# COGNITIVE, EMOTIONAL, AND BEHAVIORAL RESPONSES OF INJURED ATHLETES

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This thesis was completed as part of the author's requirements for undergraduate graduation in psychology with honors from the University of Oregon.

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# INTRODUCTION

The field of sport psychology is a discipline concerned with the personal and social experiences of individuals as they interact in physical activity and exercise settings. Some of the topics explored in the field are the behavior, cognitions, emotions, performance, and personal growth of individuals involved in the sport context. Although the main focus of study in the field of sport psychology is on the athlete, many other individuals and groups who have an impact on the athlete have been important research targets. For example, research on the influence that coaches, teammates, and spectators have on the performance of athletes has been widespread. Consequently, the broad scope of topics covered in sport psychology is concerned with nearly all of the individuals who might be influenced by their contact with sport settings.

Traditionally, the field of sport psychology has embraced the scientific method as its mode of inquiry. The utilization of the scientific method includes the observation of events, the description of phenomena, the explanation of factors that influence events in a systematic manner, the prediction of events or outcomes based upon systematic and reliable explanations and, ultimately, the control of events or contingencies that result in expected outcomes (Silva & Weinberg, 1984). It is this dedication to the scientific method which enables the sport psychology

researcher to begin to answer questions about individuals who interact in sport settings.

The science of sport psychology has primarily focused on two major questions (Silva & Weinberg, 1984): First, how does sport participation influence the psychological make-up of the athlete?; and second, how do psychological factors affect sport participation? Examples of topics from the first question include the emotions, self-esteem, and motivation of the athlete, whereas the second question deals with how psychological factors such as personality, anxiety, and self-confidence influence subsequent participation patterns and performance.

One aspect of sport participation which has been relatively neglected is how injury affects the psychological make-up of the athlete. This lack of information about how injury affects the cognitive, emotional, and behavioral responses of the athlete is surprising for two reasons. First, the possibility of a potentially debilitating injury is always present, especially for athletes involved in contact sports. Whether caused by accident or over-training, an injury can often disrupt the goals and even the future of the athlete.

Second, there is a great deal of individual variability when athletes become injured. For example, some athletes may become totally discouraged, depressed and withdrawn if they perceive their injury as disastrous and without the chance for successful rehabilitation (Rotella,

1982). Others, however, may respond with a great deal of positivism and even rehabilitate more quickly than expected (Weiss & Troxel, 1986). Given the near omnipresence of injury in the career of athletes, it seems vitally important to study how they respond when they become injured. This is especially true because of the great deal of individual variability athletes exhibit in their responses to injury.

Some research has shown that injured athletes often have negative cognitive responses to their injuries (Chan, 1985; Feltz, 1984; Glasser, 1976; Robbins & Joseph, 1985; Rotella, 1982; Weiss & Troxel, 1986; Yukelson, 1985). It is thought that negative responses such as lowered self-esteem, irrational thoughts and beliefs, feelings of helplessness, anger and depression, as well as uncertainty surrounding the future pose psychological barriers which ultimately impair the athletes rehabilitation process (Rotella, 1982).

One explanation why injury rehabilitation can be impaired is that individual differences exist among athletes with regard to the way they perceive injuries and cope with pain (Rotella, 1982). In a theoretical discussion about the psychological care of injured athletes, Rotella noted that although one athlete may perceive an injury as disastrous, another may perceive it as an opportunity to display self-discipline, persistence, and courage to fight back. But Rotella does assert that most athletes experience an emotional process in response to their injury which is

closely analogous to the well-known grieving model established by Kubler-Ross (1969). That is, the injured athlete may respond to the loss of sport participation due to the injury much the same as an individual would respond to the death of a loved one. The athletes' response would begin with denial and disbelief, then move through the stages of anger, frustration, bargaining, depression, grief, and finally acceptance that the injury does exist. Rotella's model suggests the potential for athletes to exhibit extreme emotional responses in the wake of an injury, and these responses can ultimately impair the rehabilitation process.

In a paper which included responses from ten injured athletes, Weiss and Troxel (1986) explored factors which impair the rehabilitation process. They found that a number of common factors distinguished injured athletes across a number of sports. Results of the interviews showed that the athletes tended to dwell on irrational and negative thoughts as opposed to a pattern of task-related or positive thoughts. Several common factors emerged in their responses: negative self-talk patterns, negative emotions, somatic complaints, and the inability to cope with the injury.

The self-talk statements of the athletes revealed their tendancy to perpetuate anxiety, fear, and demotivation with respect to the injury. The emotional responses they reported were disbelief, fear, rage, depression, low self-confidence, guilt, having feelings of inadequacy, and loss of

control. Their somatic complaints included muscle tension, hyperactivity, fatigue, upset stomach, insomnia, and loss of appetite. Finally, the athletes all reported a marked inability to cope with their injuries, such as the limited activity, overwhelming idea of long term rehabilitation, and feelings of being externally controlled by the injury. Clearly, all of the common factors reported by the injured athletes in Weiss and Troxel's paper show the predominence of negative thoughts in relation to the injury.

One reason why athletes have negative cognitive responses to their injuries emanates from the process or phenomenon termed "excercise withdrawal." Early research on the topic was conducted by Glasser (1976), who suggested that runners experience a form of "positive addiction". When runs were required to be missed, due to injury, for example, pain, misery, or upset (both psychological and physical) were possible outcomes. Glasser's hypothesis paved the way for later research which looked at amount of participation, commitment, and level of perceived addiction to sport (Carmack & Martens, 1979).

Carmack and Martens (1979) sought to better define the concept of "positive addiction." One of the major goals of their study was to develop a reliable measure of running commitment. In their study of competitive and non-competitive runners, Carmack and Martens found that increased participation (i.e., more miles run) significantly predicted commitment or

dependence on running. This suggests that athletes who participate in their sport with greater frequency and longer duration are more likely to have a greater dependence on their sport than recreational athletes.

Robbins and Joseph (1985), in a study of runners who were required to miss runs because of injury, found a significant incidence of psychological distress in the form of irritibility, restlessness, frustration, guilt, and depression. Less common problems were the incidence of sleeping problems, digestive difficulties, and muscle tension and soreness. Robbins and Joseph postulate that these reports of psychological and physical distress are the result of athletes being unable to cope with life stresses in periods when the coping mechanism of running is temporarily unavailable.

Finally, Chan (1986) investigated the psychological effects of running loss upon consistent runners. She compared a Prevented Runners group, who were unable to run for at least two weeks due to a running related injury, with a Consistent Runners group, who ran without interruption. The two groups were compared on three psychological measures: the Profile of Mood States, the Zung Depression Scale, and the Rosenberg Self-esteem Scale, as well as by a questionnaire assessing running habits and background. Prevented Runners displayed significantly greater symptoms of psychological distress, including depression, anxiety and tension, confusion, overall mood disturbance and lowered self-esteem than

did Consistant Runners. The results of this study indicate that a running loss due to a running-related injury is related to psychological distress among runners.

The literature reviewed thus far indicate a significant incidence of negative cognitive responses in athletes who have suffered from an injury which limits normal sport participation. Furthermore, the literature suggests that injured athletes who have a high level of commitment to their sport can be expected to experience significant levels of psychological distress. Research in this area shows that the incidence of injury leads to increased levels of negative cognitive response among athletes who become inactive or limited, yet very little systematic investigation of this phenomenon has been conducted. Consequently, additional research on the cognitive response patterns of injured athletes is warranted in order to better explain why this phenomenon occurs.

Research on the cognitive response patterns of injured athletes can be facilitated by using a theoretical model, or construct, from which to investigate the questions of interest. There are a number of reasons why a theoretical model can facilitate the research process. A theoretical model is important because it can be used to systematize and organize the area of investigation. This systemazation can then help to derive or develop specific hypotheses which can guide the research process. In effect, theory can be used to provide order and insight into research activities

(Denzin, 1970). Therefore, the investigation of psychological distress among injured athletes can benefit from being guided by sound theory.

There are two theoretical models which the author suggests can provide a framework for the investigation of psychological factors related to sports injuries. The first theoretical model recognizes that an injury is a stressful event to the athlete. Selye (1974) has defined stress as the nonspecific response of the body to any demand made upon it to adapt. This definition includes both positive and negative, pleasant and unpleasant stressors. The crucial factor is the intensity of the demand and how much coping or adaptation is required. Selye distinguished between positive stressors (eustress) and damaging stressors (distress). The term eustress refers to positive amounts of stress which promote the growth and development of the person. Conversely, the term distress refers to an excessive amount of stress which places too great a demand on the individual and which threatens to disrupt the persons ability to cope. Clearly, an injury is an experience which can threaten an athletes ability to cope effectively. Therefore, injury can be considered an unpleasant stressor which carries the potential for a great deal of distress (Weiss and Troxel, 1986) in the form of negative thoughts and emotions.

The second theoretical model which can provide a framework for the study of psychological distress in the injured athlete comes from the

coping and adaptation literature of Lazarus (1966, 1974, 1982). Lazarus, Averill and Opton (1974), define coping as "problem solving efforts made by an individual when the demands he faces are highly relevant to his welfare (that is, considerable jeopardy or promise), and when these demands tax his adaptive resources" (pp. 250-251). They emphasize that coping with stress is a transaction between an individual and his or her environment, and that "coping can never be assessed or evaluated without regard to the environmental demands that create the need for it in the first place" (p. 258).

Lazarus's psychological-stress model, outlined in Table 1, has four parts. The first step of Lazarus' central concept involves the occurance of a stimulus. The stimulus might be one that is threatening or challenging to an individual. But whether the stimulus is actually positive or negative depends on a person's perception of that stimulus. This perception depends on the second step of Lazarus' model, which is the persons assessment, or cognitive appraisal, of the situation.

The second step of Lazarus' model, the stage of cognitive appraisal, is a perception distinguishing potentially harmful stressors from potentially

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beneficial situations. At this stage of the model, the individual assesses

whether or not a situation is threatening. Lazarus asserts that threat implies a state in which the individual anticipates a confrontation with a harmful condition of some sort. Situations which produce threat or non-threat reactions are cues that signify to the individual some future condition, harmful, benign, or beneficial. These and other cues are evaluated by the cognitive process of appraisal (Lazarus, 1966; p. 25). This appraisal thus determines for a person if a situation is in fact a threat (negative perception) or instead a challenge (positive perception).

The third step of the model involves the secondary appraisal of the situation. During this phase, the range of an individual's coping alternatives is delineated. The individual assesses what coping alternatives are within his or her ability to utilize and whether those alternatives will lead to solution or mastery of the threat.

Given the results of the secondary appraisal, the individual then goes through the final stage of Lazarus's model. During this phase, the person makes a reappraisal of the original stressor. The original perception of the situation may be changed from threatening to benign, or vice versa depending on the person's particular coping skills.

Lazarus' theoretical model provides a promising framework from which to investigate the phenomenon of psychological distress among injured athletes for several reasons. First, an injury can be considered a stressor both physically and psychologically for the athlete. Because of this

stressor, the individual must then make the cognitive appraisal which evaluates whether the injury presents a challenge, forecasting a positive outcome, or if it presents a threat, forecasting a negative outcome. Third, the athlete must make an assesssment of his/her available coping alternatives, deciding whether he/she has the ability to successfully cope with and rehabilitate the injury, or if the injury poses a threat which cannot mastered, resulting in hopelessness and dispair. Finally, the original perception of the injury can be changed from threatening to benign, and vice versa depending on the athletes evaluative judgements of his/her coping abilitites.

It is during the second stage of Lazarus coping model in which the athlete most likely falls into the intense emotions of psychological distress. At this stage the athlete has already evaluated whether or not the injury poses a threat or challenge. This cognitive appraisal of the injury leads the athlete to decide if the injury forecasts a positive or negative outcome. If the injury is viewed negatively, without the possibility for succesful rehabilitation, the athlete may very well experience feelings of hopelessness, depression, and anger, all symptoms of psychological distress.

One reason why intense emotional responses may occur during the stage of cognitive appraisal is that stress or anxiety manifests itself in a narrowing of the perceptual field, or an innappropriate focus of attention

(Yukelson, 1985). Yukelson states that this inappropriate focus of attention results in a preoccupation with irrational emotional thoughts that usually reflect fear, apprehension, worry, and self-doubt. When we worry, we tend to focus on the undesirable aspects of a situation and the negative consequences that might result. This inappropriate focus of attention can also become narrowed because of the pain being experienced due to the injury (Nideffer, 1980).

Given the comprehensive manner in which Lazarus' psychological stress model can address the cognitive response patterns of injured athletes, this model has been adopted as the framework from which to study the questions of interest. This model assumes the interaction of an individuals' personal dispositions within the situational determinants of the injury. The model recognizes that cognitive responses are created primarily by the persons appraisal of the injury. And the model recognizes the positive and negative aspects of injuries, assuming different outcomes for both classes of that situation. For the purpose of this current research, Lazarus's psychological-stress model has been chosen as the construct from which to study the phenomena of negative cognitive response among injured athletes.

There are several factors related to psychological distress which can be considered using Lazarus' coping model. The first factor is that the athletes' cognitive appraisal of the injury will perceive the injury as a

threat. There are are myriad of reasons why the athlete would perceive an injury as threatening. The perception of the injury is thought to be influenced by variables such as how much reward, satisfaction, self-esteem, identity and social interaction which the athlete derives from sport participation, not to mention the pain of the injury itself. Consequently, the athlete who has a greater interest and connection to the sport in respect to their level of commitment is thought to perceive an injury as more threatening than the individual who gains less from sport participation.

Another factor which is hypothesized to influence how threatening the athlete will perceive an injury is the level of commitment which the athlete feels toward the sport. Drawing largely upon the previous work of Carmack & Martens (1979), the concept of commitment is included here as a significant variable in the cognitive response patterns of injured athletes. Athletes who participate regularly in their sport are more likely to report higher levels of self-perceived commitment than athletes who feel more casually toward their activity. It is hypothesized that athletes with a high level of commitment will perceive their injury as more threatening than the individual with a lower level of commitment.

A third factor which is thought to greatly influence the cognitive response patterns of the injured athlete is the severity of injury which has been sustained. Drawing on the work of Chan (1985) and Robbins and

Joseph (1985), the injury can be assessed according to whether or not the athletes' participation has been disrupted. In summary, both Chan and Robbins and Joseph found significant levels of psychological distress in individuals who were unable to participate in their activity. Given these findings, it is hypothesized that athletes with a high severity of injury will become more psychologically distressed than athletes with a minor injury. It is thought that the severity of injury will determine whether or not the athlete will be able to continue participating in sport. Decreased participation will therefore increase the athlete's level of psychological distress, or negative cognitive responses.

The phenomenon of psychological distress as a result of athletic injury has prompted some sport psychologists to attempt to answer questions about how and why such distress occurs (Chan, 1985; Robbins & Joseph, 1985). In addition, the identification of the phenomenon has created an interest in how an athletes positive or negative thoughts can influence his/her injury rehabilitation (Feltz, 1984; Weiss & Troxel, 1985; Yukelson, 1985). It is thought that the emotions and thought processes of the injured athlete can significantly impair or enhance the recovery process (Allen, 1983; Pelletier, 1977), and consequently finding ways to speed up rehabilitation has become a new area of investigation.

Recently, there has been an increased interest in providing injured athletes with positive psychological skills training, or psychological

rehabilitation, in addition to their physical rehabilitation ( Feltz, 1984; Rotella, 1982; Weiss & Troxel, 1985; Yukelson, 1985). These are stress management techniques that can be used to help athletes cope more effectively with injuries. Examples of a number of the more well known intervention strategies are stress inoculation, emotional self-control, relaxation techniques, imagery training, systematic desensitization, and visuo-motor behavior rehearsal. Some of these strategies are recommended by sport psychologists to athletic trainers, physicians, and coaches to use with their injured athletes. The ultimate goal of these intervention strategies is to enable injured athletes to recover more quickly, and more completely, both physically and psychologically, after an injury occurs.

To date, there has been little empirical research to support the role that psychological intervention strategies can play in the rehabilitation of injured athletes. While the concept behind psychological intervention in rehabilitation is an intuitive one, the case for such strategies could be strengthened by scientific research which determines that injured athletes do in fact respond negatively to their injuries. Consequently, it it is the purpose of this study, based on the literature reviewed, to obtain descriptive data about the use or lack of use of negative coping strategies among injured athletes. Ultimately, research can provide evidence which supports the utilization of psychological skills training during injury

rehabilitation.

The purpose of this study, therefore, was to examine whether level of commitment and severity of injury were related to psychological distress in the injured athlete. Data were collected from 85 athletes who were currently injured. A questionnaire was used to assess demographic information on sport behaviors, as well as to assess the athletes severity of injury, level of sport commitment, and positive or negative cognitive, emotional, and behavioral responses. The data were analyzed using a 2 x 2 ANOVA. It was hypothesized that athletes with a high level of sport commitment and a high severity of injury would have higher levels of negative cognitive, emotional and behavioral responses than athletes who were less committed and who had minor injuries.

## METHOD

### Subjects

Subjects (n=85) consisted of individuals who were recruited from the athletic treatment center and student health facility of a large university on the west coast. Only individuals who were currently injured and in rehabilitation were included in the study. In all, 44 males and 41 females ranging in age from 17 to 38 years participated in the study.

Design

Subjects were classified into groups according to a 2 x 2 (commitment to sport by severity of injury) factorial design. The dependent variables were the subject's cognitive, emotional, and behavioral responses. The independent variables were sport commitment (high vs. low) and severity of injury (high vs. low). Commitment levels were operationally defined as those who scored in the upper and lower 33% of the Commitment to Sport Scale. Levels of severity of injury were operationalized by determining how much sport participation had been limited. Athletes who responded that their injury had resulted in severe to moderate limitation were considered to have a high severity of injury. Conversely, those who responded that their injury had partially, not very, and not at all limited their workouts were considered to have a low severity of injury.

Measures

Athletes General Survey. A background questionnaire was designed to assess athletes on general demographic variables such as sex, age, year

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in school, competition level, the sport in which the injury occurred, and how long the athlete had participated in that sport. Other variables on the

Athletes General Survey thought to influence negative cognitive coping among injured athletes were: severity of injury, recency of injury occurrence, present time of the sport season (early vs. late), the extent which sport participation was limited, and how much the athlete worked out before and after the injury occurred. Finally, an open-ended question allowed the subjects to provide a detailed description of their injury.

Sport Commitment Scale. This was an adapted version of the Commitment to Running Scale developed by Carmack and Martens (1979).

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Whereas the Carmack and Martens scale was running-specific, the Sport Commitment (SC) Scale assessed general sport behaviors. Items on the SC Scale were modified to accommodate general behaviors in sport, primarily by changing the wording to read from "running" to "sport, workout, or participation." Responses to items on the the SC Scale were made on a five-point Likert type scale ranging from "strongly agree" (5) to "strongly disagree" (1).

Athletic Injury Response Scale. This instrument was designed to assess the coping responses of injured athletes in this study. Three types

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of responses were the focus: cognitive, emotional, and behavioral. Items assessing cognitive responses included the athletes self-talk, optimism, self-confidence, and acceptance of the injury. Emotional responses were assessed by questions which targeted feelings such as depression, irritability, anger, and anxiety. Behavioral changes such as loss of appetite and sleep, general fatigue and restlessness, and interaction with friends were measured. Responses were made on five-point Likert-type scales ranging from "very true" (1), to "not at all true" (5), with regard to the frequency of occurance.

The Athletic Injury Response (AIR) Scale was developed to specifically address the types of responses to injury that have appeared in the literature and are considered a consequence of the stress process. Clinical personality scales such as the MMPI and the Zung Depression Scale were deemed innappropriate because they focused on traits rather than characteristics in response to injury.

Based on the literature reviewed, the specific responses to injury of interest were grouped into three categories: cognitive, emotional, and behavioral. Cognitive responses were those considered to be a product of the athletes thought pocesses. According to Weiss and Troxel's (1986) study, injured athletes had the tendancy to dwell on irrational or negative thoughts as opposed to a pattern of task-related or positive thoughts. Consequently, the AIR Scale questions designed to measure cognitive

responses sought to identify whether the athletes had positive versus negative thoughts in relation to their injury.

Questions which assessed emotional responses to injury were developed by selecting the predominant emotional reactions found in prior research. For example, depression, irritability, anger, and anxiety were all emotions which had been identified as related to athletic injury (Chan, 1985; Robbins & Joseph, 1985; Rotella, 1982; Weiss & Troxel, 1986). The questions in this category asked the subject whether the emotion had been experienced since the injury occurred.

Finally, the questions which addressed behavioral responses to injury were also developed by selecting the predominant somatic complaints found in prior research. The predominant somatic complaints were irregular sleep patterns, appetite disturbances, and general restlessness (Robbins & Joseph, 1985; Weiss & Troxel, 1986). In addition, one question was included which asked if subjects interactions with people had become negative as a result of their injury. This question was included to explore whether athletes' responses to injury influenced interpersonal interactions.

Procedure

Recruitment of subjects for this study was first cleared with the Director of Athletic Training at the university, as well as the head Athletic Trainer at each clinic. The subjects were approached in the

waiting area of the clinics as they arrived for their appointments and were asked if they would be willing to participate in a study about injured athletes. The study was briefly explained at that time, and the subjects were free to accept or decline participation. Subject compliance using this procedure was high; 85 out of 97 (88%) agreed to participate. If they agreed to participate, subjects first signed an informed consent, after which they completed the questionnaire. A cover letter on the front of the questionnaire provided a more detailed description the study. Subjects were asked to work independently and encouraged to approach the experimenter for help. Subjects were required to complete the questionnaire during their stay at the training facility only.

Data Analysis

The SC Scale and the AIR Scale were subjected to reliability analyses using Cronbach's (1970) alpha to measure internal consistency. Three reliability analyses (.60) were computed for each subscale of the AIR Scale. Reliability of the five questions composing the cognitive scale was extremely low (alpha = .11). Reliability of the five emotional questions was also low (alpha = .48). The six items composing the behavioral scale approached reliability with an alpha of .59. The reliability of the SC Scale was very high (.85).

Descriptive statistics were computed on six questions from the Athletes General Survey. These items were, 1) athletes level of

self-perceived commitment, 2) sport in which the athletes became injured, 3) how long the athletes had participated in their sport, 4) how many days subjects participated in their sport when healthy and when injured, 5) how much the injury had limited the athletes sport participation, and 6) the range of different injuries experienced by subjects.

A 2 x 2 (sport commitment by injury severity) analysis of variance was conducted on individual items which composed each subscale of the AIR Scale. The main effects due to both independent variables (commitment, injury severity) on the dependent variables were computed. In addition, the two-way interaction effects of the independent variables were also computed for each subscale item.

## Results

### Descriptive Statistics

Six questions from the Athletes General Survey were selected to report as background information on the subjects. These items were, 1) the athletes level of self-perceived competitive status, 2) the sport in which the athletes became injured, 3) how long the athletes had participated in their sport, 4) how many days subjects participated in their sport when healthy and when injured, 5) how much the injury had limited the athletes

sport participation, and 6) the range of different injuries experienced by subjects.

Subjects level of self-perceived competitive status was assessed by asking subjects to describe themselves in one of four participation categories: 1) elite, 2) serious competitor, 3) recreational competitor, and 4) recreational only. Results showed that nearly half of the subjects considered themselves serious competitors (46.4%), followed by those who described themselves as recreational competitiors (25.0%), elite (15.5%), and recreational only (13.1%). The average length of sport participation was 7.6 years.

A number of different sports were identified when subjects were asked to report the source of injury. The type of sport and number of reported injuries can be found in Table 5. The sport in which injuries most

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frequently occurred was track and field (26%), followed by football (20%) and basketball (16%). In addition, three out of four (74%) subjects indicated they were injured in the sport in which they primarily train.

An open-ended question which asked subjects to describe their injury in detail revealed a wide range of injuries (Table 6). Over half of all reported injuries fell into the knee and ankle categories (54%). Most

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common were knee injuries (33%) such as ligament, bursa, and cartilage tears, followed by ankle ailments (21%) such as sprains and bruises. In addition, 41% of all subjects reported multiple injuries. For the purposes of reporting injuries in this section, responses with more than one injury listed on the open-ended question were limited to the most prominent injury.

The degree to which subjects sport participation was limited by their injury was obtained in two ways. First, subjects were asked to indicate how many days they worked out when healthy and how many days when injured. Results showed that the average number of workouts dropped from 5.2 per week (SD = 1.48) when healthy to 3.3 per week (SD = 2.44) when injured. Second, subjects were also asked to rate how much they perceived their sport participation to be limited by their injury from "severely limited" to "not at all limited". Results showed that more subjects considered their injury had severely limited their workouts (44.7%) than did those who described themselves as moderately (20.0%) or partially limited (20.0%). Responses that sport participation had been not very or not at all limited were reported least often (11.8% and 3.5% respectively).

Inferential Statistics

In order to test the hypotheses of the study, 2 x 2 (commitment by injury severity) analyses of variance were conducted. High and low commitment groups were obtained by selecting those subjects who occupied the upper and lower 33% of scores on the Sport Commitment Scale. As scores could range from 33 to 60, the high group was represented by those with scores from 53-60 (n = 28) and the low group by scores of 33-45 (n = 29).

High and low injury severity groups were obtained by scores to the question pertaining to the amount sport participation had been limited. The high group was composed by those individuals who responded that their injury moderately or severely limited their participation (n = 39) while the low group was composed of those who responded that they were partially limited, not very limited, or not at all limited by their injury (n = 18). The cells for the 2 x 2 ANOVA were obtained by selecting only those high and low severity scores which were also in the upper and lower 33% of the SC Scale.

Because none of the subscales (cognitive, emotional, behavioral) of the Athlete Injury Response Scale acheived an acceptable reliability coefficient (alpha = .60), individual items from each subscale were used as dependent variables in three subsets of ANOVA's. Five analyses of variance ($p < .02$) were conducted for the cognitive items, five ANOVA's

($p < .02$) for the emotional items, and six ANOVA's ($p < .02$) for the behavioral items.

Main Effects, Injury Severity

Four out of five main effects due to injury severity on the cognitive dependent variables were not significant, as summarized in Table 7. The

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main effect due to injury severity on acceptance of the injury was significant, $F(1,53) = 6.35$, $p < 0.015$, but this effect was in the opposite of the predicted direction, showing that athletes with higher injury severity were more accepting that they would have to limit workouts. In addition, the means and standard deviations (Table 8) of the high and low injury severity groups from these analyses of variance indicated that four

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out of five of the subscale items did not fall in the predicted direction. Results showed subjects in both the high and low injury severity groups experienced negative thoughts (M = 2.62, 2.50) in relation to the injury. However, results also showed that subjects reported optimism (M = 1.85, 2.39; M = 1.90, 2.22) and self-confidence (M = 3.90, 4.33) in relation to

their chances for recovery, and in all cases, the high severity group showed greater optimism and self-confidence than the low severity group.

The main effects due to injury severity on the emotional subscale items were not significant (Table 7). The mean scores of the high and low injury severity groups for these analyses of variance revealed that subjects reported depression (M = 2.92, 3.17), unhappiness (M = 3.85, 3.67), and anxiety (M = 2.74, 3.11) in the predicted direction. However, the means for irritability (M = 3.23, 3.33) and anger (M = 3.10, 3.33) did not fall in the predicted direction. For all items on the emotional subscale, means for subjects in the high severity group were closer to the predicted direction than means for subjects in the low severity group (Table 8).

The main effects due to injury severity on the behavioral dependent variables were also not significant (Table 7). Mean scores for high and low severity groups revealed scores opposite the predicted direction for sleep disturbance (M = 3.46, 3.89), appetite disturbance (M = 3.67, 3.78; M = 4.13, 4.00), restlessness (M = 3.18, 3.33), negative interpersonal interactions (M = 3.77, 3.89), and listlessness (M = 3.36, 3.56). For all items on the behavioral subscale, means for subjects in the high severity group were closer to the predicted direction than means for subjects in the low severity group (Table 8).

Main Effects, Sport Commitment

Four out of five main effects due to sport commitment on the cognitive subscale dependent variables were not significant, as summarized in Table 9. The main effect due to commitment on optimism for recovery was

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the only significant main effect in this subscale, $F(1,53) = 5.37$, $p < .02$, but this effect was in the opposite of the predicted direction, showing that athletes were optimistic that their injury was only a temporary setback. In addition, the means and standard deviations of the high and low severity groups from these analyses of variance indicated that four out of five of the subscale items did not fall in the predicted direction (Table 10). Similar to the main effect for injury severity, results showed that subjects in both the high and low commitment groups experienced negative thoughts (M = 2.39, 2.75) in relation to the injury. However, results also indicated that subjects in both the high and low commitment

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groups displayed more optimism (M = 1.89, 2.10) and self-confidence (M = 4.29, 3.79) about recovery, as well as more acceptance (M = 2.43,

2.48) about the need to limit workouts during recovery than was originally predicted. Comparisons between the high and low commitment groups also revealed that the high commitment group was more optimistic, self-confident, and accepting about their injuries than the low commitment group.

There was one significant main effect due to sport commitment on the emotional subscale (Table 9). Results showed that a main effect of commitment on irritability, $F(1,53) = 11.50$, $p < 0.001$, indicating subjects experienced significant levels of irritability in this condition. In addition, mean scores for the high commitment group in the emotional subscale items all supported the hypothesis by falling in the predicted direction (Table 10).

There were no significant main effects due to sport commitment on any of the behavioral subscale items (Table 9). Results also showed that the mean scores of the behavioral dependent variables did not support the hypotheses as those items did not fall in the predicted direction (Table 10), although restlessness (M = 2.96, 3.48) approached the correct direction in the high commitment group. Table 10 also shows that even though items in the behavioral subscale did not fall in the predicted direction, for all behavioral variables, the high commitment group reported somatic complaints more often than the low commitment group.

Two-Way Interactions

The joint effects between the independent variables sport commitment and injury severity, summarized in Table 11, produced both significant and

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Insert Table 11 About Here

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not-significant interactions on the subscale items. For example, the two-way interaction effect was not significant for the cognitive subscale variable negative thoughts ($F [1,53] = 4.19$, $p < 0.05$), although this interaction effect did approach reliability. The joint interaction effects were also not significant for the cognitive variables optimism ($F [1,53] = 0.96$; $F [1,53] = 0.12$), self-confidence ($F [1,53] = 1.69$), and acceptance ($F [1,5] = 1.69$). Likewise, the two way interaction effect was not significant for the behavioral subscale variables irregular sleep ($F [1,53] = 2.81$), appetite disturbance ($F [1,53] = 0.64$; $F [1,53] = 0.06$), restlessness ($F [1,53] = 0.18$), negative interpersonal interactions ($F [1,53] = 1.08$), and tiredness/listlessness ($F [1,53] = 1.00$).

Conversely, four out of five dependent variables from the emotional subscale showed significant interaction effects. The two-way interaction effect was significant for the subscale variables depression ($F [1,53] = 6.94$, $p < 0.01$), irritability ($F [1,53] = 11.22$, $p < 0.001$), anger ($F [1,53] = 10.64$, $p < 0.002$), and unhappiness ($F [1,53] = 6.03, 0.02$). The two-way

interaction effect for anxiety was not significant (F [1,53] = 0.13).

Comparison between groups of the ANOVA cell means, as summarized in Table 12, showed that the high commitment/high injury severity subjects had scores in the predicted direction for the dependent variables negative thoughts (M = 2.24), depression (M = 2.48), irritability (M = 2.62), anger (M = 2.57), unhappiness (M = 4.00), anxiety (M = 2.62), and restlessness (M = 2.90). The high commitment/low severity subjects had no variable means in the predicted direction, and the low commitment/high severity subjects had one variable mean in the predicted direction (anxiety, M = 2.89). Lastly, the low commitment/low severity subjects had means in the predicted direction for negative thoughts (M = 2.27), depression (M = 2.91), anger (M = 3.00), and unhappiness (M = 4.09). These results indicate that subjects with high sport commitment and high injury severity displayed greater levels of psychological distress than other subjects in the study, though not necessarily in significant amounts.

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Insert Table 12 About Here

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## Discussion

This study examined psychological factors related to sports injuries. Specifically, level of commitment and severity of injury were explored jointly as they related to psychological distress in the injured athlete. The main hypothesis of the study was that athletes high in sport commitment and high in severity of injury would show greatest amounts of cognitive, emotional, and behavioral distress than athletes with lower commitement and sverity scores.

In order to test the hypotheses of the study, 2 x 2 (commitment by injury severity) analyses of variance were conducted. High and low commitment groups were obtained by selecting those subjects who occupied the upper and lower 33% of scores on the Sport Commitment Scale. High and low injury severity groups were obtained by scores to the question pertaining to the amount sport participation had been limited. The high group was composed by those individuals who responded that their injury moderately or severely limited their participation (n = 39) while the low group was composed of those who responded that they were partially limited, not very limited, or not at all limited by their injury (n = 18).

The analyses of variance of the three subscales, cognitive, emotional, and behavioral, produced findings which both supported and did not support the original hypotheses. There was one significant main effect due to

injury severity on the cognitive variable acceptance, as well as one significant main effect due to commitment on the cognitive variable optimism, although these main effects were in the opposite of the predicted direction. The two-way interaction effects for the cognitive and behavioral subscale items were not significant. However, the two-way interaction effects were significant for the emotional variables depression, irritability, anger, and unhappiness. The joint interaction effects were not significant for the emotional subscale variable anxiety. Overall, the results of the current study showed that athletes who had high levels of commitment and severity of injury were more likely to suffer from increased psychological distress in the form of negative thoughts, depression, irritability, anger, unhappiness, and anxiety than athetes who had lower levels of commitment and injury severity.

The study revealed that the cognitive response patterns of injured athletes did not significantly support the hypotheses. Results showed that although most athletes who had high commitment/high severity (HH) reported negative thoughts in relation to their injury, they also displayed high levels of optimism and self-confidence about their chances for recovery, as well as high acceptance that their rehabilitation might require suspension of workouts. These results are contrary to the hypothesis that HH athletes would evidence higher levels of negative cognitive response.

Except for the fact that HH athletes had high levels of negative thoughts in relation to their injury, the results of this study do not completely support the conclusions of Weiss and Troxel (1986) in regards to self-talk patterns and negative cognitive responses. In Weiss and Troxel's case study of ten injured athletes, there was the tendancy for athletes to dwell on irrational thoughts, utilizing a negative mind set. The results of the current study, however, revealed that athletes have significant optimism that their injuries were a temporary set-back. In addition, results showed that most subjects, across all commitment and severity categories, revealed high levels of self-confidence in their ability to rehabilitate successfully, although these findings were not significant. Weiss and Troxel also found that subjects were unable to cope with tolerating rest and limiting activity. However, results of the current study showed athletes had significantly high acceptance that their rehabilitation might include not working out.

One of the reasons these findings might be different is that the Weiss and Troxel study used the case study method, whereas the current study utilized quantitative data collection, drawn from a sample of 85 currently injured athletes. Although the case study method is often superior in gathering broad and descriptive data, it also has the disadvantage of a limited population from which to draw conclusions. Consequently, the current sample of injured athletes may be more representative of the total

population than the subjects in the Weiss and Troxel study.

Another reason that the athletes in this study may have shown higher levels of optimism and self-confidence than expected is that some athletes perceive injury as an opportunity to display self-discipline, persistence, and courage to fight back (Rotella, 1982). Rotella has noted that individual differences exist among athletes with regard to the way they perceive injuries and cope with pain. Results of the current study indicated that most athletes, and especially those who were HH, were positive in their outlook on injury recovery and ability to compete again at the level they had attained before they became injured. This positive outlook was especially true of athletes who had high commitment and low severity of injury (HL).

Finally, the explanation for the significant main effect due to injury severity on the cognitive variable acceptance is intuitive. Athletes with severe injuries are likely to experience greater pain and disability than athletes with minor injuries, thus realizing the necessity for limited activity to reduce discomfort and to promote rehabilitation. The influence that medical personnel and coaches have on athletes accepting the discontinuation of their workouts is also likely. These individuals most likely are able to convince athletes that a cessation of activity is a necessary part of the healing process. Consequently, severely injured athletes may understand the need for limited activity, and are more

accepting of that condition. In fact, results showed that both groups of severely injured athletes (HH, LH) displayed more acceptance toward limiting workouts than athletes with less severe injuries.

The analysis of variance for emotional subscale items revealed that the emotional response patterns of injured athletes significantly supported the hypotheses. Results showed significant levels of depression, irritability, anger, and unhappiness, especially among athletes in the HH group. Although the two-way interaction effect for anxiety was not significant, this result was due to the fact that most subjects with different levels of commitement and injury severity experienced anxiety in the predicted direction, thus eliminating the possibility for significant interaction due to the joint effects of the independent variables. On the other hand, comparisons of the cell means for each emotional subscale item revealed that those athletes in the HH group displayed higher levels of negative emotional responses than athletes in the other three categories. These results are consistent with the findings of previous research (Chan, 1985; Robbins & Joseph, 1985; Rotella, 1982; Weiss & Troxel, 1986) which has suggested that injured athletes who experience limited activity display increased levels of psychological distress.

The analysis of variance for behavioral subscale items revealed that the behavioral response patterns of injured athletes did not support the hypotheses. Results showed that athletes did not display significant

levels of sleep and appetite disturbance, listlessness, or negative interactions with friends. Although athletes in the HH group did display restlessness in the predicted direction, this result was not significant, nor very strong. Overall, subjects did not display behavioral or somatic disturbances, and these results were not consistent with the findings of previous researchers (Robbins & Joseph, 1985; Weiss & Troxel, 1986).

The biggest limitation of the current study relates to the reliability of the AIR Scale because the internal consistency of the three subscales did not acheive an acceptable reliability coefficient (alpha = .60). The reliability of the cognitive subscale was very low (alpha = .11), the emotional subscale was also low (alpha = .48), and the behavioral subscale only approached reliability (alpha = .59). These low reliability coefficients point to definite concerns in the development of the subscales and their potential to accurately measure the variables of interest. The low reliabilities also reflect the experimental nature of the current study, and the development of the subscales was an attempt to design an instrument which could more directly measure psychological distress among athletes than existing clinical personality instruments such as the MMPI and the Zung Depression Scale.

Consequently, the possible design flaws of the AIR Scale must be taken into account when interpreting the data. For example, the current study did not produce results consistent with previous research with regard to

cognitive thoughts and somatic complaints (Robbins & Joseph, 1985; Weiss and Troxel, 1986). However, the low reliability of the cognitive and behavioral subscales reduce the predictive value of the AIR Scale and, in fact, justify close criticsm of the results. On the other hand, although the reliability coefficient of the emotional subscale was low, the main hypothesis was strongly supported by the results that were obtained from this subscale. Clearly, further psychometric development of the AIR Scale is necessary before solid predictions can be made about athletes cognitive, emotional, and behavioral responses.

This study was meant as a starting point for continued research into the phenomena of psychological distress among injured athletes. Two major thrusts for continued research should be considered. The first area for continued investigation should focus on athletes use or lack of use of negative cognitive, emotional, and behavioral responses to injury. A better understanding about the incidence of negative coping responses among injured athletes is essential before methods of intervention can be established.

One interesting way to explore the coping responses of interest would be to conduct a longitudinal study which followed the injured athlete from the onset of the injury until rehabilitation was completed. This type of study could assess the athletes response patterns immediately after the injury occurred, during the treatment stage, and then again after the

rehabilitation was complete. The advantage to the longitudinal method would be that the same subjects responses could be compared when the subjects had high and low levels of injury severity.

A second important area for continued research is to develop an instrument that can reliably measure the variables of interest. The development of any instrument used in quantitative data analysis is most certainly a complicated task, one that requires not only expertise in statistical design, but also thorough knowledge of the population being measured. Although there are numerous clinical personality scales that have already been developed, it is a compelling thought to develop an instrument that can measure the questions of interest and is tailored for the athlete population.

In conclusion, it is difficult to suggest pratical applications with authority, given the mixed results of the current study, One of the most dominant applications under consideration at the present time in the field of sport psychology is the use of psychological skills intervention to help injured athletes recover more quickly and more completely (Feltz, 1984; Weiss & Troxel, 1986; Yukelson, 1985). The results of this study suggest that athletes may benefit from psychological intervention to reduce high levels of negative emotions in relation to their injuries. Whether such intervention is provided by mental health experts, coaches, or athletic trainers is open to exploration.

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## Table 1: Lazarus's Psychological-Stress Model

1. Situation: Threat or challenge.

2. Cognitive Appraisal: Evaluative judgements or decisions about whether a transaction with the environment

   a) is relevant or irrelevant to one's well-being;

   b) has already produced harm;

   c) threatens future harm;

   d) presents a challenge;

   f) forecasts a positive outcome.

3. Secondary Appraisal: Assessment of available coping alternatives.

4. Reappraisal: Original perception of the situation may be changed from threatening to benign, and vice versa.

ID#__ __ __

## ATHLETES GENERAL SURVEY--General Information

1. Age:_____ 2. Sex: Male_____ Female_____

3. Year in school: Fresh_____Soph_____Jr_____Sr_____Grad_____
   Not Applicable (N/A)_____

4. What type of athlete do you consider yourself? (check only one)

   elite_____ serious competitor_____ recreational competitor _____ recreational only ___

5. What time of the season is it for you presently?

   beginning_____ middle_____ end_____ N/A_____

6. Are you currently injured? yes_____ no_____

7. In what sport were you injured?_____ N/A___

8. Is this your major sport? yes_____ no_____

9. If not, what is your major sport?_____ N/A___

10. How long have you participated in your major sport?_____ years
    _____ months

11. How long ago did your injury occur?

    _____days _____weeks _____months _____years N/A___

12. How many days per week do you work out when healthy? (circle one)

0 1 2 3 4 5 6 7

13. How many days per week do you work out now?

0 1 2 3 4 5 6 7

14. How many hours/day do you work out when healthy?_____hrs _____min

15. How many hours/day do you work out now? _____hrs _____min

16. How long has your injury prevented you from working out normally?

_____days _____weeks _____months _____years N/A___

17. How much has your injury limited your workouts? (circle one)

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| severely limited | moderately limited | partially limited | not very limited | not at all limited |

18. How many different injuries in the last year have limited your workouts? (circle one)

1 2 3 4 5 6 7

19. Please describe exactly what type of injury you have:

_____

_____

_____

_____

ble 3.



## FEELINGS ABOUT SPORT

The following statements may or may not describe your feelings about your sport. Read each statement and then circle the appropriate number to indicate how well the statement describes your feelings most of the time. There are no right or wrong answers. Do not spend too much time on any one item, but give the answers which seem to describe how you usually feel about your sport.

| | | strongly disagree | disagree | not certain | agree | strongly agree |
|---|---|---|---|---|---|---|
| 1. | I look forward to practicing my sport. | 1 | 2 | 3 | 4 | 5 |
| 2. | I wish there were a more enjoyable way to stay fit. | 1 | 2 | 3 | 4 | 5 |
| 3. | My sport is drudgery. | 1 | 2 | 3 | 4 | 5 |
| 4. | I do not enjoy my sport. | 1 | 2 | 3 | 4 | 5 |
| 5. | My sport is vitally important to me. | 1 | 2 | 3 | 4 | 5 |
| 6. | Life is so much richer as a result of participating in my sport. | 1 | 2 | 3 | 4 | 5 |
| 7. | My sport is pleasant. | 1 | 2 | 3 | 4 | 5 |
| 8. | I dread the thought of working out. | 1 | 2 | 3 | 4 | 5 |
| 9. | I would arrange or change my schedule to meet the need to work out. | 1 | 2 | 3 | 4 | 5 |
| 10. | I have to force myself to work out. | 1 | 2 | 3 | 4 | 5 |
| 11. | To miss a day's workout is sheer relief. | 1 | 2 | 3 | 4 | 5 |
| 12. | Working out is the high point of my day. | 1 | 2 | 3 | 4 | 5 |

Table 4.



## ATHLETIC INJURY RESPONSE SCALE

The following statements may or may not describe how you think and feel about your injury. Read each statement and then circle the appropriate number to indicate how well the statement describes your thoughts and feelings most of the time. Again, there are no right or wrong answers.

1. Most of the thoughts I have about my injury are negative.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

2. Since my injury occurred I have been depressed.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

3. Since my injury occurred my sleeping habits have been irregular.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

4. My injury feels like a temporary setback.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

5. I have been irritable since my injury occurred.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

6. Since my injury, my appetite has decreased.

| very true | true | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

7. I will be unable to compete again at the level I had attained before I became injured.

| very true | true | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

8. I have been angry since my injury occurred.

| very true | true | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

9. Since my injury occurred I have felt restless when I sit in a chair.

| very true | true | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

10. I will be able to rehabilitate my injury successfully.

| very true | true | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

11. Since my injury occurred I have been happy.

| very true | true | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

12. Since my injury, my appetite has increased.

| very true | true | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

13. I accept that not working out may be a necessary part of my injury recovery.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

14. I have been anxious about my injury.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

15. My injury has had a negative effect on the way I interact with people.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

16. I have often felt tired and listless since my injury occurred.

| very true | | somewhat true | not true | not at all true |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

---

Please clarify or add any responses about how you feel or think about your injury in the space provided below. We are interested in finding out as much as possible about your thoughts and feelings on this issue.

_____

_____

_____

_____

Can I call you to ask you more detailed questions about your injury?
If yes, please leave your name, address, and phone number below.

NAME_____ ADDRESS_____

PHONE_____ _____

Table 5: Sports in which injuries occurred.

| Sport | Number of Injuries |
|---|---|
| Track & Field | 20 |
| Football | 15 |
| Basketball | 12 |
| Volleyball | 9 |
| Wrestling | 4 |
| Baseball | 2 |
| Weight Training | 2 |
| Soccer | 2 |
| Walking | 2 |
| Softball | 1 |
| Cycling | 1 |
| Skiing | 1 |
| Tennis | 1 |
| Raquetball | 1 |
| Dance | 1 |
| Backpacking | 1 |
| Judo | 1 |

Table 6: Type and Frequency of Injury

| Frequency | Affected Area | Description of Injury |
|---|---|---|
| 28 | knee | ligament, bursa, cartilage tear<br>bruise<br>tendinitis<br>surgery<br>patellar subluxation |
| 18 | ankle | sprain, bruise |
| 6 | achilles tendon | tendonitis |
| 6 | back | muscle spasms |
| 5 | shoulder | dislocation<br>tendonitis<br>non-definable |
| 4 | hamstring | pulled |
| 3 | foot | plantar fasciatis |
| 3 | biceps | tendonitis |
| 3 | lower leg | compartment syndrome |
| 2 | wrist, hand | tendonitis |
| 2 | neck | pinched nerve |
| 1 | elbow | pinched nerve |
| 1 | arm | broken bone |
| 1 | upper leg | iliotibial band syndrome |
| 1 | achilles | ruptured |
| 1 | lower leg | shin splints |

e 7: Main Effects Due To Injury Severity

| cale | Variable | SS | DF | F | SIGNIF |
|---|---|---|---|---|---|
| itive | negative thoughts | 0.36 | 1,53 | 0.26 | 0.61 |
| | optimism | 2.71 | | 4.81 | 0.03 |
| | self-confidence | 3.26 | | 3.28 | 0.08 |
| | optimism | 1.08 | | 1.24 | 0.27 |
| | acceptance | 6.25 | | 6.35 | 0.015 |
| ional | depression | 0.36 | 1,53 | 0.32 | 0.57 |
| | irritability | 0.004 | | 0.005 | 0.95 |
| | anger | 0.27 | | 0.24 | 0.62 |
| | unhappiness | 0.46 | | 0.46 | 0.50 |
| | anxiety | 1.41 | | 0.58 | 0.45 |
| vioral | irregular sleep | 1.51 | 1,53 | 1.50 | 0.23 |
| | appetite decrease | 0.07 | | 0.05 | 0.83 |
| | restlessness | 0.07 | | 0.54 | 0.82 |
| | appetite increase | 0.13 | | 0.25 | 0.62 |
| | negative interactions | 0.12 | | 0.15 | 0.70 |
| | tired and listless | 0.23 | | 0.22 | 0.64 |

e 8: Mean and Standard Deviations for Dependent Variables by Injury Severity (High and Low Groups)

| cale | Variable | Predicted Direction (1-5) | $\bar{x}$ High | $\bar{x}$ Low | SD (High & Low) |
|---|---|---|---|---|---|
| itive | negative thoughts | (1) | 2.62 | 2.50 | 0.60 |
| | optimism | (5) | 1.85 | 2.39 | 1.65 |
| | self-confidence | (1) | 3.90 | 4.33 | 1.81 |
| | optimism | (5) | 1.90 | 2.22 | 1.04 |
| | acceptance | (5) | 2.23 | 2.94 | 2.50 |
| ional | depression | (1) | 2.92 | 3.17 | 0.60 |
| | irritability | (1) | 3.23 | 3.33 | 0.06 |
| | anger | (1) | 3.10 | 3.33 | 0.52 |
| | unhappiness | (5) | 3.85 | 3.67 | 0.68 |
| | anxiety | (1) | 2.74 | 3.11 | 1.19 |
| vioral | irregular sleep | (1) | 3.46 | 3.89 | 1.23 |
| | appetite decrease | (1) | 3.67 | 3.78 | 0.26 |
| | restlessness | (1) | 3.18 | 3.33 | 0.27 |
| | appetite increase | (5) | 4.13 | 4.00 | 0.36 |
| | negative interactions | (1) | 3.77 | 3.89 | 0.33 |
| | tired and listless | (1) | 3.36 | 3.56 | 0.48 |

le 9: Main Effects: Commitment

| scale | Variable | SS | DF | F | SIGNIF |
|---|---|---|---|---|---|
| nitive | negative thoughts | 2.11 | 1,53 | 1.51 | 0.22 |
| | optimism | 3.02 | | 5.37 | 0.02 |
| | self-confidence | 4.38 | | 4.41 | 0.04 |
| | optimism | 0.41 | | 0.47 | 0.50 |
| | acceptance | 0.02 | | 0.02 | 0.88 |
| tional | depression | 3.07 | 1,53 | 2.70 | 0.11 |
| | irritability | 8.95 | | 11.50 | 0.001 |
| | anger | 4.01 | | 3.57 | 0.06 |
| | unhappiness | 0.15 | | 0.15 | 0.70 |
| | anxiety | 0.41 | | 0.17 | 0.68 |
| vioral | irregular sleep | 3.42 | 1,53 | 3.41 | 0.07 |
| | appetite decrease | 0.85 | | 0.63 | 0.43 |
| | restlessness | 3.61 | | 2.66 | 0.11 |
| | appetite increase | 0.38 | | 0.72 | 0.40 |
| | negative interactions | 0.40 | | 0.57 | 0.45 |
| | tired and listless | 2.11 | | 1.99 | 0.17 |

le 10: Mean and Standard Deviations for Dependent Variables by Sport Commitment (High and Low Groups)

| cale | Variable | Predicted Direction (1-5) | $\bar{x}$ High | $\bar{x}$ Low | SD (High & Low) |
|---|---|---|---|---|---|
| itive | negative thoughts | (1) | 2.39 | 2.75 | 1.45 |
| | optimism | (5) | 1.75 | 2.28 | 1.74 |
| | self-confidence | (1) | 4.29 | 3.79 | 2.09 |
| | optimism | (5) | 1.89 | 2.10 | 0.64 |
| | acceptance | (5) | 2.43 | 2.48 | 0.15 |
| ional | depressed | (1) | 2.75 | 3.24 | 1.75 |
| | irritable | (1) | 2.86 | 3.66 | 2.99 |
| | anger | (1) | 2.89 | 3.45 | 2.00 |
| | unhappiness | (5) | 3.75 | 3.83 | 0.39 |
| | anxiety | (1) | 2.75 | 2.97 | 0.64 |
| vioral | irregular sleep | (1) | 3.32 | 3.86 | 1.85 |
| | appetite decrease | (1) | 3.57 | 3.83 | 0.92 |
| | restlessness | (1) | 2.96 | 3.48 | 1.90 |
| | appetite increase | (5) | 4.18 | 4.00 | 0.62 |
| | negative interactions | (1) | 3.71 | 3.90 | 0.64 |
| | tired and listless | (1) | 3.21 | 3.62 | 1.45 |

e 11: 2-Way Interactions; Sport Commitment by Injury Severity

| cale | Variable | SS | DF | F | SIGNIF |
|---|---|---|---|---|---|
| itive | negative thoughts | 5.83 | 1,53 | 4.19 | 0.05 |
| | optimism | 0.54 | | 0.96 | 0.33 |
| | self-confidence | 0.55 | | 0.55 | 0.46 |
| | optimism | 0.01 | | 0.12 | 0.91 |
| | acceptance | 1.67 | | 1.69 | 0.20 |
| ional | depression | 7.89 | 1,53 | 6.94 | 0.010 |
| | irritability | 8.73 | | 11.22 | 0.001 |
| | anger | 11.97 | | 10.64 | 0.002 |
| | unhappiness | 6.02 | | 6.03 | 0.017 |
| | anxiety | 0.31 | | 0.13 | 0.723 |
| vioral | irregular sleep | 2.82 | 1,53 | 2.81 | 0.10 |
| | appetite decrease | 0.87 | | 0.64 | 0.43 |
| | restlessness | 0.24 | | 0.18 | 0.68 |
| | appetite increase | 0.03 | | 0.06 | 0.82 |
| | negative interactions | 0.76 | | 1.08 | 0.30 |
| | tired and listless | 1.06 | | 1.00 | 0.32 |

Table 12: Analysis of Variance Cell Means for Two-Way Interactions; Sport Commitment by Injury Severity

| Subscale | Variable | Predicted Direction (1-5) | H Commit H Severity (n=21) | H Commit L Severity (n=7) | L Commit H Severity (n=18) | L Commit L Severity (n=11) |
|---|---|---|---|---|---|---|
| Cognitive | negative thoughts | (1) | 2.24 | 2.86 | 3.06 | 2.27 |
| | optimism | (5) | 1.57 | 2.29 | 2.17 | 2.45 |
| | self-confidence | (1) | 4.10 | 4.86 | 3.67 | 4.00 |
| | optimism | (5) | 1.81 | 2.14 | 2.00 | 2.27 |
| | acceptance | (5) | 2.14 | 3.29 | 2.33 | 2.73 |
| Emotional | depression | (1) | 2.48 | 3.57 | 3.44 | 2.91 |
| | irritability | (1) | 2.62 | 3.57 | 3.94 | 3.18 |
| | anger | (1) | 2.57 | 3.86 | 3.72 | 3.00 |
| | unhappiness | (5) | 4.00 | 3.00 | 3.67 | 4.09 |
| | anxiety | (1) | 2.62 | 3.14 | 2.89 | 3.09 |
| Behavioral | irregular sleep | (1) | 3.10 | 4.00 | 3.89 | 3.82 |
| | appetite decrease | (1) | 3.48 | 3.86 | 3.89 | 3.73 |
| | restlessness | (1) | 2.90 | 3.14 | 3.50 | 3.45 |
| | appetite increase | (5) | 4.19 | 4.14 | 4.06 | 3.91 |
| | negative interactions | (1) | 3.62 | 4.00 | 3.94 | 3.82 |
| | tired and listless | (1) | 3.10 | 3.57 | 3.67 | 3.55 |