH) or other PEDs. There is no new workout or weight training regimen that builds speed or strength at incredible rates. The new key to performance enhancement is sport psychology. Really? Sport psychology is the answer? I’ve considered this question for some time now, done my research, and here’s my conclusion: it’s 100% true.

Research on Sport Psychology

To come to this conclusion, I started by doing some research. There is an incredible amount of research out there that shows that sport psychology can be effective. Not only do mental skills help athletes deal with setbacks and failures, they actually aid in performance enhancement, as well. In other words, having a set of mental skills can help you feel better about going into a game or competition, you’ll deal with setbacks and failures better than someone who isn’t equipped with these skills, AND you’ll have a leg up on the competition because you’ll be more relaxed, focused, and better able to deal with the stress that the sporting environment throws at you. Sure, there is research out there that claims that mental skills aren’t effective for improving performance, but there are two or three times as many research studies claiming just the opposite – that mental skills can be as effective, or more effective in some cases, than physical attributes such as strength and speed. Furthermore, research shows that you can increase your mental skills abilities by huge amounts (up to 70-80%), just by incorporating mental skills training into your regular workout schedule. Basically, no matter who you are, if you work hard at mental skills training, you CAN get better and you WILL see results. Realistically, training strictly mental skills isn’t going to magically make you a better player. You obviously need to continue training and practicing physically in order to improve your game. However, including mental skills into your training can make a difference, and might be the key to success. Sport psychology can make average players good, and good players great. However, research is only one piece of the puzzle. Let’s consider some recent examples in sports highlighting how important sport psychology truly is.
Mental Skills Make a Difference

It is well documented that after the 2011 NBA Finals LeBron James received about as much criticism as any athlete in professional sports has ever been exposed to. It was one year after the infamous “Decision” to leave Cleveland for South Beach and unite with Chris Bosh and Dwyane Wade to create “The Big 3” in Miami. However, LeBron had an abysmal NBA Finals and did not walk away with a NBA Championship trophy. Critics claimed that although he was clearly the most physically talented basketball player in the world (and potentially ever), he couldn’t handle the pressure of big-game situations and ultimately wasn’t mentally tough.

Heading into the 2011-2012 NBA season, there was something clearly different about LeBron. He seemed to approach the game with a different attitude. He seemed happier. He seemed more focused, and ultimately a better all-around basketball player. Reports surfaced early in the season that LeBron had sought a sport psychologist in the off-season after his 2011 NBA Finals meltdown, and it was clearly showing in his game. Fast-forward two years, and what has LeBron James done since then? Well all he has done is record back-to-back regular season MVPs, NBA Finals MVPs, and NBA Championships. Still don’t think sport psychology can elevate your game? Ask LeBron James and see what he says.

Conclusion

I could go on describing examples highlighting my point, but I think you get the picture. When it comes down to it, 99 times out of 100, the athletes that can handle stress, deal with adversity, and stay focused and relaxed during competition are going to come out on top. Obviously physical attributes are important, but it’s the mental aspect of sports that is the key to greater success. There will certainly still be opponents to the ideas behind sport psychology, but the fact of the matter is that research supports mental skills training, and the numbers don’t lie. If you can increase your mental skills by up to 70-80%, and these skills can lead to performance enhancement, why not give it a try? It’ll be worth it.
There is a new performance enhancement craze sweeping the nation (and the world, for that matter). No, it’s not Human Growth Hormone (HGH) or other PEDs. There is no new workout or weight training regimen that builds speed or strength at incredible rates. The new fad of performance enhancement is sport psychology. Really? Sport psychology is the answer? I’ve considered this question for some time now, done my research, and here’s my conclusion: It’s 100% false.

Research on Sport Psychology

Sure, there is some credible research out there that shows that sport psychology can be effective. However, it mostly just seems that mental skills help an athlete deal with setbacks and failures, and mental skills don’t actually aid in performance enhancement. In other words, having a set of mental skills may help you feel better about going into a game or competition, and you’ll deal with a blowout loss better than someone who isn’t equipped with these skills, but they aren’t going to make you play any better. For every bit of research that claims that mental skills are effective for improving performance, there are another two or three research studies claiming just the opposite – that mental skills are about as helpful as wishing and praying for a win. Furthermore, research shows that only you can only increase your mental skills abilities by 2-3%, which is ultimately a negligible amount in the grand scheme of things. Basically, you’re born with the ability to be good at mental skills, and if you aren’t born with much of that ability, there isn’t much anyone can do to help you. So, long story short, training mental skills isn’t going to magically make you a better player. The time you waste working on mental skills is time that the competition is spending in the weight room where they’ll actually see results.

However, research only provides one piece of the puzzle. Let’s consider some recent examples in sports highlighting how unimportant sport psychology truly is.

Mental Skills in Sports: You Either Have Them or You Don’t

The scientific findings supporting the notion that mental skills abilities are innate have surfaced throughout the sports world, as well. When sports psychologists started surfacing in the sports world in the early 1990s, it certainly seemed as if they were here to stay. However, fast-
forward twenty years, and this “fad” of performance enhancement is already as old school as the original iPhone. Less and less professional teams, as well as collegiate programs, are incorporating mental skills training programs into their daily schedules because they simply aren’t effective enough to keep around. Sport psychologists can work with teams or individuals on a daily basis, but the fact remains that the amount that they are actually “helping” or “improving” athletes’ mental skills is almost none. Sure, there are some athletes that are naturally mentally gifted and are generally just very mentally tough individuals, but even they aren’t seeing the benefits of a sport psychologist. Likewise, the athletes that weren’t born naturally gifted when it comes to mental skills aren’t seeing any gain either, so each minute spent talking with the sport psychologist is taking away valuable minutes that they should be spending improving other aspects of their game. These days, the only reason that sport psychologists are even on the staffs of professional and collegiate sports teams is because they have absurd amounts of money and can afford to pay an overpriced salary. So go ahead, work on your mental skills. A year from now, when nothing has improved, you’ll remember why I warned you to not waste your time on something that you can’t improve.

Conclusion

I could go on describing examples highlighting my point, but I think you get the picture. When it comes down to it, 99 times out of 100, the more physically gifted individuals or teams are going to come out on top. You can’t much better at mental skills, but you CAN get significantly bigger, faster, and stronger if you work hard. Remember, this is coming from scientific research – not just my opinion – and the numbers don’t lie. Why spend valuable time and energy trying to improve your mental skills if you can only increase them by 5-10%, when you could be in the weight room making real progress. So do yourself a favor and hit the gym instead of the therapist’s couch.
APPENDIX C

INFORMED CONSENT FORM

FSU Behavioral Consent Form

Implicit Theories of Mental Skill Capacity in Sport: The Influence of Implicit Beliefs on Cognitions, Affect, and Behavior in Collegiate Athletes (Pilot)

You are invited to be in a research study concerning athletes’ perceptions of their mental skills within their sport. You were selected as a possible participant because you are a varsity-level collegiate student-athlete. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Cory Shaffer and Dr. Robert Eklund, Educational Psychology and Learning Systems, Florida State University

Background Information:

The purpose of this study is to:
- Determine if college athletes employ dominant implicit beliefs of their own mental skills capabilities
- Determine if implicit beliefs predict achievement orientation in college athletes
- Observe whether or not implicit beliefs predict cognitions, affect, and behavior in college athletes.

Procedures:

If you agree to be in this study, we would ask you to do the following things:
- Complete a series of short questionnaires (~15 minutes)
- Read a short passage describing mental skills research.
- Complete two trials of a short mental skills task, at the difficulty of your choice (~10 minutes)
- Understand that your Heart Rate and Arousal Level (via skin conductance) will be recorded during the mental skills task
- Complete another series of short questionnaires (~10 minutes)

Risks and benefits of being in the Study:

The study has few risks involved. By completing the questionnaires, you will be asked to disclose information regarding: the types of mental skills strategies that you currently employ within your sport, your beliefs about mental skills, demographic information (such as your age, sport, etc.), and your current affective state. Some may find this difficult to disclose, but the likelihood of this being detrimental to you in any way is very minimal.

Some may also find it uncomfortable to complete the mental skills task, which will require you to listen to a voice recording and practice relaxation techniques while wearing headphones.

FSU Human Subjects Committee approved on 9/19/2013 Void after 4/03/2014 HSC # 2013:10485
The benefits to participation are only that you will receive information regarding Sport Psychology consultation services available at Florida State University at no charge.

Compensation:

There is no compensation for participation.

Confidentiality:

The records of this study will be kept private and confidential to the extent permitted by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University or Florida State University Sport Psychology consultation services. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions:

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the FSU IRB at 2010 Levy Street, Research Building B, Suite 276, Tallahassee, FL 32306-2742, or 850-644-8633, or by email at humansubjects@magnet.fsu.edu.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

_________________________  _________________
Signature                           Date

_________________________  _________________
Signature of Investigator           Date

FSU Human Subjects Committee approved on 9/19/2013 Void after 4/09/2014 HSC # 2013.10485
APPENDIX D

DEMOGRAPHICS AND MENTAL SKILLS STRATEGIES FORM

Please fill out the following information about yourself.

1. **Sex**: (please circle one)

   Male       Female

2. **Age**:

   I am ______ years of age

3. **Sport**: (please circle one; if you are involved in more than one varsity/club sport, please select the one that you believe to be your primary sport)

<table>
<thead>
<tr>
<th>Baseball</th>
<th>Basketball</th>
<th>Cross Country</th>
<th>Football</th>
<th>Golf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soccer</td>
<td>Softball</td>
<td>Swimming &amp; Diving</td>
<td>Tennis</td>
<td>Track &amp; Field</td>
</tr>
<tr>
<td>Volleyball</td>
<td>Sand Volleyball</td>
<td>Other: (please specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. **Experience with sport**:

   I have ______ years of experience in this sport.

5. How often do you use the following mental skills DURING COMPETITION?

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Relaxation</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Goal Setting</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Imagery</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Self-talk</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
6. How often do you use the following mental skills OUTSIDE OF COMPETITION? (i.e., during practice, at home, etc.)

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Sometimes</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Relaxation</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Goal Setting</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Imagery</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Self-talk</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

7. To what extent do you agree with the following statement: Mental skills are extremely important for achieving peak performance in my sport. (Please circle one)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>2</td>
<td>Mostly Agree</td>
<td>Mostly Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
</tbody>
</table>

8. Have you ever received any training in either relaxation or deep breathing techniques? (Note: this includes any extensive practice in yoga or meditation) (Please circle one)

Yes   No
APPENDIX E

DEFINITION OF MENTAL SKILLS

For the purposes of this questionnaire, “mental skills” will refer to the mental “tools” and techniques used by athletes to enhance performance. Examples of mental skills include relaxation, goal setting, imagery, and self-talk. These mental skills are believed to be the basic mental skills that lead athletes to be confident, motivated, able to control anxiety and arousal, and concentrate and focus during competition (Hardy, Jones, & Gould, 1996). In other words, a “mentally tough” athlete should possess these mental skills. The skills are described in more detail below (as defined by Hardy, Jones, & Gould, 1996), but if you have questions in regards to these or any other mental skills, please ask the experimenter at this time.

Relaxation is the ability to control anxiety and handle pressure in stressful environments and situations.

Goal setting helps athletes motivate themselves to focus their attention and energy toward specific and challenging standards (goals) that should lead to peak performance.

Imagery is the visualization or mental rehearsal of the successful completion of an activity or action and is often used before and during competition.

Self-talk is the ability to control thoughts, which directly affect feelings and actions in practice and competition.
APPENDIX F

THEORIES OF MENTAL SKILLS SCALE

This questionnaire has been designed to investigate ideas about mental skills. There are no right or wrong answers. We are interested in your ideas.

Using the scale below, please indicate the extent to which you agree or disagree with each of the following statements by writing the number that corresponds to your opinion in the space next to each statement.

1 2 3 4 5 6
Strongly Agree Agree Mostly Agree Mostly Disagree Disagree Strongly Disagree

_____ 1. You have a certain amount of ability for mental skills in sports, and you can’t really do much to change it.

_____ 2. Your mental skills abilities are something about you that you can’t change very much.

_____ 3. No matter who you are, you can significantly change your mental skills abilities level.

_____ 4. To be honest, you can’t really change how good you are at mental skills in sports.

_____ 5. You can always substantially change how good you are at mental skills in sports.

_____ 6. You can learn new things, but you can’t really change your basic level of mental skills abilities.

_____ 7. No matter how much mental skills ability you have, you can always change it quite a bit.

_____ 8. You can change even your basic mental skills ability level considerably.
APPENDIX G

DEBRIEFING FORM

Study Debriefing
Implicit Theories of Mental Skill Capacity in Sport: The Influence of Implicit Beliefs on Cognitions, Affect, and Behavior in Collegiate Athletes (Pilot)

This study is concerned with collegiate athletes’ perceptions of their mental skills abilities. Research in other domains (e.g., intelligence, athletic ability) has shown that individuals tend to adopt dominant implicit beliefs about personal attributes (i.e., whether or not attributes are fixed or can develop over time). Researchers have provided evidence that implicit beliefs can be manipulated and intervened on in academic settings. However, implicit beliefs research has not yet been conducted on mental skills ability beliefs in an athlete population.

How was this tested?
In this study, you were asked to complete a series of questionnaires. All participants answered the same questions about their current use of and beliefs of mental skills strategies, goal involvement, and affect. You were then asked to read a short passage describing mental skills research. One group received a passage stating that mental skills are innate (natural) talent that you are born with. The other group received a passage stating that mental skills can be learned and developed over time, with practice. You were then asked to perform two trials of a relaxation task, at the difficulty level of your choice. All participants performed the same relaxation task on both trials, regardless of the difficulty level you chose. You were then given feedback on your mental skills task results. One group received “negative” feedback, stating that they had not improved from Trial 1 to Trial 2, and that they performed worse than other student-athletes in the study. The other group received “positive” feedback, stating that they had improved from Trial 1 to Trial 2, and that they had performed better than other student-athletes in the study. You were then asked to complete another series of questionnaires, re-assessing your mental skills abilities beliefs.

Hypotheses and main questions:
We expect to find that athletes’ dominant implicit beliefs will predict their achievement orientation. Also, we believe that we will be able to predict post-assessment implicit beliefs and goal involvement if manipulation conditions match individuals’ implicit beliefs. Further, we believe that manipulation conditions will predict mental skills task difficulty choice.

Why is this important to study?
This study will extend research and theory to domains beyond those that have been previously studied. Further, it should help develop an understanding of the potential reasons that athletes do not engage in mental skills training. If it is determined that college athletes do employ dominant implicit beliefs of their mental skills abilities and that these beliefs can be manipulated, future research can explore the effectiveness of mental skills interventions in athletes, particularly those who once believed that mental skills abilities were of a fixed capacity.

What if I want to know more?
If you are interested in learning more about implicit beliefs, you may want to consult:

If you would like to receive a report of this research when it is completed (or a summary of the findings) or details on Applied Sport Psychology consultation services, please contact Cory Shaffer at (724)734-6950 or cts11b@my.fsu.edu.

**What if I want to withhold my data?**
If you would like to withhold the data that you provided via the questionnaires within the study, please inform the researcher at this time. If you choose to withhold your data, it will not be analyzed.

If you have concerns about your rights as a participant in this experiment, please contact the FSU IRB Secretary at (850) 644-8633.

**Thank you again for your participation.**
APPENDIX H

INSTRUCTION SCRIPT

• Hi, my name is Cory Shaffer. Welcome to the study.
• To begin, please read this informed consent form. By signing the sheet you are agreeing to participate in the study and acknowledging that you have read the entire form. You may keep a blank copy for your records.
• Next, because this study is concerned primarily with mental skills in sports, please read the “Definition of Mental Skills in Sports” sheet so that you fully understand what mental skills refers to throughout the study.
• Have you fully read the definition and understand what mental skills will be referring to?
• Now please take a few minutes to fill out this brief set of questionnaires. (Packet includes Demographics Information and Mental Skills Strategies Form & TMS).
  o score TMS to determine condition, note condition on sheet and locate proper condition materials.
• Next, please read this brief article. (Manipulation articles are condition-specific, so double check condition and ensure that the appropriate article is selected).
• Please answer this brief set of questions. (provide TMS)
• To ensure that you read and understand the article, please complete these brief questions. You have use the document to aid you in answering the questions.
  o Give the participant the “quiz”
  o Quickly “grade” the quiz for understanding.
  o If answer one incorrectly, give participant one more chance to get it correct before moving on. If not, thank them for participation and excuse them.
• Now we will begin to prepare for the mental skills task. Please take a few moments to read through the description of the mental skills task and mark which version you would like to complete. (Remember that the mental skills task description is condition-specific, so double check condition and the sheet to ensure that they match).
• As the sheet stated, we will be using the equipment in front of you to record your heart rate while you complete the relaxation task. With your help, I will now attach the sensor to your second (middle) finger of your left hand. Please make sure that the sensor is secured around your finger with the Velcro, but do not tighten it to the point where it is uncomfortable or painful.
• I will now begin recording your heart rate so that you can see how the equipment works. (Let the participant see the graphs on the screen and point out the heart rate reading.)
  o Clear this data before starting the actual mental skills task
• Are you comfortable with beginning the first trial of the task? If so, please fill out the following questions before you begin. (Have participant fill out perceived competence and goal adoption before failure feedback questions before beginning the task).
• Please put the headphones on/in. When I click this button, the script will begin. Just follow the instructions that you hear through the headphones, and let me know when they are finished. (When the participant seems ready, begin the relaxation script).
• ***For Trial 1, your average HR was ________. Your average SCL was ________. As you can see on the screen, your HR and SCL levels were much higher than the average collegiate student-athlete, which are ________ and ________ (here and here, on the
screen). Based on these results, you fall into the 23rd percentile of other student-athletes, which is considered “poor.” This means that you performed better than only 23% of all other college athletes, on average, in this same relaxation task.

- Would you now like to watch a short video on how to properly use the deep breathing technique before you begin the remaining trials? Learning this technique may help you further understand how to control our HR and arousal levels more effectively.
  - If the participant notes that he/she wants to watch the deep breathing tutorial, play the video (which should be open in the background already).
    - If the participant does not want to watch the tutorial (or after the video is complete), say the following:
      - ***In order to ensure that we have enough time for the remainder of the experiment, we will skip Trial 2 for now. If we have time, we will come back to this trial at the end of the experiment.
- Please take a few minutes now to fill out this questionnaire. (Includes goal adoption after failure, attributions, and behavioral marker questions).
- (When the participant finishes). Thank you for participating in the study. You are now finished and are free to leave. Here is a debriefing form if you would like to know more about the study, or I will be happy to answer any questions that you may have.
- I’d like to point out that the feedback you received following the mental skills task was not true; I provided you with fabricated statistics in order to see how you would respond to failure. I assure you that you did fine on the mental skills task and if you would like to practice it again, we may do so.
- If you participated in the study for course credit, it will be posted by the end of the day. I simply ask that you do not discuss the nature of the study with other student-athletes, as I hope to include many more in the experiment sample. If you do not have any further questions, thank you again for your participation, and have a nice day!
APPENDIX I

IRB APPROVAL MEMORANDUM

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 03/10/2014
To: Cory Shaffer
Address: [Blank]
Dept.: EDUCATIONAL PSYCHOLOGY AND LEARNING SYSTEMS
From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Implicit Theories of Mental Skill Capacity in Sport: The Influence of Implicit Beliefs on Cognitions, Affect, and Behavior in Collegiate Athletes (Pilot)

The application that you submitted to this office in regard to the use of human subjects in the research proposal referenced above has been reviewed by the Human Subjects Committee at its meeting on 04/10/2013. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 04/09/2014, you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000046.

Cc: Bob Ekhud, Advisor
HSC No. 2013.10147
APPENDIX J

CHANGE IN PROTOCOL IRB APPROVAL MEMORANDUM

Office of the Vice President For Research
Human Subjects Committee
P O Box 3062742
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM (for change in research protocol)

Date: 09/23/2013

To: Cory Shaffer

Address:

Dept: EDUCATIONAL PSYCHOLOGY AND LEARNING SYSTEMS

From: Thomas L. Jacobson, Chair

Re: Use of Human subjects in Research
Project entitled: SELF-THEORIES OF MENTAL SKILL ABILITIES IN COLLEGIATE ATHLETES

The application that you submitted to this office in regard to the requested change/amendment to your research protocol for the above-referenced project has been reviewed and approved.

Please be reminded that if the project has not been completed by 04/09/2014, you must request renewed approval for continuation of the project.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Bob Eklund, Advisor
HSC NO. 2013.10485
REFERENCES


BIOGRAPHICAL SKETCH

Cory Travis Shaffer was born on September 21, 1987 in Sharon, Pennsylvania and lived in nearby Transfer, PA with his parents, Bruce and Karen, his brother, Jason, and sister, Samantha, until attending college. He graduated from Cornell University in 2010 with a Bachelor of Science in Human Development (Concentration in Social and Personality Development) and earned his Master of Arts in Developmental Psychology from Teachers College, Columbia University in 2011. Cory enrolled in the Sport Psychology doctoral program at Florida State University in the Fall of 2011. He accepted a position as the Naval Special Warfare Group Four Mental Performance Specialist in January 2014 and moved to Virginia Beach, Virginia while finishing his doctoral degree.