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By

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ABSTRACT

AN EVALUATION OF AN EDUCATIONAL INTERVENTION IN PSYCHOLOGY OF INJURY FOR ATHLETIC TRAINING STUDENTS

By

Jennifer Lynn Stiller

This dissertation has two purposes: (a) to identify the psychosocial competencies that are needed by certified athletic trainers; and (b) to evaluate whether these competencies can be taught to athletic training students (ATS). It includes an introduction (Chapter 1), a review of literature, (Chapter 2), two background studies (Chapter 3), the dissertation study (Chapter 4), and one comprehensive discussion (Chapter 5). The purpose of the two background studies contained in Chapter 3 was to identify the psychosocial competencies that are needed by certified athletic trainers (ATCs). This was accomplished through individual interviews with currently or previously injured college student-athletes and through focus group interviews with recently certified athletic trainers. Results of these two background studies were triangulated with information obtained from the review of literature (Chapter 2) to produce content to be included in athletic training education programs. The purpose of the main dissertation study (Chapter 4) was to evaluate the effectiveness of an educational module in teaching these competencies to athletic training students. Chapter 4 also contains a discussion of the development of two psychometrically sound questionnaires designed to measure the application and transfer of sport psychology knowledge and applied sport psychology techniques. Chapter 5 is dedicated to a discussion of the implications of the results of the studies contained within Chapter 3 and

Chapter 4. In the primary dissertation study (Chapter 4), 31 athletic training students were assigned to an intervention versus a control condition and took part in six-week Applied Sport Psychology for Athletic Trainers (ASP-AT) educational module designed to increase proficiency in psychology of injury competencies. Assessments of psychology of injury knowledge and usage occurred at multiple occasions, extending 14 weeks post-intervention. Results indicated that the ASP-AT educational module is effective at increasing psychology of injury knowledge (increase of 31 points from baseline) and skill usage (increase of 44 points from baseline) in undergraduate and Masters degree candidate athletic training students. These increases were maintained at seven- and 14-week retention testing.

This dissertation is dedicated to John, who made me realize that nothing in life that is worth having comes easy.

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CHAPTER 1

Introduction

The professional success of certified athletic trainers (ATCs) is influenced by more than the ability to provide effective physical interventions to injured athletes. Specifically, increasing attention is being placed on the importance of psychological recovery from athletic injury. Athletic Training Education Programs (ATEPs) generally focus primarily on the physical nature of athletic injury, and for good reason. The primary roles of ATCs include physical injury prevention, evaluation and treatment, and rehabilitation. However, the National Athletic Trainers' Association Board of Certification and the Education Council agree that knowledge regarding psychology of injury is also essential for the entry-level ATC. This is evidenced by the inclusion of Psychosocial Intervention and Referral as one of 12 content areas required in accredited ATEPs.

Although the Commission on Accreditation of Athletic Training Education (CAATE) standards now require formal instruction in psychology, they make no suggestions or requirements regarding how such competencies must be taught. While this has the benefit of allowing ATEPs to implement these competencies in any way that they choose, it may be a detriment to athletic training students. Competency guidelines provided to ATEPs are very general, and there is a need for educational preparation regarding specific, practical application of psychology of injury knowledge. Effective interpersonal skills (e.g., communication, social support, motivation) and sport psychology skills (e.g., relaxation, imagery, self-talk) are not generally a primary focus during athletic training education; rather these skills are expected to develop from gaining

experience throughout one's professional career. The absence of a CAATE-required course in sport psychology leaves the placement and development of the Psychosocial Intervention and Referral competencies to the discretion of the individual ATEPs. This may put newly certified athletic trainers, and the athletes served by this population, at a disadvantage.

Previous research indicates that many ATCs feel underprepared by their ATEPs to handle situations within these content areas (Misasi, et al., 1996; Misasi, 1998). Additionally, survey research has indicated that the use of techniques such as imagery, relaxation, and self-talk in the athletic training room would likely be increased if ATCs had a stronger knowledge base in this area (Weise, Weiss, & Yukelson, 1991). Unfortunately, these results were published in 1991 (over 15 years ago), prior to the elimination of the internship route to certification and prior to the mandated inclusion of education in psychosocial intervention and referral. It is necessary to determine if the need for this knowledge is being met by current educational standards within ATEPs. Research must be conducted with recently certified ATCs in which the academic preparation and early professional experiences in the areas of communication, motivation, social support, and psychological skills training (PST) techniques are evaluated. With the growing body of research on psychology of injury, there may also be a need to expand education on psychology of injury within the content area of psychosocial intervention. Currently, the area of psychology of injury is given equal weight as other psychological issues (e.g., eating disorders, depression); however, issues requiring communication skills and motivational strategies are more common than these other psychological issues (S. P. Pero, Covassin, & O'Neil, 2000) and less likely to

require advanced referral. ATCs will be expected to handle such issues, and they need the appropriate skill set to do so.

This dissertation has two primary purposes: (a) to determine what psychosocial competencies certified athletic trainers need to be taught during their education programs; and (b) to determine whether the Applied Sport Psychology for Athletic Trainers educational intervention module is effective at increasing athletic training students' (ATS) knowledge in psychology of injury and their ability to apply knowledge to real-world situations with injured athletes in the athletic training room. It is comprised of three studies with one comprehensive review of literature (Chapter 2). Chapter 3 addresses Purpose 1 and encompasses two background research studies that established the need for the primary study contained in this dissertation (Chapter 4). The first background study involved currently or previously injured collegiate student-athletes, the purpose of which was to identify important psychosocial aspects of the athlete-athletic trainer relationship as perceived by this population. The second background study involved recently certified athletic trainers. The purpose of this study was to assess the relevant psychosocial issues that newly certified ATCs face, and the extent to which their undergraduate education prepared them to handle these issues. The combined goal of these background studies was to triangulate information gained from the literature, injured athletes, and ATCs to generate a list of psychosocial content to be included in ATEPs. Chapter 4 addresses the second purpose and contains an evaluation of the effectiveness of a new educational module focused on applied sport psychology for athletic trainers. This chapter also contains a discussion of the development of two psychometrically sound questionnaires designed to measure the application and transfer of sport psychology knowledge and applied sport psychology techniques to the athletic

training room. The following hypotheses and research questions were examined in this study:

Primary Hypotheses:

H1: Intervention Group A will demonstrate increased psychology of injury knowledge after a 6-week educational module versus a Control Group, as measured by the Psychology of Injury Knowledge Test (POI-K).

H2: Intervention Group A will demonstrate increased usage of psychology of injury techniques after a 6-week educational module versus a Control Group, as measured by the Psychology of Injury Usage Survey (POI-U).

Secondary Hypotheses:

H3: Intervention Group B will demonstrate increased psychology of injury knowledge after a 6-week educational module versus its own control period, as measured by the POI-K.

H4: Intervention Group B will demonstrate increased usage of psychology of injury techniques after a 6-week educational module versus its own control period, as measured by the POI-U.

H5: There are no differences between athletic training student and athlete perceptions of frequency of use of psychology of injury techniques in the athletic training room, as measured by differences between the POI-U and the Psychology of Injury Transfer Survey (POI-T).

Exploratory Hypotheses:

H6: Student-athletes working with participants in Intervention Group A will report increased frequency of use of psychology of injury techniques versus student-athletes working with participants in the Control Group, as measured by the POI-T.

H7: Student-athletes working with participants in Intervention Group B will report increased frequency of use of psychology of injury techniques as compared to the use by participants during the control period, as measured by the POI-T.

H8a: Intervention Group B will demonstrate increased psychology of injury knowledge after Week 3 of the educational module versus knowledge at Week 3 of the control period, as measured by the POI-K.

H8b: Intervention Group B will demonstrate increased psychology of injury knowledge after Week 6 of the educational module versus knowledge at Week 6 of the control period, as measured by the POI-K.

H8c: Intervention Group B will demonstrate increased psychology of injury technique usage after Week 3 of the educational module versus technique usage at Week 3 of the control period, as measured by the POI-U.

H8d: Intervention Group B will demonstrate increased psychology of injury technique usage after Week 6 of the educational module versus technique usage at Week 6 of the control period.

H9a: Intervention Groups A and B will demonstrate no differences in psychology of injury knowledge after Week 3 of the educational intervention, as measured by the POI-K.

H9b: Intervention Groups A and B will demonstrate no differences in psychology of injury knowledge after Week 6 of the educational intervention, as measured by the

POI-K.

H9c: Intervention Groups A and B will demonstrate no differences in psychology of injury technique usage after Week 3 of the educational intervention, as measured by the POI-U.

H9d: Intervention Groups A and B will demonstrate no differences in psychology of injury technique usage after Week 6 of the educational intervention, as measured by the POI-U.

Exploratory (Non-Directional) Research Question:

RQ1: What percentage of psychology of injury knowledge do participants retain following the end of the Intervention period?

CHAPTER 2

Review of Literature

Introduction

With the growth of athletic participation over recent decades, athletic injury has become a major risk for athletes competing at all levels and in all sports. Regardless of sex, an athlete has a 50% chance of becoming injured (Arnheim & Prentice, 1993; Beachy, Akau, Martinson, & Olderr, 1997). In any single year, one in six athletes will sustain an athletic injury serious enough to cause missed athletic participation (Ballard, 1996). Along with this growth in athletic participation and subsequent injury has come an increased recognition of the need for ATCs and other sports medicine professionals to provide care for injured athletes. Until the 1990s, rehabilitative interventions primarily addressed the physical dimensions of sports injury, focusing on helping athletes return to pre-injury level of function by treating the obvious physical symptoms (Van Heerden & Potgieter, 2003). However, pain is both physical and psychological, and often overlooked in the injury treatment and rehabilitation processes is the emotional component and the role of the mind (Lynch, 1988). Pain does not occur in the body without the mind reacting and contributing to the experience (O'Connor, 2002). Thus, it would seem that the treatment of physical symptoms is only half of the solution, because the athletic injury involves strong emotional and mental components.

Due to frequent contact with injured athletes during recovery and rehabilitation, ATCs are in a position to provide psychological skills training and emotional support to their athletes (Van Heerden & Potgieter, 2003). Key sport psychology topics that have been suggested to be components of an athletic injury rehabilitation program include

effective communication and motivation skills, social support and counseling, cognitive restructuring, imagery, relaxation, and goal setting. "A holistically educated and skilled [athletic trainer] is in an excellent position to provide effective social support for injured athletes which will facilitate optimal recovery" (Ford & Gordon, 1993). Results of a national survey of ATCs indicated that 47% believe that athletic injuries affect athletes both psychologically and physiologically, and most believe that both psychological and physiological factors need to be addressed during rehabilitation (Larson, Starkey, & Zaichkowsky, 1996). Athletic trainers have experience-based knowledge about psychological responses to injury but often lack systematic and specific educational preparation in these areas (Wiese-Bjornstal & Smith, 1993). A need and desire for more formal education or continuing education on the psychological factors and strategies associated with the rehabilitation from athletic injury has been communicated by ATCs (Moulton, Molstad, & Turner, 1997; Weise et al., 1991).

While 70% of certified athletic trainers hold advanced degrees (Association, 2006), there is little documentation that they receive graduate courses related to psychology and counseling (Pennsylvania, 1998). The undergraduate setting is the ideal location for such a course, as this placement would ensure that all ATCs who have met entry-level standards have had formal education and have demonstrated competency in this content area. This review will discuss the components deemed to be essential inclusions in a course on applied sport psychology and counseling for athletic trainers, with research justifications for each component. Areas that will be discussed include: communication and interpersonal skills; counseling and social support; relaxation, imagery, self-talk, and goal-setting.

Communication and Interpersonal Skills

Communication and interpersonal skills are critical for any professional in the allied health fields. These professionals must put clients at ease, often in very scary and uncertain situations. Professionals must be good listeners to help identify symptoms, and must be excellent communicators with the ability to translate complex medical information into terms that can be easily understood by patients. As communication skills become more and more important in the allied health fields, it is essential to determine what type of communication athletes respond to and what skills to incorporate into an athletic training curriculum. Communication should be embedded in a global patient-oriented curriculum, as communication skills are viewed as core elements of good medicine (Deveugele et al., 2005). While there is no gold standard for good communication between health care provider and patient, emphasis on patients' ideas, concerns, emotions, and need for information are key. In athletic training, listening skills are needed in order to allow athletes to fully express themselves, to explain their injury, and to ask questions about what to expect over the course of their injury. Clear, controlled communication is the primary responsibility of athletic trainers during initial management of injury (Wiese-Bjornstal & Smith, 1993). Communication skills are also essential for an ATC to provide social support to the athlete, and to ensure athlete adherence and compliance during injury rehabilitation. There is evidence in the medical field that good doctor-patient communication is related to better outcomes, better compliance, and higher satisfaction of both doctor and patient (Brown, Stewart, & Ryan, 2003; Stewart et al., 1999).

A two-part study published in 1993 examined what factors athletes and ATCs considered important when relating to athletes who are injured or rehabilitating (Fisher &

Hoisington, 1993; Fisher, Mullins, & Frye, 1993b). Thirty-six athletes and 187 ATCs responded to Likert scales and open-ended questions. Data analysis yielded the following factors as being important by both ATCs and athletes: good rapport and communication between ATC and injured athlete; clear explanation of the injury and the rehabilitation regimen; athlete motivation; and support from important others. Athletes in this study also identified successful rehabilitation and adherence strategies that are used or should be used by ATCs. Strategies included clarifying expectations about the rehabilitation process, goal setting and motivation, progress monitoring, and personalized treatment (Fisher & Hoisington, 1993). Similar results were reported from preliminary interviews with 13 injured athletes (Ford & Gordon, 1993). These athletes indicated that an improvement in communication skills was needed, with suggestions that ATCs ensure that athletes are aware of what is occurring at all stages of rehabilitation, provide candid information in a language that athletes can understand, and encourage athletes to discuss matters that are concerning (Ford & Gordon, 1993).

In a more recent study (Stiller, Gould, Paule, & Ostrowski, 2006), in-depth interviews were conducted with nine previously and currently injured collegiate athletes. These interviews focused on the relationship between athletes and their ATCs. Qualitative content analyses of these interviews suggest that the majority of traits that athletes perceive as being negative center around communication and interpersonal issues. Athletes complained about ATCs who "hide out" in their offices rather than staying in the athletic training room and talking with athletes during treatments and rehabilitation. Positive traits centered on good communication, ability to explain injuries and treatments in language that athletes could understand, and positive personal relationships between ATCs and athletes. More specifically, athletes identified the

following general qualities of effective ATCs: motivating and challenging; confident and experienced; attentive and accommodating; informative and helpful; friendly and relatable; and having positive personality traits. Personality traits that made the rehabilitation experience more enjoyable included having a positive attitude and being out-going, trustworthy, genuine, passionate, and comforting. (Stiller, Gould, Paule et al., 2006).

In summary, when an injury occurs, athletes will likely listen and adhere to what is suggested or advocated by ATCs if a personal relationship has already been established (Shelley, Trowbridge, & Betling, 2003). Athletic training students need education and practice in communication prior to entering the professional world. With the types of communication that athletes prefer and respond to identified, the next step is to incorporate training in these skills into athletic training undergraduate curriculum programs.

Academic Preparation of Athletic Trainers as Counselors.

Many athletic programs do not have mental health professionals available full-time, which often makes the ATC the first point of contact for athletes dealing with the emotional or psychological issues associated with injury. Successful development of the relationship between the ATC and athlete depends on the environment of the athletic training room and on the informal counseling skills of the ATCs themselves (S. P. Misasi, Kemler, & Redmond, 1998a). Attending to athletes, active listening, paraphrasing, and reflecting can be considered communication skills, but are better regarded as counseling skills when the athlete sets the agenda of the dialogue. The ATC should develop these counseling skills to facilitate self-expression and autonomy on behalf of the athlete (Rock & Jones, 2002).

Counseling is not the principle function of ATCs, but it is an important aspect of their professional role (Furney & Patton, 1985). The term 'counseling' is used differently in different contexts. By definition, a counselor is someone who helps an individual find answers and resolutions to issues by guiding these individuals in making informed, sound choices (George & Cristiani, 1986). Counseling injured athletes involves educating, establishing rapport and communication, and providing "emotional first aid" (Rock & Jones, 2002). Some professionals follow specific preparation for their work in counseling and are awarded credentials or licenses in counseling; other professionals, like athletic trainers, are considered informal counselors due to their day-to-day interactions with individuals seeking their assistance (S. P. Misasi et al., 1998a). Counseling skills are defined as "competency or accomplishment in communication, acquired or developed in training" (Culley, 1993). Athletic trainers are not professionally trained counselors and, although academic curriculum should provide ATCs with some degree of preparation for this role, often we find that this is not the case. It should also be noted that all athletic training programs should have licensed counselors or psychologists available for referral, and that ATCs should know when and how to make referral to a licensed mental health professional.

To evaluate the extent to which ATCs function in a counseling role, a survey was sent to 500 randomly selected ATCs who were certified in either 1997 or 1998, as these athletic trainers would have been required to complete competencies in the area of psychology of injury. Of the 139 ATCs who responded, 90% indicated that they counsel athletes regarding injury-related problems, 77% counsel athletes regarding sport-related problems, and 65% counsel athletes regarding personal problems. Despite the frequency

with which ATCs report counseling as a vital part of their job, 60% felt that they were not adequately trained in counseling (S. P. Pero et al., 2000).

A series of research studies conducted at two Connecticut universities have demonstrated through survey research that most ATCs (70-85%) feel academically prepared to counsel in the areas of injury prevention, injury rehabilitation, and nutrition (S. Misasi, Davis, Morin, & Stockman, 1996). Correspondingly, these are the top three areas that ATCs reported clinical experience in counseling athletes. However, these studies confirmed results of previous studies in that ATCs felt unprepared or under-prepared to detect, to counsel, and to make referrals in psychological areas such as alcohol, drug use and abuse, relationship issues, sexual issues, suicide, family matters, racial issues, and financial issues (S. Misasi et al., 1996; S. P. Misasi, 1998). Across all areas of psychological counseling, the majority of ATCs indicated that more emphasis should be placed on counseling during academic preparation (S. Misasi et al., 1996). Survey results also indicated that athletic training coursework is severely lacking in the amount of psychology courses that are offered or required (S. P. Misasi, 1998).

It has been hypothesized that individualized and direct personal counseling during the rehabilitation process is important, and that intervention strategies that focus on communication and listening skills help athletes in their search for meaning in their injury experience (Ermler & Thomas, 1990). A counseling intervention with three injured athletes has been shown to produce high adherence to rehabilitation (Rock & Jones, 2002). Additionally, athletes participating in the program identified members of the sports medicine team, and ATCs in particular, as important sources of information support. Specifically, injured athletes valued information about the injury, surgical intervention, and the course of rehabilitation. Despite the limited number of subjects, this

study demonstrates that counseling intervention has potential to provide emotional, listening, and information support. While it is likely impractical to recommend implementing such an intervention with all athletes due to time constraints, it may be useful during rehabilitation setbacks.

Injured athletes need an outlet to discuss concerns privately, apart from individuals who have a vested interest in their expedient return to sport (B. W. Brewer, Jeffers, Petitpas, & Van Raalte, 1994). Many researchers agree that "counselor" is a vital role played by athletic trainers and argue that more curriculum offerings and advanced instruction should be provided (Fields, Murphey, Horodyski, & Stopka, 1995; Furney & Patton, 1985). Dozens of studies indicate that while athletic trainers feel that this issue of counseling is important, they lack knowledge about how to act as an informal counselor (Anderson & Hill, 1995; Compton & Ferrante, 1991; Elmer & Thomas, 1990; Furney & Patton, 1985; Gieck, 1994; S. Gordon, D. Milios, & J. R. Grove, 1991; Henderson & Carroll, 1993; Kane, 1982, 1984; S. Misasi et al., 1996; Pedersen, 1986; Rotella, 1985; Tuffy, 1991; Tunick, Etzel, & Leard, 1991; Weise et al., 1991; Weiss & Troxel, 1986; Zeske, 1994). Practical counseling suggestions for ATCs are offered in several research publications (S. P. Misasi et al., 1998a; Shelley et al., 2003), but professional preparation of the role of a counselor is currently lacking in athletic training education programs. There is a demand for counseling professionals to be sensitive to athletes (Hinkle, 1991); therefore it stands to reason that there is a need for professionals who care for athletes to be sensitive to psychological and counseling issues. To this extent, instruction in injury and non-clinical psychological counseling should be considered essential elements of athletic training education programs.

It should be noted, however, that while athletic trainers need to develop appropriate counseling skills and a counseling mindset, the counseling field is a highly specialized profession that has its own certification and standards. While it is important for ATCs to become better prepared as counselors, it is in no way implied that they will be equivalent to professional counselors in these skills and competencies. In addition to developing communication and counseling skills, ATCs must develop a referral protocol that will be followed when they are confronted with issues outside of their experience or training.

Providing Social Support.

Social support can be defined as an exchange of resources between at least two individuals perceived by the provider or the recipient to be intended to enhance the well-being of the recipient (Shumaker & Brownell, 1984). Social support has been proposed to reduce stress and improve psychological and physical health in injured athletes primarily through the buffering hypothesis, which states that social support buffers the impact of stress on the individual, indirectly affecting the individual's well-being. When social support is low, the relationship between stress and psychological and physical well-being is strong and direct. When social support increases, stress and well-being are no longer correlated (Hardy, Richman, & Rosenfeld, 1991; House, 1981). To this extent, providing social support to all athletes may serve to prevent the occurrence of injury (Udry, 1996). Several studies have also demonstrated a positive effect of social support on psychological distress following athletic injury (Cobb, 1976; Duda, Smart, & Tappe, 1989; Gordon & Lindgren, 1990; Ievleva & Orlick, 1991). Social support, then, is a variable that may play a significant role in both etiology and recovery from athletic

injury, with quality of social support being more important than quantity of providers (Udry, 1996).

There are eight broad categories of social support: listening support, emotional support, emotional challenge, task appreciation, task challenge, reality confirmation, personal assistance, and tangible assistance (Richman, Rosenfeld, & Hardy, 1993). Categories of social support are not necessarily mutually exclusive and are not provided in isolation (Richman, Hardy, Rosenfeld, & Callahan, 1989). Because individuals generally require a combination of support types, the eight broad categories are often grouped into three dimensions: emotional support (listening support, emotional support, emotional challenge); information support (reality confirmation, task appreciation, task challenge); and material support (personal and tangible assistance) (Rock & Jones, 2002). Listening support involves actively listening without giving advice or making judgments. Emotional support is characterized by the willingness to provide support and comfort, indicating that the provider is on the athlete's side. Emotional challenge involves challenging the athlete to evaluate attitudes, values, and feelings in an effort to overcome obstacles and achieve goals. Reality confirmation, sometimes referred to as shared social reality, refers to having someone who is similar to the athlete available to offer advice during times of confusion and stress and to confirm the athlete's perspective of the world. Task appreciation indicates acknowledgement of athlete effort and expressing appreciation for high-quality work. Task challenge is characterized by consistent challenge of the athlete's way of thinking about a task of an activity in order to stretch, motivate, and lead the support recipient to achieve more. Tangible assistance refers to the provision of financial assistance, products, or gifts; personal assistance indicates provision of services or help, such as running an errand or driving the support recipient

somewhere (Ford & Gordon, 1993; Rosenfeld, Richman, & Hardy, 1989; Udry, 1996). The social support network of college athletes can be divided into two broad categories: support that requires content expertise (task appreciation and task challenge); and support not requiring content expertise (listening support, emotional support, emotional challenge, reality confirmation) (Rosenfeld et al., 1989).

Research in the area of social support and injury recovery has been driven by two major forces: recognition of the need for psychosocial intervention in sports injury rehabilitation; and belief that the positive relationship between social support and improved recovery outcomes observed in non-sport populations can be extended to sport populations (Hardy & Crace, 1993). In research on exercise adherence, the variable contributing most of the difference between adherers and non-adherers was the amount of encouragement perceived from supervisors and others in the program. This is consistent with previous reports that individuals who do exercise prefer to do it with at least one other (Willis & Campbell, 1992). Reports in the general medical field have indicated that social support enhances recovery from illness if the support is appropriate and from the right source (Schaefer, Coyne, & Lazarus, 1981; S. Taylor, 1986; Wallston, Alagna, DeVellis, & DeVellis, 1983). Lack of social support was the single most important predictor of non-compliance in cardiac rehabilitation (Oldridge, 1984). Fisher (1993) found the same result with adherence among injured athletes, although there is some criticism that the adherence measure used was not psychometrically sound (Fisher, Scriber, Matheny, Alderman, & Bitting, 1993). Nevertheless, the implications of these research findings to injury rehabilitation are clear: athletes may be more likely to adhere when they receive support and encouragement from their ATC. Further, matching injured athletes with other athletes rehabilitating similar injuries may increase

commitment to the program and motivation to work hard. However, generalizations from exercise adherence and cardiac rehabilitation studies cannot be readily made to injured athletes due to the difference in population characteristics. Rather, success in these related areas provide a basis for expanding social support research to injured athletes. In doing so, it is important to delineate what types of social support facilitate adherence to injury rehabilitation protocols (Hardy & Crace, 1993). Injured athletes need social support from four main sources: family, friends, and significant others; coaches and teammates; athletic trainers and the sports medicine team; and similar others (i.e., other injured athletes). Because the purpose of this dissertation is to develop an applied course for athletic trainers, this review is focused on social support from ATCs.

Research studies have demonstrated that athletes look increasingly towards athletic trainers as a source of social support during the rehabilitation process (Hartman, 1999; Robbins & Rosenfeld, 2001), and that adherence to and compliance with rehabilitation is positively related to injured athletes' social support (Duda et al., 1989; Fisher, Domm, & Wuest, 1988). Further, in athletes who perceive their injury to be severe, beliefs about the effectiveness of the rehabilitation program can be influenced by the amount of social support that is perceived to be available (Bone & Fry, 2006). Research is equivocal regarding the relationship between social support and various positive rehabilitation outcomes with a shift towards the consensus that high social support acts as a moderator in the life stress-injury relationship (i.e., the Buffering Hypothesis). By tempering this relationship, social support may lead to decreased risk of injury, decreased stress, and increased recovery rate following injury (S. Cohen & Wills, 1985; T. A. Petrie, 1992, 1993; Smith, Smoll, & Ptacek, 1990).

Social support received and expected by athletes was assessed in 57 collegiate athletes via the Social Support Survey, a valid measure with sound psychometric properties (Richman et al., 1993). This study found listening support and task appreciation to be the top two types of social support, and tangible assistant to be least important (Bone & Fry, 2006). These results support findings of previous research using the Social Support Survey (Barefield & McCallister, 1997). Here, athletes reported receiving mostly listening support and task appreciation, and that these were the two forms of social support that they expected from their athletic trainers (Barefield & McCallister, 1997). They also reported receiving and expecting the least amounts of tangible support and personal assistance. Specifically, athletes needed and expected the athletic trainer to take time to listen and show empathy (emotional support dimension), the need to know that the exercises are effective (information support), the need to feel that accomplishments during injury rehabilitation are appreciated and that others understand what they are going through (task appreciation), and the need to be pushed to succeed in their rehabilitation (task challenge) (Barefield & McCallister, 1997). The important findings relate to the athletes' expectations, versus what was received, because expectations often arise from athletes' needs. It is important to note that social support perceived by athletes is more important than social support actually received. The implication of this is that ATCs' attitudes and presence should be such that athletes feel welcome to approach the ATC for social support, with the expectation that provision of support may not be required (Sarason, Sarason, & Pierce, 1990).

Examinations of the changing need for social support over time indicate that needs for emotional support and material support dimensions decreased over time, while the need for the information support dimension increased (Johnston & Carroll, 1998).

Throughout the injury and rehabilitation process practical support was expected as needed, based on the severity of the injury and disability. As rehabilitation progressed, the early need for listening support and reality confirmation shifts to the need for information support during middle and end stages of rehabilitation. Specifically, athletes initially expect ATCs to function as an "information bridge" between the athlete and the physician (Johnston & Carroll, 1998). Qualitative analysis of athlete comments indicated that athletes considered it vital to have as much information as possible about their injury, even though this information is likely to be emotionally painful (Johnston & Carroll, 1998). To this extent, the need for emotional support is at its peak during early rehabilitation. Such support can only be provided by people with close personal relationships with the athlete. When the ATC is considered one such individual, he or she can help the athlete acknowledge the existence and severity of the injury (acute or chronic), help choose treatment options, and assist athletes in rationalizing and expressing thoughts and feelings. As rehabilitation progressed, the need for emotional support was only paramount during "crisis periods," such as setbacks or perceived lack of forward progress. As the need for emotional support faded, needs shifted to include information regarding rehabilitation progress, treatment-related advice, encouragement, and motivation. Emotional support was again needed as the athlete prepared to return to sport, with the expectation that the ATC would help athletes come to terms with anxiety and other emotional reactions towards return (Johnston & Carroll, 1998).

Social support received has also been tied to perceived susceptibility of re-injury (Bone & Fry, 2006). It has been reported that perceived susceptibility was uniquely influenced by task challenge, in that athletes who were challenged by ATCs during rehabilitation had increased belief in their ability to overcome injury and decreased fear

of being re-injured. It appears that when ATCs challenge athletes with harder, more sport-specific tasks, athletes' belief in the effectiveness and success of their rehabilitation program escalates (Bone & Fry, 2006).

An interesting finding was that athletes' self-presentation style may have an influence on the social support and attention provided by ATCs, meaning that athletes may have difficulty gaining the assistance they need because of the way they behave (Silver, Wortman, & Crofton, 1990). Athletes who take steps to alleviate stressors but who discuss distress they cannot handle on their own put themselves in an excellent position to receive support from ATCs and others. However, athletes who suppress distress by giving the impression that everything is fine despite stressful aspects of injury or by conveying no information about their feelings may not signal a need for distress. Conversely, injured athletes who constantly complain about their difficulties and only focus on the negative may cause ATCs to feel inadequate in their ability to help the athlete. These outward appearances do not necessarily reflect internal thoughts or needs for social support, therefore ATCs should learn to recognize introverted styles and probe to see if a need for support exists below this exterior (Silver et al., 1990). One should keep in mind, however, that over-support can be just as unhelpful as lack of support (Coyne, Ellard, & Smith, 1990). It is important to recognize that there are situations in which support may not always be welcomed or needed. For these reasons, it is important for ATCs to develop an understanding of the athlete's personality and aspects of the situation.

Use of Goal Setting to Facilitate Social Support. Athletic trainers are in a unique position to provide social support to injured athletes because of their familiarity with the athlete, the sport, and the injury. Athletic trainers can provide support and give advice on

a daily basis throughout the rehabilitation process; however, one should not confuse merely interacting with another as being the same as providing social support. Quality social support does not occur automatically in an athlete's environment, but rather it needs to be purposefully developed (Richman et al., 1989). Specific research on the influence of structured goal setting by ATCs on perceived social support has been conducted at Western Illinois University (Hartman, 1999, 2001). Results indicated that ATCs are considered by athletes to be a source of social support only if the ATC participates in both the goal-setting and physical rehabilitation processes. However, this research suggests that, in general, ATCs are not educated about how to assist athletes in developing specific, challenging, realistic, short-term goals. Goal setting and other psychological skills have been suggested as effective means of improving the provision of social support, with survey research indicating that professionals would welcome further education and training in applied sport psychology (Ford & Gordon, 1993). Goal setting and other relevant psychological skills are discussed in a subsequent section.

Social Support from Similar Others: Support Groups and Modeling. Participation in injured athlete support groups led by ATCs or sport psychologists functions to decrease injured athletes' anxiety, and to increase motivation, sense of control, and self-confidence (Barefield & McCallister, 1997; Ford & Gordon, 1993; Udry, 1997). Support group counseling provides an opportunity for injured athletes to learn that they are not alone in being injured and to benefit from the experiences of others with similar concerns (Singer & Johnson, 1987; Weise & Weiss, 1987; Weiss & Troxel, 1986). Support networks allow injured athletes to express fears, doubts, worries, frustrations, and concerns to others who are empathetic. As the facilitator, it is important to remember that these group discussions should not become "gripe sessions." Discussions should

remain positive and focused on individual strengths and on factors that are controllable. The dynamic of the session should be to empower, support, and encourage one another toward overcoming apprehension and anxiety about the future (Shelley et al., 2003).

Modeling is another technique for helping injured athletes. In one scenario, two athletes who have sustained similar injuries and are rehabilitating concurrently are matched. This provides both athletes with the opportunity to express fears and frustrations, and to share in successes with another with similar experiences. This may also serve to increase commitment to the rehabilitation program and increase motivation to work harder (Bianco, 2001). Matching athletes with similar others who have successfully completed injury rehabilitation and return to play following a similar injury may also be helpful to demonstrate to the athlete that successful return to sport is possible. This type of matching provides the athlete with a resource who can answer questions about what the athlete can expect throughout injury and recovery. Qualitative research with 10 elite downhill skiers who had recovered from serious sports injuries has indicated that having a 'rehabilitation buddy' was motivational and challenging. Athletes recalled drawing inspiration from comparing themselves to similar others, as this served as a marker of their own rehabilitation process (Bianco, 2001).

The effectiveness of a modeling intervention was evaluated in a population of female athletes rehabilitating from surgical repair of a torn anterior cruciate ligament (Flint, 1991). Twenty injured athletes were divided into modeling and control groups. Individuals in the modeling group were age-matched with female models and this group watched videotapes of basketball players going through rehabilitation or who had recovered from surgery. Models emphasized dealing with rehabilitation by being

positive and anticipating a return to sport. Results indicated that the modeling group demonstrated greater adherence to rehabilitation than did the control group (Flint, 1991).

These research findings accentuate the importance of athletic trainers providing athletes with both physical and mental assistance to enable athletes to get through the rehabilitation process as quickly and painlessly as possible. Although proof of a direct relationship between social support and rehabilitation adherence or positive rehabilitation outcomes has not been demonstrated consistently, there is a large enough body of evidence to suggest potential and to recommend provision of social support to injured athletes by ATCs. Research has identified aspects of social support that are best provided by ATCs, as well as demonstrated the importance of receiving these types of support to the recovery process of injured athletes. Data suggest what types of social support athletes expect and receive, even breaking this down into timeframes. Additionally, goal setting, injured athletes support groups, and peer modeling techniques are all effective at increasing opportunities for facilitating social support provision from similar others, increasing athlete motivation and adherence, and decreasing anxiety. The next step is to educate ATS on the situations in which social support is appropriate and on practical methods of providing social support. Additionally, it is critical to determine if such educational intervention is effective.

Sport Psychology in the Athletic Training Room

Recently, sport psychologists and other professionals within allied health fields have been interested in whether injured athletes could be taught to transfer and use psychological skills learned in sport to injury rehabilitation settings. Of particular interest to this review were the perceptions of ATCs about the use of sport psychology in the athletic training room, as well as the research on use of PST with injured athletes. A

1991 study designed to evaluate the importance of sport psychology skills in the athletic training room focused on the perceptions of certified and student athletic trainers (Weise et al., 1991). Athletic trainers in this study believed that focusing on short-term goals and encouraging positive self-thoughts were effective psychological techniques for facilitating athletes' injury recovery. The study was replicated in 2000 with 57 Australian physiotherapists (Francis, Anderson, & Maley, 2000). There was agreement across both studies, with ATCs and physiotherapists rating practical strategies such as communication, social support, and reinforcement as most important. Psychological skills such as relaxation, mental imagery, and concentration development were ranked less important. One explanation for this finding was that while ATCs are familiar with psychological skills, they may believe that injured athletes would not benefit from them or that athletes would be resistant to their implementation. Another possibility was that while ATCs may believe in the use of these techniques, they may not feel qualified to implement them, and therefore ranked them as less important. Both of these explanations stemmed from one main problem: education, or rather, lack of education. An alternative explanation was that psychological skills require some specific instruction by the ATC and practice by the athletes, unlike the first three which are utilized and controlled by the ATC only.

Although some studies have indicated that ATCs view psychological skills as less important in injury rehabilitation, other studies have shown these skills to be extremely important to successful recovery and rehabilitation. The Athletic Trainer and Sport Psychology Questionnaire (ATSPQ) was developed for use in this line of research (Larson et al., 1996). Questions focused on behaviors associated with successful and unsuccessful coping with athletic injury, frequency of use of psychological skills with

athletes during injury, rating of the importance of using and learning about psychological skills and techniques in relation to athletic injury, rating of the importance of the psychological aspect of athletic injury, and importance of a course in sport psychology in the education of an athletic trainer. The ATSPQ was modified in 2002 to be used with sport physiotherapists in the United Kingdom (Hemmings & Povey, 2002). Because athletic trainers are referred to as sport physiotherapists in the United Kingdom, the questionnaire was renamed The Physiotherapist and Sport Psychology Questionnaire (PSPQ), and relevant questions were reworded to reflect this professional title.

The ATSPQ was mailed to 1000 ATCs, with 482 questionnaires returned and used in the analysis. The PSPQ was mailed to 179 chartered physiotherapists, with 90 being returned and used in the analysis. Responses to the Likert scale questions were of similar value and ordering across both ATCs and physiotherapists. For example, ATCs and physiotherapists were asked how often short-term goals were used when working with injured athletes (Likert scale: 1, never use; 2, use 25% of the time; 3, use 50% of the time; 4, use 75% of the time; 5 use 100% of the time). Average scores for ATCs for this question was 4.34, and for physiotherapists was 4.32 (Hemmings & Povey, 2002; Larson et al., 1996). Not only were answers to Likert scale questions similar across professions and countries, but answers to the open-ended questions were similar as well. Professionals in the two studies listed the same top-five characteristics of athletes who cope successfully, and four of the top-five characteristics of athletes who cope unsuccessfully, which included compliance with the rehabilitation program, positive attitude, motivated to rehabilitate, patience with the injury program, and determination. This similarity between the two studies indicated that injury-relevant psychological issues are similar across athletes at multiple competitive levels and countries. Additionally, the

similarity of results in ATCs and sport physiotherapists in two countries and across multiple settings strengthened the generalizability of results. These results also supported the earlier findings of Weise, et. al. (1991), with professionals in both studies expressing a strong interest in learning more about each of the skills presented in the ATSPQ or PSPQ. These findings on the use of sport psychology in the athletic training room were further substantiated by a 1997 survey of ATCs, physical therapists, and physicians. This study confirmed the belief that while allied health professionals recognize the psychological component to injury and are generally receptive to the use of psychological strategies in rehabilitation, many feel they lacked the necessary skills and knowledge to teach these strategies (Crossman, 1997).

Taken together, the results of these studies may be best used to advise athletic training educators of the importance of including mental skills and strategies into their programs. If ATCs are not educated about the benefits of sport psychology techniques and strategies, they would be unwilling or unable to instruct athletes on the use of such skills during injury rehabilitation. Research also indicated that if ATCs are provided with education regarding the theory and implementation of psychological skills and techniques, they would use it.

Psychological Skills Training (PST) Techniques

The course of rehabilitation is not always consistent, and psychological factors involved with injury response may influence treatment compliance and rehabilitation performance in many ways (Heil, 1993; J. Taylor & Taylor, 1997). Over half of injured persons fail to comply with their rehabilitation program to some degree (A. H. Taylor & May, 1996), and more than 200 variables have been associated with rehabilitation compliance (Fisher, 1990; Fisher et al., 1993). A number of psychological interventions

have been recommended to increase adherence to rehabilitation protocols and to facilitate the physical rehabilitation of injured athletes. In addition to counseling and peer modeling, these interventions include cognitive restructuring, imagery, relaxation, and goal setting (B. W. Brewer et al., 1994). However, we learned that college athletes generally underutilize mental health services (Bergandi & Wittig, 1984), so non-mainstream techniques (e.g., imagery, relaxation) may be viewed with skepticism. An athlete must be confident in a treatment for that treatment to be effective; therefore, only psychological interventions that have been demonstrated effective and that are perceived as credible and acceptable to injured athletes will be beneficial (Ievleva & Orlick, 1991; Meichenbaum & Turk, 1987). To explore this, in-depth discussions of each psychological skills technique are contained in this review.

Stress Inoculation Training. Stress Inoculation Training (SIT) is a cognitive-behavioral intervention that advocates educating the athlete about what to expect during the rehabilitation process. Athletes are then provided with psychological skills so that they may monitor and cope with their cognitive and emotional distress. SIT is comprised of three components: conceptualization, skills acquisition, and application. During conceptualization, athletes are provided rationale for understanding their cognitive and emotional responses to surgery. They are informed that they will likely experience anxiety and pain during rehabilitation, and that cognitive and behavioral interventions have been found effective in decreasing distress and discomfort. In the skills acquisition phase, athletes are trained to self-monitor their own individual cognitive and emotional indicators of distress and pain. Finally, psychological strategies commonly used in SIT included deep breathing, progressive relaxation, imagery, and positive self-talk. During

application, athletes are instructed to rehearse these strategies several times each day, and to use them in response to distress and pain (Ross & Berger, 1996).

The effects of SIT on post-surgical anxiety, pain, and physical recovery were prospectively evaluated in a group of 60 men having undergone arthroscopic repair of a single meniscal tear (Ross & Berger, 1996). This group of men had never had surgical treatment or physical therapy for any other athletic injury, which eliminated previous experience as a potential confounder. Subjects were randomly assigned to either physical therapy-only (PT-only) or physical therapy plus SIT (PT+SIT) conditions. The same physical therapist supervised all rehabilitations, and this individual was blinded to subjects' group assignment. While state anxiety and pain decreased naturally over time in both groups, statistical analyses indicated a significant group main effect for both variables ($p<0.001$), signifying more rapid decreases in the SIT+PT group. Average number of days to recovery (criterion: 80% of uninvolved knee strength for two consecutive measurement sessions) was also found to be significantly less for subjects in the SIT+PT group ($23 < 29$, $p<0.001$). This study provided empirical support for the use of cognitive-behavioral interventions to enhance psychological and physical rehabilitation of injured athletes. It was also an important initial step in establishing a research base for psychological interventions with this population. Unfortunately, this study only included Caucasian, male, non-professional athletes so it may not be generalizable to all injured athletes. It does, however, make a strong argument for the inclusion of psychological strategies in physical rehabilitation.

There were several hypotheses suggested to explain the effect of SIT procedures on decreasing time needed to return to function. Relaxation and guided imagery have been shown to facilitate decreased anxiety and pain during physical rehabilitation (Cupal

& Brewer, 2001). This decrease in anxiety and pain may facilitate vasodilation, which in turn increases blood flow and speeds the physical healing process (Surwit, Pilon, & Fenton, 1978). Alternatively, the decreased pain and anxiety produced by the SIT procedures may have facilitated increased compliance with rehabilitation, resulting in decreased number of days to recovery. This effect has been demonstrated in hospital patients (Wells, Howard, Nowlin, & Vargas, 1986); however, there was no indication that SIT+PT group participants attended more physical therapy sessions than the PT-only group, nor was there evidence that subjects were more active during their rehabilitation sessions. The final hypothesis was based on the attributional model, which suggests that therapeutic gains may be increased by the presence of internal attributions for success (e.g., effort) and external attributions for failures (e.g., the healing process) (Brehm & Smith, 1986). Subjects trained in SIT procedures may view themselves as active participants with a significant degree of self-control over their rehabilitation and recovery, which may have then motivated them to make positive gains during physical rehabilitation.

While there was clearly strong evidence for the use of a SIT program with injured athletes, SIT is an extremely time-consuming process that incorporates several techniques commonly used in sports psychology. Athletic trainers likely do not logistically have the time to implement such an involved program with their injured athletes. Also, athletes may not need training in each of these techniques; rather, techniques should be matched to the individuals' needs. It is important to examine the efficacy of individual components of SIT to evaluate their relative contribution to achieving significant positive outcomes in athletic injury recovery. The following sections will address these components individually.

Somatic (Physiological) Interventions: Relaxation in Rehabilitation. A combination of physiological (somatic), psychological, and behavioral responses occur when an individual is worried, stressed, or afraid (Loundagin & Fisher, 1993). Voluntary skeletal muscles are arranged in pairs. When a muscle tightens because of perceived stress, its antagonist counterpart sets up a counter tension to hold the body segment in place. This "double pull" causes excessive tension build up but is generally unidentified by most people. Unresolved, increasing tension caused by worry or anxiety interferes with performance because it causes pain and prevents appropriately coordinating movement. The more muscular tension in the body, the more difficult it is to execute good form or proper coordination in any type of movement task (J. M. Williams & Harris, 2006). Specifically, tension works against the effectiveness of rehabilitation exercises by decreasing blood flow and range of motion in the injured area (H. N. Brewer, VanRaalte, & Linder, 1991; Ievleva & Orlick, 1993). Learning to relax is essential to regulating these responses. An athlete can learn to reach this state voluntarily by practicing relaxation skills and strategies. Skill in voluntary relaxation can play a role in decreasing stress and speeding injury recovery (Loundagin & Fisher, 1993).

Physical relaxation facilitates mental control processes, thereby enabling inner control over the body (Botterill, Flint, & Ievleva, 1996). Practicing a relaxation routine could release tension and enhance blood circulation. The greater the bloodflow, the faster injured issues are repaired (Ievleva & Orlick, 1993). Athletes could become proficient at identifying and releasing unwanted tension at will. Muscle-to-mind techniques, such as Jacobson's Progressive Relaxation, train muscles to become more sensitive to any level of tension and to release (J. M. Williams & Harris, 2006). However, while studies have demonstrated the effect of relaxation training on reducing

injury rate and injury severity (Davis, 1991), studies on the use of relaxation training with injured athletes during recovery is much more limited. Injured athletes commonly experience a pain-spasm-pain cycle which, if not controlled, has the potential to cause further damage (Starkey, 1999). Relaxation training, combined with imagery and positive self-talk, was used in a controlled, prospective study where all subjects received physical therapy (Ross & Berger, 1996). As compared to the control group, participants who were exposed to these three techniques demonstrated less post-operative pain and anxiety during rehabilitation and returned to normal physical functioning more quickly. While the effect of relaxation training alone has not been demonstrated independently of the other psychological skills, there is empirical evidence that relaxation combined with imagery has positive effects on injured athletes during recovery (Hamberger & Lohr, 1980; Porter & Foster, 1990).

Cognitive-Based Interventions: Positive Self-Talk, Thought-Stopping, and Reframing. Any time an athlete carries on dialogue with him or herself, be it out loud or internally, he or she is engaged in self-talk. Examples of self-talk include giving oneself instructions or reinforcement, restating convictions, and interpreting what one is feeling. Self-talk is an asset when it is used to enhance self-worth and performance, but can be a liability when it distracts from the task or when it is used for negative self-labeling (Zinsser, Bunker, & Williams, 2006). Athletes cannot change the fact that they have been injured, but they can control their thoughts about injury and recovery. Numerous studies have demonstrated increases in negative mood states in athletes following injury (B. W. Brewer & Petrie, 1995; Crossman, 1997; Hamilton, Hamilton, Meltzer, Marshall, & Molnar, 1989; Leddy, Lambert, & Ogles, 1994; McDonald & Hardy, 1990; T. Petrie, Brewer, & Buntrock, 1997; Quackenbush & Crossman, 1994; Roh, Newcomer, Perna, &

Etzel, 1998; Schoene, 1998; Smith, Scott, O'Fallon, & Young, 1990; Smith, Scott, & Wiese, 1990; Smith et al., 1993). A certain amount of grieving is a natural part of the injury process, however, it is much more productive to focus on the positives. Positive self-talk contributes to personal well-being and can be focused on any ability, including healing. Positive dialogue with one's body, especially during injury rehabilitation, has been recommended by experts for enhancing healing (Jaffe, 1980; Porter & Foster, 1986). What athletes say to themselves following injury helps determine subsequent behaviors during the rehabilitation process. For example, athletes may choose to focus on the negative aspects of injury (e.g., possible loss of starting role) or on the positive aspects (e.g., recovering from injury builds character). There are many uses of self-talk in athletics (Zinsser et al., 2006).

Self-talk encompasses thought stopping, cognitive restructuring, countering, reframing, and affirmation statements. These skills require conscious effort to screen negative statements and to focus on personal strengths or positive aspects of a situation. They are extremely useful in helping an athlete overcome the loss of confidence that commonly follows injury. Self-talk can be used to aid in relearning movement patterns during rehabilitation, to change bad habits, to maintain attention and control effort in rehabilitation, to create or change mood and affect, and to build self-efficacy in the body's healing power (Zinsser et al., 2006). Cognitive restructuring essentially involves changing negative thoughts and dialogue to positive. This can be achieved by countering, a technique in which underlying beliefs are refuted with facts or reasoning, or through reframing, a type of self-talk in which an individual talks oneself through the positive aspects of the situation, consciously drawing reversing negative perceptions. Another technique, thought stopping, involves saying "STOP" internally when he or she

recognizes negative thoughts, then substituting a positive statement in place of the negative thought (Worrell, 1992). It may also be helpful for athletes to use affirmation statements: meaningful statements that are posted on mirrors and in locker rooms in an attempt to change a negative focus (e.g., fake it 'til you make it).

In the general medical literature, chances of survival in terminal illness are better with a positive outlook and a fighting spirit (Achterberg, Matthews-Simonton, & Simonton, 1977; Benson, 1984; Borysenko, 1982; Simonton & Shook, 1984). Successful patients want to be well and plan to be well. The factors of attitude and outlook are considered to be critical in virtually all types of rehabilitation. Athletes must be made to realize that recovery depends on their positive attitude (Arnheim, 1985). A retrospective study of injured athletes concluded that athletes who used highly positive self-talk during rehabilitation and recovery healed the fastest from injury (Ievleva & Orlick, 1991). These findings have been replicated in other studies, although the majority of patients have denied using self-talk with rehabilitation (Scherzer et al., 2001). This suggests that while the use of positive self-talk has been correlated with positive effects during injury rehabilitation, injured athletes must be educated on the benefits and encouraged to use the skills. Athletic trainers should be taught how to incorporate self-talk, thought stopping, and reframing into injury rehabilitation programs. Athletic trainers should encourage athletes to identify appropriate cue words to stop negative thoughts during challenging or difficult situations, and to identify negative self-talk about the injury and reframe it.

Imagery in Rehabilitation. While many psychological techniques are in their infancy with respect to the rehabilitation research and application, mental imagery is arguably one of the youngest. Imagery, or visualization, is a technique which utilizes all the senses to re-create or create an experience in the mind (Vealey & Greenleaf, 2006). It

has been theorized that when individuals engage in vivid imagery, the brain interprets these images as identical to the actual stimulus situation (Marks, 1983). The power of imagery allows athletes to practice physical and mental skills and strategies without physically being in the training environment. Skills are thought to improve through the psychoneuromuscular theory (Brett, 1987; Vealey, 1986), which suggests athletes' imaginations can greatly influence their response to injury, however, many imagine the worst that could happen. Athletes can be taught to control their visual images and to direct them productively to decrease anxiety and aid in rehabilitation and successful return to the performance arena (Vealey & Greenleaf, 2006). Similar impulses occur in the brain and muscles when a movement is imagined without actually performing the movement; vivid, imagined events produce innervation in our muscles similar to that produced by the actual physical execution of the event (Richardson, 1967).

Although imagery has been shown to have motivational and cognitive functions in training and competition and by patients in other types of rehabilitation (e.g., cancer patients), it is still unclear whether it serves the same function in injury rehabilitation (Sordoni, Hall, & Forwell, 2000, 2002). Once injury has occurred, imagery may be used to increase relaxation, motivation, and self-confidence, and to decrease anxiety, manage depression, and relieve pain (E. R. Korn, 1994). These effects have been demonstrated in rehabilitation settings with cancer patients (Baider, Uziely, & De-Nour, 1994; Syrjala, Cummings, & Donaldson, 1992; Syrjala, Donaldson, Davis, Kippes, & Carr, 1995). Injured athletes can also use imagery to rehearse desired rehabilitation outcomes such as healing, returning to play, or executing specific skills (B. W. Brewer et al., 1994).

Imagery is often separated into three distinct types: motivational, cognitive, and healing. Motivational imagery can be used to help athletes control arousal and stress

levels, improve self-confidence, and set appropriate goals (e.g., imagining yourself being self-confident when performing rehabilitation exercises, achieving treatment goals, working successfully through tough situations). Athletes can use motivational imagery to rehearse effectively overcoming anticipated problems or obstacles that may stand in the way of successful return to the performance arena (J. M. Williams & Scherzer, 2006). Cognitive imagery refers to imagining rehabilitation skills and strategies (e.g., imagining yourself completing each rehabilitation exercise) (Sordoni et al., 2000). For example, athletes may visualize successfully completing a new exercise that requires the athlete to re-learn muscle firing patterns and timing. Healing imagery involves imaging positive physiological changes and has been reported to increase healing in cancer patients (Sordoni et al., 2002). Healing imagery operates on the basic principle of mind over matter; the mind has the power to influence one's immune response, resulting in faster recovery. There is constant interchange between mental and physiological functions, so the mind and body must work together. Imagery is one psychological intervention that focuses on this principle, and there are strong arguments for its use in athletic injury rehabilitation (Green, 1992; E. Korn, 1984; Sordoni et al., 2002).

Research indicates that injured athletes use both motivational and cognitive imagery less during rehabilitation than non-injured athletes during sport situations. (Sordoni et al., 2000, 2002). Studies are divided regarding factors that influence use of imagery during injury rehabilitation (Milne, Hall, & Forwell, 2005; Sordoni et al., 2000, 2002), but we can conclude that the athletes who have used imagery previously or who have been rehabilitating longer realize the importance of transferring imagery used in sport to their current situation. It may also indicate that athletes have found the use of imagery during rehabilitation successful in the past (Sordoni et al., 2002). In

retrospective studies, motivational imagery has been reported to increase injured athletes' level of self-efficacy by increasing feelings of personal control, especially when dealing with stress. Use of motivational imagery was also associated with a more rapid return to activity and competition (Ievleva & Orlick, 1991). However, these results were based on retrospective subject interviews, not on a prospective intervention. Injured athletes report using cognitive imagery less than motivational injury during rehabilitation. This finding is likely the result of unchallenging exercises or failure of athletes to recognize rehabilitation exercises as skills (Sordoni et al., 2000).

The frequency of use of healing imagery during rehabilitation is quite variable across the literature (Scherzer et al., 2001; Sordoni et al., 2002). This variance is likely the result of the amount of education provided by ATCs or health care providers about the injury and encouragement in using healing imagery. The use of healing imagery would likely increase across all injured athletes if health care professionals explained the benefits of healing imagery, and, if needed, destigmatized its use. By educating athletes about injury using anatomical models and by explaining the benefits of healing imagery, a base has been provided from which athletes can apply healing imagery. Both prospective and retrospective studies have demonstrated a positive relationship between the use of healing imagery and recovery time (Durso-Cupal, 1996; Ievleva & Orlick, 1991; Potter & Grove, 1999; Ross & Berger, 1996). One study indicated that the use of healing imagery was one of the top three variables positively related to faster recovery from knee and ankle injuries (Ievleva & Orlick, 1991). However, this finding is only consistent when athletes do not report extensive injury-replay imagery (Green, 1992; Ievleva & Orlick, 1991), as negative images have been found to interfere with the production of positive images of healing and recovery (Green, 1992; Porter & Foster,

1986). Athletes utilizing healing imagery have also reported experiencing less reinjury anxiety and perceiving greater control over their recovery (Durso-Cupal, 1996).

Imagery is an extremely valuable skill and has great potential for use during injury rehabilitation. The benefits of motivational, cognitive, and especially healing imagery have been demonstrated across several contexts including athletic injury (Sordoni et al., 2002). Findings across all three types of imagery (healing, motivational, and cognitive) suggest that ATCs and other allied health care providers need not be overly concerned about teaching imagery to injured athletes, but rather should encourage athletes to transfer their skill in imagery from sports performance into the rehabilitation arena. Additionally, ATCs can enhance the benefits of imagery by providing information on the injury and the healing process so that healing imagery can begin.

Cognitive-Somatic Interventions: Relaxation and Imagery. Cognitive-somatic interventions refer to the combination of physiological and mental techniques, most commonly the combination of relaxation training and imagery. Relaxation facilitates imagery by decreasing distracting stimuli, aiding in recall, and clarifying the visual representation of experiences (Hamberger & Lohr, 1980; Porter & Foster, 1990). Relaxation and imagery together are thought to decrease tension and anxiety, assist in pain management, and promote healing. The two are among the most frequently advocated psychological interventions for the rehabilitation of sports injuries. Preliminary evidence indicates that the use of combined imagery and relaxation in athletes with long-term injuries results in athletes having better moods (Green, 1992; Heil, 1993; J. Taylor & Taylor, 1997).

One of the first published controlled studies to evaluate the efficacy of relaxation and guided imagery during rehabilitation examined their effect on knee strength, re-injury

anxiety, and pain following anterior cruciate ligament reconstruction (Cupal & Brewer, 2001). Preliminary studies have shown that imagery and supportive, nondirective contact applied in a placebo condition was perceived as equally as credible as guided imagery interventions in sport injury rehabilitation (B. W. Brewer et al., 1994). This study used a placebo group in addition to a control group, with the placebo group receiving attention, encouragement, and support. Treatment, placebo, and control groups each received standard physical therapy by the same therapist who was blinded to group assignment. The treatment group attended 10 bi-weekly PST sessions across the six-month rehabilitation process. Sessions were conducted by the same clinician with 14 years of experience in the techniques and consisted of three main elements: (a) addressing specific physical processes at work during each stage of recovery (edema, pain, inflammation) with videotapes of the arthroscopic surgery serving as a visual baseline; (b) using varied imagery skills (e.g., visual, kinesthetic) to facilitate vivid mental experiencing and mental rehearsal of specific physical rehabilitation goals appropriate for their state of recovery; and (c) accommodating patients' perceptions by including suggestions to promote positive coping responses. Sessions were scripted and were identical for each treatment group participant. Sessions were audiotaped and participants were instructed to listen to the tape at least once per day until the next session. Placebo group participants received attention, encouragement, and support in addition to standard physical therapy and were asked to devote time each day to sitting quietly and visualizing a peaceful scene. During physical therapy sessions clinicians reminded participants to practice this visualization. Treatment and placebo groups were similar in that each was supervised by the same trained clinician and that each had equal amounts of structured contact time with the clinician, and time designated for out-of-clinic activities (listening to audiotape or

visualizing a peaceful scene). Results provided strong support for the use of relaxation and guided imagery in sport injury rehabilitation programs. There was a significant effect for treatment group membership for all variables (knee strength, reinjury anxiety, pain). As compared to the control group, at 24 weeks knee strength was significantly greater than both placebo and control groups. Also, while reinjury anxiety and pain decreased across time for all groups, the treatment group experienced significantly faster decreases in both (Cupal & Brewer, 2001).

There are several plausible theories to explain the physical recovery results of this intervention. Possibly the intervention promoted the belief that the rate of recovery was within the patient's control. Post-experimental comments by treatment group participants supported this assertion (Cupal & Brewer, 2001). If a treatment consisting of relaxation and guided imagery produced significantly lower levels of anxiety and pain; perhaps these reductions enabled patients to engage more fully in the rehabilitation program. Participants in this group may have been relaxed enough to increase range of motion more quickly, with increased motion facilitating strength training. This seems to be a reasonable conclusion as knee strength was strongly correlated with both decreased reinjury anxiety and pain over the course of rehabilitation in this study (Cupal & Brewer, 2001). There is also speculation that the intervention may have increased motivation, thereby facilitating more positive outcomes (Cupal & Brewer, 2001). In addition, psychological processes may have influenced the autonomic nervous system affecting tissue regeneration-repair and immune-inflammation responses essential for healing (Bresler, 1984; Penfield & Perot, 1963; Richey, 1992; Rossi, 1994). We must keep in mind, however, that these theories are only hypothesized. While possible, these theories cannot be substantiated because this study did not measure the variables relevant to these

theories. While the exact mechanisms may not be known, there is adequate evidence to suggest positive effects of incorporating relaxation and imagery into athletic injury rehabilitation programs.

Behavioral Interventions: Goal Setting. In injury rehabilitation, goal setting is a strategy in which the injured athlete and the ATC collaboratively establish rehabilitation targets. In this process, an appropriate rehabilitation goal is identified, the importance of the goal is assessed, and possible roadblocks to achieving the goal are identified. Athletes and ATCs work together to construct a ladder of intermediate, short-term goals to help achieve long-term outcomes (B. W. Brewer et al., 1994). Experts have suggested that goal setting can be used as a motivational and organizational tool to enhance rehabilitation performance (Danish, 1986; S. Gordon, D. Milios, & R. Grove, 1991). Literature on structured goal setting in athletic injury and rehabilitation indicates that goal setting has a positive effect on athletes' anxiety levels by providing a sense of control over rehabilitation (Gould, 1986; Worrell, 1992) and by focusing thoughts on specific actions and away from possible worries (Gould, 1986). Structured goal-setting programs increase adherence and commitment to rehabilitation programs by providing athletes with a sense of motivation (DePalma & DePalma, 1989; Penpraze & Mutrie, 1999; Rotella & Heyman, 1986; Scherzer et al., 2001; J. Williams & Roepke, 1993; Worrell, 1992). Goal setting has also been theorized to increase performance by mobilizing effort, directing attention to individual efforts and relevant aspects of the task, facilitating new learning strategies, and prolonging persistence (Locke & Latham, 1990). In the athletic domain, specific, challenging goals lead to increased performance versus easy, non-specific goals or no goals (Theodorakis, 1995, 1996; Theodorakis, Malliou, Papaioannou, Beneca, & Filactakidou, 1996; Weinberg, Bruya, Longino, & Jackson, 1988).

Short-term goals must be distinguished from long-term goals. Daily short-term goal setting was found to be more related to recovery time than long-term, return-to-sport goals (Ievleva & Orlick, 1991). Short-term goals and positive reinforcements facilitate behavioral change and help take focus off of long-term goals that are unattainable in the near future. Short-term goals require specific objectives. For goal setting to be effective in the injury rehabilitation environment, the athlete must understand what functional performance is required at each level of progression and must be able to connect the relation of the daily functional goal attainment to a successful return to sport. However, because athletes do not realistically have the skill required to develop short-terms goals on their own, the ATC is in a position to help athletes set daily short-term goals that will eventually lead to the achievement of the ultimate goal: return to play. The athlete is rewarded or positively reinforced by the ATC each time he or she achieves a short-term goal, and this helps the athlete develop a sense of control over injury (Worrell, 1992).

A study comparing introductory sessions on goal setting, relaxation and imagery, and counseling (B. W. Brewer et al., 1994) revealed injured athletes' preference for goal setting use that is consistent with previous research in this area (Fisher & Hoisington, 1993). One suggestion for this finding was that goal setting may be a natural part of an uninjured athlete's daily routine. If an athlete is comfortable setting goals for athletic performance, this skill may be easily transferred to the context of sports injury rehabilitation. Further, goal setting is more of a concrete exercise than the other sport psychology techniques evaluated in this study (i.e., relaxation, imagery, counseling), so athletes likely view themselves as playing an active role in the recovery process. Results of the 1994 study also describe a significant positive correlation between rehabilitation progress ratings and perceptions of goal setting (B. W. Brewer et al., 1994). This may

suggest that athletes who perceive that their rehabilitation program is going favorably are more likely to prefer goal setting, whereas those whose rehabilitation is not progressing smoothly may become frustrated with goal setting if goals are not met on time.

Goals function in conjunction with other psychological variables such as self-efficacy, or one's expectation that he or she can successfully perform a specific behavior required to produce a specific outcome (Bandura, 1977). Attainment of goals increases self-efficacy, which in turn increases performance. To substantiate this theory, a series of studies examining the effect of goal setting on quadriceps strength, pre-test anxiety, and self-efficacy was undertaken. Subjects who had undergone arthroscopic knee surgery and required quadriceps strengthening were recruited and randomly assigned to control or treatment groups (Theodorakis, Beneca, Malliou, & Goudas, 1997). Participants in the treatment group received feedback on performance of previous strength tests and set goals for subsequent tests. Feedback was withheld from the control group because it has been argued that when feedback is provided, individuals tend to set personal goals (Locke & Latham, 1990). Treatment group participants in this study experienced significant increased self-efficacy, decreased pre-test anxiety, and increased performance on the quadriceps strength tests versus the control group. Treatment groups also outperformed the control group in a previous study by the same authors (Theodorakis et al., 1996). In this study, four trials of a knee extension task on an isokinetic dynamometer were performed by all study participants (Theodorakis et al., 1996). The means of Trials 1 and 2 were considered the measure of the subject's ability. Participants in the treatment groups received feedback on their first two trials and set personal goals for Trial 3, then for Trial 4. Control group members were provided no feedback and only instructed to do their best on each trial. Performance on the third and fourth trials was significantly

increased in both treatment groups, whereas performance actually decreased from trial to trial under the control condition (Theodorakis et al., 1996). This result can be explained by the goal setting theory (Locke & Latham, 1990) which maintains that when participants receive specific feedback, they are encouraged to set specific goals. Feedback is a way of making explicit what it means to do one's best. Unfortunately, a limitation of both studies is a failure to include a placebo group in which feedback was provided without encouragement in structured goal setting. This omission potentially confounds the effects of a structured goal setting program because feedback was provided to the treatment group only (Theodorakis et al., 1997; Theodorakis et al., 1996). Despite this, it is conclusive that providing feedback on progress or performance and encouraging structured goal setting results in increases in subsequent performance.

Educating the athletes in terms they can understand about the purpose behind the exercise is likely to improve adherence and compliance. Furthermore, providing the athlete with an understanding of what they can do to facilitate the healing process gives the athlete a sense of control over their injury and recovery. Specific research on goal setting has demonstrated the importance of ATCs and athletes collaboratively setting goals, indicating that the ATCs are considered a source of social support only when they are actively involved in the goal setting process with the athlete (Hartman, 1999). If ATCs are educated about how to assist athletes in developing structured short-term goals, the effectiveness of the entire rehabilitation process could be enhanced.

Applied Sport Psychology Course for Athletic Trainers

A review of the literature yielded only one study in which a course in applied sport psychology for ATCs was implemented and evaluated (S. F. Pero, 1995). This course was offered as either an optional workshop at the 1995 Eastern Athletic Trainers'

Association Clinical Symposium (27 participants) or as a self-study course (61 participants). Content included the role of the ATC within the psychology of injury domain, pain perception, antecedents of injury, emotional response to injury, and applied sport psychology in injury rehabilitation. However, specific topics included were not identified, nor were the methods used to convey them. The author created a 28-item sport psychology knowledge test, which was administered to participants one month prior to the workshop (pre-pretest), at the beginning of the workshop to establish a baseline, and again following the workshop as a post-test. A follow-up questionnaire was mailed to participants one month after the workshop to determine how well ATCs could implement the techniques learned at the workshop. The response rate for all four test periods was 65% for workshop attendees and 53% for home studiers. The author reported a 43% increase from baseline knowledge in sport psychology knowledge; no significant differences were found between workshop and home study groups. Participants were asked at baseline how many sport psychology courses they had taken; results indicated that the more sport psychology classes that a participant had taken, the higher their sport psychology knowledge test scores. The majority of participants who returned the follow-up questionnaire indicated that they were implementing sport psychology techniques from the workshop. However, the author noted concern with the inability to determine whether these techniques were actually being implemented, or if they were being implemented correctly.

Suggestions for future research as presented by the author included conducting a two- or three-part workshop and increasing the length of the workshop to allow for "hands-on" practice of the techniques. The author also recommended evaluating longer-term retention of sport psychology and athletic training information, as well as

developing a method of assessing the ability of athletic trainers to utilize the psychological skills training techniques during injury rehabilitation programs. A course in psychology of injury for athletic trainers should also address the potential for dual-role conflicts, as well as strategies that should be implemented by ATCs to prevent such conflicts and other related ethical issues.

Summary

Athletes competing in all sports and at all levels are at risk for injury. Each year, one in six athletes sustains an injury that will cause at least one missed day of athletic participation (Ballard, 1996). Often overlooked in the injury treatment and rehabilitation process are the psychological aspects of injury. The nature of the athletic training profession puts ATCs in a position where they will be expected to handle many of these injury-related psychological issues (Van Heerden & Potgieter, 2003), however, ATCs have communicated the need for more formal training in psychological factors and strategies associated with rehabilitation from athletic injury (Larson et al., 1996; Moulton et al., 1997; Weise et al., 1991). Areas that have been suggested as important components of such training and education include communication and interpersonal skills, counseling and social support, and psychological skills, such as relaxation, visualization and imagery, goal setting, and self-talk.

Communication skills are essential for any professional in the allied health field. These skills are especially important for ATCs throughout the injury and rehabilitation process, from initial injury management, through the athletes' emotional responses and reactions to injury, to ensuring adherence and compliance to the rehabilitation program. Athletic trainers should also receive some training in how to function as informal counselors, as ATCs are often the first point of contact for athletes dealing with

emotional and psychological issues associated with injury. Although 90% of ATCs reported counseling athletes in some area, 60% felt they had not been adequately prepared to do so (S. P. Pero et al., 2000). It is important to note, however, that even with adequate education and training, ATCs must develop a referral network and be educated on when and how to make a referral.

Aside from actual counseling and referral skills, ATCs should be trained to provide appropriate levels of social support throughout the injury and rehabilitation process, and to identify when athletes are not receiving adequate social support from important others. Research has indicated that athletes look increasingly towards ATCs as a source of social support during the rehabilitation process (Hartman, 1999; Robbins & Rosenfeld, 2001), that rehabilitation adherence and compliance are positively related to social support received from ATCs (Duda et al., 1989; Fisher et al., 1988), and that athletes' belief in rehabilitation effectiveness is influenced by the amount of social support perceived to be available from ATCs (Bone & Fry, 2006). Athletic trainers can also indirectly provide social support through goal setting (Ford & Gordon, 1993; Hartman, 1999, 2001) and through facilitation of injured athlete support groups and peer modeling programs (Barefield & McCallister, 1997; Ford & Gordon, 1993; Singer & Johnson, 1987; Udry, Gould, Bridges, & Tuffey, 1997).

Many studies have demonstrated positive effects of psychological skills on performance enhancement, and recent studies have demonstrated positive effects with injury rehabilitation as well. Psychological skills training techniques may facilitate rehabilitation adherence (B. W. Brewer et al., 1994; Heil, 1993; J. Taylor & Taylor, 1997). In particular, stress inoculation training, relaxation, imagery, self-talk, and goal

setting, used alone or in combination, have all been shown to have positive effects on various portions of the athletic injury rehabilitation process.

This review concluded with a discussion of one attempt at a continuing education course in sport psychology for ATCs (S. F. Pero, 1995). Although this course had somewhat equivocal success, the results are promising. A similar course designed for athletic trainers may increase knowledge of relevant sport psychology techniques and skills, and would have the potential to change the professional practice of ATCs.

Future Research Directions

Few studies to date have been conducted in which *athletes* were asked what factors or characteristics of ATCs they perceive to be important during the injury and rehabilitation processes. It is crucial for such research to be conducted with athletes, the ultimate goal being to transfer this knowledge into teachable lessons for ATS. Recent research has borne numerous articles focused on ATCs' perceptions of sport psychology in the athletic training room (Francis et al., 2000; Larson et al., 1996; Weise et al., 1991). These studies have explored the areas of communication, rehabilitation adherence, motivation, and goal setting. While most studies identify strategies that the subject population deemed successful in improving or implementing these techniques, few suggestions are made regarding *how* these strategies can be taught to athletic trainers. Additionally, more qualitative research is needed to explore the knowledge base and comfort levels of recently-certified ATCs in these areas. These individuals will provide the best information about what is, and is not, being included in ATEPs in terms of communication skills, motivational strategies, social support and counseling, and use of PST in athletic injury rehabilitation. From here, questionnaires should be constructed and validated to quantitatively evaluate the use of essential skills and techniques that have

been qualitatively identified as being important by both athletes and ATCs. Quantitative methodology is useful to explore perceptions of groups far too large to assess using qualitative methodology. Quantitative methods also provide the means of determining the relative importance of these skills and strategies.

This line of research should be extended to develop and evaluate an ATEP course focused on training and educating of athletic trainers on psychological skills and strategies that are useful and necessary for successful rehabilitation of the mind and body. A sport psychology course for athletic trainers must be practical in nature, with emphasis on both practical skills and theoretical concepts. It should address skills and techniques such communication, motivation, social support and counseling, cognitive restructuring, relaxation, imagery, and goal setting. In developing a course designed to teach these skills to ATS, one must also consider the existence of a method to evaluate not only the learning of these skills during the course, but to evaluate the transferability of these skills. It is important to understand the impact these skills have on ATS' interaction with athletes. To complicate matters, it is imperative to keep the mindset that these are young and inexperienced athletic training *students*, not experienced and credentialed professionals. Thus, the educational material must target the knowledge level and skill base appropriate for entry-level athletic trainers.

CHAPTER 3

Identifying Psychosocial Competencies Needed By Certified Athletic Trainers

Background

When the idea for a course in applied sport psychology for athletic trainers was first developed, it was realized that more information was needed about essential athletic training psychological competencies than what was obtained through a review of the literature. For this reason, a series of two qualitative studies was undertaken with the purpose of identifying these essential psychological competencies. This purpose was accomplished through individual interviews with currently or previously injured collegiate student athletes (Study 1) and through focus group interviews with recently certified ATCs (Study 2).

Study One: Athlete-Identified Strategies for Improving the Communication, Motivation, and Social Support Skills of Athletic Trainers

The majority of the literature has used ATCs or sport physiotherapists to identify the needs of injured athletes; very few studies have conducted research with injured athletes themselves. In this study, currently or previously injured collegiate student-athletes were asked a wide range of open-ended questions related to their positive and negative experiences with ATCs. The purpose of this study was to identify important aspects of the athlete-ATC relationship as reported by collegiate athletes, with the goal being to identify essential psychological competencies that are needed by ATCs (Stiller & Gould, 2006; Stiller, Gould, & Paule, 2006).

Method and Participants

A descriptive study using qualitative methodology was used to explore these psychological issues. Qualitative research designs typically provide an in-depth analysis of a small number of participants selected purposefully to achieve a stated goal and are an excellent method of gaining initial knowledge in understudied areas by capturing the richness and complexity of individual experiences (Patton, 1990). Due to the extensive nature of the interviews the number of desired participants was set at 10, or until saturation was reached. Semi-structured in-depth interviews were utilized to facilitate comparisons across participants and to assist in the data analysis procedures. Key research questions included: what ATC traits or behaviors characterize an ideal athlete-to-athletic trainer relationship; how do athletes learn about injury; and how are athletes motivated during rehabilitation (interview guide included as Appendix A). The length of interviews ranged from 45 to 90 minutes, with all interviews being conducted by the same individual who was both a certified athletic trainer and doctoral student in sport psychology. Interviews were tape-recorded for later transcription and analysis. This study was approved by the University Committee on Research Involving Human Subjects (UCRIHS, Appendix B).

Nine student-athletes met predetermined criteria and were enrolled in the study. A wide range of gender, race, class, injuries, and sport participation was represented (Table 3.1). Individual interviews were recorded and transcribed verbatim. To determine when saturation was reached, the investigator pre-coded the transcripts to identify whether or not new information was emerging. Following the completion of all interviews, a content analysis was used to analyze emerging themes in the raw data. Data analysis required independent coding by two researchers. Peer debriefing was used to

ensure trustworthiness. Data were analyzed in a manner consistent with Patton's (1990) strategies for analysis.

Table 3.1. Athlete Participant Demographics

Participant Breakdown	Sports Represented (# of athletes)	Injuries Sustained† (# of athletes)
M Age: 20.9 (1.16)	Men's Ice Hockey (2)	Chronic Muscle Strain (3)
M years with sport: 13.4 (3.6)	Football (2)	Plantar Fasciitis (3)
Males: 6	Baseball (1)	Medial Collateral Ligament (MCL) Sprain (3)
Females: 3	Softball (1)	
Seniors: 3	Field Hockey (1)	Anterior Cruciate Ligament (ACL) Rupture (2)
Juniors: 3	Women's Basketball (1)	
Sophomores; 3	Men's Lacrosse (1)	Lateral Ankle Sprain (2)
		Pelvis Fracture (1)
M injuries sustained: 3		Thumb Ulnar Collateral Ligament Sprain (1)
M ATCs worked with: 3		
		Syndesmosis Rupture (1)
		Posterior Labral Repair (1)
		Recurrent Shoulder Sublux (1)
		Chronic Low Back Pain (1)

†Some injuries were experienced more than once by the same athlete

Results

A total of 250 raw themes were extracted from the nine interview transcripts related to the primary research questions. These themes were subsequently categorized through content analysis into three general dimensions: communication and education (75 raw themes), motivation (42 raw themes), and social support (133 raw themes).

Complete results are presented in Table C1 (Appendix C), with the most important findings highlighted below.

Communication and Athlete Education. Establishing rapport with athletes was identified as a strategy for increasing rehabilitation compliance and ensuring prompt reporting of injuries. Being provided with information and education about the injury soon after it was sustained was identified by athletes in this study as being the first step in the coping process. Additionally, clarifying expectations in terms of what athletes can expect during rehabilitation and about what ATCs expect of athletes was identified as a successful strategy for decreasing anxiety and frustration and increasing beliefs in the effectiveness of the rehabilitation program. Good communication skills and effective ATC communication strategies were perceived to be essential in preventing athletes from being placed in too-advanced situations by coaches.

Motivation. Successful motivational strategies identified by athletes included increased personal attention from ATC, perceived ability of athletes to play an active role in rehabilitation, use of short-term goal setting, and ATC willingness to perform exercises with the athlete. Personal attention from ATCs was mentioned by athletes in this study as a factor that kept them motivated and working hard during rehabilitation. Similarly, the willingness of an ATC to elicit and consider athlete feedback kept athletes motivated to continue to work hard in rehabilitation. In terms of goal setting, motivation was increased both by setting and meeting goals and by the excitement demonstrated by ATCs when the goal was met. Athletes also mentioned some specific ways in which ATCs kept them motivated and working hard throughout a long-term rehabilitation, such as working out, running stairs and doing sprints with the injured athlete.

Social Support. A large group of raw themes emerged related to provision of social support, indicating that injured athletes expect ATCs to provide many levels of social support. The injured athletes in this study primarily expected support related to their athletic injury, specifically, listening and emotional support, emotional challenge, task appreciation, and task challenge. Additionally, they expected that ATCs should possess the ability to listen, display empathy, and counsel athletes as needed in situations unrelated to sport and injury.

Discussion and Implications

Athletic training education programs are now required to provide education regarding psychological evaluation and care of injured athletes, however, these competency guidelines are very general. Creating and maintaining an open, motivational, and supportive environment in the athletic training room is an important step in ensuring expedient return to sport, and the practical suggestions identified by athletes in this study will be extremely useful to ATCs. Data obtained through this study are consistent with the previous research on rehabilitation adherence strategies, provision of social support, and successful ATC-athlete interactions (Bone & Fry, 2006; B. W. Brewer et al., 1994; Duda et al., 1989; Fisher, 1990; Fisher & Hoisington, 1993a; Fisher et al., 1993) being critical areas of interest. Data obtained through this study will be extrapolated into standardized questions that will form the basis for follow-up studies. Information gathered from this study will serve to enhance the education of future ATS, an area that is virtually nonexistent in the current literature. The future application of research findings to the athletic training educational system will benefit future athletes. The more we know about how ATCs and athletes best interact, the more efficient, effective, and mutually beneficial this relationship can be.

Study Two: Recently Certified Athletic Trainers' Perceptions of Essential Psychological Components Within Athletic Training Education

Over the past 15 years a small body of research has been conducted with ATCs and sport physiotherapists on the perceived importance of, and the need and desire for knowledge in, psychological techniques and interpersonal skills that have been recommended for use with injured athletes (Hemmings & Povey, 2002; Larson et al., 1996; Weise et al., 1991). This research has targeted a wide age range of participants, which would be desirable for most research purposes, but which provides no information regarding what is currently being done in ATEPs in terms of psychological competencies. The elimination of the internship route to certification in 2004 and the implementation of standardized competencies has drastically changed the face of athletic training education, and these new competency-based educational programs may better prepare and educate athletic trainers in psychological competencies. For these reasons, the purpose of this study was to assess the relevant psychological-based issues that newly certified athletic trainers face and the extent to which their undergraduate education prepared them to handle these issues. Weaknesses and limitations in undergraduate ATEPs regarding preparation of students to handle various interpersonal and psychological issues they will experience as ATCs were identified, with the goal of suggesting psychological competencies to be included in ATEPs. Findings are discussed in relation to results elicited from injured student-athletes in Study 1.

Method and Participants

A descriptive study using qualitative methodology was again utilized. Semi-structured focus group interviews with ATCs were utilized to facilitate comparisons across participants and to assist in the data analysis procedures. The length of interviews

ranged from 45 to 90 minutes, with all interviews being conducted by the same individual who was both a certified athletic trainer and doctoral student in sport psychology. Interviews were tape-recorded for later transcription and analysis. This study was approved by the University Committee on Research Involving Human Subjects (UCRIHS, Appendix D).

Eleven recently certified athletic trainers participated in three focus group discussions (n_1=5, n_2=3, n_3=3) of their educational preparation and professional experiences related to enhancing athlete motivation, social support provision, psychosocial referral, and psychological skills (e.g., imagery, relaxation, self-talk, goal setting) used in injury rehabilitation. Key research questions included: athlete-related issues; coach-related issues; motivation and compliance issues; psychosocial referral experiences; and experience using PST with injured athletes (interview guide included as Appendix E). Participants were asked to rank the level to which their undergraduate ATEP prepared them to handle each set of issues (one to 10 scale; one being completely unprepared, 10 being completely prepared). A wide range of undergraduate ATEPs, sports worked, and current athletic training settings were represented (Table 3.2). Focus group interviews were recorded and transcribed verbatim. To determine when saturation was reached, the investigator pre-coded the transcripts to identify whether or not new information was emerging. Once all focus group interviews were completed, a deductive content analysis was used to analyze emerging themes in the raw data. Data analysis required independent coding by two researchers. Peer debriefing was used to ensure trustworthiness. Data were analyzed in a manner consistent with Patton's (1990) strategies for analysis.

Table 3.2. Athletic Trainer Participant Demographics

Participant Breakdown	Undergraduate NCAA Division	Current Athletic Training Setting
M Years Certified: 2.7 (1.6)	Accredited Division IA: 5	Full-time Assistant ATC: 3
(+/-1.6, range 0.5-6.0)	Accredited Division IAA: 1	Intern ATC: 2
Males: 3	Accredited Division II: 2	Graduate Assistant ATC
Females: 8	Accredited Division III: 4	(college setting): 4
		Graduate Assistant ATC
		(high school setting): 2

Results

Recently certified ATCs in this study indicated that they felt under-prepared to handle many typical communication situations, including communicating effectively with coaches regarding athletes' injuries and playing status, developing relationships and rapport with coaching staffs, and handling conflict with coaches. On a scale of one to 10, the majority of ATCs ranked their communication preparedness between a four and a six. In terms of dealing with injured athletes, ATCs expressed concern with the lack of strategies they had for dealing with non-compliant and difficult athletes. ATCs also expressed the need for more education and preparation regarding successful motivational strategies in injury rehabilitation. While most ATCs could recall learning goal setting (to varying extents), others explained that they developed successful strategies through experience and after many failed attempts. ATCs who had been taught goal setting and used this technique with athletes found it to be very successful; however, ATCs expressed the need for motivational strategies in addition to goal setting.

ATCs in this study reported being very under-prepared in terms of psychological skills training (e.g., relaxation, centering, visualization/imagery), handling student-athlete personal issues (e.g., pregnancy/abortion, eating disorders, death in a family, relationship issues), and knowing when and how to refer for psychosocial issues. Individuals also felt they lacked skills in mentally preparing athletes for return to sport following injury. As a final question, ATCs were asked what suggestions for curriculum additions they would make back to their undergraduate ATEPs. Suggestions included inserting more psychological skills training education and practice, being involved in practical situations in which counseling intervention or referral is necessary, and training in effective communication.

Discussion and Implications

In general, injured student-athletes from Study 1 and recently certified athletic trainers involved in these studies both agreed on the types of motivational strategies that were effective. However, athletes indicated that ATCs should focus more on these motivational strategies and the ATCs expressed the need for more educational training in this area. It was the perspective of ATCs in this study that they were only expected to provide athletes with injury-related social support, however, the athletes interviewed in Study 1 desired all eight types of social support from their ATCs. The majority of athletes in Study 1 indicated that they had no experience using PST in the athletic training room, and the ATCs indicated that they had little, if any, educational preparation in these techniques. Amongst ATCs there was a general consensus that PST would be used in the athletic training room if ATCs had background knowledge about them, and they expressed interest in learning more about these techniques. These findings are consistent with previous research indicating that ATCs wanted more education in PST,

counseling, and referral issues, and that they would be willing to implement such strategies if they felt properly educated (Larson et al., 1996; Moulton et al., 1997; S. P. Pero et al., 2000; Weise et al., 1991).

Information gathered from this study will serve to enhance the education of future ATS through a better understanding of the issues faced by recently certified athletic trainers. This is an area that is virtually nonexistent in the current literature. The application of research findings to the athletic training educational system will benefit future ATS and ATCs. Knowledge and conclusions from this study have direct application to ATEPs. The more we know about the issues new ATCs face, the more effectively we can structure the athletic training education programs. Information obtained through this study will be extrapolated into standardized questions that will form the basis for the major dependent variables used in the third study in this series (Chapter 4).

CHAPTER 4

Developing and Assessing a Course Designed to Enhance Athletic Training Students' Psychosocial Competencies

Method

Participants

After receiving approval from the University Committee on Research Involving Human Subjects (UCRIHS, Appendix F), a convenience sample of students from a large Midwestern University's undergraduate and graduate ATEPs were invited to participate in this study. Junior and senior level undergraduate and graduate students were recruited for this study. The inclusion of graduate students was justified based on information obtained from focus group interviews with 11 graduate student ATCs (Study 2, Chapter 3), which indicated that the majority of graduate students have had very little academic preparation in applied sport psychology techniques during their undergraduate ATEPs. An a priori power analysis based on an expected effect size of 0.7, a desired alpha level of 0.05, and power equal to 0.80 indicated that 52 subjects would be the ideal sample size. Initial contact with the pool of eligible participants was made during the first week of the Fall 2007 Athletic Training Proficiencies course. The purpose and procedures of the study were explained to the students, and they were asked to participate. It was explained that participation in this research study would not prevent students from participating in the proficiency course; rather, they would be given the opportunity to do both during the study intervention period. Students were also advised that there were neither benefits nor consequences for participating in this study, in that the knowledge test and usage surveys would not be counted towards their course grade and the instructor

of the educational module was not responsible for any grading in the proficiency course. Potential participants were informed that the workshop and seminar sessions would be video recorded. Participants were assured that every attempt to exclude their images from the recording would be taken, however, they were told that it was possible that they may appear on the recording. A total of 31 out of a possible 32 participants provided informed consent and were enrolled in the study. Although the power analysis indicated that 52 subjects would be ideal for the study 32 was the total number available and seemed large enough to assign a minimal size of 15 to each group.

Study Design

A simple intervention versus control group design was used in this study. However, because ATS were assigned to their athletic team responsibilities prior to the start of the study, a traditional simple randomization of participants to groups was not possible due to the potential for cross-group contamination. Specifically, it was assumed that participants assigned to the control group but working in the same athletic training rooms on a daily basis with intervention group participants would be exposed to the skills being taught in the intervention. Such contamination would effectively extinguish the control group. For this reason a group allocation design was used; this type of allocation is also referred to as composite randomization design or cluster randomization (Dohoo, Martin, & Stryhn, 2003). In this case, individual athletic training rooms (n=7, Table 4.1) were purposefully assigned to intervention or control groups based on the characteristics of the ATS (i.e., academic class) and sports working out of each athletic training room. This type of design is appropriate when the unit of comparison is not the individual, but the group. Such is the case in this study, in which intervention and control groups are being compared. Additionally, to ensure the integrity of the control group, participants in

the intervention group were sternly reminded at the beginning of each session to not discuss information with participants in the control group.

Table 4.1. Athletic Training Room Characteristics

Sports by ATR	ACIs	Juniors	Seniors	Graduate Assistants	Total ATS	Group
Football, Tennis, Field Hockey	4	5	2	0	7	B
W Crew, M/W Soccer, Dance, W Volleyball, W Gymnastics, Cheer, Baseball, Softball, M/W Track, X-Country	4	2	7	2	11	A
M Ice Hockey	1	1	0	0	1	A
Wrestling, M/W Swim	2	0	2	1	3	B
W Basketball, M/W Golf	2	2	0	0	2	B
High Schools 1 and 2	2	0	1	2	3	A
High Schools 3-5	3	0	4	0	4	B

ACI: approved clinical instructor; ATR: athletic training room
M: men's sport; W: women's sport

Due to the relatively small number of participants in the intervention group (15 participants), the decision was made prior to the initiation of the study to replicate the intervention with the control group (16 participants) after six weeks. At the end of Week 6, the participation of individuals assigned to the initial intervention group (Intervention Group A) was complete. The control group then became Intervention Group B, with their performance during the first six weeks of the semester serving as their own control. Intervention B was implemented as planned, following the same procedures as was intervention A. This study population number was considered acceptable because it

consisted of all participants in the target population at the University. Additionally, a post-hoc power analysis indicated the study had power equal to 0.6015 given the output effect sizes and the final sample size (31) for the primary intervention.

The Applied Sport Psychology for Athletic Trainers Educational Module

The Applied Sport Psychology for Athletic Trainers (ASP-AT) education module was designed for upper-level (junior and senior) undergraduate students within an approved ATEP. This intervention was designed to mirror how this course might be implemented into undergraduate ATEPs. It is understood that the majority of ATEPs do not have room within their curriculum for another full course. For this reason, this module was designed to be easily incorporated into whatever course the undergraduate ATEP is using to fulfill the Education Council's competency on Psychosocial Intervention and Referral, be it a proficiency course, a unit in an evaluation course, or even into an already-existing sport psychology course. The module was designed to last six weeks: two-hour workshops once a week for three weeks, followed by 30-minute seminar sessions once a week for three weeks; thus, the entire course was completed in seven and one-half hours over a six week period. Workshops and seminars were held two nights each week, and students could choose which night to attend based on their schedule. Workshop and seminar sessions were video recorded.

The specific content and schedule of course activities are included as Appendix G. The ASP-AT was created based on a critical review of the literature (Chapter 2), data from individual and focus group interview studies (Chapter 3), Psychosocial Intervention and Referral competency guidelines (Council, 2006), personal experience, and suggestions from experts within the field. All course materials were evaluated by a panel of experts, including two ATCs with 12 years of combined experience, two sport

psychology consultants with nearly 55 years of combined experience, and one faculty member with expertise in college teaching and pedagogy (33 years of experience).

Instrumentation

Questionnaire Development. In order to evaluate the effectiveness of this educational intervention, a psychology of injury knowledge test (POI-K), a psychology of injury usage survey (POI-U), and a psychology of injury transfer survey (POI-T) were developed. The POI-K was designed to evaluate whether participants were learning the content of the ASP-AT course. The purpose of the POI-U was to evaluate whether participants were using the skills, techniques, and strategies learned in the ASP-AT course during their interactions with injured student-athletes. The ASP-AT was developed to evaluate whether ATS were using these techniques effectively. This survey was designed to be taken by injured student-athletes to evaluate ATS' transfer of classroom skills to real-world, athletic training room settings.

Survey construction was performed using the guidelines established by Raycov (2007); a detailed description of survey construction is included as Appendix H. Survey construction was essentially a five-step process. First, a critical review of the literature (Chapter 2) and content analyses of open-ended interview questions with injured athletes and recently certified athletic trainers (Chapter 3) were conducted to generate survey items. Personal experience and direct observation of athlete-athletic trainer interactions were used to generate additional items. Once an initial pool of items for each survey had been compiled, input was solicited from experts in the field to help narrow and refine the types of behavior pertaining to each construct (e.g., communication, attitude). Experts included three ATCs with a combined 14 years of experience, one Association for

Applied Sport Psychology (AASP) certified sport psychology specialist with over 30 years of experience, and one ATC/sport psychology specialist with 8 years of experience.

An initial pool of items was then constructed: 62 for the POI-U, and 86 for the POI-T (see Appendices I and J). The format of all items was a 9-choice Likert scale with response scales ranging either from strongly disagree (1) to strongly agree (9), or from never (1) to always (9). The initial survey instruments were reviewed for accuracy by experts in the field, and were examined for wording and ambiguity by subjects in the target population. The initial survey instruments were field tested with 215 ATS and 216 collegiate student-athletes. The pools of pilot test subjects were within the target population (junior-level, senior-level, and graduate athletic training students and collegiate student-athletes), but did not include participants who would be using the final survey instrument. Comments were invited from pilot test participants on how they perceived each item, and these suggestions were considered when developing the final survey instruments. Exploratory factor analysis revealed one factor underlying each of the six subscales on both the POI-U and POI-T, and all six scales demonstrated moderate or high inter-item reliability coefficients (reliability coefficient range: 0.627-0.911) and cronbach's coefficient alpha (internal consistence range: 0.657-0.910). Complete results of factor analysis and reliability testing are presented in Appendix H. The final survey instruments are included as Appendices K and L. The final POI-U consisted of 36 items, with a range of possible scores from 36-324. The final POI-T consisted of 34 items, with possible scores ranging from 34-306.

The POI-K was developed to assess improvement in students' knowledge following participation in the course. Three ATCs not associated with this study participated in a mock ASP-AT course, then took the knowledge test. Modifications and

clarifications to the test were made based on suggestions solicited. The final POI-K consisted of 28 open-ended questions, with a range of possible scores from zero to 73; the POI-K and key are included as Appendices M and N.

Test-Taking Schedule

Once intervention or control groups were assigned, all participants completed pre-course POI-K and POI-U tests. Scores on these two instruments served as a pre-intervention baseline. Seven days following the third classroom session (Week 3), participants in both the intervention and control groups were given the same POI-K and POI-U that they had taken prior to the course. Students in the intervention group were encouraged to study for this test in the same way that they would study for any test within the athletic training major. Although participants in the control group were aware of the test date, they were instructed to not prepare for the tests in any way. The rationale for these instructions was to maintain the integrity of the control group. Athletic training students who were not involved in this study would generally not study sport psychology on a daily basis, and the purpose of the control group in this study was to simulate typical athletic training students. It was the intention of this study to have injured student-athletes complete the POI-T at the same periods as ATS completed the POI-U. However, due to an unexpected decision on the part of the athletic training staff at this University, access to injured athletes was denied (despite University human subjects approval and athlete consent). For this reason, the POI-T was not administered to injured athletes and the hypotheses related to POI-K (Hypotheses 5, 6, 7) were not tested.

Seven days following the third seminar session (Week 6), the POI-K and POI-U were again administered to the intervention and control groups. Once again, intervention group participants were encouraged to prepare as they would for any test in a course

within the athletic training major, while control group participants were instructed not to prepare for the tests in any way. Participants in the intervention group reported studying an average of 44.7 minutes (Group A) and 35.6 minutes (Group B) for the POI-K. Following the completion of the tests, the intervention group was reminded that while their participation in the weekly sessions was complete, they would be asked to take the POI-K and POI-U again in seven weeks. They were told that they would not know on what day the knowledge test would be administered, and were not encouraged to prepare for this subsequent test. The purpose of this test was to assess knowledge retention. Athletic training students would not generally study course materials after the course was completed, therefore, participants were not encouraged to prepare for this retention test. Control group participants were reminded that their participation in weekly classroom sessions would begin the following week.

At Week 7 of the study period, control group members became Intervention Group B and the intervention was replicated in the same manner as it was with Intervention Group A. On the evening of the Week 14 of the study, the POI-K and POI-U were administered to participants in intervention Group A (Retention Week 7). On the evening of Week 20 of the study, the POI-K was administered to participants in both intervention Group A and intervention Group B (Group B Retention Week 7, Group A Retention Week 14). The design of this study is summarized in Figure 4.1. Inspection of this figure shows when the intervention took place as well as the when the dependent variables were assessed in each group. It also demonstrates how this module fits into a typical academic semester.

Data Analysis Plan

Several sets of data analyses were run; one between-groups set to evaluate the effectiveness of the Applied Sport Psychology for Athletic Trainers (ASP-AT) educational intervention (Intervention Group A) as compared to the control group (Hypotheses 1, 2), the second within-group set of analyses to evaluate the effectiveness of the ASP-AT replication (Intervention Group B) to its own previous assessments when it served as the control group for Intervention Group A (Hypotheses 3, 4, 8a-d). Finally, the relative effectiveness of the intervention at Time A (Intervention Group A) and Time B (Intervention Group B) was compared (Hypotheses 9a-9d), and retention over time was evaluated (Research Question 1).

Primary Analyses. The first set of analyses was designed to evaluate the impact of the intervention on participant psychology of injury knowledge (POI-K) and skills usage (POI-U). A one-way Repeated Measures Analysis of Variance (RMA) was conducted to evaluate group differences for each dependent variable (POI-K and POI-U total score). The decision to use the total score of the POI-U, rather than the POI-U subscales, was based on the small statistical sample size. Each RMA was a 2 x 3 (group x time) analysis. A conservative f procedure was not needed because the correlations between the two dependent variables were small (Table 4.2). The decision to run repeated ANOVAs rather than one MANOVA was made based on the desire to evaluate separate effects of the POI-K and POI-U. Consultation with a statistics expert (T. Raycov, personal communication, March 13, 2007) confirmed the ability to substantively defend the assumption of independence of participants. Although participants were divided into seven athletic training rooms, each participant worked with a different

approved clinical instructor (ACI) or set of ACIs, thus preventing inter-dependence of participants and upholding one of the primary ANOVA assumptions.

A one-way RMA was conducted to compare group scores on the POI-K at baseline, Week 3, and Week 6 (means and standard deviations presented in Table O1). The assumptions of homogeneity of covariance matrix and equality of error variances were upheld; the sphericity assumption was violated (Tables O2-O4) necessitating the use of the Huynh-Feldt correction in interpreting output. Results demonstrate a significant group x time interaction (Wilks' Lambda < 0.001, partial eta squared $= 0.720$; Huynh-Feldt < 0.001, partial eta squared $= 0.651$) (Tables 4.3 and 4.4), with an inspection of the means indicating that the intervention was effective at increasing Group A POI-K scores significantly more than Group B (control group) scores. The eta-squared (0.651) indicates a significant effect of intervention, with 0.14 being the generally accepted cut-off for a strong effect (J. Cohen, 1988). Because Group A contained more Masters students than Group B, the RMA was re-run without Masters students. Group A POI-K scores remained significantly higher than Group B even when controlling for effects of the intervention on Masters students (Tables O5-O7). Hypothesis 1: Intervention Group A will demonstrate increased psychology of injury knowledge after a 6-week educational module versus a Control Group was therefore supported.

Figure 4.1 Study Design and Assessment Timeline

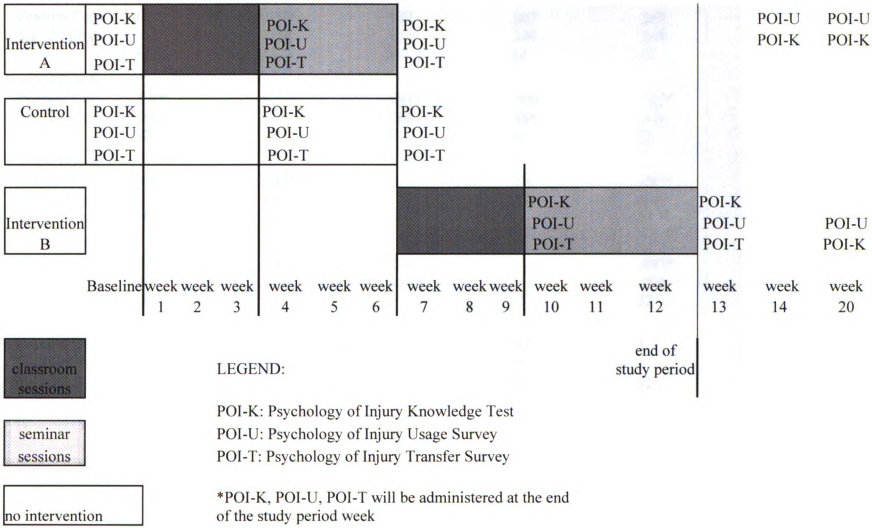


Table 4.2. Correlations of POI-K to POI-U Scores at Baseline, Week 3, and Week 6

	Baseline POI-K	Week 3 POI-K	Week 6 POI-K	Baseline POI-U	Week 3 POI-U	Week 6 POI-U
Baseline POI-K						
Pearson Corr.	1	.530*	.442	.267	.262	.499*
Sig (2-tailed)	.	.002	.013	.140	.148	.004
N	32	32	31	32	32	32
Week 3 POI-K						
Pearson Corr.	.530*	1	.941*	.099	.376*	.567*
Sig (2-tailed)	.002	.	.000	.588	.034	.001
N	32	32	31	32	32	32
Week 6 POI-K						
Pearson Corr.	.442*	.941*	1	.209	.453*	.585*
Sig (2-tailed)	.013	.000	.	.259	.014	.001
N	31	31	31	31	31	31
Baseline POI-U						
Pearson Corr.	.267	.099	.209	1	.597*	.315
Sig (2-tailed)	.140	.588	.259	.	.000	.079
N	32	32	31	32	32	32
Week 3 POI-U						
Pearson Corr.	.262	.376*	.453*	.597*	1	.521*
Sig (2-tailed)	.148	.034	.014	.000	.	.002
N	32	32	31	32	32	32
Week 6 POI-U						
Pearson Corr.	.499*	.567*	.585*	.315	.521*	1
Sig (2-tailed)	.004	.001	.001	.079	.002	.
N	32	32	31	32	32	32

Table 4.3. RMA Multivariate Output for POI-K

Effect		Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Time	Pillai's Trace	.789	52.263	2.000	28.000	.000	.789
	Wilks' Lambda	.211	52.263	2.000	28.000	.000	.789
	Hotelling's Trace	3.733	52.263	2.000	28.000	.000	.789
	Roy's Largest Root	3.733	52.263	2.000	28.000	.000	.789
Time*Group							
	Pillai's Trace	.720	35.987	2.000	28.000	.000	.720
	Wilks' Lambda	.280	35.987	2.000	28.000	.000	.720
	Hotelling's Trace	2.570	35.987	2.000	28.000	.000	.720
	Roy's Largest Root	2.570	35.987	2.000	28.000	.000	.720

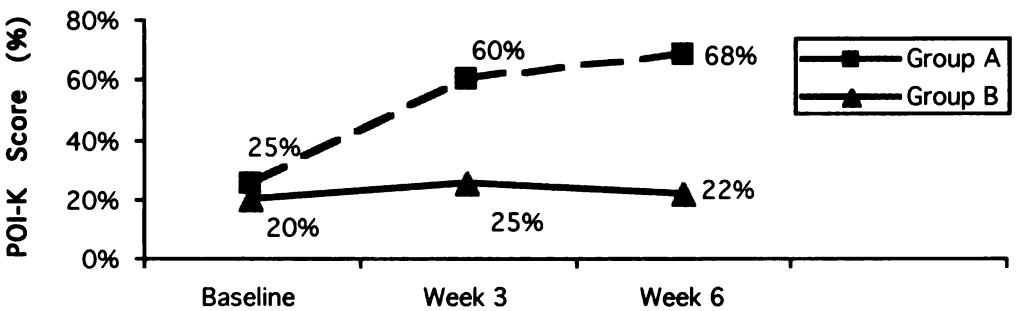
Table 4.4. RMA Tests of Within-Subjects Effects for POI-K

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Partial Eta Squared
Time						
Sphericity Assumed	5221.807	2	2610.904	76.399	.000	.730
Greenhouse-Geisser	5221.807	1.645	3175.121	76.399	.000	.730
Huynh-Feldt	5221.807	1.791	2916.230	76.399	.000	.730
Lower-bound	5221.807	1.000	5221.807	76.399	.000	.730
Time*Group						
Sphericity Assumed	3606.001	2	1803.000	54.140	.000	.651
Greenhouse-Geisser	3606.001	1.645	2192.630	54.140	.000	.651
Huynh-Feldt	3606.001	1.791	2013.849	54.140	.000	.651
Lower-bound	3606.001	1.000	3606.001	54.140	.000	.651

To examine the pattern of change over time, a trend analysis was conducted. Results demonstrated a linear trend for Group A, indicating that POI-K scores continued to increase from baseline to Week 6 (Figure 4.2, Table O8). Pairwise comparisons demonstrate significant group differences, and a significant time effect for Periods 1 and 2 (baseline to Week 3) and 1 and 3 (baseline to Week 6) indicating significant increases in POI-K scores from baseline. There was a non-significant time effect for Periods 2 and

3 (p = 0.273; Tables O9 and O10). All results were significant when adjusting for multiple comparisons using Bonferroni correction.

Figure 4.2. Group and Time Interactions for POI-K



A one-way RMA was conducted to compare total scores for the POI-U at baseline, at Week 3, and at Week 6. A MANOVA with the six POI-U subscales could not be conducted due to the group sample sizes; however, change in Group A scores are detailed in Table O11. The means and standard deviations for POI-U total are presented as Table O12. The assumptions of homogeneity of covariances matrix and equality of error variances were upheld; the sphericity assumption was violated (Tables O13-O15), resulting in the need to use the Huynh-Feldt correction in interpreting output. Results demonstrate a significant group x time interaction (Wilks' Lambda = 0.016, partial eta squared = 0.256; Huynh-Feldt = 0.014, eqa squared = 0.149) (Tables 4.5, 4.6), with an inspection of the means indicating that the intervention was effective at increasing Group A POI-U scores significantly more than Group B scores. The eta-squared (0.149) indicates a strong effect of intervention. These results were significant even when controlling for the effects of the intervention on Masters students (Table O16-O18).

Hypothesis 2: Intervention Group A will demonstrate increased usage of psychology of injury techniques after a 6-week educational module versus a Control Group was therefore supported.

Table 4.5. RMA Multivariate Output for POI-U

Effect		Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Time	Pillai's Trace	.546	16.831	2.000	28.000	.000	.546
	Wilks' Lambda	.454	16.831	2.000	28.000	.000	.546
	Hotelling's Trace	1.202	16.831	2.000	28.000	.000	.546
	Roy's Largest Root	1.202	16.831	2.000	28.000	.000	.546
Time*Group							
	Pillai's Trace	.256	4.805	2.000	28.000	.016	.256
	Wilks' Lambda	.744	4.805	2.000	28.000	.016	.256
	Hotelling's Trace	.343	4.805	2.000	28.000	.016	.256
	Roy's Largest Root	.343	4.805	2.000	28.000	.016	.256

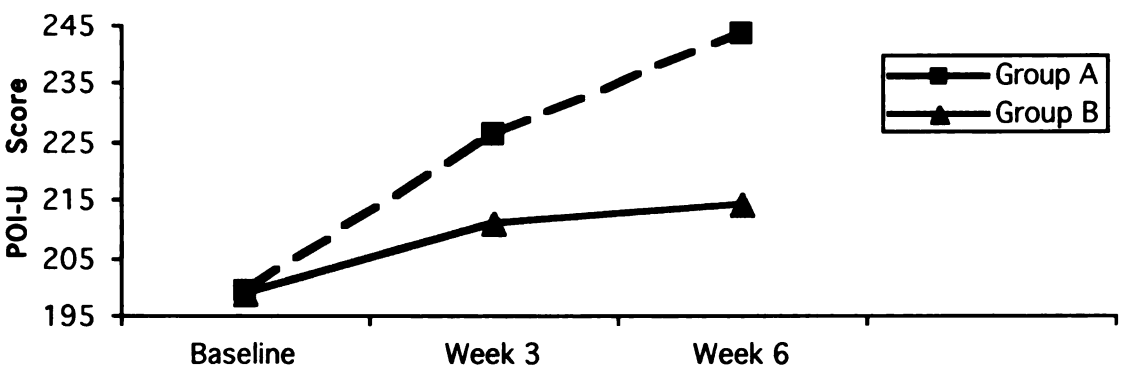
Table 4.6. RMA Tests of Within-Subjects Effects for POI-U

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Partial Eta Squared
Time						
Sphericity Assumed	14116.336	2	7058.168	21.676	000	.428
Greenhouse-Geisser	14116.336	1.546	9128.823	21.676	.000	.428
Huynh-Feldt	14116.336	1.673	8436.484	21.676	.000	.428
Lower-bound	14116.336	1.000	14116.336	21.676	.000	.428
Time*Group						
Sphericity Assumed	3303.218	2	1651.609	5.072	.009	0.149
Greenhouse-Geisser	3303.218	1.645	2136.141	5.072	.016	0.149
Huynh-Feldt	3303.218	1.791	1974.134	5.072	.014	0.149
Lower-bound	3303.218	1.000	3303.218	5.072	.032	0.149

Results demonstrate a linear trend for Group A, indicating that psychology of injury skill usage (measured by POI-U scores) increased in linear fashion from baseline

through Week 6 (Figure 4.3, Table O.19). Pairwise comparisons for group demonstrate a non-significant group difference ($p = 0.175$; Table O.20), but a significant time effect for all time periods (Periods 1 to 2, 2 to 3, 1 to 3; Table O.21) indicating significant POI-U score increases at each follow-up period. All results reported were adjusted for multiple comparisons using Bonferroni correction.

Figure 4.3. Time Interaction for POI-U



Although the primary intent was to demonstrate the impact of the intervention on POI-K and POI-U scores separately, it was of interest to conduct a Multivariate Analysis of Variance (MANOVA) to evaluate the overall effectiveness of the intervention. A one-way MANOVA (2 dependent variables: POI-K, POI-U) was conducted. Results demonstrate a significant main effect for group (Wilks' Lambda <0.001, partial eta squared = 0.762; Table 4.7), indicating that the overall intervention was effective at increasing both psychology of injury knowledge and skill usage. The partial eta-squared value (0.762) demonstrates an extremely strong effect of the intervention. Univariate tests were also significant, even when using the Bonferroni correction for multiple

comparisons ($p < 0.025$), confirming results of the separate RMAs for POI-K and POI-U (Table 4.8).

Table 4.7. MANOVA Multivariate Output for POI-K and POI-U at Week 6

Effect	Value	F	Hypothesis df	Error df	Sig	Partial eta Squared
Pillai's Trace	.762	44.785	2.000	28.000	.000	.762
Wilks' Lambda	.238	44.785	2.000	28.000	.000	.762
Hotelling's Trace	3.199	44.785	2.000	28.000	.000	.762
Roy's Largest Root	3.199	44.785	2.000	28.000	.000	.762

Note. Each F tests the multivariate effect of group. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

Table 4.8. MANOVA Univariate Output for POI-K and POI-U at Week 6

Dependent Variable		Sum of Squares	df	Mean Squares	F	Sig	Partial Eta Squared
Week 6 POI-U	Contrast	6813.763	1	6813.763	6.128	.019	.174
	Error	32245.333	29	11111.908			
Week 6 POI-K	Contrast	8700.278	1	8700.278	87.346	.000	.751
	Error	2888.593	29	99.607			

Note. The F tests the effect of group. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

Secondary Analyses. The second set of data analyses was run on the group that first served as its own control and then served as Intervention Group B (Hypotheses 3, 4). Separate analyses were run on this data set in order to determine the effect of group assignment while controlling for individual-level variables, and to determine if implementing the intervention later in the semester had a different effect on knowledge gain or usage of skills (assuming, perhaps, that those students who took the class at the beginning of the semester may have not had enough injured athletes with whom to use

the skills). To further evaluate the effectiveness of the replicated intervention (Intervention Group B), both independent and dependent t-tests were conducted. A series of dependent t-tests were conducted comparing Group B intervention Week 3 to their control Week 3, and comparing Group B intervention Week 6 to their control Week 6 (Hypotheses 8a-8d). To evaluate relative effectiveness of the two intervention periods, a series of independent t-tests were conducted comparing Group A intervention Week 3 to Group B intervention Week 3, and comparing Group A intervention Week 6 to Group B intervention Week 6 (Hypotheses 9a-9d).

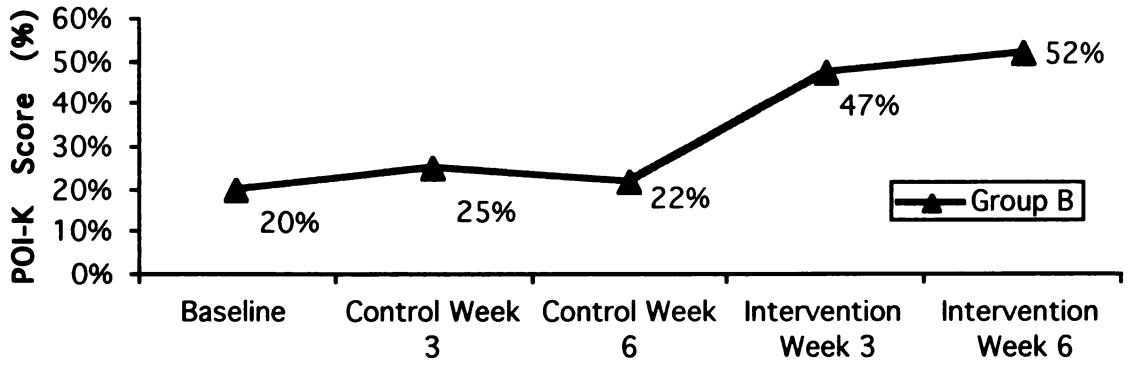
A one-way RMA was conducted to evaluate single-group (Intervention Group B) change over time for POI-K. The means and standard deviations are presented in Table O22. The sphericity assumption was upheld (Table O23). Results demonstrate a significant time effect (Wilks' Lambda < 0.001, partial eta squared = 0.935; Table 4.9), indicating a significant increase in POI-K from baseline to Week 6 of Group B intervention. The effect size was extremely large (0.935), well beyond the 0.14 cut-off for large effect. Hypothesis 3: Intervention Group B will demonstrate increased psychology of injury knowledge after a 6-week educational module versus its own control period was therefore supported.

Table 4.9. RMA Multivariate Output for POI-K (Group B Change Over Time)

Effect		Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Time							
	Pillai's Trace	.935	39.382	4.000	11.000	.000	.935
	Wilks' Lambda	.065	39.382	4.000	11.000	.000	.935
	Hotelling's Trace	14.321	39.382	4.000	11.000	.000	.935
	Roy's Largest Root	14.321	39.382	4.000	11.000	.000	.935

To examine the pattern of change over time a trend analysis was conducted. Results demonstrate a linear trend (Table O24). Pairwise comparisons demonstrate non-significant time effects for Periods 1 to 2, and 2 to 3 (control period; $p = 1.000$ and $p = 0.798$, respectively) but significant time effects for Periods 3 to 4 and 3 to 5 (intervention period; $p < 0.001$) (Figure 4.4, Table O25), indicating that Group B POI-K scores did not begin to increase significantly until participants began their intervention period (Times 4 and 5). All results reported were adjusted for multiple comparisons using Bonferroni correction.

Figure 4.4. Trend Analysis for POI-K (Group B only)



A one-way RMA was conducted to evaluate single-group (Intervention Group B) change over time for POI-U total. A MANOVA with Group B POI-U subscales could not be conducted due to the sample size; however, change in Group B intervention scores are detailed in Table O26. The means and standard deviations for POI-U total are presented in Table O27. The sphericity assumption was violated (Table O28), necessitating the Huynh-Feldt correction in interpreting output. Results demonstrate a significant time effect (Wilks' Lambda = 0.034, partial eta squared = 0.583; Huynh-Feldt

=0.001, partial eta squared = 0.343; Tables 4.10, 4.11), indicating a significant increase in POI-U scores from baseline to intervention Week 6. Hypothesis 4: Intervention Group B will demonstrate increased usage of psychology of injury techniques after a 6-week educational module versus its own control period was therefore supported.

Table 4.10. RMA Multivariate Output for POI-U (Group B Only)

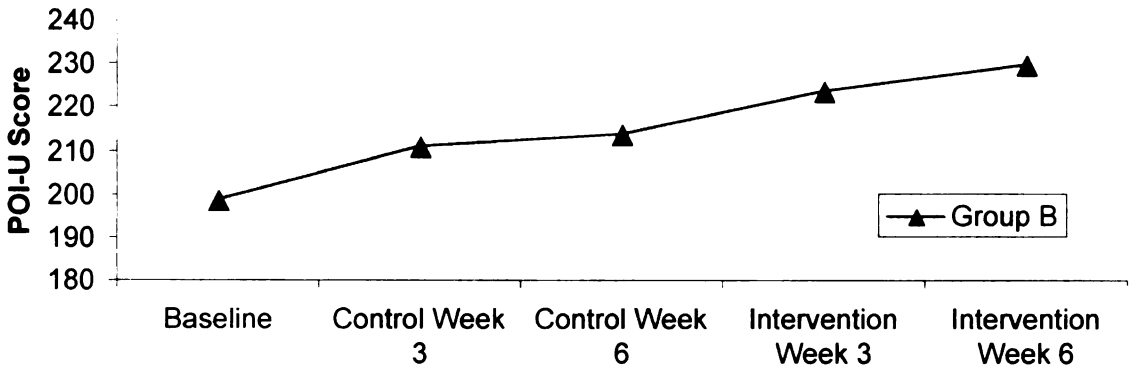
Effect		Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Time							
	Pillai's Trace	.583	3.840	4.000	11.000	.034	.583
	Wilks' Lambda	.417	3.840	4.000	11.000	.034	.583
	Hotelling's Trace	1.396	3.840	4.000	11.000	.034	.583
	Roy's Largest Root	1.396	3.840	4.000	11.000	.034	.583

Table 4.11. RMA Tests of Within Subjects Effects for POI-U (Group B Only)

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Partial Eta Squared
Time						
Sphericity Assumed	8683.120	4	2170.780	7.324	.000	.343
Greenhouse-Geisser	8683.120	2.036	4265.067	7.324	.003	.343
Huynh-Feldt	8683.120	2.385	3640.263	7.324	.001	.343
Lower-bound	8683.120	1.000	8683.120	7.324	.017	.343

To examine the pattern of change over time, a trend analysis was carried out and found a linear trend for Group B (Figure 4.5; Table O29). Pairwise comparisons demonstrate non-significant time effects for Periods 1, 2, and 3 (control periods). There was a non-significant time effect between Periods 3 and 4 (p = 0.206), but a significant effect between Periods 3 and 5 (p = 0.007; Table O30), indicating a non-significant increase in POI-U scores at intervention Week 3, but a significant increase by intervention Week 6. All results reported were adjusted for multiple comparisons using Bonferroni correction.

Figure 4.5. Trend Analysis for POI-U (Group B only)



Psychology of Injury Transfer Survey. Due to an unexpected decision on the part of staff ATCs at this university who supervised all course participants, we were denied access to injured student-athletes and were therefore unable to administer the POI-T. In particular, access to the injured athletes was denied because staff ATCs felt that participating in this study would be too time-consuming for their athletes. For this reason, Hypotheses 5-7 could not be tested.

Exploratory Analyses. Dependent t-tests on Group B were conducted to evaluate whether there was increased POI-K and POI-U scores during the intervention period, as compared to control period (Hypotheses 8a-8d). Dependent t-tests were conducted on the following paired samples: POI-K Control Week 3: Intervention Week 3 (15 df); POI-K Control Week 6: Intervention Week 6 (14 df); POI-U Control Week 3: Intervention Week 3 (15 df); and POI-U Control Week 6: Intervention Week 6 (14 df); means and standard deviations presented in Table O31. Results showed significant increases from control to intervention for Week 3 and Week 6 POI-K, and for Week 6 POI-U even when using the Bonferroni correction for multiple comparisons (used $p < 0.0125$; Table 4.12). This

indicates, even when controlling for individual-level differences, that the intervention was effective at increasing POI-K scores at Week 3 continuing through Week 6, and at increasing POI-U scores by Week 6. Hypotheses 8a, 8b, and 8d: Intervention Group B will demonstrate increased psychology of injury knowledge at Intervention Week 3 and 6 and increased psychology of injury techniques usage at Intervention Week 6 as compared to the control period were therefore supported. Hypothesis 8c: Intervention Group B will demonstrate increased psychology of injury technique usage after Intervention Week 3 as compared to the control was rejected ($p = 0.919$).

Table 4.12. Dependent t-tests for Group B Control: Intervention POI-K and POI-U

	Mean	SD	SEM†	95% CI of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
POI-K Week 3	-13.75	12.40430	3.10108	-20.35979	-7/14021	-4.434	15	.000
POI-U Week 3	1.5	58.21569	14.55392	-29.52095	32.52095	.103	15	.919
POI-K Week 6	-21.8	8.43632	2.17825	-26.47188	-17.12812	-10.008	14	.000
POI-U Week 6	-15.86667	14.23209	3.67471	-23.74814	-7.98520	-4.318	14	.001

†SEM: standard error of mean

Independent t-tests were conducted with Group A and Group B at Week 3 and 6 of their respective intervention periods (A or B) to evaluate the relative effectiveness of the two (Hypotheses 9a-9d). Independent t-tests were conducted on the following: POI-K 3-week intervention (A:B), POI-K 6-week intervention (A:B), POI-U 3-week intervention (A:B), POI-U 6-week intervention (A:B) (28 df). Results indicated no difference in intervention period for POI-U at Week 3 or Week 6, but demonstrate significantly different POI-K scores at both Week 3 and Week 6 (Table 4.13). An

inspection of the means demonstrates that POI-K was significantly increased in Group A at both weeks (Table O32). This group difference is significant even when using the Bonferroni correction for multiple comparisons ($p < 0.0125$; Table 4.13). Additionally, because there were more Masters students in Group A than in Group B (three in A, one in B), independent t-tests using undergraduate participants only were conducted. The group difference for POI-K remained significant at Week 3, but was non-significant at Week 6 (Tables 4.14, Table O33). Hypotheses 9b, 9c, and 9d: Intervention Groups A and B will demonstrate no differences in POI-K scores at Week 6 or differences in POI-U at Week 3 or Week 6 were therefore supported. Hypothesis 9a: Intervention Groups A and B will demonstrate no differences in POI-K at Week 3 was rejected.

Finally, to evaluate retention over time (Research Question 1), the following dependent t-tests were conducted: Groups A and B POI-K and POI-U at Intervention Week 6 versus Retention Week 7 (evaluating percent decreased knowledge/skill usage at Week 7 Retention); Groups A and B POI-K and POI-U Week 7 Retention versus baseline (evaluating percent retained knowledge/skill usage increase from baseline); Group A POI-K and POI-U Intervention Week 6 versus Retention Week 14 (evaluating percent decreased knowledge/skill usage at Week 14 Retention); and Group A POI-K and POI-U Retention Week 14 versus baseline (evaluating percent retained knowledge/skill usage increase from baseline).

Group A and B paired sample statistics (means and standard deviations) for baseline, Intervention Week 6, Retention Week 7, and Retention Week 14 are presented in Tables O34-O35. Dependent t-tests for Groups A and B combined are presented in Table 4.15. Overall, Groups A and B demonstrated a significant 23.5% decrease in POI-K at Retention Week 7 ($p = 0.000$) as compared to their POI-K scores at Week 6, but this

represented a 101.9% increase in POI-K score from baseline ($p = 0.000$) (Tables 4.15, O34). Retention Week 7 POI-U scores for Groups A and B combined demonstrated a non-significant 2.1% decrease ($p = 0.354$) from Week 6 values, which represented a 21% increase in usage from baseline ($p = 0.000$) (Tables 4.15, O35). When Groups A and B were evaluated individually, Group A demonstrated the same magnitude of decreases for POI-K and POI-U at Retention Week 7 (Tables O.36, O.37). Conversely, Group B demonstrated a greater decrease in POI-K scores at Retention Week 7, but POI-U scores actually increased (Tables O38, O39).

Intervention Group A was followed for 14 weeks post-intervention. At Retention Week 14, Group A demonstrated a significant 35.2% decrease in POI-K ($p = 0.000$) as compared to Week 6 POI-K, however this still represented a 76% increase in POI-K scores from baseline ($p = 0.000$). Group A POI-U scores decreased by only 2.8% ($p = 0.250$) as compared to Week 6, which represented a 19.6% increase from baseline POI-U scores ($p = 0.000$) (Tables O36, O37).

Table 4.13 Independent t-tests for POI-K and POI-U (all participants)

	Levene's Test		t-test for Equality of Means						
	F	Sig	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference	95% CI of Difference Lower	Upper
Week 3 POI-K Assumed†	.501	.485	-2.822	28	.009	-9.9	3.50867	-17.0872	-2.71281
Not Assumed†			-2.822	27.083	.009	-9.9	3.50867	-17.0982	-2.70183
Week 3 POI-U Assumed	1.547	.224	-.235	28	.816	-3	12.75219	-29.1217	23.12168
Not Assumed			-.235	26.44	.816	-3	12.75219	-29.1913	23.19131
Week 6 POI-K Assumed	.059	.81	-2.767	28	.01	-12.27	4.43301	-21.3473	-3.18606
Not Assumed			-2.767	27.589	.01	-12.27	4.43301	-21.3534	-3.17996
Week 6 POI-U Assumed	5.815	.023	-1.039	28	.308	-14.2	13.66523	-42.192	13.79195
Not Assumed			-1.039	21.554	.31	-14.2	13.66523	-42.574	14.17395

†Refers to assumptions about equal variances

Table 4.14. Independent t-tests (Undergraduate Participants Only)

	Levene's Test		t-test for Equality of Means						
	F	Sig	t	df	Sig (2-tailed)	Mean Difference	Std. Error Difference	95% CI of Difference Lower	Upper
Week 3 POI-K Assumed†	.881	.358	-2.327	23	.029	-8.84740	3.80275	-16.71398	-.98082
Not Assumed†			-2.279	19.654	.034	-8.84740	3.88181	-16.95388	-.740933
Week 3 POI-U Assumed	1.705	.205	.739	23	.468	9.56494	12.94711	-17.21820	36.34807
Not Assumed			.782	21.914	.443	9.56494	12.23542	-15.81555	34.94542
Week 6 POI-K Assumed	.110	.743	-1.674	23	.108	-7.93506	4.74131	-17.74322	1.87309
Not Assumed			-1.672	21.546	.109	-7.93506	4.74559	-17.78884	1.91871
Week 6 POI-U Assumed	5.915	.023	-.254	23	.802	-3.71429	14.63774	-33.99476	26.56619
Not Assumed			-.278	17.531	.784	-3.71429	13.33825	-31.79075	24.36218

†Refers to assumptions about equal variances

Table 4.15. Dependent t-tests for POI-K and POI-U Total (Groups A and B Combined)

	Mean	SD	SEM†	95% CI of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
POI-U Baseline: Retention 7	-42.7143	33.0878	6.2530	-55.5444	-29.8842	-6.831	27	.000
POI-U Baseline: Retention 14	-37.6000	34.1923	8.8284	-56.5351	-18.6649	-4.259	14	.001
POI-U Week 6: Retention 7	-3.1786	17.8181	3.3673	-10.0877	3.7306	-0.944	27	.354
POI-U Week 6: Retention 14	6.73333	21.7370	5.6125	-5.3042	18.7709	1.2000	14	.250
POI-K Baseline: Retention 7	-17.0000	10.6021	2.0404	-21.1940	-12.8060	-8.332	26	.000
POI-K Baseline: Retention 14	-13.9667	8.2926	2.1411	-18.5589	-9.3744	-6.523	14	.000
POI-K Week 6: Retention 7	10.3333	8.1512	1.5687	7.1088	13.5579	6.587	26	.000
POI-K Week 6: Retention 14	17.5333	9.8949	2.5549	12.0537	23.0127	6.863	14	.000

†SEM: standard error of mean

Summary

In summary, the Applied Sport Psychology for Athletic Trainers (ASP-AT) educational module was found to be effective at increasing psychology of injury knowledge (as measured by POI-K) by Week 3, with continued improvement through Week 6. The ASP-AT was effective at increasing psychology of injury skill usage (as measured by POI-U) by Week 3, with continued significant increases through Week 6. These findings were consistent across both intervention periods (A and B). Overall, there was no difference in the impact of the module at Time A (Intervention Group A) or Time B (Intervention Group B), indicating that the module can be implemented equally effectively during either the first or second six weeks of the semester.

CHAPTER 5

Discussion

Introduction

Due to frequent contact with injured athletes during injury recovery and rehabilitation, ATCs are in a position to provide key psychosocial support. However, while 70% of ATCs hold advanced degrees (Association, 2006), there is little documentation that they receive graduate courses related to psychology and counseling (Pennsylvania, 1998). The undergraduate setting is the ideal location for such a course, as this placement would ensure that all ATCs who have met entry-level standards have had formal education and have demonstrated competency in this content area. Athletic training's Education Council standards require formal instruction in Psychosocial Intervention and Referral, but make no suggestions or requirements regarding how such competencies must be taught. While this has the benefit of allowing ATEPs to implement these competencies in any way that they choose, it may be a detriment to athletic training students (as demonstrated in Study 2 of this dissertation). Competency guidelines provided to ATEPs are very general, and there is a need for educational preparation regarding specific, practical application of psychology of injury knowledge relevant to athletic training.

Overview of ASP-AT Module Content

Effective ATC communication skills were identified by injured athletes in Study 1 as being extremely important for establishing rapport with injured athletes, which, in

turn, ensures prompt reporting of injuries and compliance with rehabilitation. The importance of communication skills on the part of ATCs continues throughout the entire injury and rehabilitation processes, with athletes recalling how fully understanding the ATC's explanation of the injury was the first step in their coping process. Helping athletes understand what to expect during rehabilitation functioned to decrease athlete frustration and anxiety, and increase their belief in the success of the rehabilitation program. These injured athletes felt that the most effective ATCs continued to clarify athletes' expectation through the return-to-sport phase, which both prevented athletes from pushing their bodies too far and helped prevent too-high expectations on the part of athletes. In Study 2, ATCs discussed the most effective communication skills and strategies they have developed, but also discussed weaknesses of their educational preparation in this area. The development of effective communication and athlete education skills have repeatedly been recommended in the literature, particularly in terms of improving athlete adherence to rehabilitation programs (Fisher & Hoisington, 1993a; Fisher et al., 1993b; Fisher et al., 1993), but research suggests more effective ATC-athlete communication is needed. For this reason, a large portion of the ASP-AT module course focused on teaching participants the importance of early, clear, informative communication, as well as developing strategies to help improve their own communication skills. Both in-class and out-of-class activities were implemented to encourage participants to practice these skills with injured athletes, and sections of the POI-K and POI-U were created to evaluate participants' knowledge and skill usage within this area.

Athlete motivation was discussed at length by participants in both Study 1 and Study 2, with both injured athletes and recently-certified ATCs detailing effective motivational strategies. There was, however, a somewhat disturbing consensus amongst athletes and ATCs regarding the use of motivation in the athletic training room, with athletes discussing the lack of motivation they often receive from ATCs and ATCs recalling learning little about motivational techniques (or how to improve athlete adherence and compliance with rehabilitation) during their ATEPs. An understanding of individual motivation has been cited as one of the top strategies of which ATCs should have knowledge (Weise et al., 1991); however, it was apparent from the two background studies contained in this dissertation (Chapter 3) that many ATCs are not being educated in this area and that athletes feel that motivation from ATCs is lacking. Previous research with injured athletes confirms the under-utilization of motivation and adherence strategies in the athletic training room (Fisher & Hoisington, 1993a). For these reasons, approximately one-third of the ASP-AT module course was dedicated to these two topics. In terms of improving athlete adherence, participants learned practical strategies for gaining compliance, as well as strategies for dealing with 'difficult' or non-adherent athletes. At the completion of the unit, participants worked through typical non-compliance scenarios and had to use the information they had been given to strategize the best method of ensuring athlete compliance. The difference between intrinsic and extrinsic motivation as they relate to athletic injury and rehabilitation was outlined. In terms of extrinsic motivation, the focus was on simplistic, practical strategies that have been identified by athletes and other ATCs (e.g., ATC participation in rehabilitation), then shifted to more formal motivation strategies such as goal-setting. Subtopics within

goal-setting included its effect on rehabilitation performance, how to set proper process, performance, and outcome goals, how to set S.M.A.R.T short-term goals, common mistakes with goal-setting, and how to deal with an athlete who has failed to achieve a goal by the deadline. In-class and out-of-class activities encouraged participants to develop creative motivational strategies and to practice setting each type of goal with their injured athletes. Sections of the POI-K and POI-U evaluated participants' knowledge and usage of these strategies and techniques.

Although social support was a topic of discussion in both Study 1 and Study 2, neither athletes nor ATCs emphasized it much, and it receives little attention in the Psychosocial Intervention and Referral content area of the competency matrix (Council, 2006). However, given the recent body of research demonstrating the powerful effects of ATC-provided social support during injury rehabilitation (Bone & Fry, 2006; Hartman, 1999; Richman et al., 1989; Robbins & Rosenfeld, 2001), the decision was made to include a small section in the ASP-AT module course. Participants were given an overview of the effects of ATC-provided social support, including its effects on athletes' self-efficacy, anxiety levels, compliance, belief in rehabilitation process, and impact on perceived susceptibility of reinjury. Participants learned the generally accepted definition of social support, as well as the appropriate ATC provision of all eight types of support, and how they could facilitate support from these other important people in their athletes' lives. Out-of-class activities encouraged participants to practice appropriate social support provision, and sections of the POI-K and POI-U evaluated participant knowledge and technique usage.

In the final classroom session participants learned and practiced 'sport psychology' techniques specific to their interactions with injured athletes. Topics included muscle-to-mind techniques (with specific practice in Jacobson's Progressive Relaxation technique), problem- and emotion-focused coping techniques for dealing with stress (with specific practice in centering), cognitive restructuring strategies (introduction to self-talk with specific practice in techniques to control or reframe negative self-talk), and imagery/visualization (with specific practice in developing healing imagery scripts). This final session concluded with a review of referral situations and an overview of the ATC's role as an informal counselor. The purpose of this final unit was to help prepare participants for situations they may encounter as ATCs. Previous research has shown that 90% of ATCs counsel athletes regarding injury-related problems, 77% counsel regarding sport-related problems, and 65% counsel regarding personal problems (S. P. Pero et al., 2000). However, it was the consensus of ATCs in Study 2 that the majority of undergraduate ATEPs are not preparing students for this aspect of their professional duties. These ATCs reported a serious lack of educational preparation and clinical practice in this area and, as a result, reported feeling under-prepared to handle psychosocial and referral situations they faced as ATCs. This finding was consistent with other reports in the literature, in that the majority of ATCs surveyed felt unprepared or underprepared to detect, counsel, and make referrals in many psychological areas (S. Misasi et al., 1996; S. P. Misasi, 1998). To this extent, course material attempted to differentiate between situations which do and do not require referral, helped participants to develop strategies for approaching an athlete with a suspected issue, various "what to

do when..." scenarios, and emphasized importance of documentation and how to document confidential situations.

Through Study 1 and Study 2 (Chapter 3), the most effective communication and athlete education strategies, adherence and motivation techniques, social support provision, sport psychology techniques, and referral strategies thought to be important for utilization by ATCs were identified. These studies expanded on previous research that reported either athlete or ATC-identified strategies (Fisher & Hoisington, 1993a; Fisher et al., 1993; (Larson et al., 1996; Weise et al., 1991) by synthesizing results to create an encompassing list based on the two perspectives. In addition to topics that emerged from these two background studies, the Applied Sport Psychology for Athletic Trainers module content was structured to include relevant findings from previous research into these topics areas (Chapter 2), as well as the relevant Psychosocial Intervention and Referral content area competencies and proficiencies focusing on antecedents to injury (and the stress-injury relationship in particular) and emotional responses to injury (emphasizing the cognitive appraisal model) (Council, 2006).

While the intention was to make the ASP-AT module very practical, research was incorporated into the course materials to demonstrate to participants that the information was based on sound research studies, just as the information they receive in their evaluation, modalities, and rehabilitation courses. Participants were also provided with a "Toolbox" of in-class activities, and were required to complete seven out-of-class assignments and to journal about the successes or challenges of implementing in-class techniques with athletes in real-world settings. The module also consisted of 30-minute seminar sessions once per week for three weeks, the purpose of which were to provide

participants with the opportunity to check in with the instructor, to share their experiences implementing techniques with athletes, to learn from others' experiences, and to get feedback regarding how to handle challenges that they were facing. Each seminar session began with a review of course material and by asking participants what ways they had found to implement techniques over the past week. These sessions simulated how this module would be implemented in a true ATEP setting, in that athletic training students would have the opportunity to ask follow-up questions to the instructor over the course of the academic semester. Participants were required to attend at least two of the three seminar sessions in order to remain in the study.

Given the content of the ASP-AT module and the limited class time implementation would require (six hours), there are several options for placement of this module within existing ATEP structures. One possibility would be to include it as one unit within an already-existing sport psychology course. However, because the module course content is so specific to athletic trainers, it may not be practical to include such a large unit into a course which likely consists of a large percentage of non-athletic training students. For this reason, it would be worthwhile to incorporate the module into an ATEP core course. At the university used in this dissertation study, the module could be easily incorporated into the Organization and Administration course, given the amount of course material and the classroom time dedicated to it. Other practical suggestions would include an advanced athletic training course, and athletic training procedures course, or a special topics course. Preliminary analysis of data from an on-going study designed to evaluate the implementation of Psychosocial Intervention and Referral competencies within ATEPs indicates that the majority of ATEPs whose program directors responded

are using the Administration and Organization, Therapeutic Rehabiltiation, or Seminar/Special topics courses to teach Psychosocial Intervention and Referral competencies. While there are clearly several course options in which to implement the ASP-AT module, the question of *who* should teach the module is perhaps more challenging. The ideal instructor is one who could be considered an 'expert' in either athletic training or sport psychology, with a solid understanding of the role of sport psychology within athletic training, or of ATCs' use of sport psychology techniques. Individual ATEPs should determine who among their faculty/staff best meets these requirements.

Discussion of Statistical Effectiveness of the ASP-AT Module

The effectiveness of this educational module was excellent with nearly every hypothesis being supported. Psychology of injury knowledge (as measured by the POI-K) significantly improved by Week 3 of the intervention, with continued improvement through Week 6. Although statistically significant knowledge increases were expected at both Week 3 and Week 6 of the intervention, the lack of significant POI-K increase at Week 6 may be explained by the dramatic knowledge increase by Week 3. The POI-K consists of 28 questions for a total possible score of 73 points. By Week 3, individual Group A participants scored as high as 63.5 points (87%; group average was 44.1 points, 60%). Additionally, POI-K scores did continue to increase from Week 3 to Week 6 (Group A Week 6 average score was 68%) while control group scores did not change significantly from their baseline values. While an average score of 60% to 68% does seem low, one must keep in mind the voluntary nature of this study. Although participants reported studying an average of 40 minutes for each follow-up test (average

of Groups A and B combined), knowledge test scores were was not tied into participants' GPA, therefore there was less extrinsic incentive to increase quality or quantity of studying. A second possible explanation for low average POI-K scores may be instructor error. Both Intervention A and Intervention B were implemented exactly the same (implemented as planned), however the instructor made notes throughout regarding what should be changed for future ASP-AT course administration. With any new course, there is an expected 'learning curve' as the instructor deciphers the best methods of transferring information to students. An example of this phenomenon in this study is Question 1 on the POI-K. Question 1 was answered correctly on only three of 168 POI-K tests that were administered. This clearly indicated that (a) Question 1 was a bad question, or (b) the instructor did not do a proper job preparing participants to answer this question. Question 1 was also worth six of 73 possible points on the POI-K, so the repeated incorrect answers on this question definitely effected average POI-K scores. Nevertheless, the average baseline score (overall Group A and B average: 22%) indicates two things: first, that participants did increase their psychology of injury knowledge through participation in the ASP-AT module; and second, that there was an extreme need for a module course in this area since athletic training students were grossly underprepared within of the Psychosocial Intervention and Referral content area.

While retention testing at Week 7 and Week 14 indicated that participants lost a significant portion of the knowledge they had initially gained, POI-K scores were still significantly increased as compared to baseline values. This decrease in retained knowledge is not completely unexpected. It has been reported that knowledge retention generally falls to 75-89% of its original level after a relatively short period of time

(Bruno, Ongaro, & Fraser, 2007). Additionally, previous research has suggested that 45-60% of students become "unqualified" on course material three months following completion of a course (based on students scoring below 70% on tested material) (Sisson, Swartz, & Wolf, 1992). A meta-analysis of 96 studies evaluating student retention across a wide range of subject matter found that one to four weeks following initial knowledge gain, knowledge recall decreased an average of 19% and cognitive skill decreased an average of 18%. In studies that evaluated knowledge retention between five and 13 weeks following initial knowledge gain, knowledge recall decreased by 18% and cognitive skill decreased by 11% (Semb & Ellis, 1994). In studies related specifically to psychology knowledge (the most similar topic contained in the meta-analysis), retention follow-up intervals ranged from one to 80 weeks. In two studies that evaluated one-week retention, recall knowledge decreased by 10.8% and 11.5% (Furukawa, 1977; Zimmer, 1985). Two studies with a six-week retention interval were split on cognitive skill retention; one study reported skill decrease of 1.3% (Balcerzak, 1975) while the other reported an increase of 3% (Halpin & Halpin, 1982). Finally, in one study with a 16-week retention interval, knowledge recall and cognitive skill decreased by an average of 45.5% and 22%, respectively (Semb, Ellis, & Araujo, 1993). Recall that in this dissertation study, the groups demonstrated a 23.5% decrease in POI-K scores at Week 7 retention, and a 35.2% decrease at Week 14 retention. Therefore, knowledge score decreases in this dissertation study were within the 'normal' range that has been reported previously in the psychology literature.

Shifting to psychology of injury skill usage, as expected there was a non-significant increase POI-U scores until Week 6 with Group B participants. While

immediate increases in knowledge were anticipated, it was predicted that it would take longer for participants to find opportunities to transfer knowledge gained in the classroom into implementing sills with injured athletes. Group A participants, however, had significant increases in skill usage by Week 3, with continued significant increases through Week 6. This immediate increase for Group A many be explained by further interpretation of the trend analysis for Hypothesis 2 (Tables O.20, O.21). The trend analysis for POI-U demonstrated no significant group difference for Group A and Control Group, implying that some of the more 'generic' subscales may have increased in both groups as a function of time spent with athletes. An examination of the data in Table O.11 (i.e., attitude, relationship) shows this to be the likely explanation for the Week 3 increase in POI-U scores during Intervention A.

In contrast to the POI-K, retention testing for POI-U indicated that participants in both Groups A and B continued using the skills with their athletes long after the module was complete, with Week 7 and Week 14 POI-U retention tests demonstrated 98.8% and 97.2% retained usage, respectively. In fact, Group B participants actually increased POI-U scores at Retention Week 7. There are several possible explanations for this increase, the primary explanation being that Group B participant journal entries and comments during seminar sessions indicated that they were actively using several techniques with injured athletes. This increased usage during the intervention period likely transferred to continued/increased technique usage at retention follow-ups.

The repeat ASP-AT intervention (Intervention Group B) was also found to be effective at increasing both psychology of injury knowledge and skill usage (demonstrated by both repeated measured ANOVA and dependent t-tests). The advantage

of this change-over-time analysis is that using Group B as its own control eliminates the possibility of any unmeasured group differences that may have been at play during the control-intervention analysis (i.e., GPA, desire to succeed). It was also of interest to this study to evaluate the relative effectiveness of the intervention at implementation Time A (Intervention Group A; first six weeks of the semester) and implementation Time B (Intervention Group B; second six weeks of the semester, ending two weeks before the start of final exams). Every attempt was made to ensure that Intervention B was "implemented as planned," meaning that the dissemination of information, examples utilized, and in-class activities were the same at intervention Time B as at intervention Time A. To accomplish this, each two-hour classroom session for Group A was videotaped, and these tapes were reviewed prior to implementing the same unit with Group B. No significant differences were found for Week 3 or Week 6 POI-U, but Intervention Group A had significantly increased POI-K scores at both time periods. One explanation for this finding is that Group A contained three Masters students while Group B contained only one Masters student. Although there were no significant group differences in POI-K scores at baseline, Masters students may have scored higher on follow-up testing than undergraduates, either because of higher academic class or because they were better able to relate course material to athletic training situations. In fact, when independent t-tests were conducted with Group A and B undergraduate participants only, the significant group difference in POI-K scores at Week 6 disappeared (versus 0.01), while Week 3 significance decreased (0.029 versus 0.009). One might also hypothesize participants in intervention Group A may have had more time to focus on this extra material earlier in the semester, versus later when assignments and exams increase. A

second explanation is that Group A contained stronger overall students (based on tacit knowledge of primary researcher after having study participants in class during previous semesters; participant GPAs were not recorded). A third explanation is that participants in Group A studied longer than Group B (Group A average study time was 44.7 minutes, as compared to the average of 35.6 minutes reported by Group B participants). Several participants in Group A also told the researcher that they wanted to do well on the POI-K so that the dissertation study was a success. This attitude may have spread to other Group A participants and may partially account for increased Group A knowledge scores (as compared to Group B intervention POI-K scores). For these reasons, it can only be stated that it *may* be more effective to implement the module earlier in the semester. However, due to potential unmeasured differences between Group A and Group B (e.g., GPA, desire to succeed), this statistical significance may not have practical significance.

Contribution to the Literature

A review of the literature produced only one other attempt at a course in sport psychology for athletic trainers (Pero, 1995). This course was in the form of a workshop at the Eastern Athletic Trainers' Association regional conference. Paying participants could choose to attend the course at the conference, or could take the workshop as a home-study. Workshop content included antecedents to injury, emotional response to injury, athlete pain perception, and applied sport psychology in injury rehabilitation. Specific topics were not identified, nor were the methods used to convey them. The author created a 28-item sport psychology knowledge test (psychometric properties not provided), which was administered to participants one month prior to the workshop (pre-pretest), at the beginning of the workshop (baseline), and following the workshop

(immediate post-test). A follow-up questionnaire was mailed to participants one month after the workshop to determine how well ATCs could implement the techniques learned. The response rate for the four test periods was 65% for workshop attendees and 53% for home studiers. The author reported a 43% increase from baseline sport psychology knowledge; no significant differences were found between workshop and home study groups. The majority of participants who returned the follow-up questionnaire indicated that they were implementing sport psychology techniques from the workshop. However, the author notes the inability to determine whether these techniques were actually being implemented. Additionally, lack of 100% response rate on follow-up testing prevents full trust that the course increased knowledge by an average of 43%, as there is no way to know how much knowledge was gained by the 35-46% of participants who were lost to follow-up. Another major concern of this study was the potential for selection bias. The format of the workshop required ATCs to pay to participate; therefore, obviously only ATCs who were sincerely interested and 'bought into' the material would have enrolled. In the ASP-AT study, 97% (31/32) of eligible participants were enrolled, and all participants who completed the six-week course returned for follow-up retention testing.

Conclusions

In conclusion, a 6-week educational module consisting of three two-hour classroom sessions, followed by three 30-minute seminar sessions was found to be effective at increasing psychology of injury knowledge and skill usage in undergraduate and Masters degree candidate athletic training students. The ASP-AT module was designed in this fashion so that this educational module could be easily incorporated into existing ATEP structures. Participants spent only six hours in classroom sessions, the

implication being that ATEP instructors would have to dedicate only six hours of class time during a semester to a unit on psychology of injury to get similar knowledge and skill usage increases in their students. The content that was included in the ASP-AT module was a compilation of content suggestions from previous research (Bone & Fry, 2006; Fisher & Hoisington, 1993a; Fisher et al., 1993b; Hartman, 1999, 2001; Hemmings & Povey, 2002; Larson et al., 1996; S. P. Misasi et al., 1998a; Rosenfeld, Wilder, Crace, & Hardy, 1990; Weise et al., 1991), content identified through needs assessments with injured athletes and recently-certified ATCs (Studies 1 and 2; Chapter 3), and content required to be taught in ATEP competencies and proficiencies as dictated by the Education Council (Council, 2006). This content should be sufficient to prepare ATS within the Psychosocial Intervention and Referral content area.

One major contribution of this study to the relevant literature is the longitudinal nature of the follow-up testing. All participants who completed the module were followed for seven weeks post-intervention, and Group A participants were followed for 14 weeks (over three months post-intervention). The purpose of this long retention was to evaluate how well participants retained knowledge and to assess continued skill usage. While participants only retained 64.8% of the knowledge they gained during the course, skill usage with injured athletes only decreased by 2.8%. Additionally, while both knowledge and skill usage decreased following the end of the retention period, these decreased scores still represented an increase from baseline values. This type of follow-up testing is not standard following a typical ATEP course, so there are no normative values to which these retention values can be compared.

The primary contribution of this dissertation to the literature is the all-encompassing nature of the three studies contained in it. These three studies have identified the psychosocial competencies that ATCs need to be taught during ATEPs, and have demonstrated the effectiveness of the Applied Sport Psychology for Athletic Trainers educational module at increasing knowledge in psychology of injury and athletic trainers' ability to transfer knowledge into skill usage with injured athletes the athletic training room.

Participant Feedback and Pedagogical Changes

Participants were asked to provide open-ended feedback at the end of the intervention focused on what they gained from the ASP-AT module and suggestions for improvements. Overall feedback was very positive, with the majority of participants commenting on the usefulness of the strategies to handle difficult or non-compliant athletes and on the practical motivation strategies that were discussed. Comments also indicated that participants learned the importance of communication in the athletic training room in terms of increasing prompt injury reporting, facilitating athletes' emotional response to injury, and ensuring adherence to the rehabilitation program. Several participants discussed their newfound appreciation of the role of social support following injury and developed an understanding of athletes' social support systems. Perhaps the most commonly discussed benefit of the module was the sport psychology techniques, including progressive relaxation, centering, imagery, and thought-stopping. Participants appreciated the way material was presented in a manner that was "user-friendly" for athletic trainers and could easily be incorporated with athletes in the athletic

training room. The majority of in-class activities were rated as helpful and engaging, with the S.M.A.R.T. goal-setting sheet being among the favorites.

Participants also had several suggestions for the improvement of the module. While the majority felt that the 'homework' assignments were reasonable, athletic training students found it difficult to implement many of the techniques due to limited involvement with their athletes (i.e., not head athletic training student for their sport, no long-term injuries). Overall, participants found in-class activities to be helpful, with several suggestions focused on expanding the time spent on each to allow for students to practice in class. Two participants suggested having a 'lab' session dedicated to this practice where injured athletes might be brought in with whom students could work, and another participant suggested incorporating "You-Tube" videos into the course that would illustrate athletic trainers using the techniques with injured athletes in the athletic training room. The primary complaint from participants was the timing of the class: a two-hour evening session. Several participants commented that, while they were interested in the material, the timing combined with the voluntary nature of the study made it difficult to pay attention.

Limitations

As with any study, this study has its limitations. Although 31 of 32 eligible participants were enrolled, 31 is statistically a small sample size. All participants were recruited from the same ATEP and were therefore more similar to each other than participants from other ATEPs would be. Additionally the inability to obtain feedback from injured athletes (via the POI-T) somewhat decreased the strength of the usage results, as no third party evaluation of ATS' skill usage was possible. Finally, the course

was implemented by one instructor who was an expert in sport psychology's application to athletic training; therefore, the effectiveness of this module as taught by an ATEP instructor not trained in these techniques cannot be substantiated.

Another limitation of this study was the failure to use a placebo control group: a group who participated in a more generic six-week sport psychology course rather than participating in the ASP-AT module. One explanation for the better POI-K scores in Group A was the increased desire to succeed expressed by several participants. The use of a placebo control group could have confirmed the impact of the ASP-AT module. If participants in the ASP-AT module scored significantly better than both Control Group and Placebo Control Group participants, this would have strengthened the results of this study.

Future Research Directions

It was the original intention of this dissertation to evaluate the effectiveness of the ASP-AT educational module in three ways: POI-K, POI-U, and POI-T (Psychology of Injury Transfer; a usage survey completed by injured athletes regarding ATS' skill usage in the athletic training room). However, due an unexpected decision on the part of the majority of the ATC staff who supervised all of the course participants, access to injured athletes was denied. Future studies should make every effort to obtain feedback from this athlete population, or from ACIs who supervise ATS, to provide more objective feedback regarding the appropriateness of skill usage in practical settings.

It would also be of interest to evaluate the effect of this educational module in a true classroom setting. Student participation in this study was voluntary with no external motivation (i.e., course grade) for students to study for follow-up tests or to encourage

students to implement skills with injured athletes. One could certainly theorize that the impact of this educational module would be even greater if students were graded on the amount of knowledge gained and clinically evaluated on the appropriateness of skill usage. Future research should also focus on ways to increase retention levels of participants, perhaps utilizing student-friendly technology such as text message boosters, or developing a self-monitoring or supervisor monitoring clinical evaluation/feedback system. Additionally, while we recorded the amount of time participants reported studying for follow-up knowledge tests, future studies should consider retrospective interviews with participants who scored extremely high and extremely low on the POI-K to evaluate particularly effective or ineffective study methods for learning and retaining psychology of injury content.

One of the limitations of this dissertation study was the fact that participants were recruited from only one ATEP. These students would likely be more similar to each other than to students from other ATEPs. Along the same lines, it would be interesting to examine the impact of individual student differences on the effectiveness of the ASP-AT module. For example, do some students (e.g., students with high emotional intelligence) respond better to this module than others? Additionally, given the fact that some ATEP instructors may not be comfortable teaching this content due to lack of familiarity with the content, future research could be dedicated to assessing the effectiveness of the course across instructors (inter-instructor reliability) and into developing continuing education courses designed to improve ATEP instructors' proficiency in teaching this content. Future studies should focus on how to package the module best, and on the most effective methods of 'teaching the teacher' (pedagogical advice on instruction methods).

Research could also look into developing an internet course module and evaluating the relative effectiveness of the classroom versus internet versions.

Finally, it would be of interest to conduct a longitudinal study within one ATEP (or small subset of ATEPs) on ATS' success rate on the Psychosocial Intervention and Referral component of the National Certification examination. Success rate could be retrospectively recorded for ATS who took the Certification examination prior to the ATEP's implementation of this educational module and prospectively recorded following implementation of the module to evaluate how participation effects ATS' success rate on the examination. Such a study would be the ultimate evaluation of the practical effectiveness of the ASP-AT educational module.

Appendix A

Appendix A

Interview Guide for Study 1

Opening Questions

1. Have you ever been injured during college?
    a. Has an injury caused you to miss 1 or more days of practice or competition during the last calendar year?
2. How many injuries have you had during college?
    a. What types of injuries were they?
3. Have you had experience with several athletic trainers since you have been in college?

Open-Ended Questions

1. Please discuss any POSITIVE experiences that you have had with your athletic trainer (please be as specific as possible)
2. What traits or behaviors of an athletic trainer would cause you to believe that they are competent at their job? (please be as specific as possible)
3. What traits or behaviors to you believe are characteristic of an ideal athlete-athletic trainer relationship?
4. Please discuss any NEGATIVE experiences that you have had with your athletic trainer (please be as specific as possible)
5. What traits or behaviors of an athletic trainer would cause you to believe that they are NOT competent at their job? (please be as specific as possible)

6. If you have been in a situation where you and your athletic trainer did not get along, what, if anything, did the athletic trainer do to try to repair the relationship?
7. Please discuss any positive or negative experiences you have had with your athletic trainer in handling injury situations with your coach (sport coach or strength coach).
8. How does your athletic trainer motivate you in rehabilitation? (please list specific examples or techniques if possible)
    a. Ideally, what type of a role would you like to play in your own rehabilitation process (how much say do you think you should have in what exercises you do)?
9. What are some of the most effective techniques that your athletic trainer has used to explain an injury to you?
    a. Ideally, what would you like your athletic trainer to explain or education you on?

Appendix B

Appendix B

Human Subjects Approval for Study 1

A Preliminary Investigation of Certified Athletic Trainers' Attitudes, Actions, and Abilities As Viewed by Previously Injured Collegiate Student-Athletes

Informed Consent Form

You are being asked to participate in a study conducted by Daniel Gould, PhD and Jennifer Stiller, MS, ATC from Michigan State University, and John Ostrowski, MS, ATC from the College of the Holy Cross. The purpose of this study is to better understand the relationship between collegiate student-athletes and their athletic trainers. This will be accomplished through addressing the research questions of: (1) what types of positive and negative experiences have you had with your athletic trainer; (2) have you ever had experience with an athletic trainer that you felt was effective but that you did not like as a person; (3) has your athletic trainer ever confronted you to get you to work harder in rehabilitation; (4) how has your athletic trainer facilitated or impaired communication between you and your coach(es); (5) how does your athletic trainer motivate you in rehabilitation; (6) how does your athletic trainer explain injuries to you; and (7) how well or poorly does your athletic trainer fit in with your team.

As part of the study, you will be asked to participate in a 60-minute interview. The interview will be audio taped and transcribed. If you so wish, you can refuse to have the interview audio taped, or to have the audiotape turned off at any point during the interview. Audiotapes will be erased at the completion of the study. In addition, you may be contacted after the interview to clarify your responses to questions.

Your responses in the interview will remain confidential; no one except the primary investigators and their research team will have access to these responses. Results will be based on the answers given by all participants as a group, ensuring confidentiality of individual responses. Group-based findings will be made available to those who are interested. Your privacy will be protected to the maximum extent allowable by law.

Investigators will take measures to ensure the confidentiality of the participants by eliminating names from interview transcriptions, data analyses documentation, and the final project write up. Also, participation will be voluntary and you may withdraw from participation at any time without penalty. Furthermore, you may refuse to answer specific questions in the interview that you feel uncomfortable answering and can still be a part of the study.

Your participation in this study would be greatly appreciated. If you have any questions concerning your participation in this study, please contact the principle investigator Dr. Daniel Gould at (517) 432-0175 or drgould@msu.edu, or Jennifer Stiller at (517) 353-

0728 or stillerj@msu.edu, or John Ostrowski at (508) 793-2627 or jowstows@holycross. The investigators may also be reached by mail at: 205 IM Sports Circle, Michigan State University, East Lansing, MI 48824.

If you have any questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact – anonymously, if you wish – Peter Vasilenko, PhD., Chair of the University Committee on Research Involving Human Subjects (UCRIHS) by phone: (517) 355-2180, fax (517) 432-4503, e-mail: vasilenk@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

Thank you for your time and cooperation,

Daniel Gould, PhD, Principle Investigator	Jennifer Stiller, MS, ATC, Secondary Investigator

John Ostrowski, MS, ATC, Investigator

Your signature below indicates your voluntary agreement to participate in this study.

Participant Signature _____ Date _____

Your signature below indicates your voluntary agreement to the audio taping of the interview.

Participant Signature _____ Date _____

This consent was approved by the Biomedical and Health Institutional Review Board (BIRB) at Michigan State University. Approved 01-23-07 – valid through 01-22-08. This version supersedes all previous versions. IRB#06-068

Appendix C

Appendix C

Athletes' Communication, Social Support, and Motivation Expectations

Table C.1. Athletes' Communication, Social Support, and Motivation Expectations

Raw Data Theme	First Order	Second Order
Want to know what you're doing & why you're doing it "Huge" to understand how injury occurred Don't know if it's helping you or not	Want Information	Provide Adequate Education (16)
If I don't understand why I can't do it, I'm going to do it Explain why you're doing an exercise if it's not obvious	Significance	
Explain in terms an athlete can understand Need AT to explain it so you're not scared	Understandable Terms	
Explain how working hard in rehab will decrease my chance of re-injury I want to know the extent of injury	Calm Re-injury Fears	
Explain the purpose of the modality I'm doing Tell what the exercise will help you do (ex: quicker on your feet)	Educate about Injury, Treatments, Rehabilitation	
Explain that it's not always a straight road to recovery Pain is less scary when you know why & that it's normal Tell athlete what kind of pain to expect after surgery Expectations post-op abilities (what they can/can't do)	Expectations of ATC & Athlete	Explain Expectations (17)
I want to know everything on the front end AT should provide general idea, then let athlete ask questions	Timeframe for Providing Information	

AT makes an effort to get to know everyone AT made a point to know each teammate and their jersey numbers	Knowledge about athletes (10)	Establish Rapport (16)
AT came up and introduced himself, so it was nice not to have to worry Very awkward during rehab if you don't know the AT	Initial communication with athletes	
AT makes sure coach knows my status, how hard I'm working AT takes "blame" for pulling an athlete from practice	Communication	Communication with Coaches (19)
AT has authority to tell coach I need a day off AT can get my lifting program altered	Authority	
Have something closer to big goal to help drive you towards it AT took something I was looking forward to and used that as a goal Changing up exercises to make them challenging AT made a big deal when goals met	Challenging Goals, Modifiable Goals	Active Role in Rehabilitation (31)
If goals aren't meaningful, they don't motivate Need to understand how goals will get you back to play to be motivating Mentally easier if you know you're making progress	How STGs are Motivating	
AT helped create realistic goals Having a goal with a time frame was motivating Set goals for where athlete wanted to be when rehab worksheet was filled	S.M.A.R.T Goals	
AT asks me if there's anything else I feel I should be working on AT listened to how body was reacting to certain types of exercises before deciding to increase or change them	Ability to accept & use athlete feedback	

AT asked for my feedback during early rehab so I wasn't in more pain than I could handle		
If an exercise really hurts, AT comes up with another that accomplishes same purpose Changing up exercises – always doing new stuff	Creativity in Rehab	Creativity in Rehab (6)
AT ran stairs & did sprints with me AT wrote a card or pulled me aside & said I was doing well & looking good When AT watches, you do it better When AT notices I'm working hard & getting things done it keeps me motivated & on-task	Supervision, Participation	Personal Attention (5)
Sometimes you just need to vent Need to listen without giving advice Need to listen without judging Athlete needs to express what he thinks is wrong physically Someone to talk to without having to worry about pressure Need to talk about stuff that's not sport-related AT isn't into team politics	ATC as a Sounding Board (19) [Listening Support]	Social Support (91)
AT needs to be caring and bring over the box of tissues AT can understand the emotional part of injury Show concern for mental and physical well-being	Supportive (16) [Emotional Support]	
Redirect sadness into determination to get better	Provided a Mental Push (9) [Emotional Challenge]	
Need someone to say "stop crying" Remind you it's not as bad as you think Put situation back into perspective Remind you how far you've come	Provide Perspective (6) [Reality Confirmation]	

Give crutches Helped set up modalities Drives athlete to the doctor/MRI/ER	Physical Aid (8) [Personal & Tangible Assistance]
Write me a card, a little pick-me-up Show that they appreciate that I'm not always complaining AT made a big deal of me achieving my goal Friends & family don't appreciate how hard it is and how hard I'm working the way my AT does	Appreciative, Understanding (13) [Task Appreciation]
Sometimes you need a kick in the butt in rehabilitation Pushed me, made sure I was on top of everything Made sure my rehab was as tough as possible Made sure I wasn't slacking off, not even taking a couple off	Provided Physical Challenge (20) [Task Challenge]

** Numbers in parentheses represents the number of raw data points

Appendix D

Human Subjects Approval for Study 2

A Preliminary Investigation of Issues Faced by Recently Certified Athletic Trainers

Informed Consent Form

You are being asked to participate in a research study conducted by Jennifer Stiller, MS, ATC and Daniel Gould, PhD from Michigan State University, and John Ostrowski, MS, ATC from the College of the Holy Cross. The purpose of this study is assess relevant rehabilitation, motivation, and communication issues that newly certified athletic trainers face, and the extent to which his/her undergraduate education prepared him/her to handle these issues. This will be accomplished through addressing issues pertaining to: (1) athletes; (2) coaches and strength coaches; (3) supervisors; (4) athletic training students and interns; (5) doctors; and (6) parents of student-athletes.

As part of the research study, you will be asked to participate in a 90-minute focus group interview. The interview will be audio taped and transcribed. Audiotapes will be erased at the completion of the study. In addition, you may be contacted after the interview to clarify your responses to questions.

Your responses in the interview will remain confidential; no one except the primary investigators and their research team will have access to these responses. Results will be based on the answers given by all participants as a group, ensuring confidentiality of individual responses. Group-based findings will be made available to those who are interested. Your privacy will be protected to the maximum extent allowable by law.

Investigators will take measures to ensure the confidentiality of the participants by eliminating names from interview transcriptions, data analyses documentation, and the final project write up. Also, participation will be voluntary and you may withdraw from participation at any time without penalty. Furthermore, you may refuse to answer specific questions in the interview that you feel uncomfortable answering and can still be a part of the study.

There are no known risks associated with participation in this study. Individually, you will not benefit from your participation in this study, however future application of research findings to the athletic training educational system will benefit future certified athletic trainers. The more we know about the issues new certified athletic trainers face, the more effectively we can structure the athletic training education programs.

Your participation in this research study would be greatly appreciated. If you have any questions concerning your participation in this study, please contact Jennifer Stiller at (517) 353-0728 or stillerj@msu.edu, or the principle investigator Dr. Daniel Gould at

(517) 432-0175 or drgould@msu.edu. The investigators may also be reached by mail at: 134 IM Sports Circle, Michigan State University, East Lansing, MI 48824.

If you have any questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact – anonymously, if you wish – Peter Vasilenko, Ph.D., Director of Human Research Protections, (517) 355-2180, fax (517) 432-4503, e-mail irb@msu.edu, mail 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1047.

Thank you for your time and cooperation,

Jennifer Stiller, MS, ATC

Daniel Gould, PhD, Principle Investigator

Your signature below indicates your voluntary agreement to participate in this study.

Participant Signature _____ Date _____

Your signature below indicates your voluntary agreement to the audio taping of the interview.

Participant Signature _____ Date _____

This consent was approved by the Biomedical and Health Institutional Review Board (BIRB) at Michigan State University. Approved 01-23-07 – valid through 01-22-08. This version supersedes all previous versions. IRB#X06-1026.

Appendix E

Appendix E

Interview Guide for Study 2

Opening Questions

1. For how many years have you been certified as ATC?
2. What types of undergraduate programs did you come from?
3. What types of clinical athletic training experiences did you have while an undergraduate?
4. What types of administrative/communication responsibilities did you have in undergraduate?
5. What are your present clinical and administrative responsibilities?

Open-Ended Questions for each "Probe" topic

- What issues have you faced in the years since you've been out of undergrad? (e.g., interacting with, communicating with)
- **What were the most successful methods you found to handle these issues?**
- Did your undergrad program prepare you handle these types of issues?
- How did they do so?
    - Scale 1-10: Based on your undergraduate preparation how prepared did you feel to handle these issues when they arose?

Probes: Athletes

- What types of issues have you had with athletes in terms of:
    - Non-compliance; Reporting injuries in a timely fashion; Being unmotivated during long-term rehab; Repairing a strained relationship with an athlete

Probes: Coaches

- What types of issues have you had with coaches & strength coaches in terms of:
    - Informing them of athlete's health/playing status (**Athlete confidentiality issues**); Disagreements" regarding when athletes should return to activity; Ability to communicate with them on a professional level

Probes: Doctors

- What types of issues have you had with doctors in terms of:
    - Communicating on a professional level; Working relationship (two-way respect with medical decisions); Getting athletes in to see doctor / having doctor come to see your athletes; Having MD coverage at your games
    - Feeling informed on the status of your athletes; E-mail or telephone communication

Probes: Parents

- What types of issues have you had with parents in terms of:
    - Communicating athlete's status (**Athlete confidentiality issues**); Parents wanting to take child to see specialist at home: Explaining insurance issues

Open-Ended:

- What have you found to be the most effective ways of explaining injury to an athlete?
- What have you found to be the most effective ways of keeping your athlete compliant in treatment and rehabilitation.
- What have you found to be the most effective ways to keep your athlete motivated in rehab?

Strategies

- What type of training did you receive in your undergraduate program concerning:

- Helping athletes set goals during rehabilitation
    a. **Do you do this now?**
        i. **If yes, HOW -- if not, WHY NOT?**
- Strategies to keep athletes motivated during rehabilitation
- Strategies to improve athlete compliance with treatment and rehabilitation
- Visualization during healing
    a. **Do you do this now?**
        i. If yes, HOW -- if not, WHY NOT?
- Relaxation
    a. **Do you do this now?**
        i. If yes, HOW -- if not, WHY NOT?
- Cognitive techniques (thought-stopping, cognitive restructuring)
    a. **Do you do this now?**
        i. If yes, HOW -- if not, WHY NOT?
- Assessment of athlete's coping resources
    a. **Do you do this now?**
        i. If yes, HOW -- if not, WHY NOT?

Probes: Counseling

- What type of training did you receive in your undergraduate program concerning:
    - Knowing when to refer for counseling ; Handling difficult athlete issues
        - **How well do you feel you handle these types of issues?**

Probes: Social Support

What types of social support do you feel that you should provide in your role as an athletic trainer?

Conclusion

What suggestions for improvement would you make to your undergrad to better prepare you for your first few years in the "real world"?

Appendix F

Appendix F

Human Subjects Approval for Dissertation Study

An Evaluation of an Educational Intervention in Psychology of Injury for Athletic Training Students

Informed Consent Form

WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?
You are being asked to participate in this study because you are an athletic training student in Michigan State University's CAATE accredited undergraduate or graduate athletic training education programs. This study is being conducted by Daniel Gould, PhD and Jennifer Stiller, MS, ATC from Michigan State University.

WHAT IS THE PURPOSE OF THIS STUDY?
The purpose of this research is to evaluate the effectiveness of an educational intervention designed to improve your knowledge in psychology of injury.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?
The research procedures will be conducted at Michigan State University. You will be asked to participate in the study for the entire semester, however your active participation in the educational module will only last for six weeks. The total amount of time you will be asked to volunteer for this study is 7.5 hours over the next 20 weeks.

WHAT WILL YOU BE ASKED TO DO?
You will be asked to attend a two-hour workshop once a week for three weeks, then a 30-minute seminar session once a week for three weeks. Both the workshop and the seminar sessions will be held two evenings per week, and you may choose which night to attend. At six points throughout the semester you will be asked to take a psychology of injury knowledge test and a psychology of injury usage survey.

DO YOU HAVE TO TAKE PART IN THE STUDY?
If you decide to take part in the study, it should be because you really want to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?
Only the primary investigators listed in this study and the Institutional Review Board will see the information that you give. All research records that identify you will be kept confidential. Your information will be combined with information from other people taking part in the study. All published and presented accounts of this research will be written based on the combined information that has been gathered. You will not be identified in these written materials.

CAN YOUR TAKING PART IN THE STUDY END EARLY?
If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you decide to stop taking part in the study.

WHAT IF YOU HAVE QUESTIONS?
Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. If you have any questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact - anonymously, if you wish - Peter Vasilenko, Ph.D., Director of the Human Subject Protection Programs at Michigan State University, by phone: (517) 355-2180, fax: (517) 432-4503, email: irb@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824. We will give you a copy of this consent form to take with you.

Than you for your time and cooperation,

Daniel Gould, PhD	Jennifer Stiller, MS, ATC
Principle Investigator	Secondary Investigator

Your signature below indicates your voluntary agreement to participate in this study and be video taped.

Participant Signature

This consent was approved by the Biomedical and Health Institutional Review Board (BIRB) at Michigan State University. Approved 09/04/07 – valid through 06/05/08. This version supersedes all previous versions. IRB#07-528

Appendix G

Appendix G

Applied Sport Psychology for Athletic Trainer Course Content and Schedule

Classroom Session 1

- Introduction to the course, course structure
- 3 key areas of psychology of injury research
    - Antecedents (stress)
        - Overview of research on antecedents
        - Role of ATC pre-injury
    - Emotional reactions
        - 'Normal' and "abnormal' emotional reactions
        - ATC's role as an informal counselor
    - Psychology of athletic injury rehabilitation
- Communication in the athletic training room
    - Building rapport
    - 4 fundamentals of effective communication
    - Key elements of communication skills within health care curriculum
    - Practical communication skills
    - **Role play activity: injury scenario**
    - **Communication "homework" assignment**
- Clarifying expectations during injury and rehabilitation
    - Introduction to pain (as both a physical and emotional experience)
    - Rehabilitation progression, demands of rehabilitation
    - Expectations ATCs have of athletes

- Facilitating rehabilitation adherence
    - Gaining athletes' cooperation
    - Factors that influence athlete adherence
        - Strategies for improving athlete adherence
        - Importance of understanding the athlete's sport
    - Strategies for dealing with difficult or non-compliant athletes
        - **Role play activity: handling a difficult athlete**

Classroom Session 2

- Social support in the athletic training room
    - Definition and types of social support
    - Injured athletes' 4 main sources of social support
        - Family, friends, significant others
        - Support from coaches and teammates
        - ATC-provided social support
            - Practical social support provision strategies
            - **Social support "homework" assignment**
        - Social support from similar others
            - Peer modeling interventions

- Motivational strategies
    - Intrinsic versus extrinsic motivation related to rehabilitation
    - Simple, practical motivation strategies
    - Goal setting
        - Types of goals (process, performance, outcome)
        - Common mistakes in short-term goal setting
        - **ATC Toolbox: EZ Goal Form**
        - Dealing with failure to reach goals
        - The research on goal setting
        - **Goal setting "homework" assignment**

Classroom Session 3

- Introduction to psychological skills training (PST) used in injury rehabilitation
    - Physiological techniques
        - Relaxation (and techniques)
            - Physiological effects of relaxation techniques
        - Stress management (and techniques)
            - Environmental engineering techniques
            - Athlete stress management techniques
            - **ATC Toolbox: Centering**
        - **Relaxation/centering "homework" assignment**
    - Cognitive techniques
        - Typical post-injury thought process
        - Introduction to self-talk (positive versus negative)

        - The use of self-talk during injury rehabilitation
        - Positive versus negative self-talk
        - Techniques for controlling self-talk
            - Thought stopping
            - Cognitive restructuring
            - Countering
            - Reframing
            - Affirmation statements
            - "Rubberband" techniques
            - **ATC Toolbox: Thought Stopping**
    - Imagery and athletic injury rehabilitation
        - Research on imagery
        - Characteristics of effective imagery
        - Motivational, cognitive, healing imagery
        - Combination of relaxation and guided imagery
        - **ATC Toolbox: Healing Imagery Scripts**
        - Use of imagery in injury rehabilitation
        - Combining imagery and relaxation
    - **Cognitive techniques "homework"**

- The ATC as a counselor
    - Is counseling really our job?
    - Effective injury counseling (the do's and don'ts)
    - Practical counseling "flow chart"
    - Characteristics of the effective ATC-counselor
    - Potential dual-role conflicts
    - When and how to refer

Seminar Session 1

- Open-floor discussion of successes/challenges related to communication, education, clarifying expectations, facilitating adherence, handling difficulties/non-compliance
- Open-floor discussion of other participant-identified issues
- **Journaling activity (due at Seminar Session 2)**
    - Self-check: interpersonal skills
        - Do your athletes seem more comfortable with you now (versus beginning of semester)? How comfortable are you talking to them about (appropriate) non-sport related topics? Do athletes with new injuries seem to come to you sooner?
- **Assign follow-up assignment 1: goal setting follow-up (due at Seminar Session 2)**
    - Did your athletes achieve their goals? If yes, how did you reward them? If no, how did you reframe/revise goals?

Seminar Session 2

- Open-floor discussion of successes/challenges related to social support provision, motivational strategies, use of goal setting
- Open-floor discussion of other participant-identified issues
- **Follow-up assignment 1 and Journaling due TODAY: goal setting follow-up**
- **Journaling activity (due at Seminar Session 2)**
    - Self-check: what did you learn
        - Think critically about what you learned during this course. What are some of the most valuable lessons that you have taken away?
        - What were some of the most effective/successful strategies that you have been able to implement with your athletes?
        - What did you think of the in-class activities
            - Emotional Response to Injury, Handling Difficult Athletes, Goal Setting, Progressive Relaxation, Centering, Thought-Stopping, Healing Imagery (comment on each individually)
        - What did you think of the "homework" assignments?
            - Initiating Conversations, Providing Social Support, Goal Setting, Progressive Relaxation, Cognitive Techniques (Imagery), MSU's Referral Network
        - What did you like about the class (please be as specific as possible)?
        - What did you dislike about the class (please be as specific as possible), including any suggestions for improvement.

- **Assign follow-up assignment 2: PST follow-up (due at Seminar Session 3)**
    - Are they still using the PST techniques? Do they like them?
    - If they are not using them, why not (didn't buy in? Didn't think it worked? Didn't want to put forth the effort? Lack of AT follow-up on technique?)

Seminar Session 3

- Open-floor discussion of successes/challenges related to PST, informal counseling interactions with athletes
- Open-floor discussion of other participant-identified issues
- **Journaling activity due TODAY (participants turn in journals)**
- **Follow-up assignment 2 due TODAY: PST follow-up**

Appendix H

Appendix H

Survey Development Methods

In order to evaluate the effectiveness of this educational intervention, one knowledge test and two usage surveys were developed. Survey construction was performed using the guidelines established by Raycov (2007). Each survey was a subject-centered measurement, the goal of which is to the reveal the location of individuals on a quantitative continuum with respect to a particular construct (e.g., communication skills, attentiveness to athletes), and to determine what level of mastery or proficiency they possess in a particular subject area. Essentially, the purpose of each study was to evaluate an individual to determine how well they implemented a given skill set (e.g., communication, attentiveness) in the athletic training room.

The first step was to identify the primary purposes for which the test scores will be intended. In this case, the purpose was to differentiate among individuals with regard to a given construct in order to evaluate an underlying trait, the trait being knowledge and skill in psychology of injury techniques. Behaviors were then identified that represented the underlying construct (essentially defining the subject-matter domain of relevance). The first step in this process was to engage in content analysis, whereby open-ended questions were posed to recently certified athletic trainers and to collegiate student-athletes (Chapter 3). Responses were sorted into topical categories, with the predominant categories among their answer forming the major components of the construct to be assessed. These categories served as a basis for generating survey items. A critical review of the literature was next undertaken, the purpose of which was to identify behaviors most frequently studied by others in the field. This information, combined with personal experience and direct observation of other athletic trainer-athlete

interactions, was used to generate additional items. Once an initial pool of items had been compiled, input was solicited from experts in the field to help narrow and refine the types of behavior pertaining to the construct. Experts for the athletic training and athlete surveys included three ATCs with a combined 14 years of experience, one Association for Applied Sport Psychology (AASP) certified sport psychology specialist with 30 years of experience, and one ATC/sport psychology specialist with 8 years of experience (Panel A).

Once subject matter was identified, the proportion of items focusing on each type of behavior in the construct was delineated. The decision about relative weights of the sub-scales was based on qualitative data collected previously from collegiate student-athletes and recently certified athletic trainers, as well as the combined perceptions of the experts within the field. It was determined that the initial survey instruments should consist of questions relating to the following latent constructs (percent of questionnaire in parentheses): communication (20%), social support (25%), relationship development (20%), attitude and attentiveness (10%), motivation and goal setting (15%), and sport psychology in the athletic training room (10%). The construct of sport psychology in the athletic training room was comprised of items related to imagery, relaxation, self-talk, and cognitive restructuring. An initial pool of items was then constructed: 62 for the POI-U, and 85 for the POI-T (see Appendices E and F). The format of all items was a 9-choice Likert scale with response scales ranging either from strongly disagree (1) to strongly agree (9), or from never (1) to always (9). The initial survey instruments were reviewed for accuracy by experts in the field, and were reviewed for wording and ambiguity by subjects in the target population.

The initial survey instruments were field tested with 215 athletic training students and 216 collegiate student-athletes. The pools of pilot test subjects were within the target population (junior-level, senior-level, and graduate ATS and collegiate student-athletes), but did not include subjects who would be using the final survey instrument. Comments were invited from these pilot test subjects on how they perceived each item, and these suggestions were considered when developing the final survey instrument. The final questionnaires are included in Appendices K and L.

Descriptive statistics for response distribution of initial survey instruments were generated for each question, the purpose being to determine if there was sufficient variation in the responses to discriminate between subjects. The maximum likelihood method of exploratory factor analysis (EFA) was conducted to verify that all questions in each sub-scale measured the same latent variable (e.g., motivation, attentiveness, communication). One latent factor was found to underlie all questions contained within each of the six subscales (communication, social support, motivation, relationship, attitude and attentiveness, and sport psychology). Questions that loaded least on these factors were removed, both to improve validity and reliability, and to decrease the length of the test. Reliability testing was performed on each subscale, with all reliability coefficients 0.627 or higher (range: 0.627-0.911 for athlete survey; range: 0.716-0.894 for athletic training student survey) and all cronbach alpha 0.657 or higher (range: from 0.762-0.910 for athlete survey; range:0.657-0.894 for the athletic training student survey). No items were deleted to improve alpha. Complete results of factor analysis and reliability testing are presented in Table H.1 and H.2. Confirmatory factor analysis (CFA) was not conducted due to the pilot sample size.

Content validity was evaluated for each survey, which is essentially a "conceptual test" of whether a given instrument evaluates what it is presumed to measure. In order to establish content validity, a substantive domain to be measured must be determined (e.g., communication, attitude). This was established through review of the literature and content analyses (Chapter 2 and 3). Content validity is a qualitative type of validity that depends on the theoretical definition of the domain being studied (2007). To evaluate content validity in this context, a group of independent experts was impaneled to judge whether items on the surveys adequate sampled the domain of interest (Panel A).

Because there was no existing survey (criteria) with which to compare the athlete or athletic training student surveys, criterion validity could not be evaluated. An attempt at construct validation was attempted. Correlation between matching subscales on the athlete and athletic training student surveys were calculated. These correlations were very low (range: 0.05-0.17), which was hypothesized to be due to the fact that pilot subjects for the two surveys came from two completely unrelated populations. Confirmatory factor analysis is an acceptable test of construct validity, however this could not be conducted due to the pilot sample size. However, we can make some inferences about content validity based on the unidimensionality of all scales as shown by EFA; however, these models were not tested definitely through CFA.

Table H.1. Psychometrics for Psychology of Injury Transfer Survey (POI-T)

Sub-Scale	Total Items	Factors Extracted	χ^2 * (p-value)	RMSR† (p-value)	Reliability (95% CI)	Cronbach Alpha
Communication	7	1	0.0520	0.04	0.911 (0.890-0.932)	0.892
Social Support	5	1	0.1250	0.03	0.832 (0.793-0.872)	0.853
Motivation	8	1	0.0018	0.04	0.836 (0.802-0.870)	0.910
Attitude, Attentiveness	5	1	0.7708	0.02	0.841 (0.803-0.879)	0.846
Relationship	4	1	0.3159	0.03	0.627 (0.545-0.708)	0.824
Sport Psychology	5	1	0.5423	0.02	0.845 (0.810-0.880)	0.762

*χ^2 tests Hø: The 1-factor model fits the data (a non-significant p-value is desirable)
†RMSR: root mean square residual (variance unexplained, $p \leq 0.05$ is desirable)

Table H.2. Psychometrics for Psychology of Injury Usage Survey (POI-U)

Sub-Scale	Total Items	Factors Extracted	χ^2 (p-value)	RMSR† (p-value)	Reliability (95% CI)	Cronbach Alpha
Communication	7	1	0	0.12	0.790 (0.744-0.837)	0.877
Social Support	6	1	0	0.10	0.730 (0.668-0.792)	0.710
Motivation	6	1	0	0.08	0.762 (0.708-0.816)	0.747
Attitude, Attentiveness	4	1	0.2246	0.04	0.797 (0.749-0.845)	0.657
Relationship	5	1	0	0.10	0.716 (0.643-0.788)	0.759
Sport Psychology	8	1	0	0.09	0.894 (0.871-0.916)	0.894

*χ^2 tests Hø: The 1-factor model fits the data (a non-significant p-value is desirable)
†RMSR: root mean square residual (variance unexplained, $p \leq 0.05$ is desirable)

APPENDIX I

APPENDIX I

ORIGINAL PSYCHOLOGY OF INJURY USAGE SURVEY (POI-U)

Athletic Training Students' Use of Communication and
Applied Sport Psychology with Injured Athletes

As you are answering these questions, please keep in mind that the purpose of this survey to is evaluate what IS being done in the athletic training room, not what SHOULD be done. While it may be socially desirable to answer a certain way, please answer questions based on your actual behaviors in the athletic training room.

Please indicate your current year in your athletic training education program.

Second Year in Program (Junior Level)
Third Year in Program (Senior Level)
Fourth Year in Program (5th Year Senior Level)

All questions are scored on a 9-point Likert scale:

Never	Almost Never	Seldom	Occasionally	About Half of the Time	Often	Frequently	Almost Always	Always
1	2	3	4	5	6	7	8	9

1. I explain injuries in terms and language that my athletes can understand.

2. I try to make my athletes feel comfortable talking to me about issues unrelated to injury or sport

3. I remind my athletes that there will be highs and lows in progress during rehabilitation.

4. I come up with creative ways to motivate my athletes during rehabilitation.

5. I have a positive attitude when I am in the athletic training room.

6. I show interest in my athletes as people (outside of sport).

7. I educate my athletes about outside resources that are available to them.

8. I encourage my athletes to use visualization & imagery during injury and rehabilitation.

9. I recognize and compliment my athletes for the effort they are putting into treatment and rehabilitation

10. I am able to develop a rapport (carry on a conversation) with most of my athletes.

11. I am effective at motivating athletes in long-term rehabilitation.

12. I express or demonstrate negative feelings or opinions about athletes in the presence of other athletes.

13. I explain to my athletes how the exercises they are doing will help them return to their sport more quickly.

14. I teach and encourage athletes to use thought-stopping during injury and rehabilitation.

15. I explain to my athletes how accomplishing each goal will help them return to sport.

16. I am able to challenge my athletes to work harder without yelling at them.

17. I explain to athletes the progression they can expect during rehabilitation.

18. I tend to not work as hard with the athletes who I am sure are faking injuries or blowing minor injuries out of proportion.

19. I know things about my athletes outside of sport.

20. I help my athletes find something positive in any situation.

21. The rehabilitation goals that I set are meaningful to the athlete.

22. I teach and encourage athletes to use relaxation techniques during injury and rehabilitation.

23. I monitor or pay attention to athletes when they are rehabilitating

24. I am friendly and approachable the first time I interact with an athlete.

25. I take care of my athletes' needs (e.g., providing physical assistance, rides to doctor appointments)

26. I make sure that my athletes know what to expect during the course of their injury (pain, range of motion, function, etc).

27. I explain the purpose of the exercises or treatments that I am having my athlete do.

28. I encourage my athletes to express their feelings and emotions about their injury

29. I provide athletes with objective (#'s) feedback on their progress on a regular basis.

30. I can tell when an athlete is having a bad day.

31. I show my athletes respect.

32. I explain treatments and exercises in terms and language that my athletes can understand.

33. I allow my athletes to vent without judging them

34. I teach and encourage athletes to use cognitive restructuring techniques during injury and rehabilitation.

35. I develop creative rehabilitation programs.

36. When I notice that an athlete seems to be focused on the possibility of re-injury, I remind him/her to trust that the rehabilitation program was successful.

37. I consider myself to be effective at motivating athletes during the low points (setbacks, bad weeks) in rehabilitation.

38. I play favorites with players on my team.

39. I am able to challenge and motivate my athletes when they are not putting enough effort into rehabilitation.

40. I use healing imagery scripts with my athletes.

41. I am able to listen to athletes without giving advice.

42. I outline a progression (series, list) of short-term goals for my athletes.

43. I work with my athletes one-on-one.

44. I do a good job of getting to know both uninjured and injured athletes on my team.

45. I fit in with my team.

46. I make sure my athlete knows what to expect after a new injury or surgery.

47. I express concern about the condition of my athletes.

48. I confront athletes when they skip a treatment or rehabilitation session.

49. I help my athletes set short-term goals.

50. I consider myself a trustworthy person to whom my athlete could turn to for advice.

51. I explain to my athletes how being tense can hinder success in rehabilitation.

52. I explain the purpose of the modality that I am using with my athlete.

53. I teach athletes how to monitor their negative self-talk during injury and rehabilitation

54. I encourage my athletes to express their feelings and emotions about their injury.

55. I explain the purpose of the exercises or treatments that I am having my athlete do.

56. I am able to challenge my athletes' negative emotions when they are interfering with their rehabilitation progress.

57. I am able to connect with most of my athletes on a personal level.

58. I encourage athletes to play an active role in developing rehabilitation tasks and exercises.

59. I keep my personal life out of the athletic training room.

60. I help my athletes see the "big picture" and put their injury into perspective.

61. I tell my athletes what they can do to help speed their recovery.

62. I act negatively towards certain athletes on my team.

APPENDIX J

APPENDIX J

ORIGINAL PSYCHOLOGY OF INJURY TRANSFER SURVEY (POI-T)

Evaluation of Your Experiences in the Athletic Training Room

As you are answering these questions, please keep in mind that the purpose of this survey is to evaluate what IS being done in the athletic training room, not what SHOULD be done. The results of this study will be used to help athletic training students learn how they can better meet your needs as a student-athlete. Remember that your name, school, or other personal information will NOT be tied to your responses; your responses will remain totally anonymous.

All questions are scored on a 9-point Likert scale:

Never	Almost Never	Seldom	Occasionally	About Half of the Time	Often	Frequently	Almost Always	Always
1	2	3	4	5	6	7	8	9

1. My athletic trainer explains injuries in terms and language that I can understand.

2. My athletic trainer is understanding when I have a bad day

3. Having my athletic trainer yell at me is an effective motivation strategy. (reverse scale)

4. I feel comfortable talking to my athletic trainer about issues unrelated to injury or sport.

5. I imagine myself working successfully through tough situations (further injury, slow rehabilitation).

6. My athletic trainer reminds me that there will be highs and lows in progress during rehabilitation.

7. My athletic trainer comes up with creative ways to motivate me during rehabilitation.

8. My athletic trainer maintains a positive attitude when he/she is in the athletic training room.

9. My athletic trainer shows interest in my as a person (outside of sport).

10. My athletic trainer educates me about outside resources that are available to me.

11. I like my athletic trainer as a person.

12. It was difficult for me to do exactly what the athletic trainer told me to do.

13. My athletic trainer encourages me to use visualization & imagery during injury and rehabilitation.

14. My athletic trainer notices and recognizes the effort I put into treatment and rehabilitation.

15. My athletic trainer is able to carry on a conversation with me.

16. I imagine myself coping with (dealing with) the stress associated with my injury.

17. My athletic trainer can keep me motivated during long-term (extended) rehabilitation.

18. My athletic trainer says negative things about other athletes on my team. (reverse scale)

19. My athletic trainer helps me to see how the exercise I am doing will help me return to my sport more quickly.

20. I find myself thinking negative thoughts about my injury.

21. My athletic trainer shows me how accomplishing each goal will help me return to my sport.

22. My athletic trainer allows me to say everything I wanted about my injury

23. I respect my athletic trainer as a professional.

24. To get me to work harder during rehabilitation, my athletic trainer yells at me. (reverse scale)

25. My athletic trainer explains the progression I can expect during my rehabilitation.

26. Even before I start a rehabilitation exercise, I can imagine (visualize) myself completing it perfectly).

27. My athletic trainer acts like he/she thinks I am faking an injury or blowing an injury out or proportion. (reverse scale)

28. My athletic trainer knows things about me outside of my sport.

29. My athletic trainer is too pushy in trying to learn about my personal life. (reverse scale)

30. My athletic trainer is too pushy in trying to learn about my personal life. (reverse scale)

31. My athletic trainer helps me find something positive in any situation.

32. My athletic trainer seems to take my problems seriously.

33. My athletic trainer makes rehabilitation goals meaningful to the me.

34. I consider my athletic trainer a friend.

35. I find myself saying negative things to myself about my injury.

36. I imagine my body repairing itself.

37. My athletic trainer teaches and encourages me to use relaxation techniques during injury and rehabilitation.

38. My athletic trainer tells me all that I want to know about my injury.

39. My athletic trainer monitors me or pays attention to me when I am rehabilitating

40. My athletic trainer was friendly and approachable the first time I interacted with him/her.

41. My athletic trainer takes care of my needs (e.g., providing physical assistance, rides to doctor appointments)

42. My athletic trainer makes sure that I know what to expect during the course of my injury (pain, range of motion, function, etc).

43. My athletic trainer explains the purpose of the exercises or treatments that they ask me to do.

44. My athletic trainer encourages me to express my feelings and emotions about my injury.

45. I feel comfortable talking about my problems (injury-related or personal) with my athletic trainer.

46. My athletic trainer provides me with objective (#'s) feedback on my rehabilitation progress (e.g., range of motion, strength).

47. My athletic trainer can tell when I am having a bad day.

48. My athletic trainer shows me respect.

49. My athletic trainer explains treatments and exercises in terms and language that I can understand.

50. I know that I can vent to my athletic trainer when I need to, and that they won't judge me for what I say.

51. My athletic trainer teaches me ways to change negative thoughts that I have about my injury.

52. I think my athletic trainer is good at his/her job.

53. I imagine each rehabilitation exercise outside of the athletic training room.

54. My athletic trainer is very creative with coming up with new activities for my rehabilitation (so I am not bored).

55. I work harder when my athletic trainer yells at me. (reverse scale)

56. When I start thinking about the possibility of getting re-injured (or when I am nervous about going back to my sport for the first time), my athletic trainer encourages me to trust in the success of my rehabilitation program.

57. My athletic trainer is effective at motivating me during the low points (setbacks, bad weeks) in rehabilitation.

58. My athletic trainer plays favorites with players on my team. (reverse scale)

59. My athletic trainer knows how to challenge and motivate me when he/she sees that I am not putting my full effort into rehabilitation.

60. My athletic trainer encourages me to use visualization & imagery during injury and rehabilitation.

61. My athletic trainer is willing to listen to me without giving advice.

62. My athletic trainer explains procedures to me so that I knew what to expect.

63. My athletic trainer outlines a progression (series, list) of goals that I must achieve before I will be ready to return to my sport.

64. When my athletic trainer yells at me for not working hard enough during rehabilitation, it makes me want to give up and stop trying. (reverse scale)

65. I feel like I can turn to my athletic trainer in times of stress.

66. My athletic trainer works with me one-on-one.

67. My athletic trainer does a good job of getting to know both uninjured and injured athletes on my team.

68. I think my athletic trainer fits in with my team.

69. My athletic trainer tells me what to expect after a new injury or surgery.

70. My athletic trainer expresses concern about me as a person.

71. My athletic trainer knows how to confront me when I skip a treatment or rehabilitation session.

72. My athletic trainer helps me set goals for things I want to accomplish during rehab.

73. My athletic trainer is a trustworthy person I could turn to for advice when I need it.

74. My athletic trainer explains how being tense can prevent doing my exercises well.

75. My athletic trainer explains the purpose of the modality (e.g., e-stim, ultrasound) that I am using.

76. My athletic trainer teaches me ways to stop saying negative things to myself about my injury.

77. My athletic trainer encourages me to express my feelings and emotions about my injury.

78. My athletic trainer helps me understand the purpose of the exercises or treatments that I am doing.

79. My athletic trainer is able to challenge my negative emotions.

80. My athletic trainer is able to connect with me on a personal level.

81. My athletic trainer asks for my help in developing sport-specific rehabilitation.

82. My athletic trainer keeps his/her personal life out of the athletic training room.

83. I imagine (visualize) the physiological changes occurring in my body during healing (such as swelling decreasing or my muscle being repaired).

84. My athletic trainer helps me see the "big picture" and puts my injury into perspective.

85. My athletic trainer makes sure that I know what I can do to help speed my recovery.

86. My athletic trainer acts negatively towards some athletes on my team.

APPENDIX K

APPENDIX K

FINAL PSYCHOLOGY OF INJURY USAGE SURVEY (POI-U)

Athletic Training Students' Use of Communication and
Applied Sport Psychology with Injured Athletes

As you are answering these questions, please keep in mind that the purpose of this survey to is evaluate what IS being done in the athletic training room, not what SHOULD be done. While it may be socially desirable to answer a certain way, please answer questions based on your actual behaviors in the athletic training room.

Please indicate your current year in your athletic training education program.

Second Year in Program (Junior Level)
Third Year in Program (Senior Level)
Fourth Year in Program (5th Year Senior Level)

All questions are scored on a 9-point Likert scale:

Never	Almost Never	Seldom	Occasionally	About Half of the Time	Often	Frequently	Almost Always	Always
1	2	3	4	5	6	7	8	9

1. I try to make my athletes feel comfortable talking to me about issues unrelated to injury or sport
2. I have a positive attitude when I am in the athletic training room.
3. I show interest in my athletes as people (outside of sport).
4. I encourage my athletes to use visualization & imagery during injury and rehabilitation.
5. I recognize and compliment my athletes for the effort they are putting into treatment and rehabilitation
6. I am able to develop a rapport (carry on a conversation) with most of my athletes.
7. I ask for athlete input in setting goals for the rehabilitation program.

8. I explain to my athletes how the exercises they are doing will help them return to their sport more quickly.
9. I teach and encourage athletes to use thought-stopping during injury and rehabilitation.
10. I explain to my athletes how accomplishing each goal will help them return to sport.
11. I am able to challenge my athletes to work harder without yelling at them.
12. I explain to athletes the progression they can expect during rehabilitation.
13. I know things about my athletes outside of sport.
14. I help my athletes find something positive in any situation.
15. I teach and encourage athletes to use relaxation techniques during injury and rehabilitation.
16. I monitor or pay attention to athletes when they are rehabilitating
17. I make sure that my athletes know what to expect during the course of their injury (pain, range of motion, function, etc).
18. I explain the purpose of the exercises or treatments that I am having my athlete do.
19. I encourage my athletes to express their feelings and emotions about their injury
20. I provide athletes with objective (#'s) feedback on their progress on a regular basis (e.g., range of motion, strength).
21. I can tell when an athlete is having a bad day.
22. I show my athletes respect.
23. I explain treatments and exercises in terms and language that my athletes can understand.

24. I allow my athletes to vent without judging them.
25. I teach athletes how to monitor their negative self-talk during injury and rehabilitation.
26. I am able to challenge and motivate my athletes when they are not putting enough effort into rehabilitation.
27. I use healing imagery scripts with my athletes.
28. I outline a progression (series, list) of short-term goals for my athletes.
29. I work with my athletes one-on-one.
30. I do a good job of getting to know both uninjured and injured athletes on my team.
31. I help my athletes set short-term goals.
32. I consider myself a trustworthy person to whom my athlete could turn to for advice.
33. I explain to my athletes how being tense can hinder success in rehabilitation.
34. I explain the purpose of the modality that I am using with my athlete.
35. I teach and encourage athletes to use cognitive restructuring techniques during injury and rehabilitation.
36. I encourage athletes to play an active role in developing rehabilitation tasks and exercises.

APPENDIX L

APPENDIX L

FINAL PSYCHOLOGY OF INJURY TRANSFER SURVEY (POI-T)

Evaluation of Your Experiences in the Athletic Training Room

As you are answering these questions, please keep in mind that the purpose of this survey is to evaluate what IS being done in the athletic training room, not what SHOULD be done. The results of this study will be used to help athletic training students learn how they can better meet your needs as a student-athlete. Remember that your name, school, or other personal information will NOT be tied to your responses; your responses will remain totally anonymous.

All questions are scored on a 9-point Likert scale:

Never	Almost Never	Seldom	Occasionally	About Half of the Time	Often	Frequently	Almost Always	Always
1	2	3	4	5	6	7	8	9

1. My athletic trainer explains injuries in terms and language that I can understand
2. My athletic trainer is understanding when I have a bad day.
3. I feel comfortable talking to my athletic trainer about issues unrelated to injuries or sports.
4. My athletic trainer comes up with creative ways to motivate me during rehabilitation.
5. My athletic trainer maintains a positive attitude around all athletes when in the athletic training room.
6. My athletic trainer shows interested in me as a person (outside of sport).
7. My athletic trainer helps me to see how the exercise I am doing will help me return to my sport more quickly.

8. My athletic trainer shows me how accomplishing each goal will help me return to my sport.
9. My athletic trainer explains the progression I can expect during my rehabilitation.
10. My athletic trainer makes rehabilitation goals meaningful to me.
11. My athletic trainer teaches and encourages me to use relaxation techniques during injury and rehabilitation.
12. My athletic trainer monitors me or pays attention to me when I am rehabilitating.
13. My athletic trainer was friendly and approachable the first time we interacted.
14. My athletic trainer notices and recognizes the effort I put into treatment and rehabilitation.
15. My athletic trainer provides me when objective (#s) feedback on my rehabilitation progress (e.g., range of motion, strength).
16. My athletic trainer can tell when I am having a bad day.
17. My athletic trainer shows me respect.
18. My athletic trainer teaches me ways to change negative thoughts that I have about my injury (e.g., reframing, countering).
19. My athletic trainer changes and adds new activities to rehabilitation (so I am not bored).
20. My athletic trainer works with me one-on-one.
21. My athletic trainer is effective at motivating me during the low points (setbacks, bad weeks) in rehabilitation.
22. My athletic trainer knows how to challenge and motivate me when I am not putting my full effort into rehabilitation.
23. My athletic trainer explains procedures to me so I know what to expect.

24. When I start thinking about getting re-injured (or when I am nervous about going back to my sport for the first time), my athletic trainer encourages me to trust in the success of my rehabilitation program.
25. My athletic trainer does a good job getting to know both uninjured and injured athletes on my team.
26. My athletic trainer tells me what to expect after a new injury or surgery.
27. My athletic trainer helps me set goals for events I want to accomplish during rehabilitation.
28. My athletic trainer explains how being tense can prevent me from doing my exercises well.
29. My athletic trainer teaches me to use thought stopping to stop negative thoughts about my injury.
30. My athletic trainer encourages me to express my feelings and emotions about my injury.
31. My athletic trainer is able to challenge my negative emotions and attitudes in rehabilitation.
32. My athletic trainer is able to connect with me on a personal level.
33. My athletic trainer asks for my help in developing sport-specific rehabilitation exercises.
34. I imagine my body healing itself (such as swelling decreasing or my muscle being repaired).

APPENDIX M

APPENDIX M

PSYCHOLOGY OF INJURY KNOWLEDGE TEST (POI-K)

1. List 3 guidelines for the psychological management of pain.

2. What are the 3 major areas that affect the stress response?

3. What are the 2 basic mechanisms behind the stress/injury relationship?

4. List and briefly describe the 2 types of stressors.

5. Give an example of positive and negative self-talk.

6. Research has identified several important results of effective athlete-athletic trainer communication. Please list two reasons why this communication is so important.

7. What are 2 fundamentals of effective injury communication?

8. Please list 2 practical communication skills.

9. Providing information and clarifying expectations during rehabilitation serves several important purposes; please list two such purposes.

10. List 2 strategies to improve adherence.

11. List 2 strategies for dealing with non-compliant or difficult athletes.

12. What are 3 types of social support and provide 1 practical provision example of each.

13. What are the athlete's 4 major groups of social support providers?

14. What are 2 benefits of ATC-provided social support?

15. Please list 2 practical motivation strategies.

16. What is 1 theory of how goal setting increases performance?

17. Please write one example of a goal that fits all the components of an effective goal.

18. What are the 3 types (categories) of goals?

19. What are 2 common mistakes in goal setting?

20. How should you deal with an athlete who has not reached his/her goal by the "deadline"?

21. Choose 1 stress management technique and explain how you would implement it with an athlete.

22. List and explain 1 technique for controlling self-talk

23. What are 2 characteristics of effective imagery?

24. What are the 3 types (categories) of imagery and provide 1 example of each.

25. There are situations that are psychological in nature in which it would be appropriate to refer an athlete for further counseling with a professional and situations in which it is not necessary to make a referral. Please describe a circumstance for each situation.

26. Describe a situation in which a conflict may arise due to providing services in a dual role as both a sport psychologist and athletic trainer.

27. What are four characteristics of an effective ATC-counselor?

28. Why is an emotional attachment of an athlete problematic for effective counseling?

APPENDIX N

APPENDIX N

KEY TO PSYCHOLOGY OF INJURY KNOWLEDGE TEST (POI-K)

1. List 3 guidelines for the psychological management of pain.
    a. At occurrence of injury:
        - Establish rapport and create positive realistic expectations
        - Shift focus from pain to thoughts of a positive outcome or to the next step in injury management
    b. During otherwise uncomplicated rehabilitation:
        - Educate athlete regarding the mechanisms of injury and treatment
        - Identify pain as a routine aspect of rehabilitation
    c. With treatment plateaus or setbacks
        - Clarify treatment goals and encourage conscientious adherence
        - Reassume athlete of the benign status of pain
    d. At failed return to play:
        - Acknowledge discouragement and provide support
        - Differentiate routine pain from dangerous pain (which signals reinjury)
    e. Chronically failed rehab:
        - Treat pain complaints as read even if inconsistent
        - Review the rehabilitation program with respect to all factors identified above, searching for mitigating or sabotaging factors

2. What are the 3 major areas that affect the stress response?

    f. Stress history, personality factors, coping resources

3. What are the 2 basic mechanisms behind the stress/injury relationship?

    g. Increased generalized muscle tension, decreased attention during stress, decreased coordination and skill

4. List and briefly describe the 2 types of stressors.

    h. Life events (eg, death, marriage, significant other breakup, moving)

    i. Daily hassles (everyday stressors and strains of living that may/may not be connected to major life events)

5. Give an example of positive and negative self-talk.

    - Positive self talk: I can beat the odds and recovery sooner than normal, it is getting better all the time, getting through this will make me a stronger person, how can I make the most out of the situation?
    - Negative self talk: Recovering will take forever, I will never make up for lost time, I will never be as strong again, stupid injury, stupid leg, there is nothing I can do about it, why me?

6. Research has identified several important results of effective athlete-athletic trainer communication. Please list two reasons why this communication is so important.

    - Essential for rehab adherence
    - Important for successful coping
    - Essential for healing process
    - So information is transferred
    - Providing reassurance promotes positive attitude toward recovery

- Need to communicate expectation that the athlete is responsible for his/her own treatment and recovery
- Help athlete accept they are injured
- Help athlete realize that they will recover with hard work
- Convince athlete that you (AT) will help them through the difficult tasks ahead
- Explain that sensations they will likely experience are natural responses to being injured
- Help athlete develop self-confidence and self-reliability

7. What are 2 fundamentals of effective injury communication?
    - Develop credibility
    - Communicate with positive approach
    - Send messages high in information
    - Communicate with consistency
8. Please list 2 practical communication skills.
    - Allow athlete to talk and share
    - Be available when assistance is needed
    - Display a positive attitude (verbal, body language)
    - Treat the athlete as an individual
    - Let the athlete know what to expect during recovery

9. Providing information and clarifying expectations during rehabilitation serves several important purposes; please list two such purposes.
    - Decreases anxieties by answering unasked questions
    - Communicate expectation that athlete should play active role
    - Eases fears that generally arise when unknown sensations are encountered
    - Provides peace of mind and a sense of control
    - Pain information (good vs bad pain, level that indicates they should stop)
    - Let them know they should expect highs, lows, setbacks, and plateaus
    - So they understand the time commitment & EFFORT that is required
10. List 2 strategies to improve adherence.
    - Send clear, concise messages that are high in information
    - Plan rehabilitation sessions around the athlete's schedule
    - Make rehabilitation challenging
    - Personalize treatment
    - Offer variety in treatment
    - Know the sport
    - Assist with goal setting
    - Offer encouragement, support system
11. List 2 strategies for dealing with non-compliant or difficult athletes.
    - Do not get into a battle of wills
    - Develop a plan WITH the athlete (input in goal setting)
    - Reinforce any/all positive thinking and comments
    - Agree with their perceptions & reframe – get athlete to contribute

12. What are 3 types of social support and provide 1 practical provision example of each.

- Listening Support
    - Vent without judging; allow athletes to describe sensations – athletes know their bodies best
- Emotional Support
    - Help athlete acknowledge existence and severity of injury; encourage expression of emotions following injury; prevent dwelling over setbacks or lack of progress
- Emotional Challenge
    - Help redirect emotions into things athlete can control!
- Reality Confirmation
    - You are NOT in same reality – put things back into perspective
- Personal and Tangible
    - Provide rides and physical assistance devices (e.g., crutches) when possible; communicate with coaches; be flexible with rehabilitation appointments
- Task Appreciation
    - Write a card or pull the athlete aside; acknowledge athlete effort
- Task Challenge
    - Challenge athlete to act, and make them accountable; work out with athlete (opportunity for competitive spirit to come out); make rehab challenging/sport specific; push to do as much as safely possible

- Information Support
    - Provide as much information as possible; make sure athletes know what to expect; reassure athlete of success of rehabilitation; reduce fear of over-stressing injured part and of re-injury; help athlete set realistic performance goals; analyze athlete's sport technique and training; make suggestions with regard to the injury; provide explicit instruction about what athlete can/cannot do when beginning return to activity

13. What are the athlete's 4 major groups of social support providers?
    - Family, friends, significant others
    - Coaches, teammates
    - ATCs and sports medicine team
    - Similar others
14. What are 2 benefits of ATC-provided social support?
    - Increases athlete's self-efficacy
    - Decreases athlete's anxiety
    - Enhances rehabilitation adherence and compliance
    - Influences beliefs about the success/effectiveness of the rehabilitation program
    - Influences perceived susceptibility of re-injury

15. Please list 2 practical motivation strategies.
    - Regular monitoring and supervision
    - Provision of feedback; elicit feedback from athletes
    - Write card/pull athlete aside
    - Participate in exercises
    - Goal setting
16. What is 1 theory of how goal setting increases performance?
    - Mobilizes effort
    - Directs attention
    - Develops new learning strategies
    - Increases motivation
    - Prolongs persistence
17. Please write one example of a goal that fits all the components of an effective goal.
    - SMART (specific, measurable, adjustable, realistic, timeframe)
18. What are the 3 types (categories) of goals?
    - Process goals, performance goals, outcome goals
19. What are 2 common mistakes in goal setting?
    - Failure to set meaningful goals
    - Setting too many goals too soon
    - Focusing on outcome or long-term goals only
    - Failure to record goals
    - Failure to monitor progress
    - Failure to re-evaluate goals

20. How should you deal with an athlete who has not reached his/her goal by the "deadline"?
    - Acknowledge discouragement, frustrations. Ask athlete if he/she satisfied all process/performance goals during the timeframe (yes: adjust goals appropriately, no: adjust process/performance goals)
21. Choose 1 stress management technique and explain how you would implement it with an athlete.
    - Environmental engineering (schedule rehab when coach not around)
    - Progressive relaxation
    - Monitoring self-talk
    - Centering
22. List and explain 1 technique for controlling self-talk
    - Thought stopping
    - Cognitive restructuring (change negative to positive)
    - Countering (refute underlying beliefs with facts/reasoning)
    - Reframing (creating different ways of looking at it)

      affirmation statements (post meaningful statements, focus on right thing)
    - Rubberband
23. What are 2 characteristics of effective imagery?
    - Vivid, simple, specific
    - Use all senses
    - Practiced in many places, positions
    - Practiced until you can image in real time

24. What are the 3 types (categories) of imagery and provide 1 example of each.
    - Cognitive (increases comfort, confidence, focuses attention)
    - Motivational (replay imagery, seeing self complete exercise)
    - Healing (visualize some aspect of healing process)
25. There are situations that are psychological in nature in which it would be appropriate to refer an athlete for further counseling with a professional and situations in which it is not necessary to make a referral. Please describe a circumstance for each situation.
    - Referral situations: eating disorders, psychological problems (depression)
    - Non-referral situations: mild malingering, distress over becoming injured, problems dealing with the injury
26. Describe a situation in which a conflict may arise due to providing services in a dual role as both a sport psychologist and athletic trainer.
    - Primarily confidentiality issues, time management
27. What are four characteristics of an effective ATC-counselor?
    - Effective listening skills/ accessibility; positive attitude; ability to help athletes set realistic goals; treats the athlete as an individual; has the ability to education; has the ability to motivate the athlete; has an understanding of own professional limits
28. Why is an emotional attachment of an athlete problematic for effective counseling?
    - Lose objectivity

Expert Panel:

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APPENDIX O

APPENDIX O

RESULT TABLES FROM CHAPTER 4

Table O.1. Baseline and Follow-up POI-K Means and Standard Deviations (Hypothesis 1)

Group		Mean	SD	N
Baseline POI-K	Group B	14.2813	7.08277	16
	Group A	18.3667	8.44830	15
	Total	16.5281	7.91820	31
Week 3 POI-K	Group B	18.2813	7.11798	16
	Group A	44.0667	10.45546	15
	Total	30.7581	15.74583	31
Week 6 POI-K	Group B	16.3438	6.18255	16
	Group A	49.8667	12.85977	15
	Total	32.5645	19.65441	31

Table O.2. Box M Test for Equality of Covariance Matrices from RMA for Hypothesis 1

Box's M	13.497
F	1.995
df1	6
df2	6016.462
Significance	.063

Note. All Box M Tests test the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

Table O.3. Levene's Test of Equality of Error Variances from RMA for Hypothesis 1

	F	df1	df2	Significance
Baseline POI-K	.817	1	29	.374
Week 3 POI-K	2.455	1	29	.128
Week 6 POI-K	2.950	1	29	.097

Note. All Levene's Tests test the null hypothesis that the error variance of the dependent variable is equal across groups.

Table O.4. Mauchly's Test of Sphericity from RMA for Hypothesis 1

Within Subjects Effect	Mauchly's W	Approx Chi-Square	df	Sig.	Epsilon Greenhouse-Geisser	Huynh-Feldt	Lower-bound
TIME	0.784	6.817	2	.033	0.822	0.895	0.5

Note. All Mauchly's Tests test the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix

Table O.5. Baseline and Follow-up POI-K Means and Standard Deviations (Undergraduate Students Only)

Group		Mean	SD	N
Baseline POI-K	Group B	13.9333	7.18845	15
	Group A	16.4091	8.41967	11
	Total	14.9808	7.67135	26
Week 3 POI-K	Group B	18.0667	7.31404	15
	Group A	42.4545	10.29431	11
	Total	28.3846	14.94419	26
Week 6 POI-K	Group B	16.3438	6.18255	15
	Group A	49.8667	12.85977	11
	Total	32.5645	19.65441	26

Table O.6. RMA Multivariate Output for POI-K (Undergraduate Students Only)

Effect		Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Time	Pillai's Trace	.797	45.228	2.000	23.000	.000	.797
	Wilks' Lambda	.203	45.228	2.000	23.000	.000	.797
	Hotelling's Trace	3.933	45.228	2.000	23.000	.000	.797
	Roy's Largest Root	3.933	45.228	2.000	23.000	.000	.797
Time*Group							
	Pillai's Trace	.719	35.987	2.000	23.000	.000	.719
	Wilks' Lambda	.281	35.987	2.000	23.000	.000	.719
	Hotelling's Trace	2.553	35.987	2.000	23.000	.000	.719
	Roy's Largest Root	2.553	35.987	2.000	23.000	.000	.719

Table O.7. RMA Tests of Within-Subjects Effects for POI-K (Undergraduate Students Only)

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Partial Eta Squared
Time						
Sphericity Assumed	4079.053	2	2039.526	70.929	.000	.747
Greenhouse-Geisser	4079.053	1.587	2569.806	70.929	.000	.747
Huynh-Feldt	4079.053	1.752	2328.063	70.929	.000	.747
Lower-bound	4079.053	1.000	4079.053	70.929	.000	.747
Time*Group						
Sphericity Assumed	2619.976	2	1309.988	45.558	.000	.655
Greenhouse-Geisser	2619.976	1.587	1650.586	45.558	.000	.655
Huynh-Feldt	2619.976	1.752	1495.315	45.558	.000	.655
Lower-bound	2619.976	1.000	2619.976	45.558	.000	.655

Table O.8. Linear Trend Table (Tests of Within-Subjects Contrasts) from Hypothesis 1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	4360.418	1	4360.418	96.054	.000	.768
	Quadratic	861.398	1	861.398	40.612	.000	.583
Time*Group	Linear	3354.451	1	3354.451	73.894	.000	.718
	Quadratic	251.550	1	251.550	11.860	.002	.290
Error (Time)	Linear	1316.469	29	45.395			
	Quadratic	615.090	29	21.210			

Table O.9. Group Pairwise Comparisons from Hypothesis 1

(I) Group	(J) Group	Mean Difference (I-J)	Std Error	Sig	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
B	A	-21.121*	2.724	.000	-26.703	-15.559
A	B	21.131*	2.724	.000	15.559	26.703

Table O.10. Time Pairwise Comparison from Hypothesis 1

(I) Time	(J) Time	Mean Difference (I-J)	Std Error	Sig†	95% CI for Difference	
					Lower Bound	Upper Bound
1	2	-14.850*	1.517	.000	-18.704	-10.996
	3	-16.781*	1.712	.000	-21.132	-12.431
2	1	14.850*	1.517	.000	10.996	18.704
	3	-1.931	1.104	.273	-4.737	.875
3	1	16.781*	1.712	.000	12.431	21.132
	2	1.931	1.104	.273	-.875	4.737

† Adjustment for multiple comparisons: Bonferroni
*The mean difference is significant at the .05 level

Table O.11. Group A POI-U Subscales Change Due to Intervention

	Baseline	Week 3	Week 6
Social Support	37.60	42.60**	45.27†
Relationship	36.40	38.53	40.07**
Sport Psychology	25.40	32.00†	37.93†
Attention	27.47	29.53*	30.13
Communication	45.80	50.47†	53.13†
Motivation	26.67	33.13**	37.13†

*Indicates significant increase from baseline at 0.05 level
**Indicates significant increase from baseline at 0.01 level
†Indicates significant increase with Bonferroni correction (0.004)

Table O.12. Baseline and Follow-up POI-U Means & Standard Deviations (Hypothesis 2)

Group		Mean	SD	N
Baseline POI-U	Group B	198.8750	35.31171	16
	Group A	199.3333	32.06838	15
	Total	199.0968	33.21782	31
Week 3 POI-U	Group B	210.8125	37.38131	16
	Group A	226.2667	30.38671	15
	Total	218.2903	34.51395	31
Week 6 POI-U	Group B	214.0000	39.46306	16
	Group A	243.6667	25.19259	15
	Total	228.3548	36.08282	31

Table O.13. Box M for Equality of Covariance Matrices from RMA for Hypothesis 2

Box's M	6.860
F	1.014
df1	6
df2	6016.462
Significance	.414

Table O.14. Levene's Test of Equality of Error Variances from RMA for Hypothesis 2

	F	df1	df2	Significance
Baseline POI-K	.335	1	29	.567
Week 3 POI-K	1.222	1	29	.278
Week 6 POI-K	2.963	1	29	.096

Table O.15. Mauchly's Test of Sphericity from RMA for Hypothesis 2

					Epsilon		
Within Subjects Effect	Mauchly's W	Approx Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
TIME	0.707	9.723	2	.008	.773	.837	.500

Table O.16. Baseline and Follow-up POI-U Means and Standard Deviations (Undergraduate Students Only)

Group		Mean	Standard Deviation	N
Baseline POI-U	Group B	202.4000	33.51077	15
	Group A	187.6364	28.15767	11
	Total	196.1538	31.64388	26
Week 3 POI-U	Group B	215.1333	34.30924	15
	Group A	217.3636	23.11395	11
	Total	216.0769	29.56609	26
Week 6 POI-U	Group B	217.8000	37.69653	15
	Group A	237.0000	17.57840	11
	Total	225.9231	31.82694	26

Table O.17. RMA Multivariate Output for POI-U (Undergraduate Participants Only)

Effect		Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Time	Pillai's Trace	.619	18.677	2.000	23.000	.000	.619
	Wilks' Lambda	.381	18.677	2.000	23.000	.000	.619
	Hotelling's Trace	1.624	18.677	2.000	23.000	.000	.619
	Roy's Largest Root	1.624	18.677	2.000	23.000	.000	.619
Time*Group							
	Pillai's Trace	.343	5.999	2.000	23.000	.008	.343
	Wilks' Lambda	.657	5.999	2.000	23.000	.008	.343
	Hotelling's Trace	.522	5.999	2.000	23.000	.008	.343
	Roy's Largest Root	.522	5.999	2.000	23.000	.008	.343

Table O.18. RMA Tests of Within-Subjects Effects for POI-U (Undergraduate Participants Only)

Source	Type III Sum of Squares	df	Mean Square	F	Sig	Partial Eta Squared
Time						
Sphericity Assumed	13738.697	2	6869.349	23.266	.000	.492
Greenhouse-Geisser	13738.697	1.631	8425.656	23.266	.000	.492
Huynh-Feldt	13738.697	1.806	7608.029	23.266	.000	.492
Lower-bound	13738.697	1.000	13738.697	23.266	.000	.492
Time*Group						
Sphericity Assumed	3660.236	2	1830.118	6.198	.004	.205
Greenhouse-Geisser	3660.236	1.631	2244.746	6.198	.007	.205
Huynh-Feldt	3660.236	1.806	2026.915	6.198	.005	.205
Lower-bound	3660.236	1.000	3660.236	6.198	.020	.205

Table O.19. Linear Trend (Tests of Within-Subjects Contrasts) from Hypothesis 2

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	13685.007	1	13685.007	32.510	.000	.529
	Quadratic	431.329	1	431.329	1.873	.182	.061
Time*Group	Linear	3302.426	1	3302.426	7.845	.009	.213
	Quadratic	.792	1	.792	.003	.954	.000
Error (Time)	Linear	12207.542	29	420.950			
	Quadratic	6678.122	29	230.280			

Table O.20. Group Pairwise Comparisons (Hypothesis 2)

					95% CI for Difference	
(I) Group	(J) Group	Mean Difference (I-J)	Std Error	Sig	Lower Bound	Upper Bound
B	A	-15.193	10.922	0.175	-37.531	7.145
A	B	15.193	10.922	0.175	-7.145	37.531

Table O.21. Time Pairwise Comparisons (Hypothesis 2)

					95% CI for Difference	
(I) Time	(J) Time	Mean Difference (I-J)	Std Error	Sig†	Lower Bound	Upper Bound
1	2	-19.435*	5.123	.002	-32.454	-6.417
	3	-29.729*	5.214	.000	-42.978	-16.481
2	1	19.435*	5.123	.002	6.417	32.454
	3	-10.294*	3.107	.007	-18.188	-2.400
3	1	29.729*	5.214	.000	16.417	42.978
	2	10.294*	3.107	.007	2.400	18.188

† Adjustment for multiple comparisons: Bonferroni
*The mean difference is significant at the .05 level

Table O.22. Group B POI-K Means & Standard Deviations (Hypothesis 3)

Group	Mean	SD	N
Baseline POI-K	14.4333	7.30427	15
Control Week 3 POI-K	17.7333	7.00986	15
Control Week 6 POI-K	15.8000	5.99047	15
Intervention Week 3 POI-K	34.1667	8.68016	15
Intervention Week 6 POI-K	37.6000	11.37541	15

Table O.23. Mauchly's Test of Sphericity from RMA for Hypothesis 3

					Epsilon		
Within Subjects Effect	Mauchly's W	Approx Chi-Square	df	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
TIME	0.307	14.670	9	.103	.686	.870	.250

Table O.24. Linear Trend (Tests of Within-Subjects Contrasts) from Hypothesis 3

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	5909.482	1	5909.482	125.316	.000	.900
	Quadratic	453.201	1	453.201	21.215	.000	.602
Error (Time)	Linear	660.193	14	47.157			
	Quadratic	299.067	14	21.362			

Table O.25. Time Pairwise Comparisons from Hypothesis 3

(I) Time	(J) Time	Mean Difference (I-J)	Std Error	Sig†	95% CI for Difference Lower Bound	Upper Bound
1	2	-3.300	1.893	1.000	-9.597	2.997
	3	-1.367	1.682	1.000	-6.961	4.228
	4	-19.733*	2.113	.000	-26.760	-12.707
	5	-23.167*	2.749	.000	-32.310	-14.023
2	1	3.300	1.893	1.000	-2.997	9.597
	3	1.933	1.023	.798	-1.470	5.337
	4	-16.433*	1.662	.000	-21.960	-10.907
	5	-19.867*	1.742	.000	-25.660	-14.023
3	1	1.367	1.682	1.000	-4.228	6.961
	2	-1.933	1.023	.798	-5.337	1.470
	4	-18.367*	1.847	.000	-24.509	-12.225
	5	-21.800*	2.178	.000	-29.044	-14.556
4	1	19.733*	2.113	.000	12.707	26.760
	2	16.433*	1.662	.000	10.907	21.960
	3	18.367*	1.847	.000	12.225	24.509
	5	-3.433	2.166	1.000	-10.638	3.771
5	1	23.167*	2.749	.000	14.023	32.310
	2	19.867*	1.742	.000	14.073	25.660
	3	21.800*	2.178	.000	14.556	29.044
	4	3.433	2.166	1.000	-3.771	10.638

† Adjustment for multiple comparisons: Bonferroni
*The mean difference is significant at the .05 level

Table O.26. Group B POI-U Subscale Change Due to Intervention

	Baseline	Week 3	Week 6
Social Support	38.56	40.93	42.80**
Relationship	36.56	39.53†	40.00†
Sport Psychology	28.75	34.20	36.07*
Attention	27.75	28.87	29.33
Communication	43.13	47.73*	47.67
Motivation	24.13	32.00†	33.60**

*Indicates significant increase from baseline at 0.05 level
**Indicates significant increase from baseline at 0.01 level
†Indicates significant increase with Bonferroni correction (0.004)

Table O.27. Group B POI-U Means & Standard Deviations (Hypothesis 4)

Group	Mean	SD	N
Baseline POI-U	198.2000	36.44409	15
Control Week 3 POI-U	210.8667	38.69268	15
Control Week 6 POI-U	213.6000	40.81456	15
Intervention Week 3 POI-U	223.2667	38.93487	15
Intervention Week 6 POI-U	229.4667	46.54470	15

Table O.28. Mauchly's Test of Sphericity from RMA for Hypothesis 4

					Epsilon		
Within Subjects Effect	Mauchly's W	Approx Chi-Square	df	Sig.	Greenhouse -Geisser	Huynh-Feldt	Lower-bound
TIME	0.113	27.064	9	.001	.509	.596	.250

Table O.29. Linear Trend (Tests of Within-Subjects Contrasts) from Hypothesis 4

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	8422.507	1	8422.507	13.001	.003	.482
	Quadratic	38.571	1	38.571	.203	.659	.014
Error (Time)	Linear	9069.493	14	647.821			
	Quadratic	2660.286	14	190.020			

Table O.30. Time Pairwise Comparisons from Hypothesis 4

					95% CI for Difference	
(I) Time	(J) Time	Mean Difference (I-J)	Std Error	Sig†	Lower Bound	Upper Bound
1	2	-12.667	8.046	1.000	-39.426	14.092
	3	-15.400	7.250	.520	-39.513	8.713
	4	-25.067	8.144	.082	-52.150	2.017
	5	-31.267	9.485	.053	-62.809	.276
2	1	12.667	8.046	1.000	-14.092	39.426
	3	-2.733	4.658	.520	-18.225	12.759
	4	-12.400	4.611	.176	-27.736	2.936
	5	-18.600	6.134	.090	-39.000	1.800
3	1	15.400	7.250	.520	-8.713	39.513
	2	2.733	4.658	1.000	-12.759	18.225
	4	-9.667	3.704	.206	-21.986	2.652
	5	-15.867*	3.675	.007	-28.088	-3.646
4	1	25.067	8.144	.082	-2.017	52.150
	2	12.400	4.611	.176	-2.936	27.736
	3	9.667	3.704	.206	-2.652	21.986
	5	-6.200	3.716	1.000	-18.560	6.160
5	1	31.267	9.485	.053	-.276	62.809
	2	18.600	6.134	.090	-1.800	39.000
	3	15.867*	3.675	.007	3.646	28.088
	4	6.200	3.716	1.000	-6.160	18.560

†Adjustment for multiple comparisons: Bonferroni
*The mean difference is significant at the .05 level

Table O.31. Group B POI-K and POI-U Means and Standard Deviations for Control and Intervention Periods

		Mean	N	SD	Std Error Mean
Pair 1					
	Control Week 3 POI-K	18.2813	16	7.11798	1.77949
	Intervention Week 3 POI-K	32.0313	16	11.97006	2.99251
Pair 2					
	Control Week 3 POI-U	210.8125	16	37.38131	9.34533
	Intervention Week 3 POI-U	209.3125	16	67.30797	16.82699
Pair 3					
	Control Week 6 POI-K	15.8000	15	5.99047	1.54673
	Intervention Week 6 POI-K	37.6000	15	11.37541	2.93712
Pair 4					
	Control Week 6 POI-U	213.6000	15	40.81456	10.53827
	Intervention Week 6 POI-U	229.4667	15	46.54470	12.01779

Table O.32. POI-K and POI-U Group Means & Standard Deviations (Hypothesis 9)

Group		Mean	SD	N
Week 3 POI-K	Group B	34.1667	8.68016	15
	Group A	44.0667	10/45546	15
Week 3 POI-U	Group B	223.267	38.93487	15
	Group A	226.2667	30.38671	15
Week 6 POI-K	Group B	37.6000	11.37541	15
	Group A	49.8667	12.85977	15
Week 6 POI-U	Group B	229.4667	46.54470	15
	Group A	243.6667	25.19259	15

Table O.33. POI-K and POI-U Group Means & Standard deviations for Hypothesis 9 (Undergraduate Participants Only)

Group		Mean	SD	N
Week 3 POI-K	Group B	33.6071	8.72260	14
	Group A	42.4545	10.29431	11
Week 3 POI-U	Group B	226.9286	37.62868	14
	Group A	217.3636	23.11395	11
Week 6 POI-K	Group B	37.9286	11.73072	14
	Group A	45.8636	11.81544	11
Week 6 POI-U	Group B	233.2857	45.79793	14
	Group A	237.0000	17.57840	11

Table O.34. POI-K Paired Sample Statistics from Dependent t-tests for Groups A and B Combined (Research Question 1)

Group		Mean	N	SD
Pair 1	Baseline	16.6852	27	8.3322
	Retention Week 7	33.6852	27	13.7009
Pair 2	Baseline	18.3667	15	8.4483
	Retention Week 14	32.3333	15	12.5920
Pair 3	Week 6	44.0185	27	12.8665
	Retention Week 7	33.6852	27	13.7009
Pair 4	Week 6	49.8667	15	12.8598
	Retention Week 14	32.3333	15	12.5920

Table O.35. POI-U Paired Sample Statistics from Dependent t-tests for Groups A and B Combined (Research Question 1)

Group		Mean	N	SD
Pair 1	Baseline	198.0357	28	34.4958
	Retention Week 7	240.7500	28	32.5606
Pair 2	Baseline	199.3333	15	32.0684
	Retention Week 14	236.9333	15	28.5369
Pair 3	Week 6	237.5714	28	34.4173
	Retention Week 7	240.7500	28	32.5606
Pair 4	Week 6	243.6667	15	25.1926
	Retention Week 14	236.9333	15	28.5369

Table O.36. Paired Sample Statistics from Dependent t-tests for Group A

Group		Mean	N	SD
Pair 1	POI-U Baseline	199.3333	15	8.2800
	POI-U Retention Week 7	241.80000	15	7.1941
Pair 2	POI-U Baseline	199.3333	15	8.2800
	POI-U Retention Week 14	236.9333	15	7.3682
Pair 3	POI-U Week 6	243.6667	15	6.5047
	POI-U Retention Week 7	241.8000	15	7.1941
Pair 4	POI-U Week 6	243.6667	15	6.5047
	POI-U Retention Week 14	236.9333	15	7.3682
Pair 5	POI-K Baseline	18.5000	14	2.3388
	POI-K Retention Week 7	41.8571	14	3.0551
Pair 6	POI-K Baseline	18.3667	15	2.1813
	POI-K Retention Week 14	32.3333	15	3.2513
Pair 7	POI-K Week 6	48.8214	14	3.3853
	POI-K Retention Week 7	41.8571	14	3.0551
Pair 8	POI-K Week 6	49.8667	15	3.3204
	POI-K Retention Week 14	32.3333	15	3.2513

Table O.37. Dependent t-tests for POI-K and POI-U Total (Group A Only)

	Mean	SD	SEM†	95% CI of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
POI-U Baseline: Retention 7	-42.4667	36.7945	9.5003	-62.8428	-22.0905	-4.470	14	.001
POI-U Baseline: Retention 14	-37.6000	34.1923	8.8284	-56.5351	-18.6649	-4.259	14	.001
POI-U Week 6: Retention 7	1.8667	17.9438	4.6330	-8.0702	11.8036	0.403	14	.693
POI-U Week 6: Retention 14	6.73333	21.7370	5.6125	-5.3042	18.7709	1.2000	14	.250
POI-K Baseline: Retention 7	-23.3571	8.6010	2.3011	-28.3284	-18.3859	-1.150	13	.000
POI-K Baseline: Retention 14	-13.9667	8.2926	2.1411	-18.5589	-9.3744	-6.523	14	.000
POI-K Week 6: Retention 7	6.9643	7.2701	1.9432	2.7662	11.1623	3.584	13	.003
POI-K Week 6: Retention 14	17.5333	9.8949	2.5549	12.0537	23.0127	6.863	14	.000

†SEM: standard error of mean

Table O.38. Paired Sample Statistics from Dependent t-tests for Group B

Group		Mean	N	SD
Pair 1	POI-U Baseline	196.5385	13	10.6450
	POI-U Retention Week 7	239.5385	13	10.6582
Pair 2	POI-U Week 6	230.5385	13	11.8477
	Retention Week 7	239.5385	13	10.6582
Pair 3	POI-K Baseline	14.7308	13	2.1391
	POI-K retention Week 7	24.8846	13	2.8194
Pair 4	POI-K Week 6	38.8462	13	3.1498
	POI-K Retention Week 7	24.8846	13	2.8194

Table O.39. Dependent t-tests for POI-K and POI-U Total (Group B Only)

	Mean	SD	SEM†	95% CI of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
POI-U Baseline: Retention 7	-43.0000	29.7265	8.2447	-60.9636	-25.0364	-5.215	12	.000
POI-U Week 6: Retention 7	-9.0000	16.4368	4.5587	-18.9326	0.9326	-1.974	12	.072
POI-K Baseline: Retention 7	-10.1539	8.0813	4.5568	-15.0373	-5.2704	-4.530	12	.001
POI-K Week 6: Retention 7	13.9615	7.6932	2.1337	9.3126	18.6105	6.543	12	.000

†SEM: standard error of mean

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