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The present study investigates the effects of a formal goal setting program on self-confidence, satisfaction, and rehabilitation adherence in injured NCAA student-athletes. Six athletes volunteered for the study (mean age=20.7 years, 4 males and 2 females). A single-subject design was used, with each participant having 3-5 weeks of baseline data collected before starting the goal setting program. Each intervention lasted between 2-6 weeks. Both short- and long-term goals were used during the intervention, and athletes were encouraged to set challenging, specific, measurable goals. Measures of confidence and rehabilitation adherence were collected weekly. Measures of satisfaction (for both the athlete and the supervising certified athletic trainer or physical therapist) were collected post-baseline and post-intervention. Each athlete also participated in a post-intervention debriefing to evaluate the goal setting program.

Results demonstrated varied effects across participants. Three participants showed increased confidence and adherence during the goal setting program. Results for satisfaction were mixed. The program evaluation revealed that all participants found the program useful and would recommend it for other injured athletes. This study acts as a preliminary study on the use of a goal-setting program in athletic injury rehabilitation programs. Study limitations are presented and directions for future research provided.

EFFECTS OF A FORMAL GOAL SETTING PROGRAM ON RECOVERY AFTER ATHLETIC INJURY

By

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

College sports have become an important institution in the United States. In 2003-2004, 380,061 athletes participated in collegiate sports sponsored by the National Collegiate Athletic Association (Bray, 2004). Despite numerous precautions taken by sports medicine professionals, athletic administrators, coaches and athletes, injuries are an inherent part of competitive athletics. Thus, proper treatment and rehabilitation of injuries is critical to the success of intercollegiate athletes and the teams to which they belong.

The certified athletic trainer is the allied health professional charged with the management and treatment of athletic injury (Arnheim & Prentice, 1997). In most instances the certified athletic trainer oversees every aspect of the rehabilitation process, from initial first aid and emergency treatment through the physical rehabilitation and safe re-introduction of the athlete into his/her athletic event. Due to the nature of competitive athletics, every aspect of the rehabilitation process is designed to safely return the athlete to full competition in as little time as possible (Arnheim & Prentice, 1997). This process is magnified when dealing with collegiate athletes who place a great deal of personal investment into their athletic career. Thus, a great deal of research in athletic training strives to find new ways to safely return athletes to competition in shorter periods of time.

The role of psychology in athletic injury rehabilitation has been known for decades, but has only recently been studied as a mediator of recovery (Heil, 1993). Athletic trainers are aware that injury places a number of psychological demands upon the athlete, and that these demands should be addressed during the rehabilitation process (Ford & Gordon, 1998; Larson, Starkey, & Zaichkowsky, 1996; Wiese, Weiss, & Yukelson, 1991). However, many athletic trainers feel that they do not have enough sport psychology education to effectively implement a psychological skills program (Ford & Gordon, 1998; Wiese et al., 1991). In addition, many of the basic psychological skills (such as imagery, relaxation, concentration development, emotional control) used by sport psychology professionals were rated as less important (in terms of effectiveness in helping athletes cope with athletic injury and athletic trainers' knowledge about psychological strategies) than other techniques by athletic trainers (Wiese et al., 1991). It appears that athletic trainers can increase their use of psychological skills during the injury rehabilitation process.

Research pertaining to the effects of psychological skills on injury rehabilitation is relatively new in the sport psychology literature. Initial research shows a potential link between the use of various psychological skills and decreased recovery time (Ievleva & Orlick, 1991). Drawing from this research, further investigation has yielded positive findings regarding the use of psychological skills during injury rehabilitation to enhance positive mood, increase functional ability, and increase adherence (Brewer et al., 2000a; Johnson, 2000). Although the theory behind these results has yet to be studied, it does

appear that psychological skills can have a significant impact upon the injury recovery process.

Out of the multitude of psychological skills tested in reference to athletic injury rehabilitation, goal setting is one of the only skills to see consistent support across studies. Ievleva and Orlick (1991) identified it as one of three skills correlated with fast recovery from injury. Studies by Johnson (2000), Scherzer and colleagues (2001), and Theodorakis and colleagues (1996 & 1997) have further supported the use of goal setting to enhance various aspects of the rehabilitation process. However, all of the available studies have been performed on recreational athletes in more traditional physical therapy settings. No research has been performed on competitive athletes in a more aggressive athletic training environment. This research is critical, especially since new ways to enhance the rehabilitation process are always needed in athletic training.

Purpose/Hypotheses

The purpose of this study is to further delineate the effects of a selected psychological skill, goal setting, on measures of confidence, satisfaction and rehabilitation adherence. A goal setting intervention was used with six injured athletes after 3-5 weeks of baseline assessment to determine the effects of goal setting on these selected variables. It is hypothesized that the goal setting intervention would lead to increased adherence to the rehabilitation plan, increased confidence, and increased satisfaction with their recovery. In addition, it is expected that the supervising athletic trainer (ATC) will observe increased effort, rehabilitation intensity, and receptivity with subjects, and will also report increased satisfaction with the athlete's recovery. The

results of this study should help athletic trainers implement a relatively simple but effective psychological skill into existing rehabilitation protocols that will help enhance the rehabilitation process for the injured student-athlete.

CHAPTER II

REVIEW OF THE LITERATURE

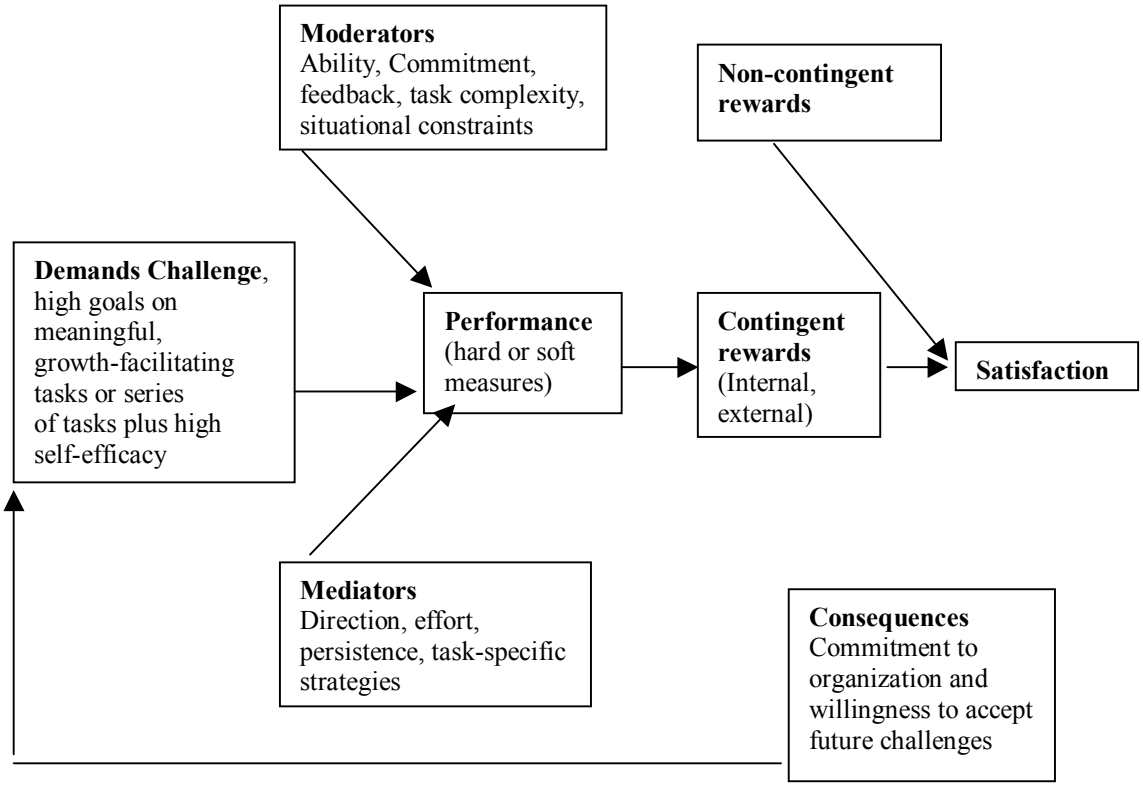
Goals are defined as "the aim or end of an action" (Locke & Latham, 1990). Indeed, most human actions are driven by goals, whether conscious or unconscious. Conscious goals involve purposeful actions driven by an individual's desire for the goal (or end). Unconscious goals (or nonconscious goals) also drive action, but are automatic and are usually confined to biological actions necessary for life (i.e., blood circulation, breathing, digestion) (Locke & Latham, 1990). Most theories of goal setting pertain to consciously driven goals, as these goals are created and achieved by the purposeful action of individuals (Locke & Latham, 1990).

Locke and Latham's Theory of Goal Setting

The primary theory used by researchers and practitioners of psychological skills was developed by Edwin Locke and Gary Latham. Locke and Latham's Theory of Goal setting states that goals have two main attributes: content and intensity. Goal content refers to the object or result of the goal being sought. Goal intensity is the amount of time, effort, and personal investment an individual will put into achieving a goal. Both interact to produce action. Goals also influence the direction, intensity, and persistence of behavior, and help stimulate the development of task-specific strategies that can be used to achieve certain levels of performance. Locke and Latham developed a goal-setting model to illustrate the variables involved in the goal setting process, as well as

describe how goals lead to performance satisfaction (see figure 1) (Locke & Latham, 1990; Burton, 1993).

Figure 1: Locke and Latham's Goal Setting Model (Burton, 1993)



Locke and Latham's Goal setting model identifies the important aspects involved in goal setting. First, a demand or challenge must be placed on an individual. This leads to the development of some goal or aim to meet the demand. Five moderator variables exist that impact the effect of goals on performance: Ability, commitment, feedback, task complexity, and situational constraints. Performance of a specific action or series of actions leads to rewards that are contingent upon successful achievement of the goal. These rewards can be either internal or external. Additional noncontingent rewards may

also occur. These rewards both influence the satisfaction an individual feels upon completion of a goal. Consequences exist after goals have been achieved; individuals may exhibit increased commitment to an organization or be more willing to accept future challenges (Locke & Latham, 1990). In addition, individuals who are successful in achieving goals exhibit increased self-efficacy and are more likely to set additional demanding goals in the future (Locke & Latham, 1990).

In this model of goal setting, two attributes have been identified through research as being of particular importance when setting goals. Goal difficulty refers to the perceived challenge the goal presents to an individual. Most organizational goal setting research has supported a linear relationship between goal difficulty and performance, although this has been debated in recent literature (Locke & Latham, 1990; Burton, 1993). Goal specificity relates to the relative vagueness of a goal. Goals that are more specific lead to additional enhancements in performance. Locke and Latham believe this is due to the inability of an individual to 'settle' for lower levels of performance when specific goals are set. Vague goals (such as "do your best" goals) result in satisfaction with lower levels of performance. Specific goals identify a very particular level of performance that must be met in order for goal achievement to occur. Both of these goal attributes will be further discussed in later chapters.

Four of the moderator variables that Locke and Latham (1990) have identified have also been thoroughly researched. Ability moderates goal effectiveness, as well as the performance increases observed. As an individual's ability increases, the effects of goal setting may take longer to appear (Burton, 1993). In addition, if the difficulty of the

goal exceeds the ability of the individual, goal effectiveness begins to plateau (Locke & Latham, 1990). The effects of goal commitment on goal effectiveness are dependent upon the level of commitment and the difficulty of the goal. Low-commitment individuals will outperform high-commitment individuals when goal difficulty is low, whereas high-commitment individuals will exhibit greater performance when goal difficulty is high (Locke & Latham, 1990; Burton, 1993). Burton hypothesizes that this effect is due to the ability of high-commitment individuals to conform their performance to the relative difficulty of a goal. Feedback has an important role in the effectiveness of any goal. Locke and Latham (1990), in a comprehensive review of the literature, found that 17 of 18 studies supported the use of goals in combination with feedback, and 21 of 22 additional studies found that the combination was more effective than feedback alone. Locke and Latham believe that feedback operates through one of two mechanisms: by enhancing self-efficacy or perceived ability, or by allowing for adjustment in goal-achievement strategies. The fourth mediator, task complexity, is less clearly understood. Goal setting is more effective when tasks are simple, although this does not mean that complex tasks do not respond to goal setting programs. Locke and Latham (1990) hypothesize that new task-specific strategies must be developed when complex tasks are performed, and then the motivational effects of effort, persistence and focus must make the new strategies work. These four mediators are important to consider when setting goals for enhancing performance.

Locke and Latham's theory on goal setting has a great deal of support in the literature and is the most widely accepted and researched model in organizational

psychology. However, some researchers have criticized the theory for it's purely mechanistic view. Garland proposed the cognitive evaluation theory to add an individual perception component to goal setting theory. In addition, goal orientation theory has been proposed as another way goals influence performance. These two theories will be discussed in the following sections as potential adjuncts to Locke and Latham's theory.

Garland's Cognitive Evaluation Theory

Howard Garland developed his cognitive evaluation theory in 1985 to address the cognitive aspects of goal setting. Garland believes that goals are cognitive constructs. His theory works specifically with task goals- those goals that are set by the individual and are not assigned. In order for a goal to be considered in this theory, it must meet the following criteria: it must be an image of a future level of performance that an individual wants to achieve, it must exist prior to the task action, it must be at least ordinal in nature, and they must have motivational significance (Garland, 1985). Garland proposes that task goals are mediated by two specific cognitive constructs: performance expectancy and performance valence. Performance expectancy is defined as "a composite of an individual's subjective probabilities for reaching each of a number of different performance levels over a range of performances that might be considered" (Garland, p. 349). Thus, performance expectancy can be viewed as how probable an individual believes a certain performance level is, in comparison to other performance levels. It is the combination of several different probabilities, from several different performance levels, that creates performance expectancy. Performance valence is defined as "a composite of those satisfactions an individual anticipates will be gained by producing

each of a number of different performance levels over a range of performances that might be considered" (Garland, p. 349-350). Valence refers to the satisfaction an individual expects to have due to performing, not the satisfaction of performance-related outcomes or rewards. In addition, Garland also recognizes task ability as a mediator of performance (Garland, 1985).

In Garland's theory, three propositions exist to conceptualize and explain the causal relationships between performance, ability, expectancy and valence. The first proposition is that task performance is a positive function of task ability and performance expectancy and a negative function of performance valence. The positive relationship between ability and performance is obvious, and research has shown that the same relationship exists between expectancy and performance (self-efficacy research also plays a role here) (Garland, 1985). The unexpected relationship is that between performance valence and task performance. Individuals who anticipate higher levels of satisfaction (high valence) will typically be more satisfied with lower performance levels. Those who anticipate lower satisfaction with a task will typically work harder to achieve higher levels of performance (Garland, 1985). Thus a negative relationship exists.

The second proposition Garland makes is that performance valence is a negative function of task goal and performance expectancy. If a task goal is easy, an individual feels more satisfaction with achieving a higher level of performance than someone else who had a more difficult task goal. Additionally, individuals who exhibit high levels of expectancy (in other words, they feel that a certain performance level is very easy to achieve) will experience lower levels of satisfaction. Indeed, when a task is challenging

and expectancy decreases, the satisfaction from reaching a certain level is higher (Garland, 1985).

The third proposition in this theory is that performance expectancy is a positive function of task goal and ability. The relationship between expectancy and ability is easy to see- individuals who have high ability expect more out of their performance on a task. However, a less direct relationship exists between expectancy and task goal. Garland hypothesizes that a number of processes could help explain this proposition. Individuals who set high task goals are more likely to develop task strategies that he/she perceives to more positively affect performance. This could result in higher expectancy. In addition, errors or biases in the estimation of the likelihood of an event ("wishful thinking") may also lead to higher expectancy.

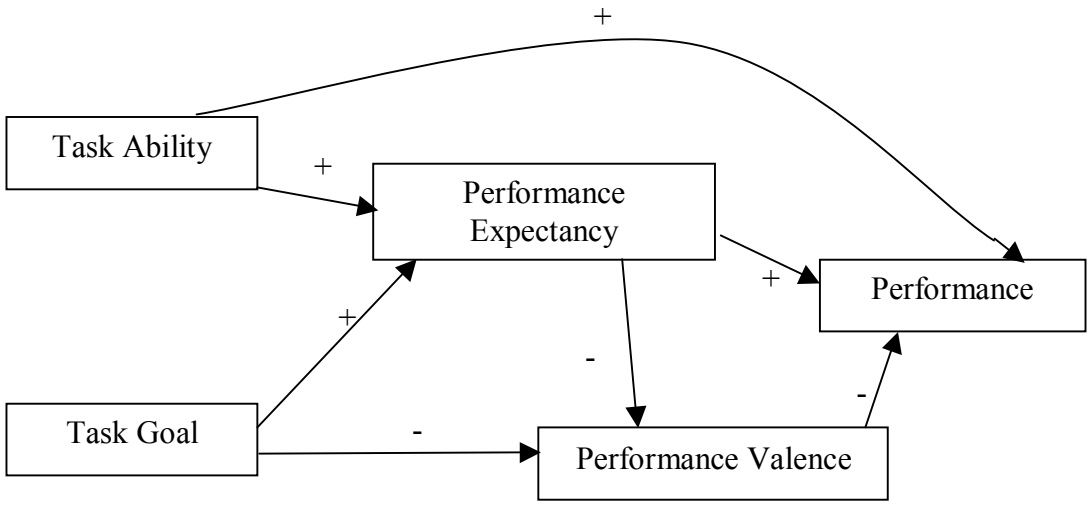
Garland (1985) conducted a study to test the model. 176 subjects participated in one of 5 experimental goal-setting conditions. Three of the conditions attempted to influence the task goals by assigning a performance standard (easy, medium, or great difficulty), while two served as control. Subjects engaged in 10 short repeated task trials, and measures of each subject's task goal were taken prior to beginning the next task. Measures of expectancy (how well an individual feels he/she will do in reference to performance standards) and valence (how satisfied an individual would be with regard to performance standards) were also obtained after each trial. The model was tested by performing a path analysis on the data obtained in the study. Results showed strong support for the model, with all path coefficients displaying statistical significance and all showing the predicted sign (positive or negative). In addition, the combination of

performance valence, expectancy and ability predicted 63% of the variance in task performance (Garland, 1985). Several procedures were used to validate the path model, all of which lent additional support to the theoretical model.

However, Locke and Latham (1990) find fault with Garland's proposition that there is no direct link between a task goal and performance. They cite several studies that provide evidence to support their theory that goals directly influence task performance. Locke and Latham (1990) support the idea that both expectancy and valence may mediate task performance, but not at the expense of the direct link between goals and performance. Thus, they seem to dismiss Cognitive Evaluation Theory, as it does not include any direct effect of goals upon task performance.

In sum, Garland's Cognitive Evaluation Theory proposes that performance expectancy and performance valence mediate the effects of task goals upon performance. Higher task goals lead to higher levels of performance expectancy and lower performance valence. Performance expectancy has a direct positive effect upon performance, and an indirect positive effect through lower performance valence. Lower levels of performance valence also result in higher performance. All of the proposed paths from task goal to performance result in higher levels of performance (see figure 2). This theory also has positive, although limited, support from empirical study (Garland, 1985) although it does not seem to receive widespread support from other researchers (Locke & Latham, 1990). This theory, in contrast to Locke and Latham's Theory, places the emphasis on cognitive constructs- meaning the individual is the determining factor in how goals affect performance.

Figure 2. Garland's Cognitive Evaluation Theory. Theoretical model of the linkages between task goals and performance (Garland, 1985)



Goal Orientation Theory

Goal orientation theory has also been proposed as a model for goal setting. Goal orientation theory predicts that an individual's perceived ability interacts with his/her achievement goals to produce achievement-related behavior (Weinberg, 2002). Each individual is thought to have a specific goal perspective that will affect his/her self-evaluations of ability, effort expenditure, and attributions for performance outcome. These cognitive constructs are then thought to influence affect, task strategies, and future task choice, performance level and persistence in the face of failure (Weinberg, 2002). Research in this area has found two predominant goal perspectives: task goal and ego goal orientation. Individuals who exhibit high levels of task goal orientation use self-referenced improvements in performance to determine their ability and competence. These perceptions will drive future goal setting. Those individuals high in ego goal orientation attempt to out-perform others. They reference their ability and competence in

comparison to the ability and competence of others. Again, future goal setting is driven by perceived success and failure. Those individuals who are higher in task goal orientation have a tendency to set more realistic goals and tend to perceive higher levels of confidence, persistence, and perceived success than individuals high in ego goal orientation (Weinberg, 2002). These two goal orientations are not independent of one another: some researchers suggest that elite athletes tend to exhibit high levels of both task and ego (Hardy, Jones, & Gould, 1996).

This theory has also received considerable support from empirical research. Gill (2000) identified several studies that demonstrate the link between perception of success and failure and perception of demonstrated ability. Burton (1989) found that swimmers who engaged in a performance-goal setting program had increases in perceived success and perceived ability, and scored very high on the intrinsic and task subscales of the Achievement Orientation Questionnaire (AOQ), indicating a strong preference towards performance orientation (task orientation). Spink and Roberts (1980) found that racquetball players fell into four general categories: Satisfied winners, satisfied losers, unsatisfied winners, and unsatisfied losers. The individual's feelings of success were more closely related to their perception of ability or quality of performance than actually winning or losing. In addition, Gill (2000) notes that goal orientation should be considered when setting task goals, as individuals higher in task orientation will respond more favorably to process, self-referenced goals, whereas individuals higher in ego orientation will respond well to outcome goals. The key to goal orientation theory is to

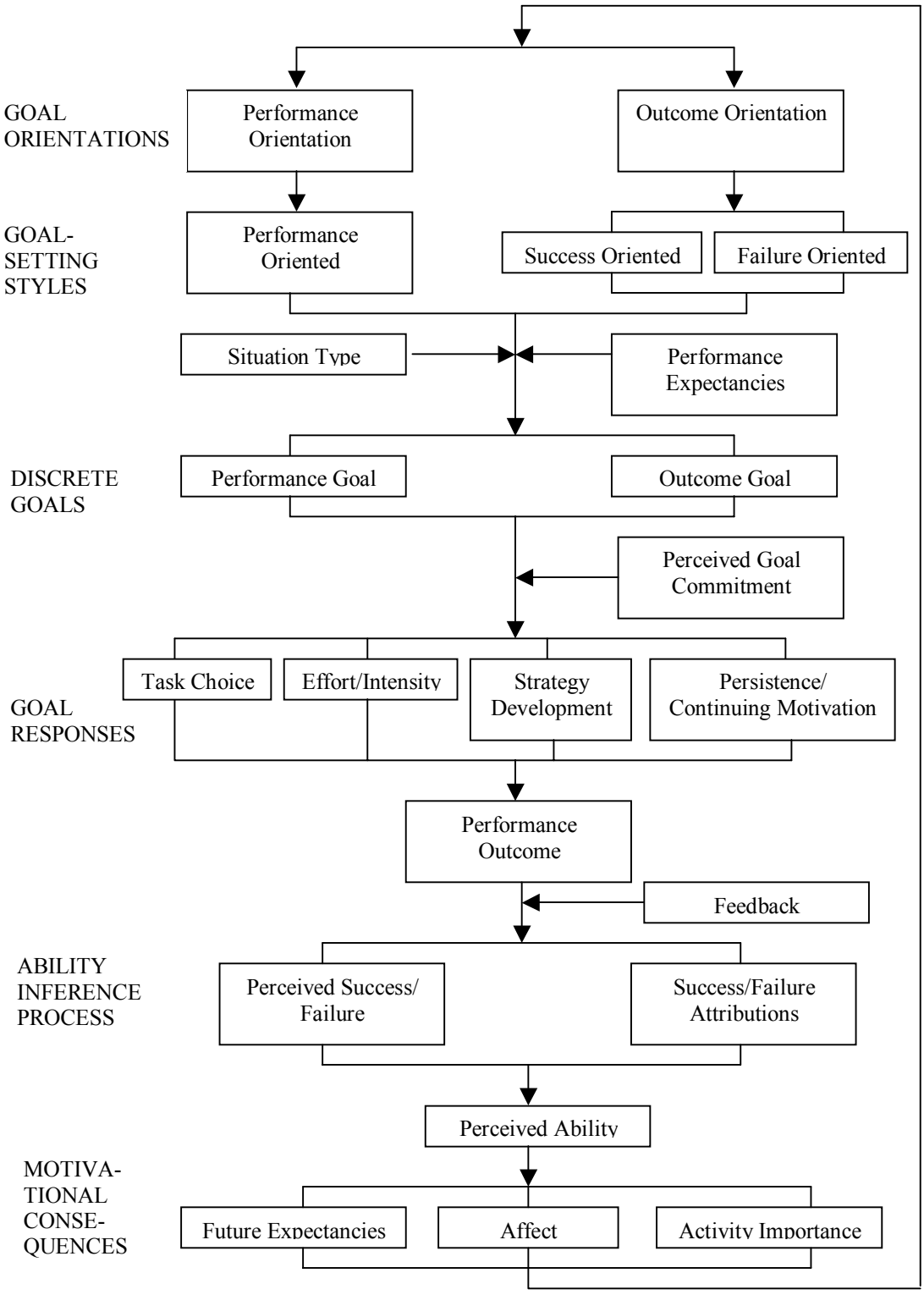
consider the personal characteristics of the individual and their individual perceptions of success when setting and evaluating goals.

Competitive Goal Setting Model

The key component of both Cognitive Evaluation Theory and Goal Orientation Theory is the role of subjective perceptions in the evaluation of both ability and success in meeting goals. Both theories contend that goals do not lead to performance through purely mechanistic constructs, but instead lead to cognitive evaluations that in turn affect performance. Research in both psychology and sport psychology support all three theories as explanations for the influence of goals on performance. Burton (1993) utilizes Locke and Latham's theory, as well as cognitive constructs, in his Competitive Goal Setting model (figure 3). Goal orientations, goal setting styles, types of goals, perceptions and attributions, and affect are all combined with traditional mechanistic constructs to produce the most comprehensive goal setting model to date (Burton, 1993). Indeed, this model appears to address the major aspects of goal setting research that have been demonstrated since Locke began his work in the 1960's. However, there is little empirical data to support this model, and thus it cannot be described in depth as yet.

Locke and Latham's Theory of goal setting is the most widely supported model in the behavioral science literature, and will be the conceptual and theoretical framework for this study. It is the belief of the investigator that a direct link between goals and performance exists, and is not entirely mediated by the cognitive constructs identified by Garland (1985) and Burton (1993). Locke and Latham (1990) identify all of the major mediators (expectancy, valence, self-efficacy, ability, difficulty, and specificity) in their

Figure 3. Competitive Goal Setting Model (Burton, 1993)



theory of goal setting, and thus the investigator will address these variables in the discussion. In addition, measures of task satisfaction and confidence are included to help delineate the influence of these factors on overall feelings toward recovery.

Goal Setting Research in Industrial/Organizational Settings

Most of the goal setting research has been performed in organizational and industrial settings. Locke, Shaw, Saari, and Latham (1981) reviewed over 200 studies published since 1968 and found that 90% supported the performance enhancing capabilities of goals. Locke and Latham (1990) also found similar results in their review of over 400 studies. However, the meta-analysis performed by Tubbs (1986) provides some of the most powerful support for the relationship between goals and performance. He identifies four hypotheses: 1) the mean effect size (mean ES) for studies investigating difficult versus easy goals will be greater than zero, 2) the mean ES for studies investigating specific versus 'do-your-best' goals will be greater than zero, 3) the mean ES for studies investigating goals plus feedback versus goals alone will be greater than zero, and 4) the mean ES for studies investigating individual participation in the goal setting process versus assigned goals will be zero (although Tubbs does amend this by stating that, if individuals participate in the goal setting process and goal levels are not held constant, the mean ES will be different than zero). Eighty-seven studies were included in the analysis (there are hundreds of studies, but only those 87 met inclusion criteria). Out of these studies, 147 usable results were obtained (N=147).

Results of the meta-analysis show moderate to strong support for three of the four hypotheses (the feedback analysis yielded only 3 usable results, and thus the results

supporting the hypothesis should be viewed with caution). Goal difficulty showed a mean ES of .816 (n=4732), goal specificity a mean ES of .502 (n=4960), feedback a mean ES of .564 (n=176), and participation a mean ES of .002 (n=890). However, Tubbs (1986) found the form of experimental methodology (direct measurement of goal results versus survey) to be a significant moderator when interpreting results for three hypotheses (no surveys were used in the three feedback studies). Studies that incorporated direct measurement displayed higher mean ES's than studies that used surveys. This has important implications when interpreting the results of studies that utilize surveys to obtain goal results. In addition, Tubbs (1986) identifies significant differences between laboratory and field ES's in all four hypotheses, indicating that laboratory experiments (which display higher mean ES's) may not share the external validity of field experiments (a finding that is not unusual, but shows a need for careful interpretation of lab results). This research strongly supports the role of goal setting in organizational settings to enhance performance.

Goal Setting Research in Athletic Settings

The performance-enhancing qualities of goals in sport settings are less clear. Locke and Latham (1985) propose that the mechanisms that produce increased performance should generalize well in athletic settings. Indeed, most of the studies in athletics demonstrate some positive relationship between goal setting and performance (e.g., Burton, 1989; Kingston & Hardy, 1997; Swain & Jones, 1995; Theodorakis, 1996; Wanlin, Hrycaiko, Martin, & Mahon, 1997). However, Burton (1993) notes that several studies in the sport psychology literature do not support the use of specific-difficult goals.

This failure to exhibit consistent results could be due to several factors, as identified by Burton (1993). First, small sample sizes have been utilized in one-third of the goal setting studies. Second, athletes tend to operate closer to their performance potential than other individuals. As noted in the discussion of Locke and Latham's Goal Setting Theory, high initial ability may delay the onset of goal setting effects, and the performance-enhancement curve begins to flatten as ability increases (Locke & Latham, 1990). Third, task complexity moderates the effectiveness of goal setting. Locke and Latham (1990) identify task complexity as a moderator of goal effectiveness, and believe that additional time may be needed to observe changes in performance when studying cognitively complex tasks. Fourth, individual differences, particularly in self-efficacy, may mediate goal effectiveness. Burton (1993) believes that the effect of sample size is negligible, thus he suggests that operating closer to performance potential, task complexity, and individual differences help explain the inconsistencies in the goal setting literature.

In addition, Hardy, Jones and Gould (1996) suggest that goals may be dysfunctional in some instances, citing two studies by Jones et al. (1990) and Hardy et al. (1986) that demonstrate a link between very challenging goals, performance decrements and high cognitive anxiety. Again, this may be partially explained through the individual differences identified by Burton (1993), particularly those individuals who display low levels of task self-efficacy. The important point is to tailor goal setting to the individual- those who exhibit high cognitive anxiety and/or low self-efficacy may require different goals than others.

A meta-analysis by Kyllo and Landers (1995) has helped resolve some of the controversy surrounding the efficacy of goals in athletics. The researchers compiled 36 studies to test three hypotheses regarding goal-setting in sport: 1) difficult goals would result in greater performance gains than easy or 'do-your-best' goals, 2) specific goals would result in greater performance gains than vague, 'do-your-best', and no goals, and 3) a combination of short-and long-term goals would result in greater performance gains than long-term goals alone. One hundred thirty-six effect sizes were coded and used in the meta-analysis. The overall effect size for the analysis was .34, indicating a general positive effect for goals on performance. Further testing revealed that moderately difficult goals led to the greatest performance gains (ES=.53, $p<.05$), significantly higher than easy, difficult, or improbable goals. Absolute (or highly specific) goals were also significantly different from relative or do-your-best goals (ES=.93, $p<.05$). The combination of short- and long-term goals was found to be equivocal with short-term goals alone (ES=.48 and .38 respectively), but significantly different from long-term goals alone ($p<.05$). In addition, several significant moderator variables emerged, including subject experience (subjects who were new to goal setting reported greater gains than experienced subjects), goal type (competitive and cooperative goals were found to elicit greater performance gains than mastery goals), and participation in the goal setting process (participant-set and cooperative goals showed greater performance than assigned goals). This study demonstrates that a moderately strong effect exists for goals on sport performance, and underscores many of the recommendations that are used in goal-setting programs for both athletes and non-athletes.

Goal Setting Research in Injury Rehabilitation

The goal setting literature in athletic training is very limited, as psychological skills training as an adjunct to traditional rehabilitation has just recently been studied. An exploratory study by Ievleva and Orlick (1991) demonstrated a potential link between faster recovery and the use of psychological skills, most notably goal setting. Thirty-two subjects answered questions about the particular psychological skills they may or may not have used during rehabilitation after either a knee injury (grade 2 medial collateral ligament sprain) or an ankle injury (grade 2 lateral ankle sprain). The skills targeted by the survey were attitude, outlook, level of stress, social support, self-talk, goal setting, and mental imagery. In addition, the recovery time for each participant was obtained, and subjects were ranked and classified as 1) fast healers (took less than 5 weeks to recover), 2) average healers (took between 5-12 weeks to recover, and 3) slow healers (took more than 12 weeks to recover). Correlations revealed that goal setting was negatively correlated to recovery (the more an individual used goal setting, the faster the recovery) (-.310, $p<.10$). In addition, qualitative analysis revealed that fast healers tended to set goals more often than slow healers, and the use of daily goals (when compared to long-term or return-to-sport goals) was most closely related to faster recovery (Ievleva & Orlick, 1991).

Evans et al. (2000) demonstrated a potential link between goal setting and increased self-efficacy and motivation. Three subjects participated in a longitudinal action research study, utilizing in-depth interviews, diaries, case notes and interviews with physiotherapists conducted over the course of several months (range 5-12 months).

The investigator provided psychological skills training and consulting services during each meeting. Qualitative analysis of the data gathered during the psychological skills intervention demonstrated the efficacy of goal setting as an intervention during injury rehabilitation. In addition, Evans et al. (2000) found support for the use of long- and short-term goals, process and performance goals, and goal flexibility.

More empirical studies by Theodorakis and colleagues (1996 and 1997) show strong support for the effects of goal setting on improved rehabilitation performance. In the 1996 study, 91 female university students (all were university or recreational athletes) participated. Thirty-two of the subjects had sustained a knee injury and undergone arthroscopic knee surgery during the previous 6 months, and had noted quadriceps femoris weakness at the time of the study. All of these individuals were placed in the first experimental group. A second experimental group consisted of non-injured women (n=29), while a third control group (n=30) was comprised of non-injured women. Four trials were completed by each participant on a Cybex 6000 isokinetic dynamometer to measure quadriceps strength (two trials to serve as ability indexes, two to serve as dependent variables). The two experimental groups set goals for each experimental trial. In addition, each participant completed measures of self-satisfaction and self-efficacy prior to the final two trials. Results showed enhanced performance by both goal-setting groups, although there were no differences between the injured and non-injured subjects. Goals were also found to indirectly influence self-efficacy and satisfaction. Individuals in the two goal-setting groups who scored higher on self-efficacy and self-satisfaction were more likely to set higher (more challenging) goals, and this in turn led to better

performance on the task. However, it is important to note that, although the correlational data for this relationship was significant, structural equation analysis did not support the conclusion that self-efficacy or self-satisfaction could predict performance (Theodorakis et. al., 1996).

In the 1997 study (Theodorakis et al., 1997), 40 university physical education students participated, split evenly into one experimental group and one control. All were undergoing rehabilitation for arthroscopic knee surgery that had occurred 6-8 weeks prior to the study. The Cybex 6000 isokinetic dynamometer was used for all subjects for the quadriceps strengthening program. The rehabilitation protocol was for 4 weeks of strengthening, with three sessions per week. Individuals in the experimental group set specific performance goals and received immediate feedback on their performance. The control group did not set any goals formally. In addition, measures of self-efficacy, anxiety and self-satisfaction were obtained once a week during the training period. Results showed that the experimental group had significantly more improvement in performance between week 0 (baseline ability measurement) and week 1, and from week 3 to 4. In addition, self-satisfaction scores were significantly lower for the experimental group between weeks 2 and 3, and weeks 3 and 4, indicating higher satisfaction with performance for subjects who set goals. No significant findings between groups were found for either anxiety or self-efficacy. From these two studies, it can be concluded that goal setting positively impacts the rehabilitation process for college-age students who have undergone knee surgery.

Urban Johnson (2000), performed a study of injured athletes who were involved in long-term rehabilitation after athletic injury. Fifty-eight competitive athletes (national and international) who had been referred to a sports medicine center were selected for inclusion, and all were unable to train or participate in athletics for a minimum of 5 weeks. Fourteen men were randomly selected for the experimental intervention, which consisted of 3 training sessions in stress management/cognitive control, goal-setting, and relaxation/guide imagery. Measures of psychosocial risk factors (which may indicate problematic rehabilitation) as well as a diagnostic checklist for physical readiness for competition (completed by the physiotherapist) were completed at the beginning and end of rehabilitation. Self-ratings of readiness for full competition were obtained at the end of rehabilitation. In addition, the MACL was utilized at the beginning, mid-point, and end of rehabilitation to assess changes in mood. Results found that short-term psychological skills training (including goal setting) enhanced mood as indicated by significant differences on the sum of the MACL at the mid-point and end of rehabilitation. In addition, the experimental group showed higher self-rated perceptions of physical readiness to return to sport. However, goal setting was not perceived to create these changes when considered alone (only relaxation/guided imagery was perceived to create changes in readiness) (Johnson, 2000).

Brewer et al. (2000a) and Scherzer et al. (2001) conducted studies investigating the effects of psychological skills on rehabilitation adherence and outcome. Brewer et al. (2000a) recruited 95 patients at a sports medicine clinic who had undergone anterior cruciate ligament (ACL) surgery as subjects. Participants completed several

psychological measures just prior to surgery (including measures of self-motivation, social support, athletic identity, and psychological distress). Adherence was measured via a ratio of physical therapy appointments kept:made, a measure of rehabilitation adherence (the Sport Injury Rehabilitation Adherence Scale, SIRAS, completed at each physical therapy session), and subjective ratings of home exercise completion. Rehabilitation outcome measures (knee laxity, functional ability, and subjective symptom ratings) were compiled at the conclusion of physical therapy. Results demonstrated a positive relationship between rehabilitation adherence and functional outcome post-ACL surgery. Regression analysis revealed that attendance, SIRAS score, and home cryotherapy completion were significant predictors of rehabilitation functional outcome. In addition, self-motivation was found to be a significant predictor of adherence. However, regression analysis did not support the hypothesis that adherence mediated the relationship between pre-surgery psychological factors and outcome (Brewer et. al., 2000a). Brewer et al. (2000a) suggest that psychological interventions that target motivation, reduce psychological distress, and enhance adherence should be used to produce better rehabilitation outcomes.

A second study follows-up on the recommendations of Brewer et al. (2000a) by actually surveying the use of such psychological skills in ACL rehabilitation. Scherzer et al. (2001) administered an abbreviated form of the Sport Injury Survey (used by Ievleva & Orlick, 1991) to 54 patients who had recently undergone ACL reconstruction. Attendance at rehabilitation sessions, therapist ratings of adherence (using the SIRAS), and subjective ratings of home exercise and cryotherapy completion were obtained at

each physical therapy session. Regression equations predicting home exercise completion and scores on the SIRAS were significant, and goal setting was found to be a significant predictor of both adherence measures. In addition, positive self-talk was associated with completion of home exercises (Scherzer et al., 2001). Results of the Brewer et al. (2000a) and Scherzer et al. (2001) studies, taken together, appear to strongly support the potential link between goal setting and enhanced rehabilitation adherence and outcome.

When taken together, it appears that psychological skills may positively influence various rehabilitation constructs, both physical and psychological in nature. The above studies all show significant relationships between goal setting, imagery, relaxation, and/or positive self-talk and various measures of rehabilitation outcome (adherence, functional measures, psychological readiness for return to sport). However, it appears the most robust findings exist for goal setting, with every study finding at least some support for its inclusion in the rehabilitation process.

It is important to recognize the limits of these studies. The Scherzer et al. (2001) and Ievleva and Orlick (1991) studies used retrospective surveys and correlations, which do not show causal relationships and are weak in validity. The two studies by Theodorakis and colleagues (1996 and 1997) were performed on physical education students (not competitive athletes) with knee injuries, thus limiting the generalizability of the findings. And the study by Evans et al. (2000) consisted of qualitative case studies, which again lack the strength of an empirical study. There is a significant gap in the psychology of injury literature in regards to psychological skills and their effects upon

rehabilitation. This study begins to address this issue, by sampling competitive athletes in athletic training settings who exhibit a variety of injuries, and using an intervention to address relationships between psychological skills and recovery.

Goal Setting Guidelines & Principles

Various types of goals have been identified in the literature. Each has its own unique attributes and can be applied in different situations. Of the various types of goals, three have received the most attention: outcome, performance, and process goals. In addition, short- and long-term goals have also been thoroughly researched, as well as specific and general goals, challenging goals, and personal (not assigned) goals. The research has shown that specific types of goals are most appropriate for certain athletes in certain situations. Thus, a thorough understanding of the attributes of each type of goal allows an individual to choose the most appropriate goal for a given task or situation.

Outcome goals are defined as an outcome or aim that is referenced to another individual or group (competition). Performance goals set a performance standard based on self-referenced improvement (Martens, 1987). Thus, an outcome goal could be "Beating my opponent in this tennis match", whereas a performance goal would be "Having a first serve percentage of 50% during this game". In addition, Hardy, Jones and Gould (1996) have identified process goals as important to task performance. Process goals are defined as those procedures that an individual wants to utilize during a particular task. An example could be "Keep my knees driving forward when sprinting". Research has identified important differences between all three types of goals.

Outcome goals are generally discouraged in goal setting programs. Burton (1989, 1993) believes that the use of outcome goals can result in increased cognitive anxiety, decreased confidence, and decreased self-efficacy. This is due to the level of control an individual has over the outcome of this type of goal. At best, the individual has partial control over the result of the contest or competition; he/she has no control over the actions or performance of another competitor. Failure can occur even when an individual performs at his/her personal best. In addition, Gould (2001) believes that individuals who set outcome goals become less flexible with their goals. Thus, failure can result in the complete abandonment of goal setting, instead of a flexible change in the goal to make it more achievable.

In contrast, performance goals usually form the backbone of a goal setting package. Performance goals are widely supported in the literature, and have demonstrated the ability to enhance performance, decrease cognitive anxiety and increase confidence and perceived ability (Burton, 1989; Kingston & Hardy, 1997). Performance goals are almost completely under an individual's control and can be adjusted more easily than outcome goals. In addition, successful performance leads to greater satisfaction when performance goals are used, because the individual can claim full responsibility for the outcome (Burton, 1989 & 1993; Gould, 2001). Burton's (1989) study of intercollegiate swimmers found significant differences between the use of outcome and performance goals, and concluded that performance goals were superior to outcome goals in terms of cognitive anxiety and performance.

Process goals have recently been addressed in the goal setting literature. Kingston and Hardy (1997) conducted a study with golfers that compared the effects of process goals and performance goals with a control group. The results showed the process goals created faster changes in performance than performance goals, and demonstrated a beneficial effect on cognitive anxiety, concentration and self-efficacy. Several researchers believe that process goals may be superior to both outcome and performance goals because the focus is on effort and strategy, instead of a particular outcome level (whether self-referenced or competitive). Thus process goals allow an individual to focus on a particular task, instead of an outcome (Gould, 2001; Kingston & Hardy, 1997; Weinberg, 2002).

Previous guidelines on goal setting have advocated the use of performance and process goals, and the exclusion of outcome goals, to enhance performance. However, recent publications have begun to address the possibility that outcome goals may not be completely ineffective. Hardy, Jones and Gould (1996) believe that outcome goals are inherent in competitive athletics and thus should not be excluded when forming goals. Outcome goals may increase overall motivation and may serve as a guide for the formation of performance and process goals (e.g., I want to win the conference championship. In order to do this, I will shoot 50% from the field, score more than 15 points a game and make 80% of my foul shots for the season). However, it is important to focus on the performance and process goals in a goal-setting program, outcome goals should not be emphasized. Thus, most goal setting packages used today advocate all

three types of goals, but recognize the benefits and limits of each, and emphasize the use of performance and process goals for performance enhancement.

A great deal of research has been dedicated to other forms of goals, particularly long- and short-term goals (also referred to as goal proximity). As their names imply, long-term goals focus of performance in the more distant future, whereas short-term goals have a more immediate time frame. Locke and Latham (1985) believe that short-term goals, when used in combination with long-term goals, will produce the greatest benefit when compared to either type of goal used alone. In the meta-analysis performed by Kyllo and Landers (1995), the use of a combination of short- and long-term goals was supported. Although Weinberg (1993) identified several studies that did not demonstrate significant differences between these goals, most recent publications advocate the use of both short-term and long-term goals.

Goal specificity has received considerable attention in the goal setting literature, primarily through the studies of Locke and colleagues. Locke believes that specific and measurable goals facilitate performance, whereas general ("do-your-best") goals do not produce significant changes. Locke and his colleagues (1981, 1990), in extensive reviews of organizational literature, found support for this hypothesis. Tubbs (1986) also found support for this hypothesis in his meta-analysis. Locke and Latham (1990) believe that general goals allow for individual adjustment in performance standards, allowing an individual to lower the level of performance necessary for the achievement of a goal. Specific, measurable goals do not allow an individual to compromise, and provide a

concrete target for performance. Most effective goal setting programs advocate the use of specific and measurable goals at all times.

Feedback is another important aspect of goal setting and is related to the ability to measure goals. Feedback is defined as the ability to identify changes in performance. Locke and Latham (1990) identify feedback as a critical component of goal setting. Both Tubbs (1986) and Kyllo and Landers (1995) found that feedback was an important part of goal effectiveness. Effective feedback can only occur if goals are measurable (it is very difficult to identify changes in general "do-your-best" goals or goals that do not specify a particular level of performance). Thus, providing feedback allows individuals to determine whether goals have been met, and allows for adjustment in goals if they are deemed too difficult.

The challenge of the goal is also important in regards to performance enhancement. Locke and Latham (1990) suggest that challenging goals are more effective than easy goals, and believe a straight, positive, linear relationship exists between goal challenge and performance. However, some researchers have suggested that goals that are too difficult may not produce increased performance in some individuals, and will result in failure. This failure causes decreased motivation in individuals (Gould, 2001; Weinberg, 2002). The literature provides strong support for the performance enhancing effects of challenging goals (see Kyllo & Landers, 1995; Tubbs, 1986), but most researchers agree that the goals should be realistic. Thus, setting challenging but realistic goals is important when forming goals for performance.

Goal acceptance is a final critical component of goal setting. Locke and Latham (1990) hypothesize that individuals who participate in the setting of their own goals will demonstrate enhanced performance. This effect is indirect, because individuals will set higher (more challenging) goals for themselves than if someone else assigned the goal to them. Gould (2001), Weinberg (2002), and Tubbs (1986) all support this view on goal acceptance. An individual who sets his/her own goals will place more meaning within the goal, and it is believed that he/she will try harder to achieve the goal. Thus allowing the individual to set goals is an important part of any goal setting program.

Two additional guidelines for goal setting exist, although empirical support is lacking. Gould (2001) suggests that goals should be written and recorded for the individual, thus providing visual reminders of the performance level that is desired. In addition, Gould (2001), Heil (1993) and Weinberg (2002) propose that goals should be stated in positive language. Negative goals (e.g., I don't want to double-fault) are believed to place attention on poor performance states, which may lead to poor outcomes. Thus, stating goals in positive language that emphasizes correct and improved performance or processes will direct attention in a positive direction. These two additional suggestions require additional research but will be included in the intervention portion of the proposed study.

Athletic Trainers and Psychological Skills Training

Athletic trainers are in a unique position, within the sports medicine team, to recognize the need for psychological intervention. Athletic trainers have daily contact with athletes, have specific knowledge about the psychological trauma often associated

with athletics and injuries, and have a network of health care providers available to assist in the care of both physiological and psychological problems (Arnheim & Prentice, 1997). Students in athletic training curriculum programs are taught multiple educational competencies relating to the appropriate recognition and treatment/referral of athletes with psychological trauma or illness, including understanding the psychological and emotional responses to trauma and forced physical inactivity, describing the basic signs and symptoms of mental disorders and emotional disorders, developing and implementing stress reduction techniques, mental imagery techniques, and motivational techniques with athletes and others engaged in physical activity. Students are required to exhibit proficiency in these competencies prior to certification (NATA, 1999). Thus, the certified athletic trainer can identify the basic signs of most psychological problems (clinical and sub-clinical) and take the necessary steps to resolve those situations.

It is interesting to note that athletes prefer to seek psychological help from athletic trainers (as compared with sport psychology professionals) when recovering from athletic injury. Maniar and colleagues (2001) found that athletes preferred athletic trainers slightly less than coaches and family/friends, but more than sport psychologists, performance enhancement specialists, and other psychology professionals. Maniar's survey consisted of three scenarios common to athletics: a mid-season slump, recovery from a serious injury, and desire to perform more optimally. Each scenario was posed to 60 student-athletes, then followed with a list of professionals who may possess the skills necessary to provide help with each scenario. The participants rated the likelihood that they would seek help, the likelihood that they would seek help from various

professionals, and the type of help they would be most receptive. Results showed a clear preference for coaches and family/friends; however, seeking psychological help from the athletic trainer was rated higher than from a sport psychologist or other psychology professionals in the 'recovery from injury' scenario. This study illustrates how important learning psychological skills are for the certified athletic trainer. In addition, athletes showed a strong preference for using goal setting in psychological skills programs, again demonstrating the need for proper training for sport medicine professionals (Brewer et al., 1994; Maniar et al., 2001).

Many athletic trainers recognize the need to address both physiological and psychological responses to injury during the rehabilitation process (Larson, Starkey & Zaichkowsky, 1996). However, Ford and Gordon (1998), in a survey of athletic therapists and trainers, found that many were not satisfied with the training they received on the application of psychological skills in athletic injury rehabilitation. Ninety-six sport trainers (the Australian, New Zealander, and Canadian equivalent to athletic trainers) responded to a survey inquiring about the psychological content of their daily practice and training. Most of the therapists sampled indicated a desire to increase the scope of their psychological skills training, noting that they were not very satisfied with their current knowledge. Indeed, many applied skills often employed by sport psychologists (such as imagery, relaxation techniques and emotional control strategies) were not used as often in injury rehabilitation as other, more universal interventions (such as creating variety in rehabilitation exercises and encouraging positive self-thoughts) (Larson et al., 1996). According to Larson (1996), only half of the surveyed athletic

trainers had taken a formal sport psychology course. In addition, only one quarter of those surveyed had access to a sport psychologist (as a member of the sports medicine team) (Larson et al., 1996). Although athletic trainers see the need for psychological skills in rehabilitation, it appears that many lack the resources or specific training to effectively implement these interventions.

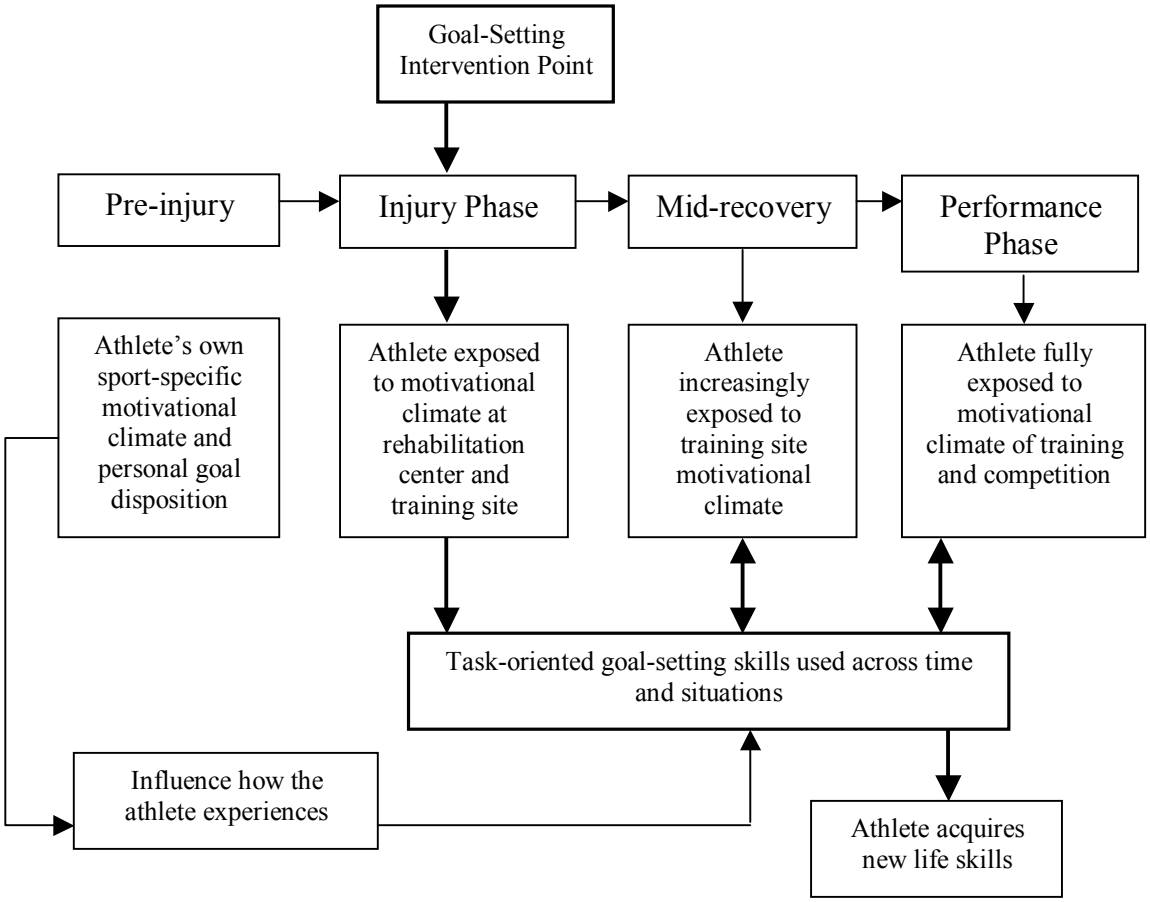
Goal setting is one of the most commonly used psychological skills in athletic injury rehabilitation. Athletes are generally receptive to this practice, since it seems to be utilized quite often in the realm of sport (Brewer et al., 1994). Athletic trainers also recognize the benefits of goal setting and report using short-term goals frequently in rehabilitation (Larson et al, 1996). However, athletic trainers also see a need for further education on the use of goal setting in athletic injury rehabilitation, specifically on setting realistic goals that are both challenging and attainable (Larson et al., 1996; Wiese, Weiss, & Yukelson, 1991). Goals in rehabilitation settings must also be flexible in order to properly reflect the current rehabilitation status of the athlete, although flexibility is often difficult to achieve when setting specific, measurable goals. Goal specificity often requires the use of a set period of time, and this can be problematic in rehabilitation where setbacks occur frequently. However, goal flexibility can be achieved through setting process as well as performance goals and recognizing the role of set backs in any rehabilitation setting (Evans et al., 2000). In addition, limiting the use of dates and encouraging achievement of set rehabilitation standards will help alleviate the problems associated with goal rigidity in rehabilitation. Flexibility in short-term goals can help

eliminate the frustration that can occur when a rehabilitation set back prevents meeting a specific goal.

Gilbourne and Taylor (1998) propose a rehabilitation-specific goal setting program that incorporates the specific phases of athletic injury rehabilitation, as well as goal perspective theory and life development approaches (Figure 4). A goal-setting intervention is applied during the initial stages of injury rehabilitation. This intervention utilizes five principles: 1) Help develop management skills that are transferable between rehabilitation situations, 2) Help athletes establish rehabilitation schedules, 3) Provide opportunities for self-evaluation and recording, 4) Involve athletes in decision making, and 5) Ensure individual progress is self-referenced. These principles follow many of the guidelines of goal setting advocated by Locke and Latham (1990), Gould (2001), and Weinberg (2002). Gilbourne and Taylor (1998) believe that the individual's goal orientation (or disposition) should drive the type of goals that are set, although emphasis should always be on self-referenced performance or process. This model is appealing and has support from studies conducted by Gilbourne and colleagues (1995, 1996), however the empirical support is still very limited.

The rationale behind utilizing goals in rehabilitation goes back to the work of Locke and Latham (1990). Goals give direction during the completion of a task, as well as influence persistence and effort. During long-term rehabilitation, persistence and effort may begin to lag, as time spent in rehabilitation becomes "boring" or "tedious". In addition, many athletes may not realize how regaining range of motion or strength will impact overall recovery. They are unable to direct their effort towards small, possibly

Figure 4. Model of sport injury rehabilitation: Integration of goal-disposition, motivational climate, and a task-oriented goal-setting intervention strategy (Gilbourne & Taylor, 1998).



easy tasks, because they lose sight of how these tasks influence overall recovery. Setting long-term goals should theoretically help increase motivation (Gilbourne & Taylor, 1998; Locke & Latham, 1990), while the use of short-term goals should direct effort towards rehabilitation tasks. In addition, achieving short-term goals (especially process goals) during rehabilitation should be seen as a "step" towards achieving overall long-term goals (Gould, 2001). The increases in self-efficacy and satisfaction that are achieved during

goal setting in rehabilitation should also help motivate athletes to continue working hard throughout the process, thus affecting persistence (Theodorakis et al., 1996).

It is apparent that a great deal of research is still required regarding the use of goal setting in athletic injury rehabilitation. However, the initial studies indicate that incorporating goal setting may produce favorable changes in a variety of rehabilitation outcomes, both psychological and physiological (Brewer et al., 2000a ; Gilbourne & Taylor, 1995; Gilbourne et al., 1996; Ievleva & Orlick, 1991; Scherzer et al., 2001; Theodorakis et al., 1996; Theodorakis et al., 1997). Both athletic trainers and athletes are receptive to goal setting as a psychological intervention, and goals are easily incorporated into any rehabilitation program (Ford & Gordon, 1998; Larson et al., 1996; Maniar et al., 2001; Wiese et al., 1991). This study will investigate the effects of a goal-setting program on an intercollegiate athletic population, currently in rehabilitation for major athletic injury. The goal setting intervention follows the guidelines utilized by several preceding authors, including the use of short-term goals (Ievleva & Orlick, 1991; Theodorakis et al., 1996; 1997) and long-term goals (Evans et al., 2000), process and performance goals (Evans et al., 2000), and challenging goals (Theodorakis et al., 1996). In addition the guidelines set forth by Locke and Latham (1990) regarding goal specificity will be considered. It is expected that the use of a goal setting program will result in increased adherence to the rehabilitation program, increased confidence upon return to play, and increased satisfaction with return-to-play performance and recovery time. It is also hypothesized that the supervising athletic trainer will exhibit increased satisfaction with the athlete's return-to-play performance and recovery time as a result of

goal setting. This study will add to the existing literature on the benefits of goal setting in athletic training, and also incorporate a new population into the literature: competitive intercollegiate athletes in rehabilitation.

CHAPTER III

METHOD

A single-subject A-B design was utilized for the present study. Single-subject designs have been advocated in clinical research, due to the ability to employ a quasi-experimental research design with relatively few subjects (Hrycaiko & Martin, 1996; Thomas & Nelson, 2001). Both Swain and Jones (1995) and Kingston and Hardy (1997) employed single-subject designs in their studies of goal setting on athletic performance. Although use of this design may threaten internal validity more than use of a true randomized experimental design (Thomas & Nelson, 2001), it is far more practical when the potential subject pool is limited or randomization is difficult. In addition, Hrycaiko and Martin (1996) suggest it is possible to analyze results from single-subject designs with confidence. They set forth five guidelines to determine the effect of an intervention in these designs: 1) the final few data points of the baseline should be stable, or in a direction opposite that predicted for the intervention, 2) results should be replicated, either across treatments or individuals, 3) baseline and intervention data points should not overlap (or overlap should be minimal), 4) the effect should be observed quickly following the intervention, and 5) the effect seen should be large. The more guidelines that are followed during the analysis, the more confident a researcher can be in the effect seen during the intervention (Hrycaiko & Martin, 1996). These guidelines were followed in the data analysis portion of this study.

Participants

The investigator contacted certified athletic trainers at three area universities and colleges to obtain the names and contact information for athletes who met the inclusion criteria (see below). Athletes were then contacted via telephone calls within two weeks of identification, and an initial consultation was scheduled. The elapsed time between identification of potential participants and the initial consultation ranged from 1-4 weeks. Eleven athletes were contacted by the investigator. Two participants voluntarily withdrew from the study before a full set of data could be obtained, one had medical problems arise during the course of the study that prevented her from continuing with her participation, one completed rehabilitation much faster than anticipated and was unable to begin the intervention, and one was initially assigned to a control group (before the study design was changed to single-subject). Thus, the final N for the study was 6 (4 male, 2 female). Average age was 20.7 years. Participants represented a wide range of sports (soccer, basketball, baseball, football, volleyball, and lacrosse), and had participated in his/her sport for an average of 11.7 years. All but two subjects indicated a previous history of serious athletic injury that required at least five weeks of recovery time. For this study, subjects met the following inclusion criteria:

- Must sustain an injury or undergo surgery for an athletic injury during the 2004-05 academic year.
- Recovery time for the injury must be estimated at greater than five weeks by the supervising ATC (to ensure adequate time to conduct the baseline and intervention periods).

- Athlete must be expected to return to competitive athletics upon completion of rehabilitation (to ensure that 'return to play' is a motivation for all participants).

Instruments/Measures

Adherence: Adherence was determined with the Sport Injury Rehabilitation Compliance Scale (SIRAS) (Brewer, 1995). The supervising ATC or PT recorded the number of weekly rehabilitation appointments scheduled and attended, and gave subjective ratings of the participant's rehabilitation intensity, frequency in following directions, and receptivity to instruction. Ratings are obtained on a 5-point Likert-like scale (see appendix A).

Initial psychometric analysis shows that the SIRAS has acceptable internal consistency (Cronbach's alpha= .82), construct validity (correlation of SIRAS scores with attendance at rehabilitation sessions is $r= .21$, $p<.05$), and test-retest intraclass reliability (correlation coefficient of .77) (Brewer et al., 2000b). Brewer et al. (2000b) also found a modified interrater intraclass correlation coefficient of .57 when the SIRAS was administered by various rehabilitation professionals across time. In a second series of studies, Brewer et al. (2002) found a rater-agreement index (RAI) of .87 (range .95-.84) in one study with inexperienced evaluators, while a second study found a RAI of .94 with certified athletic trainers. These data show the strong interrater reliability of the measure. The SIRAS has been used in prior research investigating the impact of rehabilitation adherence on rehabilitation outcome (Brewer et al., 2000a; Scherzer et al., 2001), and

because it includes information on the quality of rehabilitation effort (not just attendance), it is an appropriate measure for this study.

Confidence (self-efficacy): Confidence was measured using a self-efficacy scale drawn from the recommendations of Feltz and Chase (1998). The scale has one section with 11 items dedicated to sport performance that all athletes completed. At the beginning of the measure all participants are instructed to "think ahead to when you are cleared to participate by your physician". If the athlete answered yes to any question, he/she is then asked to give a rating of his/her confidence in his/her ability to perform at the specified level (10-point scale, 1=not confident, 10=completely confident) (see appendix A). This measure has a minimum value of 0 (indicating no confidence in his/her ability to perform at even the most minimal level) and a maximum value of 110 (indicating full confidence in his/her ability to perform better than they did prior to the injury). All sections utilize self-referenced efficacy, which has been shown to have a greater predictive power for performance than comparison to other individuals (Zimmerman, 1996). In previous studies, self-efficacy and confidence have been shown to mediate the efficacy of psychological skills interventions (Theodorakis et al., 1996, 1997), and Bandura has suggested that self-efficacy expectations influence the thought patterns of individuals (thus affecting goals and goal-setting) (Gill, 2000).

Athlete satisfaction: Athlete satisfaction with post-injury athletic performance was assessed using a 10-point scale (1=not satisfied, 10=full satisfaction) similar to the one utilized by Theodorakis et al. (1997). Athletes were asked how satisfied they would be if they achieved a particular performance level compared to their pre-injury level. The first

section had 11 items and asked about sport performance. This section has a minimum value of 11 (indicating no satisfaction with even the highest level of function) and a maximum value of 110 (indicating full satisfaction with even the lowest level of function upon return to play). The second section (7 items) determined their satisfaction with recovery time (see appendix A). This section has a minimum value of 7 (indicating no satisfaction with even the fastest of proposed recovery times) and a maximum value of 70 (indicating full satisfaction with even the slowest proposed recovery time). Athletes are instructed to "think ahead to when you will be cleared to participate by your physician". Thus, this measure shows changes in satisfaction that are not purely the result of changing physiological functioning.

It is important to note that, with the satisfaction measures, lower scores are preferential to higher scores. This is in contrast to most other measures, in which higher scores are desirable (for example, the confidence measure and SIRAS discussed above). Lower scores on the satisfaction measures indicate that an athlete is unwilling to "settle" for lower levels of performance or slower recovery. He/she would thus only find satisfaction in the highest levels of performance, and the quickest recovery times. As discussed by Theodorakis et al. (1997), athletes who find satisfaction only in the highest levels of performance are willing to push themselves harder to achieve those performance levels. Thus, lower scores on these measures indicate more desirable levels of satisfaction for athletes returning to competition.

ATC satisfaction: Supervising ATC's were asked how satisfied they would be if the injured athlete achieved a particular performance level upon return to play. The

scales were identical to the ones given to the injured athletes, as are the written and verbal instructions (see appendix A).

Post-intervention questionnaire: At the conclusion of the intervention, each athlete participated in a brief interview and debriefing. See appendix A for the questions that were addressed during the debriefing. This allowed for additional descriptive data to be compiled about the efficacy of the intervention.

Procedure

At the initial meeting, informed consent was obtained, and a release to obtain personal health information was signed by the subject. Demographic information was collected (age, gender, sport, injury type, years in sport, history of previous serious injury) and the first confidence measure was obtained. For the first 3-5 weeks, baseline measures of rehabilitation adherence (using the SIRAS) and confidence were collected on a weekly basis. At the conclusion of the baseline, both the subject and the supervising ATC or physical therapist completed a satisfaction measure (for overall recovery as well as recovery time).

The intervention period consisted of weekly meetings involving formalized goal setting. Goals followed the guidelines set by Locke and Latham (1990) regarding goal proximity (long- and short-term goals), difficulty (challenging goals), and specificity. Long-term goals were defined as taking two weeks or greater to achieve (e.g., return to play with 95% quadriceps strength), whereas short-term goals would be achieved within 1-2 weeks (e.g., increase weight on leg extensions by 10 pounds in seven days). Challenging goals were favored when applicable, but in the early stages of rehabilitation

making goals physically challenging is not possible. In these cases, attempts were made to challenge the athlete to complete exercises daily and increase quality of the exercise. All short-term goals were measurable in some fashion, whether the athlete set deadlines for completion or accomplishment of a goal, or set specific performance targets (e.g., increase range of motion by 15 degrees). Hardy, Jones and Gould's (1996) and Evans et al.'s (2000) suggestions regarding process and performance goals were also considered during each intervention. Because it is difficult to imagine the use of outcome goals in rehabilitation (everything is self-referenced, and athletes rarely compare their rehabilitation to the performance of others), performance goals were stressed, and oftentimes process goals were used as short-term goals. Athletes were encouraged to use process goals to achieve any long-term goals they set. In addition, the goals were recorded and posted in the athlete's daily rehabilitation file so that they were reminded of the goals daily (see appendix A for the goal setting form). Between 2-5 goals were set during each session to ensure the total number of goals were not overwhelming.

Every week the investigator contacted the athlete (by telephone or in person) to discuss goal attainment and to re-evaluate all goals set the previous weeks. New goals were made by the investigator and subject, recorded on the goal form, and a copy given to the subject to place in his/her rehabilitation file. At no time did the total number of goals exceed 6. The athlete also completed the confidence measure weekly, and the SIRAS was obtained weekly from the supervising ATC or PT. This continued until the athlete was released from scheduled rehabilitation by the supervising ATC or physical therapist. Please see Appendix B for a detailed account of these intervention meetings.

Upon release from rehabilitation, the investigator had a final debriefing meeting with each athlete. The athlete completed the confidence and satisfaction measures, then participated in a brief interview about the goal setting intervention. The supervising ATC or PT completed a final SIRAS as well as the satisfaction measure.

Statistical Analyses

Descriptive statistics were obtained for all relevant variables. Individual trend analysis using graphed results of confidence and adherence measures was used to ascertain potential effects. Individual differences in satisfaction measures were also compared for differences and direction of change. Paired samples t-tests were utilized to compare baseline and intervention group means for adherence measures, confidence, athlete satisfaction and ATC satisfaction. Alpha was set at .05 and all tests were two-tailed.

CHAPTER IV

RESULTS

The present study investigated how a formal goal setting intervention affected rehabilitation adherence, confidence, and satisfaction in six intercollegiate student-athletes undergoing rehabilitation for serious athletic injury. A single-subject A-B design was used, with 3-5 weeks of baseline data collection occurring prior to at least 3 weeks of intervention data collection. Adherence and confidence data were collected weekly throughout the study, and the satisfaction measure was completed at the end of both the baseline and intervention periods. In addition, the athlete's supervising ATC or PT completed the satisfaction measure post-baseline and post-intervention. It is hypothesized that the goal setting intervention will lead to increased rehabilitation adherence, increased scores on the SIRAS (a measure of adherence), increased confidence, increased satisfaction (seen as a decrease in satisfaction scores), and increased ATC or PT satisfaction.

Results are presented case-by-case, followed by a cross-case and group section. Adherence (SIRAS score) and confidence results are represented graphically, and satisfaction results are presented as raw scores. Percentage increases and decreases are given to demonstrate the magnitude of change in each participant's scores. Paired-sample t-tests (alpha=.05) are performed for group baseline-intervention comparisons of adherence, SIRAS score, confidence, satisfaction, and ATC satisfaction. A brief program

evaluation follows, with debriefing and interview responses from participants. In addition, a chart of all of the participants' goals is provided in Appendix B.2.

Participant 1

Participant 1 (referred to as P1 for the remainder of this study) was a 20 year-old Division I women's soccer player. She has played soccer for 13 years and participates in summer leagues in her home state. She has never sustained an athletic injury that has required greater than 5 weeks recovery time without concurrent participation in sport. She sustained an ankle/knee injury during her summer league play in 2004, which led to some loss of practice/playing time during her 2004 competitive season. At the conclusion of the season she was still experiencing some pain in her knee, which led to the diagnosis of an ostrochondral defect by a team physician. She underwent surgery in February 2005 to correct the defect through a microfracture technique. P1 enrolled in this study 5 weeks after surgery while she was still on crutches. P1's rehabilitation was supervised by a graduate assistant ATC, but most of the rehabilitation appointments were completed with a student athletic trainer who was using the athlete as a case study.

Intervention detail: The goal setting intervention began after three weeks of baseline data collection. At the first meeting the investigator and P1 jointly formed 2 long-term goals and 2 short-term goals that were recorded on the goal setting form. During week 6 (third intervention meeting), P1 indicated that the two long-term goals that we had set would be impossible to achieve, due to restrictions placed on her by the team physician. This dismayed her, as she felt she had "failed" herself and somehow had not done enough in rehabilitation to achieve these goals. We spoke of the need for

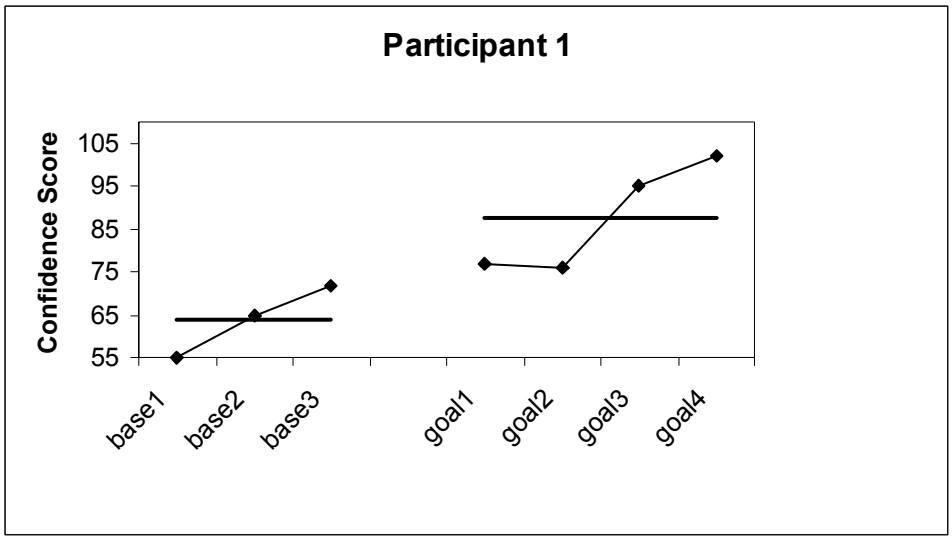
flexibility in goal setting and that these goals may not have been possible, even if she had done everything perfectly in her rehabilitation. Thus, both long-term goals were re-set to comply with the physician's restrictions, and to continue to motivate P1.

P1 had four goal-setting meetings prior to leaving for summer vacation. She missed two scheduled meetings but was able to successfully reschedule those meetings within a few days, leaving her overall compliance at 100%. At the time she left she had achieved one of her two long-term goals (sprinting), but was not yet cleared for full participation by the team physician. However, it was her understanding that over the next few weeks she could slowly work her way into practices with her summer league team. She stated that the team physician wanted her to continue her rehabilitation at home (with a home program designed by the student athletic trainer), and at the end of the summer when she returned to school, schedule an appointment with him to be cleared for participation for the competitive soccer season. The final meeting was held over the phone one week after the end of the school year. She had returned to practice but was still held out of some contact drills. At this time she completed the confidence and satisfaction measures over-the-phone, and was then interviewed.

Data analysis: At the onset of the program P1 had generally low levels of confidence. However, her scores on the measure increased considerably each week of baseline. These values seemed to stabilize from weeks 3-5 (the final baseline-the second intervention), then began increasing again during the final 2 meetings. Figure 5 displays the graphical trend for her confidence scores. P1 had a mean confidence score of 64

(sd=8.54) during baseline and a mean confidence score of 87.5 (sd=13.03) during intervention, an increase of 36.7%.

Figure 5. Confidence scores for participant 1. Heavy horizontal lines represent the mean confidence score for each period of time. Dots represent discrete scores.



P1 displayed relatively high scores on her baseline satisfaction measure of performance (baseline=47), indicating she would be satisfied with lower levels of post-rehabilitation performance than other study participants. However, her score on her return to play satisfaction measure was relatively low compared to other participants (baseline=38), meaning she would only be satisfied with faster recovery. After the intervention, both of her scores dropped minimally (intervention performance satisfaction=44, intervention recovery satisfaction =36), a change of 6% and 5% respectively. These would be considered minimal differences and may not represent effects of the goal-setting program.

P1's supervising ATC scored relatively high on the baseline performance satisfaction measure (baseline=54), indicating satisfaction with lower levels of post-rehabilitation athletic performance for P1. The ATC's score on the baseline recovery time satisfaction measure was more moderate (baseline=47). After the intervention, the ATC's performance satisfaction score increased by one point (a 1.9% increase), while the recovery time satisfaction score increased dramatically (a 31.9% increase). This would indicate that, after the intervention, the supervising ATC for P1 would be satisfied with a slower recovery time when compared to the baseline period.

P1 had an average SIRAS score of 14.3 (s.d.=0.58) during her baseline period, which increased to an average of 15.0 (s.d.=0.0) after the intervention, an increase of 4.7%. It is important to note that 15.0 is the maximum possible score on the SIRAS. Her attendance at rehabilitation appointments was 100% during both the baseline and intervention periods. Note that she only has three weeks of SIRAS and adherence data during the intervention, due to her release from rehabilitation for the summer one week early.

Figure 6. SIRAS scores for participant 1. Heavy horizontal lines represent the mean confidence score for each period of time. Dots represent discrete scores.

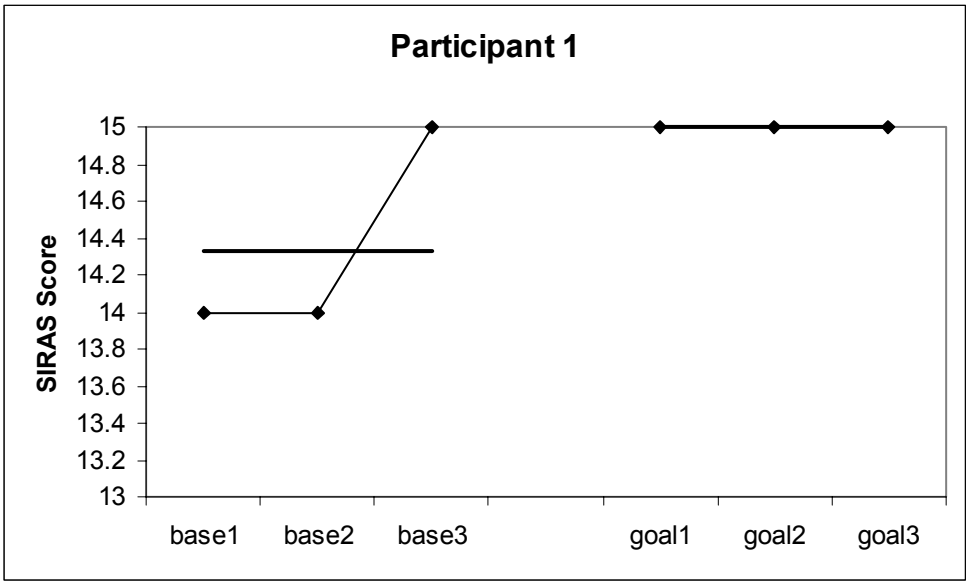


Table 1. Means (s.d.) and changes in data for participant 1.

	Baseline Mean	Intervention Mean	Change
Confidence	64.0 (8.54)	87.5 (13.03)	36.7% increase
Performance Satisfaction	47*	44*	6.0% decrease
Recovery Satisfaction	38*	36*	5.0% decrease
ATC Performance Satisfaction	54*	55*	1.9% increase
ATC Recovery Satisfaction	47*	62*	31.9% increase
SIRAS	14.3 (0.58)	15.0 (0.0)	4.7% increase
Adherence	1.0 (0.0)	1.0 (0.0)	0.0%

*= Raw score, mean is not applicable

Participant 2

Participant 2 (P2) was a 21 year-old Division III male lacrosse player. He has played lacrosse for 8 years and practices year-round. He has sustained a prior serious athletic injury that required greater than 5 weeks of recovery out of sport. During the early part of spring practice he tore the anterior cruciate ligament of his knee and underwent reconstructive surgery in February of 2005. P2 enrolled in the study 6 weeks post-surgery. He was participating in rehabilitation sessions with his supervising ATC at his college 2-3 times a week, and was attending physical therapy twice a week. For the purposes of this study his supervising ATC was responsible for the collection of rehabilitation adherence data, as he generally attended more rehabilitation sessions with his ATC than with his PT. In addition, the investigator felt that the supervising ATC, who had prior experience with this athlete, would be better equipped to give subjective ratings of adherence.

Intervention detail: P2 began the goal setting intervention after three weeks of baseline data collection. At the initial goal setting meeting P2 and the investigator set two long-term goals and two short-term goals. P2 met with the investigator a total of 6 times during the intervention period, with a compliance of 100% (he did not miss a meeting). As of the last meeting he had met one long-term goal (running by the end of April) and had been released from formal physical therapy. He was continuing his rehabilitation over the summer without supervision. He also indicated he was transferring to another local Division III program, and hoped that he would be able to play on that college's lacrosse team during the next season. At his final meeting, P2

completed a final confidence and satisfaction measure, as did his supervising ATC. He was then debriefed by the investigator.

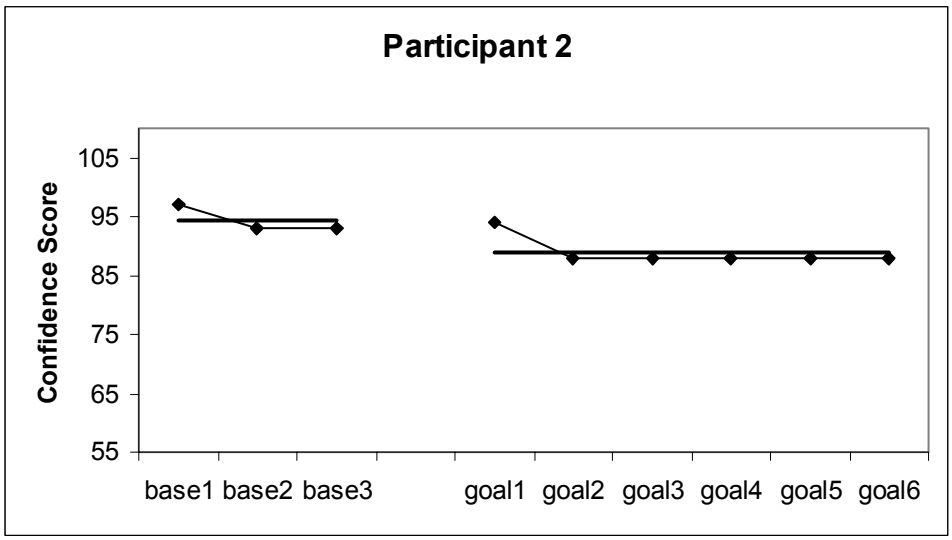
Data analysis: P2 displayed moderate levels of confidence relative to other participants in the study during baseline. However, contrary to the trend seen with other subjects, P2's confidence scores began dropping after the first baseline measurement. Between weeks 2-4 his scores plateaued, then dropped again to a very stable score for the remainder of the intervention. P2's baseline mean was 94.3 (s.d.=2.31), compared to an intervention mean of 89.0 (s.d.=2.45), a drop of 5.6%. See Figure 7 for the graphical representation of P2's confidence scores.

P2 also saw a similar drop in satisfaction scores relative to baseline. During baseline, P2 recorded a performance satisfaction score of 29, which was relatively low compared to other participants, and a recovery time satisfaction score of 56, which was comparatively high. After the intervention period, P2's performance satisfaction rose to 38 (a 31.0% rise) and his recovery satisfaction rose slightly to 58 (a 3.6% rise). The change in performance satisfaction could be considered a moderate difference, but it is not in the predicted direction.

P2's supervising ATC had a relatively moderate score on the baseline performance satisfaction measure (baseline=41), but a low score on the baseline recovery time satisfaction measure (baseline=36). This would indicate satisfaction only if P2 recovered quickly from his surgery and was able to return to play ahead of schedule. After the intervention, the ATC's performance satisfaction score rose by 24.4%, but the recovery time satisfaction score decreased by 5.6%. It appears that P2's ATC would be

satisfied with lower performance levels after the intervention. However, the decrease in recovery time satisfaction would indicate satisfaction with only the quickest recovery time.

Figure 7. Confidence scores for participant 2. Heavy horizontal lines represent the mean confidence score for each period of time. Dots represent discrete scores.



Due to the illness suffered by P2 during baseline measurements of adherence, baseline data is restricted to one measurement, taken during week 2. At this time P2 had a SIRAS score of 14. During the intervention phase, P2's SIRAS score rose slightly to a mean of 14.3 (s.d.=0.58), a 2.4% difference (See Figure 8). P2's attendance at rehabilitation sessions during baseline was 1.0 (reported as a ratio of appointments kept/appointments made), compared to a weekly average attendance of 0.83 during the intervention, a 17% drop. Note that participant 2 has only three SIRAS intervention scores, due to his release from formal rehabilitation at the end of the school year.

Figure 8. SIRAS scores for participant 2. Heavy black lines represent phase means, while dots represent discrete scores.

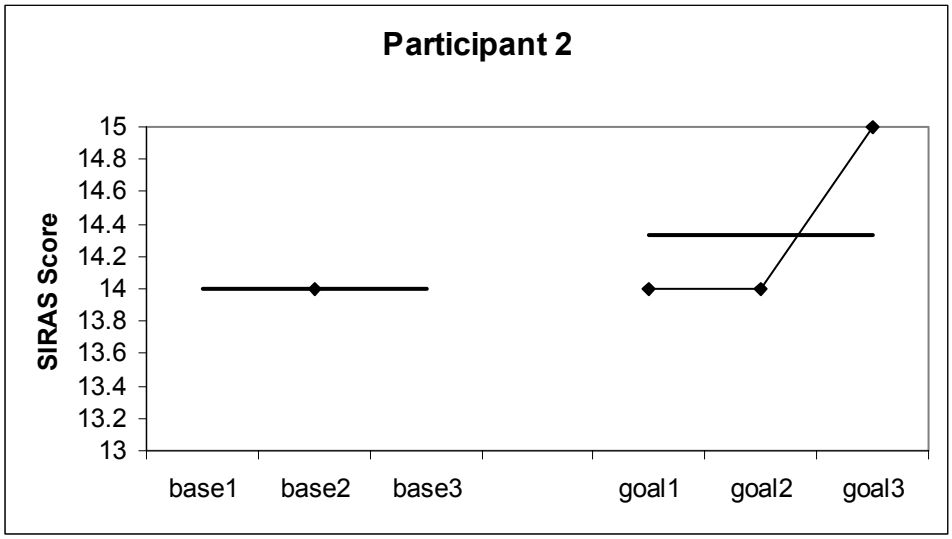


Table 2. Means (s.d.) and changes in data for participant 2.

	Baseline Mean	Intervention Mean	Change
Confidence	94.3 (2.31)	89.0 (2.45)	5.6% decrease
Performance Satisfaction	29*	38*	31.0% increase
Recovery Satisfaction	56*	58*	3.6% increase
ATC Performance Satisfaction	41*	51*	24.4% increase
ATC Recovery Satisfaction	36*	34*	5.6% decrease
SIRAS	14 (0.00)	14.3 (0.58)	2.4% increase
Adherence	1.0	0.83	17.0% decrease

*= Raw score, mean is not applicable

Participant 3

Participant 3 (P3) was a 21 year-old Division III female volleyball player. She has been playing volleyball for 3 years. She began playing during her freshman year of

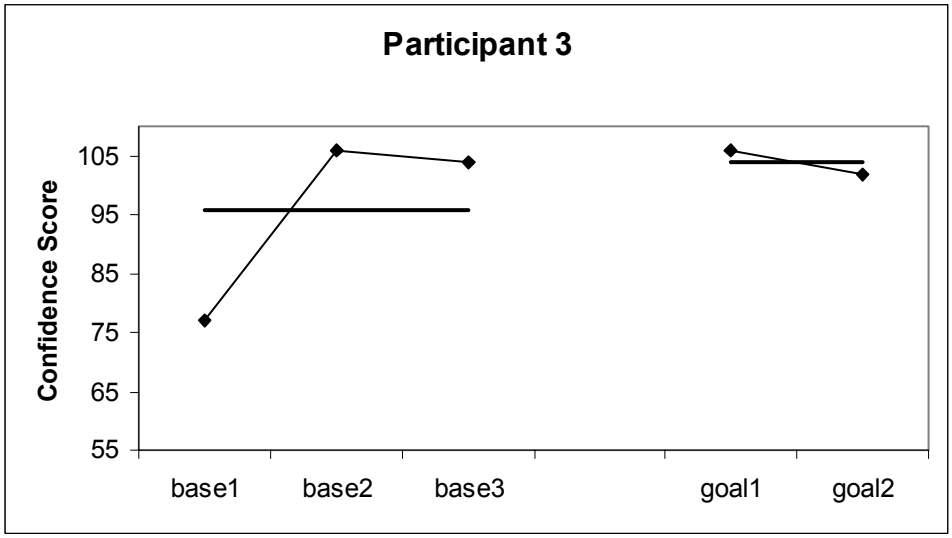
college when she was recruited by the head volleyball coach (at another college, she is a transfer student to her current school) for her height and athletic ability. She has never sustained a serious athletic injury requiring over 5 weeks of recovery time. Over the previous 2 years she has experienced shoulder pain and instability that has increased with time. During the 2004 season the pain and instability became so severe that her ability to play was limited. At the conclusion of the season her team physician recommended surgery to repair damage to the glenohumeral joint and to tighten the joint capsule in the affected shoulder. She underwent surgery in early February 2005. P3 enrolled in the study 6 weeks post-surgery. Her rehabilitation was performed at a local physical therapy clinic, thus her primary physical therapist (in this study, the primary PT is the physical therapist the participant has seen the most frequently) helped collect adherence data and completed the supervising ATC or PT satisfaction measure.

Intervention detail: The intervention for P3 began after three weeks of baseline data collection. During the first goal setting meeting, P3 and the investigator set 2 long-term goals and 1 short-term goal. P3 had a personal crisis that prevented her on two occasions from meeting with the investigator, and this limited the number of interventions that could be scheduled. Thus, her intervention compliance was 50% (missed two of four meetings). The final meeting took place after the end of P3's school year over the phone. P3 had not yet received clearance from her physician to participate in volleyball, but she was able to start some volleyball activity (she was restricted from any overhead motions). She had not yet met any long-term goals, but had achieved all of

her short-term goals. She completed her final confidence and satisfaction measures, and was then debriefed.

Data analysis: P3 displayed relatively low confidence at the first baseline measure, but it quickly increased to a relatively high level at the second and third measurements. Her confidence stayed high during both intervention measurements, with a small drop seen at the last meeting. P's baseline mean was 95.7 (s.d.=16.20), while her intervention mean was 104 (s.d.=2.83), an increase of 8.7%. This is a relatively minor increase. See Figure 9 for a graphical representation of P3's confidence scores.

Figure 9. Confidence scores for participant 3. Note that heavy black lines represent the means for each time period. Dots represent discrete measurements.



P3 had relatively moderate scores on her baseline performance satisfaction and baseline recovery satisfaction measures (35 and 47 respectively) compared to other participants. Both scores increased after the conclusion of the goal setting intervention

(42 and 58 respectively). Her performance satisfaction score increased 20%, while her recovery satisfaction increased 23.4%, a moderate difference in scores, but these increases indicate satisfaction with lower levels of performance and recovery time and are opposite the predicted direction.

P3's primary PT had a score of 44 on the baseline performance satisfaction, which stayed constant through the intervention (intervention score=44). However, the recovery satisfaction score increased from baseline to intervention (baseline=40, intervention=49), a change of 22.5%, which indicates that P3's PT would be satisfied with relatively slower recovery time (it should be mentioned briefly that P3's PT did not like the recovery time satisfaction measure and did not feel that it was valid, see the discussion for more on this potential limitation).

P3's scores on the SIRAS were the lowest of the study participants during the baseline period (M=13.7, s.d.=.58). However, her scores increased during the intervention period (M=14.3, s.d.=.58), a change of 4.8%. See Figure 10 for the graphical representation of this data. P3's attendance at physical therapy sessions was 100% (ratio 1.00) for the entire study, with no difference between baseline and intervention.

Figure 10. SIRAS scores for participant 3. Heavy lines represent means for each time period. Dots represent discrete scores.

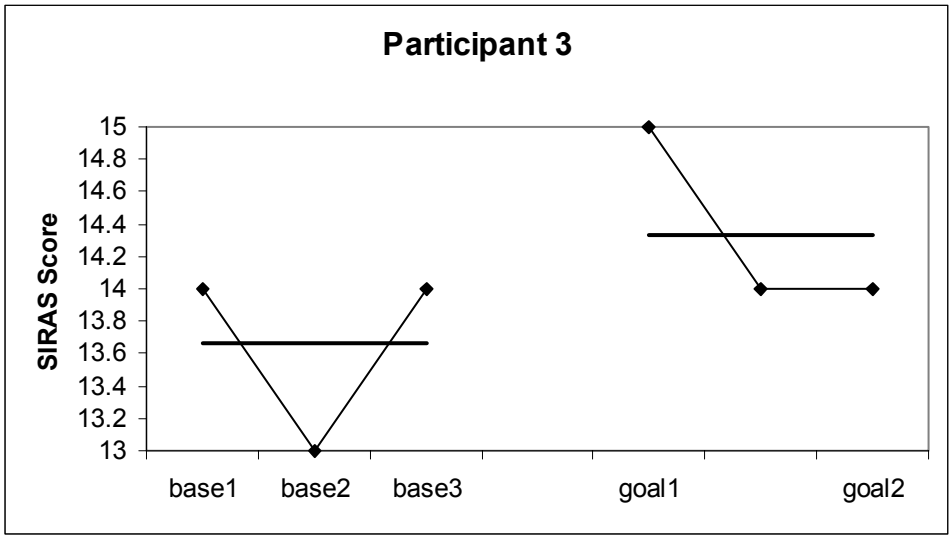


Table 3. Means (s.d.) and changes in data for participant 3.

	Baseline Mean	Intervention Mean	Change
Confidence	95.7 (16.20)	104 (2.83)	8.7% increase
Performance Satisfaction	35*	42*	20.0% increase
Recovery Satisfaction	47*	58*	23.4% increase
ATC Performance Satisfaction	44*	44*	0.0%
ATC Recovery Satisfaction	40*	49*	22.5% increase
SIRAS	13.7 (0.58)	14.3 (0.58)	4.8% increase
Adherence	1.0	1.0	0.0%

*= Raw score, mean is not applicable

Participant 4

Participant 4 (P4) was a 20 year-old male basketball player from a local Division III college. He has played basketball for 16 years and practices either informally or

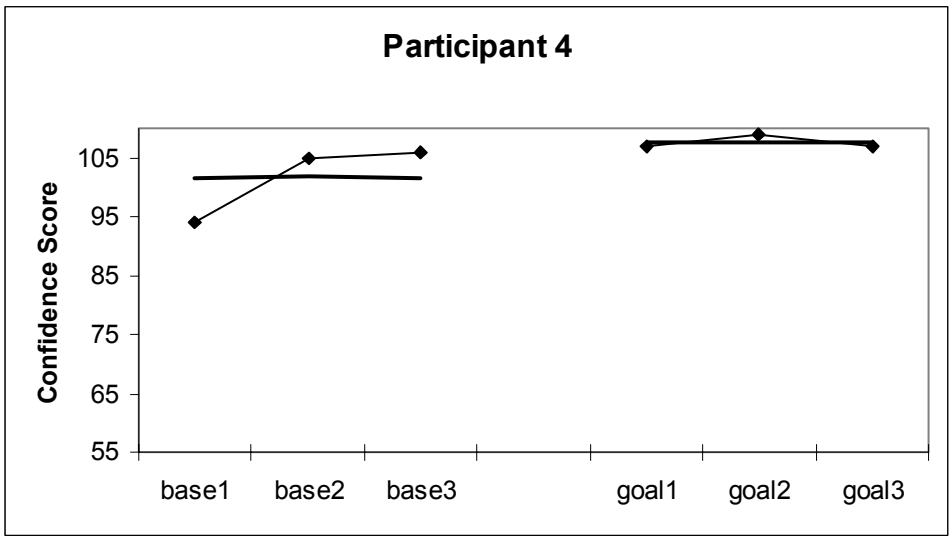
formally year-round. He has sustained prior athletic injuries that have required greater than 5 weeks of recovery time. Over the prior 2 years P4 has suffered at least two shoulder luxations (complete dislocation) and numerous subluxations. During the 2004-05 season the instability and pain in his shoulder made playing to his potential difficult. Thus, at the end of the season (February 2005) he underwent surgery to repair damage to the glenohumeral joint and tighten the joint capsule. P4 enrolled in the study 8 weeks post-surgery. He was participating in rehabilitation at a local physical therapy clinic 2-3 times per week. His primary physical therapist helped collect adherence data and completed the ATC or PT satisfaction measures when appropriate.

Intervention detail: P4 began the intervention after 3 weeks of baseline data collection. At the initial goal setting meeting, P4 and the investigator set one long-term and two short-term goals. The intervention lasted 3 weeks (one week of SIRAS and adherence data was missing, due to a missed PT appointment). P4 had an intervention compliance of 100% (he attended all meetings). The final meeting took place over the phone, as P4 had gone home for the summer. He was able to resume non-contact basketball activity but could not participate fully in games or practices yet. He was instructed to continue his exercises over the summer, and see his physician at the beginning of the 2005-06 school year for full clearance for basketball. At the time of the final meeting he had achieved most of his short-term goals, but none of his long-term goals.

Data analysis: P4 scored relatively high on his initial baseline confidence measures (M=101.7, s.d.=6.66), with a lower first score but higher and more stable

second and third scores. During the intervention his scores rose slightly, with a mean of 107.7 (s.d.=1.15), an increase of 5.9%. See figure 11 for the graphical representation of his scores.

Figure 11. Confidence scores for participant 4. Note that heavy black lines represent the means for each time period. Dots represent discrete measurements.



P4's performance satisfaction score at baseline was relatively moderate (31), however his recovery time satisfaction score was relatively high (57). After the intervention, his performance satisfaction score increased to 47 (a 51.6% increase), but his recovery time satisfaction score decreased to 46 (a 19.3% decrease). The increase in his performance satisfaction scores is considerable, and indicates that he would be satisfied with lower levels of performance after the intervention. However, the decrease in recovery time satisfaction scores seen after the intervention indicates satisfaction with only more rapid recovery times.

P4's PT had a relatively moderate score on the baseline performance satisfaction measure (44), but a relatively high score on the recovery time satisfaction measure (57). After the intervention, P4's PT scored the same on the performance satisfaction measure, but the recovery time satisfaction score decreased to 40 (a 29.8% decrease). This indicates that the PT's views on performance post-rehabilitation did not change, but that she would only be satisfied with shorter recovery times for P4.

P4's SIRAS scores were constant across both the baseline and intervention periods (15, the maximum score possible, see figure 12). During the baseline period, P4 attended 75% of his PT appointments (one was missed due to illness). During the intervention his attendance ratio remained at 75% (he missed one appointment). P4 only had two weeks of rehabilitation during the intervention (due to a missed PT appointment), thus he only has two data points for intervention SIRAS and attendance.

Figure 12 . SIRAS scores for participant 4. Note that heavy black lines represent the means for each time period. Dots represent discrete measurements.

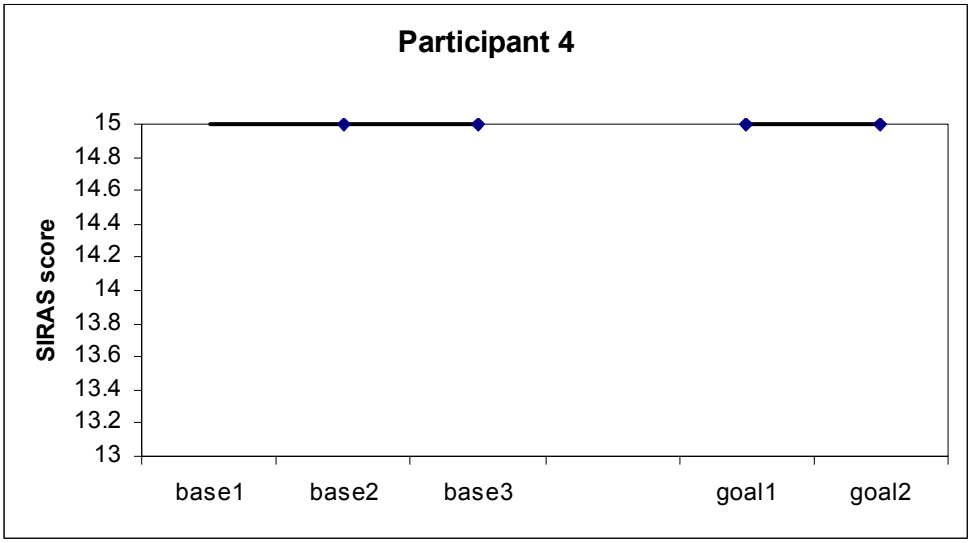


Table 4. Means (s.d.) and changes in data for participant 4.

	Baseline Mean	Intervention Mean	Change
Confidence	101.7 (6.66)	107.7 (1.15)	5.9% increase
Performance Satisfaction	31*	47*	51.6% increase
Recovery Satisfaction	57*	46*	19.3% decrease
ATC Performance Satisfaction	44*	44*	0.0%
ATC Recovery Satisfaction	57*	40*	29.8% decrease
SIRAS	15 (0.00)	15 (0.00)	0.0%
Adherence	0.75	0.75	0.0%

*= Raw score, mean is not applicable

Participant 5

P5 is a 20 year-old Division I baseball player. He has played baseball for 15 years, and has sustained prior injuries that have required at least 5 weeks of recovery time. He underwent Tommy John surgery (ulnar collateral ligament reconstruction) of his left elbow at the end of March, due to chronic injury to his medial elbow. P5 enrolled in the study two weeks post-surgery while he was immobilized from the upper arm to his fingers. All of his rehabilitation was performed in the athletic training room at his university, and a graduate assistant ATC served as his primary ATC.

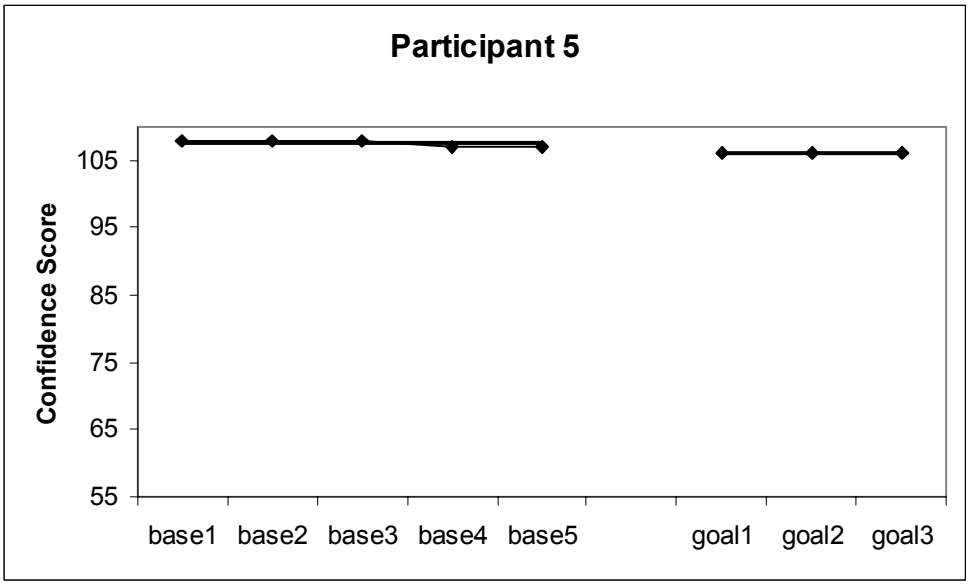
Intervention detail: Baseline data collection lasted 7 weeks for P5. During the first goal setting meeting, P5 and the investigator set 2 short-term and 2 long-term goals. After this first intervention, P5 was unable to meet for two weeks, as he was traveling with the baseball team for conference tournaments. He then met with the investigator for two weeks, then left for vacation for one week. He failed to attend his final goal-setting

meeting due to a family emergency. Thus, the final meeting was held over the phone. P5's overall intervention compliance was 57% (4/7 meetings). At the time of his final meeting P5 was advancing through the rehabilitation protocol developed by his physician. He has at least 3-4 more months of rehabilitation remaining before he can return to baseball. Thus, he has not yet met either long-term goal, but did achieve all of his short-term goals.

Data analysis: P5 had high levels of confidence from the beginning of the study (M=107.6, s.d.=.55). During the intervention period, his confidence scores dropped slightly and held consistently at 106, a decrease of 1.5%. Although a decrease was detected, it is relatively small and his scores still remained high throughout the study. See figure 13 for the graphical representation of this data.

P5 scored the lowest on his baseline performance satisfaction measure (27) relative to other participant in the study. After the intervention his score increased by 18.5% to 32. His intervention satisfaction was still lower than 4 of the other 6 participants. However, his baseline recovery satisfaction score was one of the highest among the participants (64), and increased by 7.8% to 69 after the intervention. This intervention score was the highest among all participants.

Figure 13. Confidence scores for participant 5. Note that heavy black lines represent the means for each time period. Dots represent discrete measurements



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P5's ATC had a baseline performance satisfaction score of 32, the lowest of all participating ATC's and PT's. After the intervention this score increased by 21.9% to 39, but remained the lowest of all ATC's and PT's. However, the baseline recovery satisfaction score was relatively high (67), but this decreased after the intervention to 50 (a decrease of 25.4%). This intervention score was relatively moderate compared to other supervising ATC's and PT's.

P5 displayed high scores on the SIRAS across the study. During the baseline period his scores remained constant at 15, the highest possible score. During the intervention his scores dropped slightly to an average of 14.3 (s.d.=.49), a decrease of 4.5%. See figure 14 for the graphical representation of the SIRAS scores. His attendance

at rehabilitation sessions was 100% during the baseline but dropped to 94% during the intervention, a decrease of 6%.

Figure 14. SIRAS scores for participant 5. Note that heavy black lines represent the means for each time period. Dots represent discrete measurements. Note that P5 has additional SIRAS scores due to missed goal setting meetings.

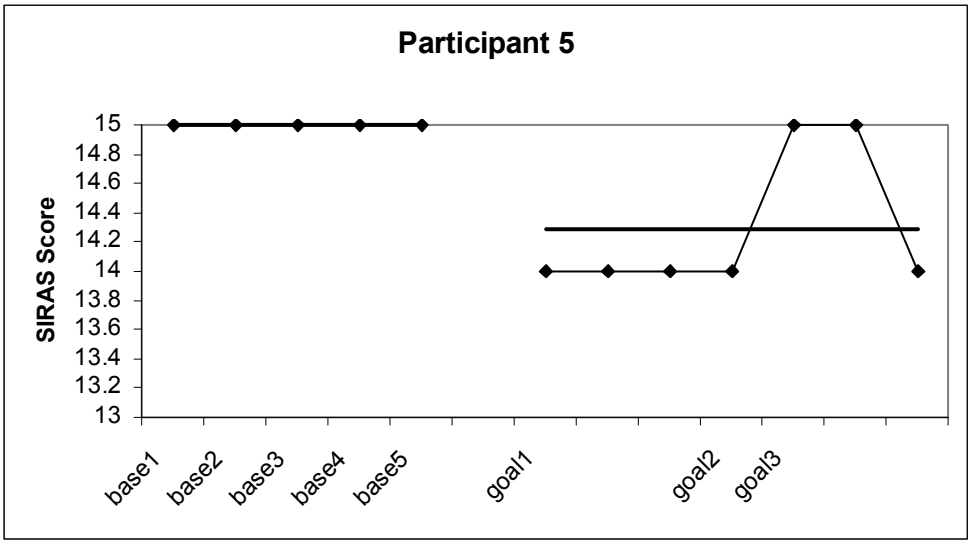


Table 5. Means (s.d.) and changes in data for participant 5.

	Baseline Mean	Intervention Mean	Change
Confidence	107.6 (0.55)	106.0 (0.00)	1.5% decrease
Performance Satisfaction	27*	32*	18.5% increase
Recovery Satisfaction	64*	69*	7.8% increase
ATC Performance Satisfaction	32*	39*	21.9% increase
ATC Recovery Satisfaction	67*	50*	25.4% decrease
SIRAS	15.0 (0.00)	14.3 (0.49)	4.5% decrease
Adherence	1.0	.94	6% decrease

*= Raw score, mean is not applicable

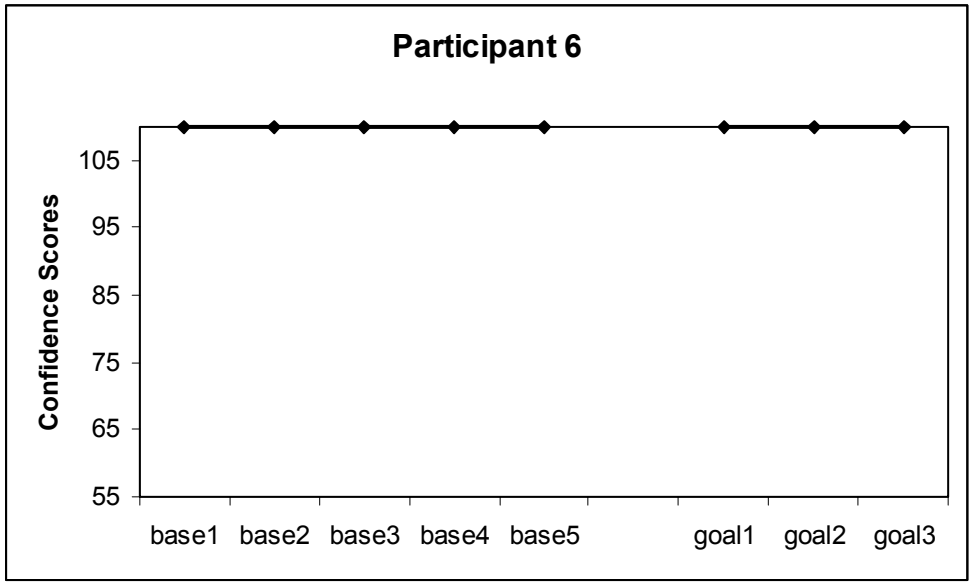
Participant 6

P6 is a 22 year-old male Division III football player. He has played organized football for 15 years and participates at the collegiate level during the fall and spring. He has suffered several injuries that have required greater than 5 weeks of recovery. During the initial weeks of the 2004 season he suffered an injury to his right knee. Diagnosed as a complete tear of his Anterior Cruciate Ligament (ACL), he continued to play throughout the season. However, the pain and instability became debilitating during the off-season, and he underwent ACL reconstruction surgery at the end of February 2005. He joined the study 9 week post-surgery. All of his rehabilitation was performed at a physical therapy clinic, as well as at a strength and conditioning gym. His PT served as the supervising caregiver during the first 2 weeks; from weeks 3-8 his strength and conditioning coach became his primary caregiver.

Intervention detail: Baseline data were collected for 5 weeks. At the first intervention meeting P6 and the investigator set 1 short-term and 2 long-term goals. The intervention lasted 3 weeks, at which time P6 had met the short-term goal set at the initial meeting. P6 displayed an intervention compliance of 100% (attended all meetings). At the time of the final meeting P6 was advancing through the conditioning program developed by his strength coach. He was expected to make a full return to play in August.

Data analysis: P6 had a constant confidence score (110). This score was the maximum possible score on the confidence measure. See Figure 15 for the graphical representation of this data.

Figure 15. Confidence scores for participant 6. Note that heavy black lines represent phase means, while dots represent discrete scores.



P6 displayed a relatively low score on his baseline performance satisfaction measure (29), which remained constant across the intervention. His recovery satisfaction score was very high at baseline (70, the maximum possible score), but decreased by 7.1% to 65 after the intervention.

The investigator was unable to collect satisfaction scores from the supervising strength coach, due to difficulty in contacting this individual. Thus no ATC performance satisfaction or recovery satisfaction scores can be reported for P6.

P6 displayed a constant SIRAS score of 15 across both the baseline and intervention periods. Fifteen is the maximum possible score on the SIRAS, indicating high levels of adherence. See figure 16 for a graphical representation of this data. P6

also attended 100% of his rehabilitation appointments during both the baseline and intervention periods.

Figure 16. SIRAS scores for participant 6. Note that heavy black lines represent phase means, while dots represent discrete scores.

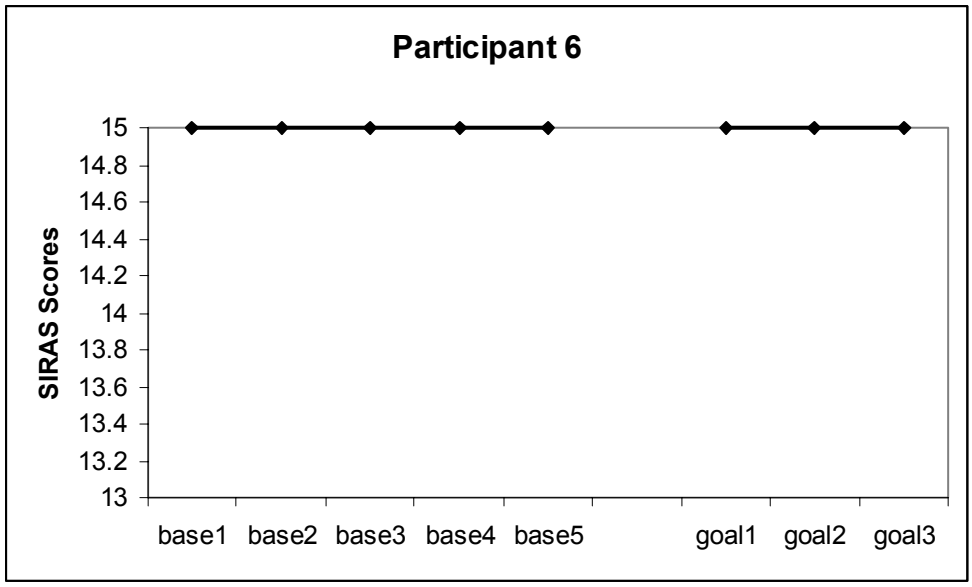


Table 6. Means (s.d.) and changes in data for participant 6.

	Baseline Mean	Intervention Mean	Change
Confidence	110 (0.00)	110 (0.00)	0.0%
Performance Satisfaction	29*	29*	0.0%
Recovery Satisfaction	70*	65*	7.1% decrease
ATC Performance Satisfaction	-	-	-
ATC Recovery Satisfaction	-	-	-
SIRAS	15.0 (0.00)	15.0 (0.00)	0.0%
Adherence	1.0	1.0	0.0%

*= Raw score, mean is not applicable

Cross Case and Group Analysis

Hrycaiko and Martin (1996) suggest that single-subject designs can be quantitatively evaluated by using the following guidelines: 1) the final few data points of the baseline should be stable, or in a direction opposite that predicted for the intervention, 2) results should be replicated, either across treatments or individuals, 3) baseline and intervention data points should not overlap (or overlap should be minimal), 4) the effect should be observed quickly following the intervention, and 5) the effect seen should be large. Baseline stability was seen in the confidence scores for P2, P3, P4, P5 and P6, as well as the SIRAS scores for P4, P5 and P6. Results were replicated three times for changes in confidence, and three times for changes in SIRAS score. There was no baseline-intervention overlap of confidence scores for P1, P4, and P5. An effect was seen quickly for the SIRAS scores for P1 and P5, as well as for the confidence scores for P5. Additionally, a large effect was seen in the confidence score for P1. Thus, there is limited ability to make strong conclusions about the changes seen during the goal setting intervention.

Of the six participants, three displayed changes in confidence that were in the predicted direction. Only one participant saw a change in performance satisfaction that was predicted, while three participants displayed the predicted change in recovery time satisfaction. None of the participating ATC's or PT's displayed the predicted change in performance satisfaction, while three showed the predicted change in recovery time satisfaction. Three participants displayed changes in their SIRAS scores that were in the predicted direction, but none showed a predicted change in attendance percentage (see

table 7 for a summary of this data). When taken together, there is some support for the experimental hypotheses for both confidence and SIRAS scores, although this support is not strong.

Table 7. Summary of Individual Case Results.

	Predicted Change	In predicted direction	Not in predicted direction	No change
Confidence	Increased Score	3 (P1, P3, P4)	2 (P2, P5)	1 (P6)
Performance Satisfaction	Decreased Score	1 (P1)	4 (P2, P3, P4, P5)	1 (P6)
Recovery Satisfaction	Decreased Score	3(P1, P4, P6)	3 (P2, P3, P5)	
ATC Performance satisfaction	Decreased Score	0	3 (P1, P2, P5)	2 (P3, P4)
ATC Recovery Satisfaction	Decreased Score	3 (P2, P4, P5)	2 (P1, P3)	
SIRAS	Increase	3 (P1, P2, P3)	1 (P5)	2 (P4, P6)
Adherence	Increase	0	2 (P2, P5)	4 (P1, P3, P4, P6)

Paired-groups t-tests, grouping all subjects together, revealed no statistically significant differences between baseline and intervention for confidence (t=-1.226, p=.275), performance satisfaction (t=-2.059, p=.095), recovery satisfaction (t=.000, p=1.000), SIRAS scores (t=-.747, p=.489), or adherence (t=1.364, p=.231). In addition, no statistically significant differences were found between baseline and intervention for ATC performance satisfaction (t=-1.744, p=.156) and ATC recovery satisfaction (t=.366, p=.733). See table 8 for all t-test values and group means.

Overall, some trends are visible in the case data. Three participants had an increase in confidence scores, while one had a consistent maximal score, and one scored near the maximum but saw a minor drop in score (1.5%). Although the t-test did not reach statistical significance, this trend shows some promise. The trend with SIRAS scores is similar but less clear, with three participants having an increase in score and two scoring at the maximum value throughout the study. Again, this trend does not reach statistical significance, but this may be attributed to the lack or variance in these scores (the minimum score by any participant was 13, the maximum was 15) and a possible ceiling effect. Attendance ratios remain constant across the intervention for four participants, and provide little information. Scores on performance satisfaction do not follow the predicted direction; in fact most scores are in the opposite direction. The trend with recovery satisfaction is mixed and overall, neither satisfaction measure provides much information. Some limitations with the measure used to test satisfaction may explain these findings and are discussed in chapter V. A similar lack of trend is seen with the ATC performance and recovery satisfaction scores. However, the positive trend seen with the confidence scores may demonstrate an effect that could reach statistical significance in a larger study.

Table 8. Means and paired t-tests for all cross case comparisons

Comparison (Baseline-intervention)	df	Baseline Mean (s.d.)	Intervention Mean (s.d.)	Paired T-test
Confidence	5	95.5 (16.66)	100.7 (9.85)	-1.226
Performance Satisfaction	5	33.0 (7.38)	38.7 (7.03)	-2.059
Recovery Satisfaction	5	55.3 (11.52)	55.3 (12.29)	0.000
SIRAS	5	14.5 (0.59)	14.7 (0.37)	-0.747
Attendance	5	0.96 (0.10)	0.92 (0.10)	1.364
ATC Performance Satisfaction	4	43.0 (7.87)	46.6 (6.35)	-1.744
ATC Recovery Satisfaction	4	49.4 (12.66)	47.0 (10.68)	0.366

Program Evaluation

The data collected from the post-intervention interviews reveal some common themes among study participants. In response to questions one, "Do you feel that the goal setting program was a useful part of the rehabilitation process? Why?"(see Appendix A.6), every participant felt that the goal setting program was a useful part of his or her rehabilitation process. All participants indicated that the goal setting program gave them direction and focus in their daily rehabilitation. They all felt that the goals challenged them to work harder during their daily exercises. Participants 1, 3, and 4 indicated that the goal setting program helped motivate them to perform during rehabilitation. In addition, participants 1, 3, 4 and 6 felt that the goals helped them track their progress during rehabilitation, to "see where they were going" with their programs. Two individuals (P1 and 3) felt that this program helped increase their optimism and helped them "stay positive", while participant 5 indicated that achieving goals was a very positive experience.

In response to question two, "What parts of the program did you enjoy most?", each participant found unique aspects of the goal setting program enjoyable. Two individuals (P3 and 4) felt that setting long-term goals in particular helped with their motivation, although P1 felt that the long-term goals were a potential weakness in the program (she felt that not meeting long-term goals was very frustrating and felt like a set-back). Participant 3 greatly enjoyed the weekly confidence measures, as she felt that they helped her track her progress from week-to-week. Participant 5 enjoyed the short-term goals the most, as he enjoyed meeting each goal. Participant 6 most enjoyed the evaluation of each goal during weekly meetings, as he felt this was a good way to measure his progress from week-to-week.

Certain aspects of the program were identified as least enjoyable by the participants in response to question three, "What parts of the program did you enjoy least? What would you change about the goal setting program?". As noted above, P1 felt that the long-term goals were not beneficial for her, and she was very disappointed in not meeting those particular goals. Participants 1 and 4 felt that the weekly surveys were tedious and unnecessary as a part of their goal setting experience. P1 and P3 indicated that having their own supervising ATC or PT set the goals with them (as opposed to an individual outside the therapy team) would be preferential, because these individuals would have a better idea of what is challenging, what is impossible (given physician restrictions), and which areas of each individuals' rehabilitation would be best suited for goal setting. However, P5 and P6 did not identify any parts of the program as least enjoyable; P5 indicated that the program was very effective "as is".

In response to question four, "Would you recommend this program to other injured athletes? Why?", all of the participants would recommend this program to other athletes in rehabilitation. P1 felt that many athletes may not set goals, or may set inappropriate ("bad") goals, and that this program would help them set proper goals. P1 and 3 felt that the increased optimism and positive outlook would be beneficial to others. P4 felt that having another individual (in the case of this program, the investigator) help brainstorm ideas would be beneficial for all athletes. P1, P5 and P6 all felt that the focus and direction provided by the program would be useful to other injured athletes.

Question five asked, "Do you feel that this program impacted your recovery from your injury? If so, how? If not, why not?". In response, every participant indicated that the goal-setting program has had an impact on his or her recovery. However, every participant indicated that this impact was indirect; they indicated that the goals helped increase motivation or provide direction, which led to enhanced performance in rehabilitation. It was this enhanced performance that benefited recovery, not the goals themselves. P1 may have indicated this best with her quote, "This program did not affect my recovery time- I just had to wait to heal. But it did help with my energy to *do* the rehab".

Overall, the participants enjoyed the goal setting intervention and felt that it was beneficial in their rehabilitation after athletic injury, helping to motivate them and keep them focused during each week of the intervention. All participants would recommend this program to other athletes in similar rehabilitation settings, with only minor changes (eliminating the weekly confidence measures, having their ATC or PT set the goals with

them). Key features of the goal-setting package (the use of long- and short-term goals, using measurable goals) were also supported by the participants as strengths of the present intervention. The results of these interviews show that this goal setting intervention was a positive experience for all participating athletes.

The present study found little statistical support for the use of a goal setting program with injured athletes during rehabilitation. However, trends in the case results showed a general increase in confidence scores (with those individuals who scored at or near the maximal level staying at or near their baseline scores). The apparent trend for SIRAS scores, a subjective rating of rehabilitation adherence, is less clear, but does show that scores stay at or near the maximal level for this group of participants. Results for both satisfaction measures are unclear, as are the results for ATC satisfaction. Participants found the program to be helpful during their rehabilitation and would all recommend this program to other injured athletes, with few changes to the protocol. Although there is no statistically significant result from this study, the positive trend in confidence and the overwhelmingly positive program evaluation show some potential in the positive effects of a goal setting program in injury rehabilitation programs.

CHAPTER V

DISCUSSION

The present study investigated the effects of a formal goal-setting program on rehabilitation adherence, confidence, and satisfaction after athletic injury. Results indicated varied responses by each individual, with some participants responding very favorably to the intervention (participants 1 and 3), while others did not respond in the predicted fashion (participants 2 and 5). No statistical analyses comparing baseline and intervention scores reached significance. Program evaluation via post-intervention interviews supports the use of a goal setting program in athletic injury rehabilitation, to help increase motivation throughout the rehabilitation process, and to increase effort during rehabilitation sessions.

This study adds to previous literature (Evans et. al., 2000; Ievleva & Orlick, 1991; Johnson, 2000; Scherzer et. al., 2001; Theodorakis et. al., 1996, 1997) to elucidate the relationship between psychological skills (in this instance, goal setting) and various constructs of recovery after athletic injury. Although the statistical results did not reach significance, it is important to note the individual changes seen during this study. Three subjects saw a positive change in their confidence post-intervention, while two remained at or near maximal levels. This change is important, because higher levels of confidence have been shown to mediate performance (Theodorakis et. al., 1996). In addition, it can be expected that athletes who are more confident upon return to play will make a

smoother adjustment than those athletes who have lower levels of confidence. Thus, increasing confidence, even by a small amount, can be of practical importance when working with individual athletes. Three participants also saw an increase in adherence (as measured by the SIRAS) and a decrease in recovery time satisfaction scores, and three participating ATC's or PT's also saw a decrease in recovery time satisfaction scores. However, given the limitations of the study, and the inability to reliably meet the five standards for single-subject design data analyses, it is inappropriate to conclude that goal setting had a positive impact on these variables.

There is not enough evidence from this study to conclude that goal setting increases adherence as measured by the SIRAS, although three participants saw a small increase in SIRAS scores post-intervention. This finding contrasts with Scherzer et al. (2001), who found goal setting increased rehabilitation adherence. It should be noted that all participating athletes were highly adherent to their rehabilitation protocols prior to the intervention, and thus a ceiling effect may have been present. This ceiling effect could have prevented the SIRAS from finding statistically significant differences in baseline-intervention adherence scores. In addition, the lack of variance in the scores (scores ranged from 13-15, with the majority of scores at 14 or 15) may prevent detection of significant differences (especially with a small N). Despite the lack of significant results, this study does support the use of the SIRAS in athletic injury rehabilitation research. Although four of the six participants saw no change in their rehabilitation attendance ratio, the SIRAS allowed for a more detailed examination of their rehabilitation effort.

Thus, studies on athletic injury rehabilitation should include a subjective measure (like the SIRAS) when examining rehabilitation adherence.

An important finding was that all athletes felt that the goal-setting program was a useful part of their rehabilitation. All indicated that the use of goal setting increased their motivation and/or effort, which supports Locke and Latham's (1990) theory of goal setting (the theoretical framework for the present study). Most athletes also supported the idea that goals gave them something to strive for (gave them direction) during each rehabilitation session. This also supports Locke and Latham. The interview content also demonstrated the effects of long- and short-term goals on goal effectiveness. Most athletes felt that the long-term goals helped the most with motivation, while the short-term goals provided direction, as well as increased effort. These findings are important, as they highlight the importance of including both long- and short-term goals in a formal goal setting program.

The inconsistency between the case studies, statistical analyses, and the program evaluation, require some discussion. Although there was no statistical support for any of the study hypotheses, the participants still provided unanimous support for the use and benefits of the goal setting program. There are several potential explanations for this discrepancy. First, the small sample size will affect the ability of the statistical analyses to detect small differences. Second, many of the participants scored at or near the maximum value for confidence, SIRAS, and attendance at rehabilitation appointments, so a significant ceiling effect may have played a role in the inability to see significant changes in scores during the intervention. Third, there is the possibility that the questions

in the program evaluation were leading, and that the participants answered in such a positive manner to please the investigator. Fourth, the selected measures may not have tapped the important mechanisms that may have played a role in this study. There was no measure of motivation, which was cited by many participants as an important effect of the goal setting. There was only one brief measure of effort that was included in the overall SIRAS score. It may be important, in future studies, to include measures that could investigate these two variables in more depth.

This study used competitive NCAA athletes as participants, which is an important deviation from previous research. Many previous studies used recreational athletes or college-age students who were not competitive athletes as subjects. Studies that did use competitive athletes generally used national or elite-level athletes. Almost all of the aforementioned studies were conducted in sports medicine clinics, and not in an athletic training environment. In the present study, three of the six participants were undergoing rehabilitation in a traditional athletic training setting, making this the first study to investigate the use of a psychological intervention in this type of environment.

Limitations of the Present Study

Although care was taken to minimize limitations, no study is perfect. Thus, it is important to note the areas of the current research that can be improved upon for future studies. Several methodological limitations arose during the data analysis. The small sample size limits generalizability and was not adequate for the selected statistical analyses. The relative length of the baseline and intervention periods was short, and the baseline measures were often not stable, due in part to time constraints. These limitations

can be remedied in longer studies with more participants and extended time for data collection.

One important limitation was the use of the ATC or PT satisfaction measure. While the section devoted to performance was generally well accepted, three of the six ATC's and PT's did not support the use of the recovery time section. They indicated that the time it takes for the athlete to recover is not important to them; what is important is the quality of the recovery. This may explain the lack of significant differences found with this measure.

The athlete satisfaction measure is another aspect of the present study that requires some discussion. In general, resulting scores on both sections of this measure did not follow the predicted direction (a direction supported by the research of Theodorakis et al., 1996 & 1997). This could be due to the time of administration after the intervention. Only one of the athletes was cleared for participation by her physician when the satisfaction measure was administered. These athletes were generally at the beginning of the functional stage of their rehabilitation; the time when they are allowed to perform most sport-related activities for the first time since injury (or surgery). However, it is also during this time that athletes realize how relatively weak or out-of-shape they are, and many realize they have a long way to go before they are "normal". It is possible that athletes would be more satisfied with lower performance levels during this critical time, but that their scores would decrease in the predicted fashion once they were actually cleared for full participation. Further research in this area is warranted.

In addition to the limitations discussed above, the recovery time portion of the satisfaction measure deserves some mention. It was designed to find differences in satisfaction with various return-to-play scenarios, ranging from returning 14 days earlier than predicted to 14 days later. When this measure was originally designed, it was believed that a range of + or – two weeks for recovery would be sensitive enough to see changes in satisfaction. However, the actual recovery time of the participating athletes was significantly greater than originally expected (at least 3 months), the sensitivity of this portion of the measure became questionable. After all, if an athlete is in rehabilitation for 6 months, does it really matter if they return to play 14 days sooner (or 14 days later) than what is estimated for them?

One additional limitation was the rehabilitation atmosphere for the injured athletes. Three of the six athletes performed all of their physical therapy at a clinic independent of their athletic training department. This may have impacted the relative "push" to get these athletes recovered in the quickest amount of time. In general, athletic training environments are more challenging and demanding than physical therapy, and the athletes tend to perform rehabilitation daily, as opposed to two or three times a week at a PT clinic. The fact that half of the sample did not utilize the athletic training staff for their rehabilitation may have impacted the group results.

However, only one of the athletes who participated in rehabilitation under the guidance of an ATC was under a real time constraint for return to play (participant 1, who had been invited to play for a highly competitive summer league at the end of the school year). It is interesting to note that her results were the most encouraging, and

supported all of the hypotheses. The other participants were injured at the beginning of the season, had season-ending surgery, and were projected to finish rehabilitation before the beginning of their next competitive season. Again, this lack of any time constraint affects the generalizability of the present results to athletic training environments.

One final limitation was the time constraints that led to short baseline and intervention periods. When several of the participants entered the study, they were about halfway done with their rehabilitation, and thus had only 6-8 weeks remaining for data collection. Thus, the baseline and intervention periods were relatively short. In most single-subject designs, the baseline period should be stable, and scores should be consistent or in a direction opposite the hypothesized change. However, due to the time constraints each participant was under, there was not enough time to allow for a stable baseline. In addition, the intervention was just a short, due to the athlete's release from PT or rehabilitation. This may have affected the ability for the intervention to produce statistically significant results.

Directions for Future Research

The present study marks the first attempt to employ a formal goal setting program in an athletic training environment with injured NCAA athletes. As such, there is a great deal of information that needs to be obtained before recommendations can be made regarding the specific benefits of such a program on recovery. Perhaps the most important direction for future research in this area is investigating the effects of goal setting on actual recovery time. It is unlikely that goal setting would affect actual physiological healing, but it is likely that it would affect rehabilitation adherence,

motivation, effort, and self-efficacy. These, in turn, could impact the recovery time of athletes in long-term rehabilitation programs (by decreasing the number of set-backs, and by reducing the time spent in rehabilitation plateaus). Thus, employing the use of an experimental design to look at differences in recovery time for athletes using goal setting would be an important, if not difficult, step in this research line.

In addition, future research should investigate the effect of a goal-setting package on recovery after short-term athletic injury. The majority of athletic injuries require only days of recovery time; more serious injuries can take 1-3 weeks. No research has been done on this population of injured athletes (recovery under 3 weeks). Although Locke and Latham (1985) believe that the effects of goal setting may be difficult to see in individuals who are operating close to their potential (as these injured athletes would be), there may still be some meaningful changes in self-efficacy that could impact return to play. Future research should begin to investigate this population.

This study provides a "pilot" study of sorts for individuals interested in this line of research, and helps identify problems that can be remedied for future research endeavors. The use of a single-subject design is appropriate for this line of research, as recruiting a representative sample of injured athletes is a long process. Future researchers should allow for sufficient time for a stable baseline period (in this study, at least 5 weeks) prior to starting the intervention. The intervention period should also be lengthened, again to at least 5 weeks (if not longer). Additional measures of rehabilitation effort (perhaps an elaboration of the effort subscale of the SIRAS) and individual motivation (possibly in the form of a daily log by the participant) should be added for a more in-depth look at the

potential effects of goal setting. In addition, the study should be continued until the athlete has been cleared for full participation in athletics and resumes practice or competition. Of course, recruiting additional athletes (N=10 or more) would only add strength to this type of study. If an experimental design with control and experimental groups is possible, the investigator should employ several universities and colleges for help with subject recruitment, as well as data collection. Training several individuals in goal setting, and thus being able to use several investigators to perform the intervention, would also be important. Allowing for several years for data collection would be beneficial as well. Although a true experimental design would be very difficult, it would allow for a more detailed picture of whether goal setting impacts actual recovery time, as well as the quality of that recovery.

Summary

The present study investigated the effects of a formal goal setting program on injured athletes in long-term rehabilitation. Statistical analyses failed to support the hypotheses that goal setting was associated with increased confidence, increased satisfaction with performance and recovery time, rehabilitation adherence and attendance at rehabilitation sessions, and ATC satisfaction with performance and recovery time. However, a positive trend in the confidence scores was seen in the case study analysis. Although no clear trend was seen in the SIRAS or adherence data, most scores stayed at or near maximum levels throughout the study, demonstrating a potential ceiling effect. There was no clear trend for either participant or ATC satisfaction, although problems with the sensitivity and administration of those measures may have led to the inconsistent

scores. Program evaluation revealed that every athlete felt that the goal-setting program was useful as a part of his or her rehabilitation, and they would recommend this program to other injured athletes. This program evaluation provides some preliminary support for this program, and should encourage further research into this area.

The inconsistency in statistical results and the program evaluation is noteworthy, and may help future researchers structure the measures or intervention differently. Specifically, researchers might strengthen interventions and establish stable baselines, improve measures and procedures to better test mechanisms and processes of goal setting, extend data collection over longer time periods, include more stringent experimental controls with larger groups of participants, and consider the indirect effect of goal setting on actual recovery time. In addition, it is recommended that any researcher pilot test all study measures and instruments to ensure that both participants and supervising health care providers understand and can reliably complete those measures, as well as to check on the sensitivity and accuracy of the data collected. Although this study does not provide strong support for the use of this skill in injury rehabilitation settings, it does provide direction for future research and may help other researchers design studies that will better demonstrate a link between psychological skills and rehabilitation outcomes.

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APPENDIX A. MEASURES

APPENDIX A.1

GOAL SETTING FORM

Date:_____

Subject #:_____

Meeting #:_____

Previous Long-term Goals:

1)
2)
3)

Previous Short-term Goals:

1)
2)
3)

Goals Met:

New Long-term Goals:

1)
2)
3)

New Short-term Goals:

1)
2)
3)

Date/time of next meeting:_____

Phone meeting? _____

APPENDIX A.2

Sport Injury Rehabilitation Compliance Scale (SIRAS)

Patient_____

Date:_____

Signature of Supervising ATC:_____

Since the date of injury:

How many appointments have been ***scheduled***? _____

How many appointments have been ***attended***? _____

1. Circle the number that best indicates the ***intensity*** with which this patient completes the rehabilitation exercises during their appointments.

1	**2**	**3**	**4**	**5**
Minimum effort				Maximum effort

2. How ***frequently*** does this patient follow your instructions or advice (circle)?

1	**2**	**3**	**4**	**5**
Never				Always

3. How ***receptive*** is this patient to changes in the rehabilitation program (circle)?

1	**2**	**3**	**4**	**5**
Very unreceptive				Very receptive

4. Is the athlete currently participating in sport?

____ No
____ Yes, modified/limited
____ Yes, no restrictions

APPENDIX A.3

Self Efficacy (Confidence) Scale

Please state your confidence in your ability to complete the following tasks. Answer each task with a yes or no. For those questions that you answered yes to, please rate your confidence on a 10-point scale (1=not confident, 10=completely confident)

I can:

Yes	No	Perform my sport at 10% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 20% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 30% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 40% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 50% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 60% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 70% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 80% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 90% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport at 100% of my pre-injury level								
1		2	3	4	5	6	7	8	9	10

Yes	No	Perform my sport better than I did prior to my injury								
1		2	3	4	5	6	7	8	9	10

APPENDIX A.4

Satisfaction Scale

Please rate your satisfaction with the following items. Use a 10-point scale to indicate your satisfaction (1=not satisfied, 10=full satisfaction).

I would be satisfied with :

Performing my sport at 10% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 20% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 30% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 40% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 50% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 60% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 70% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 80% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 90% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing my sport at 100% of my pre-injury level

1 2 3 4 5 6 7 8 9 10

Perform my sport better than I did prior to my injury

1 2 3 4 5 6 7 8 9 10

Recovery time

Returning to play 14 days sooner than expected

1 2 3 4 5 6 7 8 9 10

Returning to play 7 days sooner than expected

1 2 3 4 5 6 7 8 9 10

Returning to play 3 days sooner than expected

1 2 3 4 5 6 7 8 9 10

Returning to play when expected

1 2 3 4 5 6 7 8 9 10

Returning to play 3 days later than expected

1 2 3 4 5 6 7 8 9 10

Returning to play 7 days later than expected

1 2 3 4 5 6 7 8 9 10

Returning to play 14 later than expected

1 2 3 4 5 6 7 8 9 10

APPENDIX A.5

Satisfaction Scale for ATCs

Please rate your satisfaction with the following items. Use a 10-point scale to indicate your satisfaction (1=not satisfied, 10=full satisfaction).

I would be satisfied with the injured athlete:

Performing his/her sport at 10% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 20% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 30% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 40% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 50% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 60% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 70% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 80% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 90% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport at 100% of his/her pre-injury level

1 2 3 4 5 6 7 8 9 10

Performing his/her sport better than he/she did prior to the injury

1 2 3 4 5 6 7 8 9 10

Recovery time

Returning to play 14 days sooner than expected

1 2 3 4 5 6 7 8 9 10

Returning to play 7 days sooner than expected

1 2 3 4 5 6 7 8 9 10

Returning to play 3 days sooner than expected

1 2 3 4 5 6 7 8 9 10

Returning to play when expected

1 2 3 4 5 6 7 8 9 10

Returning to play 3 days later than expected

1 2 3 4 5 6 7 8 9 10

Returning to play 7 days later than expected

1 2 3 4 5 6 7 8 9 10

Returning to play 14 later than expected

1 2 3 4 5 6 7 8 9 10

APPENDIX A.6

Post-intervention Debriefing Questions

1. Do you feel that the goal-setting program was a useful part of the rehabilitation process? Why?

2. What parts of the program did you enjoy most?

3. What parts of the program did you enjoy least? What would you change about the goal-setting program?

4. Would you recommend this program to other injured athletes? Why?

5. Do you feel that this program impacted your recovery from your injury? If so, how? If now, why not?

APPENDIX B. INTERVENTION DETAIL

APPENDIX B.1

Intervention Meeting Detail

Setting: Typically in or just outside the athlete's athletic training room. During the summer, the meetings took place at a small ice cream shop just off the university campus.

Content: Meetings were kept informal, to put the athlete at ease and facilitate a friendly environment. The confidence measure was given to the athlete and completed first. Once this was accomplished, the athlete and the investigator talked about the goals set during the previous week's meeting. Any goals that were accomplished were checked off and recorded on the current goal-setting sheet. The athlete was then asked about their current rehabilitation. The questions followed this guide:

- current exercises being performed
- resistance level/repetitions of exercises
- number of days/week rehabilitation was performed
- number of times/day exercises were being performed
- any restrictions placed on them by their physician/athletic trainer/physical therapist

Once this information was obtained, the investigator asked the athlete if there were any goals they would like to set for their rehabilitation. Long-term goals were generally set first (if any were set during the meeting). Short-term goals were then set. If the athlete had trouble thinking of a goal, the investigator helped them "brainstorm" by

asking if there were areas of the rehabilitation that were easy or not challenging, or if there were certain areas of the rehabilitation that were particularly important (for example, regaining ROM). If easy exercises were identified, the investigator asked if the resistance could be increased, or if the repetitions could be increased so that the exercise became challenging. If certain areas of the rehabilitation were particularly important, the investigator asked if new exercises could be added, or if the athlete could perform the exercises additional times during the day. It is important to note that ANY changes to the rehabilitation program (adding exercises, increasing resistance, etc.) had to be approved by the supervising athletic trainer or physical therapist. Any new short-term goals that were identified during this process were recorded. Once at least one short-term goal was recorded, a date and time for the next meeting was agreed upon. This was also recorded on the sheet. One goal-setting sheet was given to the athlete, and a copy was kept by the investigator.

Goals: The goals were set using the following guide:

- All goals were measurable in some fashion. Typically short-term goals included some objective performance level to be met.
- All goals were specific to a particular aspect of rehabilitation or recovery.
- All goals were designed to be attainable within the specified period of time.
- All goals had some timeframe associated with them. Usually, short-term goals were set with a specific date for accomplishment.

Final meeting: The final meeting was held either in person or over the phone (in this study, 4 of 6 final meetings were held over the phone). The confidence measure was

completed first, then the satisfaction measure. The athlete was then asked if any of the previous week's goals had been met (if so, these were recorded on a final goal setting sheet). The athlete was then interviewed, following the sequence of questions given in appendix A.6. Once the interview was concluded, the athlete was asked if they had any final questions or comments. At this time the athlete was made aware that his/her participation in the study had ended, but they were free to contact the investigator at any time.

APPENDIX B.2

Chart of All Goals Set by All Participants

Short-term goals were set at each week's meeting (meeting 1, 2, etc.) and are listed in the row corresponding with the week the goal was set. Y/N indicates whether the goal was accomplished by the stated time. Any long-term goals are listed at the week they were set. If the Y/N column is left blank, that indicates the goal has not yet been accomplished (as of the end of the participant's time in the study)

Participant	Meeting	Short-term goal	Met?	Long-term goal	Met?
P1	1	Get off crutches by 4/11	Y	Begin sprinting by 5/4	N
		In 2 weeks (4/18), be able to hyperextend knee and raise heel off ground	Y	Return to play, with no restrictions, by 5/15	N
	2	Add at least 5 lbs. to each hand during squats by 4/25	Y		
		Increase resistance on bike intervals by 4/22	Y		
	3	Do 5 cardio workouts per week	Y	Begin light sprinting by 5/16	Y
		Be able to lock leg out on leg extensions by 5/9	N	Return to play by 6/1	N
	4	Start running/sprinting intervals by 5/18	Y		
		Do exercises/rehabilitation 4 days/week	Y		
P2	1	Jump rope 10 min., 3 days/week	N	Begin running by 4/30	Y
		Stairmaster 10 min., 3 days/week	Y	Full return to pay by August 1	
	2	Do 30 reps of leg press @ 40 lbs. by 4/18	Y		
		Jump rope 10 min., 3 days/week	Y		

	3	Elliptical 3 days/week for 15 min.	Y	
		Do 30 reps of leg curls @ 40 lbs. by 4/25	Y	
	4	Do 30 reps of leg press @ 100 lbs. By 5/2	Y	
		Do 30 reps of leg curls @ 30 lbs. By 5/2	Y	
	5	Start 2 leg ham curls, twice a week, 30 reps	Y	Run one mile in 10 min. by 5/30
		Do carioca and balance exercises 4 days/week	Y	
	6	Increase weight on ham curls to 120 lbs.	Y	
		Run 10 min. continuously by 5/18	Y	
P3	1	Do all shoulder lifts 20 times with 3 lbs. by 4/11	Y	No pain upon return to play Return to play on 5/27
	2	Increase weight by 1 plate on chest press and row by 5/2	Y	
		Do 3 sets of 20 wall push-ups 4 days/week by 5/2	Y	
P4	1	Start doing layups and cross-over dribble (all basketball motions) by 4/29	Y	Be able to perform @ 100% with no pain upon return to play
		Do 3 sets of 20 prone arm raises every day until 4/25	N	
	2	Do 3 sets of 20 prone arm raises every day until 5/2	N	Be able to hang on rim (do pull-ups)
		Do at least 30 min. of cardio 4	Y	

		days/week		
	3	Do at least 30 min. of cardio 5 days/week	Y	
		Do arm exercises at least 3 days/week	Y	
P5	1	Full extension by 5/18	Y	Be able to throw 86-90 mph upon return to play Be able to pitch pain-free upon return to play
	2	Maintain weight and reps on all exercises with no pain	Y	
	3	Maintain weight and reps on all exercises with no pain	Y	
	4	No goals set (final meeting)		
P6	1	Increase vertical jump by 1 inch in 2 weeks (6/17)	Y	No additional pain in right knee (when compared to left) upon return to play Keep both knees healthy past competitive season
	2	No new goals		
	3	No goals set (final meeting)		