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# An examination of the relationship between psychological conditions and the incidence of athletic injury

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**AN EXAMINATION OF THE RELATIONSHIP BETWEEN PSYCHOLOGICAL  
CONDITIONS AND THE INCIDENCE OF ATHLETIC INJURY**

**A Thesis**

**Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
In partial fulfillment of the  
requirements for the degree of  
Master of Science**

**in**

**The Department of Kinesiology**

**by  
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## ABSTRACT

The purpose of this investigation was to examine injury rates among college athletes with a diagnosed psychological condition/mental disorder. Participants were drawn from a pool of 440 male and female intercollegiate athletes (ages 18-26 years). All subjects with a psychological disorder were then identified (n=38) and placed in the diagnosis group. A second group was then selected, which consisted of matched pairs of athletes without a psychological diagnosis. Twelve sports were represented in the sample population with an equal number of male (n=26) and female (n=12) participants in each group. The athletic training database was examined via query to identify each athlete's specific psychological diagnosis (or lack thereof), number of injuries, and injury severity per occurrence.

Chi-square analysis revealed that subjects in the diagnosed group suffered a significantly higher frequency of total injuries than subjects in the non-diagnosed group. Further analysis of injury severity within the two groups showed that diagnosed males had a higher frequency of mild and moderate injuries than non-diagnosed males. A significant difference was also found between females in each group, with diagnosed females having a higher frequency of mild injuries.

Examination of gender differences within each group revealed that diagnosed males had a higher frequency of mild and moderate injuries than females, while analysis of the non-diagnosed group showed a higher frequency of mild injuries in males, and moderate injuries in females. Further analysis of overall gender differences revealed that males had a higher frequency of mild and severe injuries when compared to females. The results of this study are consistent with previous research findings that suggest increased stress predisposes an athlete to injury. Future research should continue to examine the relationship between psychological conditions and the incidence of athletic injury.

## INTRODUCTION

Recent increases in sport participation and levels of competition at high school and collegiate levels have placed a high demand on individuals responsible for providing medical care to the athletes. Sports-related injuries comprise a large percentage of the total number of injuries incurred by the population on a yearly basis, with the total count reaching over 70 million injuries per year<sup>1</sup>. According to nationwide data collection from a variety of injury surveillance systems, interscholastic and intercollegiate athletes face a 50% chance of sustaining an injury during a competitive season, translating to an estimated 50 million sports-related injuries per year<sup>2</sup>. With these numbers continuing to rise as sports participation levels increase, sports injuries, in conjunction with accidents, have become a leading cause of death and disability in children<sup>1,3</sup>. This information is vital to the members of the sports medicine team, specifically the certified athletic trainer (ATC), since he or she is responsible for the immediate care of the athletes, including injury prevention, evaluation, treatment, rehabilitation, documentation, and administration. Injury prevention is a key role of the ATC. Pre-participation physical examinations (PPE's) and past medical histories help the ATC identify underlying physical conditions and limitations that may predispose an athlete to injury. Based on these evaluations, the athletic training staff and sports medicine team clear athletes for full participation and/or develop and implement prevention programs aimed at decreasing the incidence of injury<sup>2</sup>.

The main focus of these evaluations and prevention programs is on the treatment of physical injuries, however treatment of psychiatric/psychological issues have been addressed at a minimum<sup>4</sup>. It is important for ATC's to be aware of the psychological status and well-being of the athlete and recognize how that relates to injury predisposition. Injuries have a direct impact

on an athlete's psychological well-being including self-concept, self-esteem, personal beliefs, values, commitments, and emotional balance, which affects performance levels, team objectives, and further injury risk<sup>5,6</sup>. Any change in psychological status may then directly affect an athlete's level of performance, and ultimately their success on and off the field<sup>4</sup>. Disregarding or failing to recognize an athlete's psychological and/or psychosocial state can compound the effects of physical injury<sup>7</sup>. This may occur frequently in the athletic population since psychiatric illnesses may not present as clearly as orthopedic injuries<sup>4</sup>.

In order to properly identify those individuals who may need treatment or referral outside of the athletic training room the ATC must consider several factors. First, the psychodynamic issues related to problems encountered in sports can be similar or identical to those that play a role in some mental disorders. This may be attributed to the close ties between the psychological and physical aspects of sports. Second, some athletic behaviors mimic symptoms of psychological/psychiatric disorders. When this occurs, recognition and diagnosis of a psychological or psychiatric condition may be delayed<sup>8</sup>. Finally, the ATC must realize that college student-athletes are a special population who will experience more daily pressures than the non-athlete. This added pressure to perform in both the athletic and academic arenas raises the risk of psychological, psychiatric, and developmental issues emerging, which can ultimately affect athletic performance, academic performance, and how individuals cope with stress and injury<sup>9,10</sup>.

To develop an understanding of how an individual's psychological state relates to injury predisposition, the ATC must have a basic understanding of how stress is defined across the population. Stress can be defined as any "disruption, change, or adjustment in a person's mental, emotional, or physical well-being that is caused by an external stimulus that is either

physiological or psychological<sup>11:150</sup>.” Stress can be further delineated as being either positive (eustress) or negative (distress). Athletes can experience stress in a variety of ways including parental divorce, death of a loved one, clinical depression or other mental disorders, graduation, school work, loss of sport position, eligibility criteria, social status, competitive trait anxiety, locus of control, social support or coping resources, self-concept, and self-esteem. All of these examples can be referred to as life-stress.

## REVIEW OF THE LITERATURE

### The Stress Response

In order to be able to assist an athlete in dealing with life-stress issues, it is important for the ATC to understand and comprehend the stress response. Simply stated, the stress response is how an individual deals with any level of stress. More specifically, the stress response is seen as an accumulation of the relationships between an individual's cognitive appraisal of physiological and psychological demands, consequences, and resources in combination with physiological and attentional changes<sup>12</sup>. The stress response is characterized by physiological and psychological arousal, which is often referred to as the "Fight or Flight" response. When elicited, the stress response affects various physiological and psychological variables including concentration, learned responses, anxiety levels, muscle tension, attentional focus, blood pressure, heart rate, emotional levels, emotional balance, and self-esteem<sup>3,13,14,15</sup>.

An accumulation of negative or positive stress may be detrimental to the psychological or physiological health of an athlete by negatively affecting the psychological or physiological variables<sup>16</sup>. Effects of high stress include decreased concentration levels, an increased ability to experience state anxiety, increased muscle tension, increased distractibility, decreased attention, decreased emotional balance, and decreased self-esteem<sup>3,5,14,15,17</sup>. These physical and psychological alterations produce peripheral narrowing, inhibition of adaptive responses, decreased flexibility, inability to identify visual cues, decreased ability to analyze and process information, decreased capacity to make rational decisions, increased anger, aggression, and hostility, and sleep problems, which ultimately leads to general fatigue<sup>5,14,15,17</sup>. This is important for the ATC to understand because high levels of life-stress and negative changes in psychological and physiological variables can leave an athlete prone to physical injury<sup>18,19,20,21</sup>.

## **Stress-Injury Relationship**

Andersen and Williams<sup>22</sup> have generated a model to explain how psychosocial variables mediate the stress response. An individual's psychosocial variables affect the stress response, which in turn influence how prone an athlete is to injury<sup>1,12</sup>. They categorize variables into three distinct categories including personality traits, personal history of stressors, and individual coping resources. Personality traits include hardiness, locus of control, sense of coherence, competitive trait anxiety, and achievement motivation<sup>1,22</sup>. These traits are critical in determining how an individual will respond to stress because they directly affect an athlete's cognitive appraisal of the situation<sup>22,23</sup>. The second category, personal history of stress, includes all previous events that have occurred over the course of an individual's lifetime, daily hassles that are encountered, and any previous injuries that have occurred<sup>1,22</sup>. An individual's stress history interacts with personality traits and coping resources and can lead to an activation of the stress response if their stress history has a negative overtone<sup>15</sup>. The final category, coping resources, includes individual coping behaviors, social support levels, stress management techniques, mental skills, nutrition, emotional control, medication, and sleep patterns<sup>1,22</sup>. Research on the effects of coping resources in the stress-injury relationship has found that coping behaviors and social support directly influence health and injury by mediating an individual's response to stressful life events<sup>1,6,14</sup>. Increased coping skills, as well as maintaining a strong social support structure allow individuals to better manage stress, which decreases the likelihood of suffering an injury<sup>6,12</sup>.

It has been proposed from this model and various research studies that high levels of life stress, exhibition of certain personality characteristics (high competitive trait anxiety, external locus of control, decreased achievement motivation), and decreased coping resources will cause

an individual, more specifically an athlete, to appraise a stressful situation as more stressful than it is at present. This leads to physiological arousal and loss of focus, which is the mechanism proposed to increase the risk of injury<sup>1</sup>.

### **Applied Research**

Extensive research has investigated the stress-injury relationship. Support for the stress-injury relationship has been established through investigations using football players, however mixed results have been found when examining this relationship among non-contact sport participants<sup>24</sup>. Seven authors have conducted studies at the collegiate level examining this relationship with the goal of identifying ways that ATC's can recognize at-risk athletes. Of the seven studies reviewed, five focused on athletes participating in non-contact sports including volleyball, gymnastics, baseball, softball, tennis, and track and field<sup>18,19,25,26,27</sup>. The remaining two studied the stress-injury relationship in college football players<sup>20,21</sup>.

A variety of questionnaires and surveys were used to identify life events that occurred over the previous one to two years to pinpoint areas and causes of stress for each athlete. The survey used most frequently was the Athletic Life Experience Survey (ALES)<sup>19,20,25,27</sup>. Other tools used included the Social Adjustment Readjustment Rating Scale (SARRS)<sup>21,25</sup>, the Milton Behavioral Health Inventory (MBHI)<sup>26</sup>, the Everyday Problems Scale (EPS)<sup>27</sup>, the Coddington Life Event Record<sup>18</sup>, and the Social Readjustment Rating Scale (SRRS)<sup>21</sup>. Several authors went further to assess anxiety using the Sport Competition Anxiety Test (SCAT)<sup>21,27</sup>, the Spielberger Trait Anxiety Inventory<sup>18</sup>, and the Trait Scale of the State-Trait Anxiety Inventory<sup>20</sup>. Locus of control was assessed using the Internal-External Locus of Control Scale<sup>20,27</sup> and the Nowicki-Strickland Locus of Control Scale<sup>18</sup>. Other surveys included the "People In My Life"

Inventory<sup>27</sup> and Coping Resource Section of the Stress Audit Questionnaire<sup>25,27</sup> to identify social support, as well as the Coopersmith Self-Esteem Inventory<sup>18</sup>.

Upon completion and review of the questionnaires, the researchers relied on the ATC at each school to record and report injuries incurred by each athlete during the duration of the study. There was no shared definition of injury across the research, however, a majority of the authors used time lost from practices and games as the standard measure of injury severity<sup>19,20,21</sup>. The National Athletic Injury Reporting System (NAIRS) was used in two studies to analyze injury data<sup>21,25</sup>. Two other studies utilized separate data analysis systems including the Colorado Injury Reporting System<sup>27</sup> and the Gymnast's Injury Questionnaire<sup>18</sup>, which was developed by the authors at the time of the study.

### **Personality Variables**

Of the seven studies reviewed, two examined personality variables. Research conducted by Kerr et al., showed a relationship between self-concept and injury. Gymnasts with high self-concept and self-esteem scores tended to be more prone to injury<sup>18</sup>. Their explanation was that athletes with higher self-esteem placed themselves at greater risk during practice and competition, which in turn increased their risk of injury. This is consistent with results from the Wittig et al. study of volleyball players, where athletes who incurred moderate and severe injuries exhibited increased levels of self-assurance and general independence<sup>26</sup>.

Although there has been some investigation into personality variables and their role in the stress-injury relationship, no studies to date have examined the relationship between psychological disorders and the risk of athletic injury. Psychological disorders and diagnoses are defined and identified by the American Psychiatric Association according to the signs and symptoms that an individual presents with at the time of evaluation<sup>28</sup>. They include conditions

such as major depression, dysthymia, bi-polar disorder, schizophrenia, adjustment disorder, sleep disorder, general anxiety disorder (GAD), obsessive-compulsive disorder (OCD), specific phobias, anorexia nervosa, bulimia nervosa, attention-deficit disorder (ADD), attention-deficit/hyperactivity disorder (ADHD), hypochondriasis disorder, antisocial personality disorder, dissociative amnesia, exhibitionism, kleptomania, and substance abuse<sup>28</sup>.

In 1989 the National Collegiate Athletic Association (NCAA) put forward a report, which stated that being a student-athlete at the Division 1 level provides comparable demands on both males and females<sup>9</sup>. The majority of research on athletes has focused on eating disorders and substance abuse. Study results show that the incidence of eating disorders for females increases drastically from 4%-19% between high school and college, with approximately 10% of female athletes reporting problems with bulimia or binge eating<sup>29,30</sup>. Student-athletes, regardless of gender, are also more likely to engage in alcohol use and abuse than non-athletes<sup>10</sup>.

While there is not adequate research on the predominance of gender-specific psychological disorders in the athletic population, several studies have been helpful in identifying gender-specific differences in the general population. It is widely reported that the prevalence of being affected by or diagnosed with major depression is two times more likely for females than males<sup>31,32,33</sup>. Other disorders that are more common in females include generalized anxiety disorder, dysthymia, co-morbid depression and anxiety, panic disorder, simple phobia, agoraphobia, and social phobia<sup>28,34,35</sup>. Interestingly, the most common disorders in males include alcohol abuse, major depression, and simple phobia. However, major depression and simple phobia occur less frequently in males than females. No gender difference has been reported for several disorders including bi-polar disorder, OCD, and drug dependence<sup>28,35</sup>.

## Life Stress

All studies examined the relationship between life stress and injury. Research conducted by Williams et al., Wittig et al., and Hanson et al. involving non-contact athletes found no significant relationship between levels of life-stress, injury occurrence, and injury severity when comparing injured and non-injured groups<sup>25,26,27</sup>. In two studies a positive relationship between stress and injury was reported. The first, a study conducted by Kerr et al., revealed a linear relationship between life events and injury occurrence for collegiate gymnasts as well as an increase in injury frequency and severity as each athlete's number of life events multiplied<sup>18</sup>. A second study, conducted by Hardy et al., showed a higher negative life change to be associated with incidence of injury for baseball, softball, tennis, and track athletes. Regression analysis also revealed a positive relationship between injury frequency and both total and negative life change scores<sup>19</sup>. Negative life change scores were found to be positively related to injury severity. The authors concluded, however, that life stress was only a valid predictor of injury frequency, not severity. This study was one of only two investigations that examined gender differences. In both studies, no significant differences were found between males and females in regards to frequency of injury and severity of injury<sup>19,27</sup>.

In two studies involving football players, significant relationships between stress levels, injury severity, and injury rate were reported for the injured and uninjured groups. In a study by Passer et al., individuals with high levels of negative life change incurred more injuries over the season and also exhibited low competitive trait anxiety<sup>20</sup>. It must be noted, though, that only one of the two groups in the study showed this relationship. Cryan et al. reported that athletes with high stress levels and total life change exhibited a greater risk of injury, as well as being at greater risk of suffering multiple injuries<sup>21</sup>.

## **Coping Resources**

Two of the seven studies examined individual coping strategies and abilities, finding that the uninjured athletes exhibited superior coping resources<sup>25,27</sup>. This may indicate that athletes with greater social support have a decreased chance of suffering an injury.

## **The Stress-Injury Relationship and Future Research**

Four of the seven studies found that athletes who experienced high stress and negative life change were at greater risk of sustaining an injury, as well as being injured multiple times during the season<sup>18,19,20,21</sup>. The greatest disparity of results occurred between the studies involving non-contact sports, with the results of two of the five studies identifying a positive life stress-injury relationship<sup>18,19</sup>. The only sport where no significant relationship was found between life-stress and injury for both the injured and non-injured groups was volleyball, which may be due to the intense focus that these athletes must maintain during practice and competition<sup>25</sup>. These results indicate that the stress-injury relationship may be sport-specific and that further research is needed before any findings can be generalized across all sports. Further research is also needed to determine the necessary attentional focus required for each sport, as well as how it relates to stress and injury occurrence.

Research into the role of personality variables is warranted since the two studies that included personality variables found they had a significant effect on the stress-injury relationship<sup>18,26</sup>. Injury or the threat of incurring an injury can have psychological consequences. Self-concept, self-esteem, beliefs, values, commitments, and emotional status can be affected by stress and injury<sup>7</sup>. Any alteration or influence on these variables can alter behavior, therefore leaving an athlete prone to injury. Understanding this relationship will assist the ATC in predicting an individual's psychological response to injury and stress, while helping to construct

appropriate intervention and prevention programs<sup>36</sup>. Future research into coping resources and social support is warranted in light of the fact that two studies reported superior coping resources in groups that experienced fewer injuries<sup>25,27</sup>. Coping resources and social support moderate the stress-injury relationship by affecting how we respond to stressful situations<sup>14</sup>. Individuals with adequate coping resources and high social support have an increased ability to deal with stressful situations, which directly influences how susceptible they are to injury and illness<sup>1</sup>. Social support and coping resources are provided by a number of people including friends, coaches, teammates, administrators, family, and the athletic training staff. These individuals must recognize their role and provide appropriate support that meets the needs of the athlete<sup>6</sup>.

It is also important to consider the number of survey tools utilized to collect data. Each tool measures stress and life change in a different manner, so the results for each study might have been different if another survey or questionnaire had been used. It is difficult to judge if one tool would be better suited across sports and genders. This shows a need for further research into the effectiveness of these surveys across all athletic populations.

### **Implications for Intervention and Prevention**

Despite the inconsistencies that are evident in the research that has investigated the stress-injury relationship, the results of these studies demonstrate the importance of identifying athletes who suffer from high stress levels. This can be accomplished by using psychological questionnaires and surveys during preseason physical examinations. Once the at-risk individual is identified, intervention and prevention programs, also referred to as treatment programs, can be implemented and a referral system should be put in place in order to provide support to the athlete. Proper diagnosis and treatment of psychiatric and psychological issues can lead to

improvement in overall function, which will maximize the athlete's performance and decrease the predisposition toward injury<sup>4</sup>.

Current intervention and prevention techniques have evolved from research involving stress and injury, illness, and accidents. There are many strategies that can be utilized during intervention and prevention programs. The main goal of these strategies is to reduce injuries, improve the athlete's mood, increase their effort, decrease stress, and decrease anxiety<sup>7</sup>. Examples of treatment techniques include confidence training, team building activities, relaxation training, imagery, visualization, meditation, anger management, autogenics, breathing exercises, biofeedback training, and attention control. These techniques are helpful in reducing the cognitive appraisals of stressful situations and lowering the physiological response to stress<sup>1,3,5</sup>. Enhancing communication between the coach and athlete has also been used to help athletes realize what is expected of them and to understand what resources they have available when stressful situations arise. This increased communication leads to realistic expectations on the part of the coach and athlete while providing the athlete with a sense of belonging<sup>1</sup>. Counseling is another medium by which individual values and beliefs can be clarified and reinforced<sup>36</sup>. Counseling may involve some form of psychotherapy, group therapy, family system perspective, and/or pharmacotherapy, which must be dispensed by a qualified individual. Medication is typically used in extreme cases, including individuals who may be suffering from mild or moderate depression, as well as those who experience high anxiety levels<sup>37</sup>. However, it is important to note that there is little research on how these medications affect the vision, coordination, cardiac function, and other associated factors related to athletes while they are training<sup>8</sup>.

Treatment programs are effective if the mechanism of how increased stress levels lead to injury can be clearly defined and understood by everyone involved in the athlete's treatment<sup>14</sup>. Also, these programs will be ineffective unless they are implemented based on the individual's needs and the characteristics of their problems<sup>37</sup>. Individuals who should be part of this system include a sports psychologist, academic advisor, tutors, and licensed counselors. Educational programs can be offered for all of these individuals to inform them concerning how to recognize stressful situations. The coaches must also be included at some point as it is important for the ATC to educate them so that they can understand the psychosocial effects of injuries, as well as the signs and symptoms of individuals with high stress levels or risk factors that may predispose them to increased levels of stress<sup>6,15</sup>.

### **Limitations of Previous Research**

Although there is evidence that stress predisposes athletes to be at a higher risk for injury, the results have not always been consistent, and the exact nature of the relationship between stress and injury is not clear. Methodological flaws have been identified in the sport injury research, and have contributed to the inconsistent results. The first major problem is that there is no standard definition of injury across the literature<sup>3</sup>. Although time lost from participation is the most popular method for developing an injury definition, there are many disparities across the literature. One way to alleviate this problem is to follow the injury definition set forth by the National Athletic Trainers' Association (NATA). The NATA defines injuries by loss of participation. A minor injury requires losing less than one week of participation. A moderate injury requires losing 8-21 days of participation. A severe injury requires losing more than 21 days of participation<sup>6</sup>. Following these guidelines would allow researchers to eliminate one methodological flaw. The second problem in the literature is that the majority of sport injury

research fails to determine the psychological state of the athlete prior to sustaining an injury<sup>3</sup>.

Documenting the personality and psychological make-up of the individual can help identify any factors that may predispose an individual to increased stress levels and injury.

### **Purpose**

The relationship between athletes who suffer from diagnosed psychological and psychiatric conditions (i.e. depression, anxiety) and incidence of injury has not been investigated. Investigation into the causes, effects, and treatment of psychological and psychiatric conditions in athletics is still in the early developmental stages<sup>8</sup>. Even though psychiatric interventions and treatment in the athletic arena have been present for years, documentation of those cases is very rare, and many times the athletes go under treated<sup>4</sup>. Several factors contribute to the lack of documented research. First, athletes may deny having psychological difficulty and shy away from seeking counseling/treatment because of the social stigma that has been attached to psychiatric illness. Second, some athletes believe that seeking treatment and/or having a confirmed diagnosis indicates an underlying weakness that may affect how their coaches and teammates view their abilities. Finally, many athletes believe that they can overcome their psychological problems/issues without the help of others<sup>4</sup>. It is important to note that several of these conditions require daily medication and frequent psychological treatment, which may affect the athlete's mental status and cognitive processes. Therefore, the purpose of this study was to investigate injury rates among college athletes with a diagnosed psychological condition.

## METHODS

### Participants

In this study, male and female subjects, ranging in age from 18-26 years, were selected from a group (N=440) of intercollegiate athletes. Participants include male (n=283) and female (n=157) scholarship and non-scholarship athletes who are currently enrolled at a major university in the southeast. The subjects have been competing on a varsity intercollegiate athletic team for a minimum of one year and entered the university during or after the fall of 1998.

### Procedures

Approval to execute the study was obtained from the institutional review board. Prior to the selection process, each individual read and signed an informed consent. Data collection was accomplished through examination of the athletic training database. Access to the athletic training database is limited to current staff members, graduate assistants, and athletic training students. For the purpose of this study, all information obtained was via a query that only the primary researcher had access to. Two queries were conducted to examine contents of the database. In the first query, all records for each athlete were searched to determine the reported number and severity of injuries they have sustained over the course of their careers at the intercollegiate level. For the purpose of this study, athletic injury was defined as any condition or diagnosis entered into the "Injury" portion of the athletic training database. Consistent with previous research, injury severity is defined by participation level and time lost<sup>19,20,21,25,26,27</sup>. Mild injuries include those requiring treatment without activity modification, those that keep an athlete out of practice for less than one week, and/or those that require an athletes to have a limited practice status for one to fourteen days after initial injury or return to activity (RTA). Moderate injuries involve being held out of practice for one to four weeks with limited practice

for one to fourteen days before full RTA. Severe injuries include any condition that keeps an athlete out of participation for more than four weeks. Participants who have no documented injuries during their careers were also included in the selection process.

The second query identified all individuals who had been diagnosed with a psychological disorder or condition. Psychological disorders and/or conditions are further specified and defined by the American Psychiatric Association<sup>28</sup> and occur in the athletic training database. These disorders/conditions include, but are not limited to major depression, adjustment disorder, sleep disorder, anxiety, obsessive-compulsive disorder (OCD), specific phobias, dysthymia, anxiety disorders, anorexia nervosa, bulimia nervosa, attention-deficit disorder (ADD), attention-deficit hyperactivity disorder (ADHD), and substance abuse. The team physician, family physician, and/or the team sports psychologist made the diagnosis. Upon completing of both queries, the participants were classified into two groups. The first group was comprised of every individual who had been diagnosed with a psychological condition/disorder that is identified in the athletic training database. The second group included athletes who did not have a diagnosed psychological condition. This group is constructed of matched pairs based on sport, gender, and years of experience. Both groups include injured and non-injured individuals. All information was gathered during the Fall 2003 semester.

### **Statistical Analysis**

A series of Chi-square tests were used to compare the frequency distributions between the two groups in regards to the number of injuries. The dependent variable was the number of injuries recorded for each subject.

## RESULTS

Thirty-eight athletes (26 males-68.4%; 12 females-31.6%) in the database had been diagnosed with a psychological disorder. Thirty-eight individuals from the same sports, with the same level of experience were selected as the matched pairs. The gender breakdown of the groups was similar to the gender breakdown of the sample population (N=440; 283 males/64.3%, 157 females/35.7%). Twelve intercollegiate athletic teams were represented in each group. The distribution of athletes by sport is presented in Table 1.

Table 1: Distribution of Athletes in Each Group by Sport

<b>Sport</b>	<b>Number of Subjects/Group</b>
<b>Men's Sports</b>	<b>26</b>
Basketball	4
Baseball	5
Football	14
Swimming	1
Track and Field	1
Tennis	1
<b>Women's Sports</b>	<b>12</b>
Gymnastics	3
Golf	1
Swimming	2
Track and Field	4
Tennis	1
Volleyball	1

Psychological diagnoses were obtained and recorded for each member of the group with a diagnosis. Seven classifications of mental disorders were identified, with 19 total diagnoses. Diagnoses were broken down to determine which occurred most frequently, which gender had more diagnoses, and how many athletes had multiple diagnoses. (Table 2)

Table 2: Observed Psychological Diagnoses, Frequency, and Gender Breakdown for Diagnosed Group

<b>Diagnosis</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>Substance-Related Disorders</b>	<b>11</b>	<b>0</b>	<b>11</b>
Cannabis Abuse	7	0	7
Cannabis Dependence	2	0	2
Alcohol Abuse	2	0	2
<b>Adjustment Disorders</b>	<b>6</b>	<b>4</b>	<b>10</b>
Adjustment Disorder with Depressed Mood	5	2	7
Adjustment Disorder with Anxiety	1	0	1
Adjustment Disorder with Anxiety and Depression	0	2	2
<b>Mood Disorders (Sub-classification: Depressive Disorders)</b>	<b>6</b>	<b>4</b>	<b>10</b>
Major Depression-Single Episode	3	0	3
Major Depression-Recurrent	2	3	5
Dysthymia	1	1	2
<b>Anxiety Disorders</b>	<b>8</b>	<b>1</b>	<b>9</b>
Obsessive Compulsive Disorder (OCD)	2	0	2
Generalized Anxiety Disorder	3	0	3
Social Phobia	2	0	2
Panic Disorder with Agoraphobia	1	0	1
Simple Phobia-Performance Anxiety	0	1	1
<b>Personality Disorders</b>	<b>1</b>	<b>0</b>	<b>1</b>
Avoidant Personality Disorder	1	0	1
<b>Disorders Usually First Diagnosed in Infancy, Childhood, or Adolescence (Sub-classification: Attention-Deficit &amp; Disruptive Behaviors Disorders)</b>	<b>1</b>	<b>2</b>	<b>3</b>
Attention-Deficit/Hyperactivity Disorder (ADHD)	1	2	3
<b>Eating Disorders</b>	<b>0</b>	<b>3</b>	<b>3</b>
Atypical Eating Disorder	0	1	1
Bulimia Nervosa	0	2	2
<b>Total Diagnoses</b>	<b>33</b>	<b>14</b>	<b>47</b>
<b>Multiple Diagnoses</b>	<b>6</b>	<b>2</b>	<b>8</b>

When examining disorder classifications, substance-related disorders occurred most frequently, followed by adjustment disorders, mood disorders, and anxiety disorders. Eating disorders, personality disorders, and disorders usually first diagnosed in infancy, childhood, and

adolescence were also reported, however they occurred less frequently. The most prevalent individual diagnosis was adjustment disorder with depressed mood and cannabis abuse, followed by major depression-recurrent. Other diagnoses that were found to occur more than once included generalized anxiety disorder, ADHD, major depression-single episode, alcohol abuse, obsessive-compulsive disorder, social phobia, cannabis dependence, dysthymia, bulimia nervosa, and adjustment disorder with anxiety and depression. As seen in Table 1, male athletes had more psychological diagnoses than females. Males also had more multiple diagnoses than females.

When analyzing the frequency of injuries by group, results from the chi-square analysis [ $\chi^2 (2, N = 76) = 12.382, p < .01$ ] indicates that the distribution of injuries differed across the two groups. Inspection of the contingency table reveals that a higher than expected frequency of mild injuries occurred in the group of individuals with a diagnosis. (Table 3)

Table 3: Observed and Expected (in parentheses) Frequencies of Injuries by Group

Group	Mild Injuries	Moderate Injuries	Severe Injuries	Total
Psych (n=38)	225 (191)	19 (18)	13 (12)	257
Non Psych (n=38)	157 (191)	17 (18)	11 (12)	185

The chi-square analysis [ $\chi^2 (1, N = 38) = 22.42, p < .001$ ] of frequencies of injury by gender in the group with a diagnosis indicates that the distribution of injuries differs between males and females. Inspection of the contingency table reveals that a higher than expected frequency of mild and moderate injuries occurred in males with a diagnosis. (Table 4) Chi-square analysis [ $\chi^2 (1, N = 38) = 4.50, p < .05$ ] of injury frequency in the group without a diagnosis also indicates that the distribution of injuries differed between genders. Inspection of

the contingency table reveals that a higher than expected frequency of mild injuries occurred in males and moderate injuries in females without a diagnosis. (Table 5) The severe injury category could not be included because the expected value for females was lower than five.

Table 4: Observed and Expected (in parentheses) Frequencies of Injuries by Gender in the Diagnosed Group

Psych Group	Mild Injuries	Moderate Injuries	Severe Injuries	Total
Males (n=26)	184 (153.9)	17 (13)	12 (8.9)	213
Females (n=12)	41 (71.1)	2 (6)	1 (4.1)	44

Table 5: Observed and Expected (in parentheses) Frequencies of Injuries by Gender in the Non-diagnosed Group

Non-Psych Group	Mild Injuries	Moderate Injuries	Severe Injuries	Total
Males (n=26)	113 (107.42)	8 (11.63)	9 (7.5)	130
Females (n=12)	44 (49.58)	9 (5.37)	2 (0.6)	55

Chi-square analysis [ $\chi^2(2, N = 52) = 20.68, p < .001$ ] examining differences between diagnosed and non-diagnosed males indicates that the distribution of injuries differed between the two groups. Inspection of the contingency table reveals that a higher than expected frequency of mild and moderate injuries occurred in the diagnosed group. There was no difference in the expected frequency of severe injuries. (Table 6) The chi-square analysis [ $\chi^2(1, N = 24) = 4.47, p < .05$ ] examining differences between diagnosed and non-diagnosed females

indicates a different distribution of injuries between the two groups. Inspection of the contingency table reveals that non-diagnosed females had more moderate injuries than expected, while females with a diagnosis had fewer moderate injuries than expected. The severe category could not be included because the expected values were less than five. (Table 6)

Table 6: Observed and Expected (in parentheses) Frequencies of Injuries by Gender and Diagnosis

Males (Diagnosed vs. Non-diagnosed)				
	Mild	Moderate	Severe	Total
Diag	184	17	12	213
(n=26)	(148.5)	(12.5)	(10.5)	
Non	113	8	9	140
(n=26)	(148.5)	(12.5)	(10.5)	
Females (Diagnosed vs. Non-diagnosed)				
	Mild	Moderate	Severe	Total
Diag	41	2	1	44
(n=12)	(42.5)	(5.5)	(1.5)	
Non	44	9	2	55
(n=12)	(42.5)	(5.5)	(1.5)	

The chi-square analysis [ $\chi^2(2, N = 76) = 19.44, p < .001$ ] comparing males and females, without regard for diagnosed condition indicates that the distribution of injuries differed between the two groups. Examination of the contingency table shows that males, overall, had a higher than expected frequency of mild and severe injuries as compared to females. (Table 7)

Table 7: Overall Observed and Expected (in parentheses) Frequencies of Injuries by Gender

Overall Males vs. Females				
	Mild	Moderate	Severe	Total
Males	297	25	21	343
(n=52)	(261.36)	(24.63)	(16.42)	
Females	85	11	3	99
(n=24)	(120.64)	(11.37)	(7.58)	
Total (N=76)	382	36	24	442

## DISCUSSION

Certified athletic trainers play many roles. One of their main roles is injury prevention through the identification of individual characteristics that may predispose an athlete to injury. Certified athletic trainers use this information to treat the “whole” athlete, both body and mind. Psychological and psychiatric illness is becoming a bigger part of today’s society, and although they are not formally educated counselors, psychiatrists, or psychologists, ATC’s can help identify athletes in need of psychiatric care and refer them to the appropriate individuals.

There is an abundance of research on life-stress and its relationship with athletic injury. However, researchers have failed to examine how suffering from a mental disorder affects injury rates. Although there has been contradicting research on the stress-injury relationship in athletics, this study supports the notion that increased life-stress predisposes an athlete to injury. Suffering from a mental disorder is an added stress in any individual’s life. Signs and symptoms of these disorders routinely disrupt, alter, or adjust an individual’s mental well being. Athletes suffering from a mental disorder can experience negative effects from the increased levels of psychological stress. Negative effects include decreased concentration, increased state anxiety, peripheral narrowing, increased muscle tension, increased distractibility, decreased focus, decreased emotional balance, and increased anger and hostility. Athletes who go untreated or undiagnosed may suffer decreases in athletic and academic performance, as well as become more prone to injury.

In this study, athletes in the diagnosed group, specifically males, had more total injuries and suffered more mild injuries than athletes in the non-diagnosed group. Males with a diagnosis also had more total and mild injuries than females with a diagnosis. However, the number of football players used in the study could have skewed the results because more injuries

are expected due to the high-velocity and contact nature of the sport. Previous research on the stress-injury relationship in football players supports this finding, however a positive relationship has also been found in non-contact sports<sup>18,19,20,21</sup>.

The Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> Ed. (DSM-IV) reports that the prevalence of certain mental disorders in the general population varies according to gender. Females have been found to have a higher prevalence of panic disorder, specific (simple) phobia, social phobia, generalized anxiety disorder, major depression, dysthymia, and bulimia nervosa, while males have a higher prevalence of alcohol and cannabis abuse. DSM-IV also reports that males and females are equally affected by adjustment disorders, obsessive-compulsive disorder (OCD), and avoidant personality disorder<sup>28</sup>. Results of this study contradict many of these findings. Males in the diagnosed group suffered from major depression, adjustment disorder, OCD, avoidant personality disorder, panic disorder with agoraphobia, social phobia, generalized anxiety disorder, alcohol abuse, and cannabis abuse more often than their female counterparts. However, females in the diagnosed group did have a higher prevalence of bulimia nervosa and specific (simple) phobia. The number of participants in this study, however, is too small to draw any conclusions concerning gender and prevalence of mental disorders in an athletic population.

The results of this study clearly show a need for continued research on the relationship between psychological conditions and the incidence of athletic injury. Future research should focus on analyzing the relationship within specific sports in order to accurately identify high-risk sports. An examination of how treatment and intervention techniques affect injury rates would also help certified athletic trainers, team physicians, psychologists, and psychiatrists assess current practice and develop protocols that can be followed by each member of the sports

medicine team. The major limitation of this study is its relatively small participant pool. Future research can account for this by involving several universities across the country. This would not only give researchers a much larger participant pool, but also provide data on athletes in many other sports that may not be present at each school.

## **CONCLUSION**

As the level of competition continues to increase at the high school and collegiate levels, athletes are faced with more daily pressures to be successful both on and off the field. Coping with this added stress might be overwhelming for some, which may lead to negative changes in their mental status. Alteration of an athlete's psyche may invariably affect their performance and leave them prone to injury.

It is vital for the certified athletic trainer to be able to recognize and identify individuals who are exhibiting the signs and symptoms of, or have a history of suffering from increased stress and/or a mental disorder. This can be accomplished through pre-season screening, in-season evaluation, and education of athletes and coaches. Once identified, these athletes should then be referred to the appropriate individuals to receive a formal psychological evaluation and treatment as deemed necessary. Proper identification, diagnosis, and treatment of these individuals will aid in maximizing their performance, as well as provide certified athletic trainers with a means of preventing not only physical injury, but psychological injury as well.

## REFERENCES

1. Williams, JM. (2001). Psychology of Injury Risk and Prevention. In R.N. Singer, H.A. Hausenblas, & C.M. Janelle. (Eds.), *Handbook of sport psychology* (2<sup>nd</sup> ed., ) New York: John Wiley & Sons.
2. Prentice, WE. *Arnheim's Principles of Athletic Training: A Competency-Based Approach*. 11<sup>th</sup> Ed. New York, 2003, McGraw-Hill.
3. Thompson, NJ, Morris, RD. Predicting Injury Risk in Adolescent Football Players: The Importance of Psychological Variables. *Journal of Pediatric Psychology*. 1994; 19:415-429.
4. Glick, ID, Horsfall, JL. Psychiatric Conditions in Sport. *Physician and Sports Medicine*. 2001; 29:44-52.
5. Blackwell, B, McCullagh, P. The Relationship of Athletic Injury to Life Stress, Competitive Anxiety and Coping Resources. *Athletic Training*. 1990; 25:23-27.
6. Robbins, JE, Rosenfeld, LB. Athletes' Perceptions of Social Support Provided by Their Head Coach, Assistant Coach, and Athletic Trainer, Pre-Injury and During Rehabilitation. *Journal of Sport Behavior*. 24:277-297.
7. Cupal, DD. Psychological Interventions in Sport Injury Prevention and Rehabilitation. *Journal of Applied Sport Psychology*. 1998; 10:103-123.
8. Begel, MD. An Overview of Sport Psychiatry. *American Journal of Psychiatry*. 1992; 149: 606-614.
9. Smallman, E, Sowa, CJ, Young, BD. Ethnic and Gender Differences in Student-Athletes' Responses to Stressful Life Events. *Journal of College Student Development*. 1991; 32:230-235.
10. Wecshler, H, Davenport, AE. Binge Drinking, Tobacco, and Illicit Drug Use and 5. Involvement in College Athletics. *Journal of American College Health*. 1997; 45:195-211.
11. Gunnoe, AJ, Horodyski, M, Tennant, LK, Murphey, M. The Effect of Life Events on Incidence of Injury in High School Football Players. *Journal of Athletic Training*. 2001; 36(2):150-155.
12. Petrie, TA. Coping Skills, Competitive Trait Anxiety, and Playing Status: Moderating Effects on the Life Stress-Injury Relationship. *Journal of Sport and Exercise Psychology*. 1993; 15:261-174.

13. Booher, JM, Thibodeau, GA. *Athletic Injury Assessment*. 4<sup>th</sup> Ed. New York, 2000, McGraw-Hill.
14. Williams, JM, Tonymon, MA, Andersen, MB. Effects of Life-Event Stress on Anxiety and Peripheral Narrowing. *Behavioral Medicine*. 1990; Winter:174-181.
15. Van Mechelen, W, Twisk, J, Molendijk, A, Blom, B, Snel, J, Kemper, HCG. Subject-Related Risk Factors for Sports Injuries: A 1-yr Prospective Study in Young Adults. *Medicine and Science in Sports and Exercise*. 1996: 1171-1179.
16. Skirka, N. The Relationship of Hardiness, Sense of Coherence, Sports Participation, and Gender to Perceived Stress and Psychological Symptoms Among College Students. *Journal of Sports Medicine and Physical Fitness*. 2000; 40:63-70.
17. Lysens, R, Auweele, YV, Ostyn, M. The Relationship Between Psychosocial Factors and Sports Injuries. *Journal of Sports Medicine*. 1986; 26:77-84.
18. Kerr, G, Minden, H. Psychological Factors Related to the Occurrence of Athletic Injuries. *Journal of Sport and Exercise Psychology*. 1988; 10:167-173.
19. Hardy, CJ, Riehl, RE. An Examination of the Life Stress-Injury Relationship among Noncontact Sport Participants. *Behavioral Medicine*. 1988; Fall: 113-118.
20. Passer, MW, Seese, MD. Life Stress and Athletic Injury: Examination of Positive versus Negative Events and Three Moderator Variables. *Journal of Human Stress*. 1983; December: 11-16.
21. Cryan, PD, Alles, WF. The Relationship Between Stress and College Football Injuries. *Journal of Sports Medicine*. 1983; 23:52-58.
22. Andersen, MB, Williams, JM. A Model of Stress and Athletic Injury: Prediction and Prevention. *Journal of Sport and Exercise Psychology*. 1988; 10:294-306.
23. Miller, TW. Advances in Understanding the Impact of Stressful Life Events on Health. *Hospital and Community Psychiatry*. 1988; 39:615-622.
24. Rider, SP, Hicks, RA. Stress, Coping, and Injuries in Male and Female High School Basketball Players. *Perceptual and Motor Skills*. 1995; 81:499-503.
25. Williams, JM, Tonymon, P, Wadsworth, WA. Relationship of Life Stress to Injury in Intercollegiate Volleyball. *Journal of Human Stress*. 1986; Spring: 38-43.
26. Wittig, AF, Schurr, KT. Psychological Characteristics of Women Volleyball Players: Relationships With Injuries, Rehabilitation, and Team Success. *Personality and Social Psychology Bulletin*. 1994; 20(3):322-330.

27. Hanson, SJ, McCullagh, P. The Relationship of Personality Characteristics, Life Stress, and Coping Resources to Athletic Injury. *Journal of Sport and Exercise Psychology*. 1992; 14:262-272.
28. American Psychiatric Association. *Diagnostic And Statistical Manual Of Mental Disorders*. 4<sup>th</sup> Ed. Washington, DC, 1994.
29. Gutgesell, ME, Moreau, KL, Thompson, DL. Weight Controls, Problem Eating Behaviors, and Problem Drinking Behaviors in Female Collegiate Athletes. *Journal of Athletic Training*. 2003; 38(1):62-66.
30. Kirk, G, Singh, K, Getz, H. Risk of Eating Disorders Among Female College Athletes and Nonathletes. *Journal of College Counseling*. 2001; 4:122-133.
31. Scheibe, S, Preuschhof, C, Cristi, C, Bagby, RM. Are There Gender Differences in Major Depression and Its Response to Antidepressants? *Journal of Affective Disorders*. 2003; 75: 223-236.
32. Galambos, NL, Leadbeater, BJ, Barker, ET. Gender Differences in and Risk Factors for Depression in Adolescence: A 4-Year Longitudinal Study. *International Journal of Behavioral Development*. 2004; 28: 16-26.
33. Barnow, S, Linden, M, Lucht, M, Freyberger, HJ. The Importance of Psychosocial Factors, Gender, and Severity of Depression in Distinguishing Between Adjustment and Depressive Disorders. *Journal of Affective Disorders*. 2002; 72: 71-79.
34. Simonds, VM, Whiffen, VE. Are Gender Differences in Depression Explained by Gender Differences in Co-Morbid Anxiety? *Journal of Affective Disorders*. 2003; 77: 197-203.
35. Bijl, RN, de Graaf, R, Ravelli, A, Smit, F, Vollebergh, WA. Gender and Age-Specific First Incidence of DSM-III-R Psychiatric Disorders in the General Population: Results From the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Social Psychiatry & Psychiatric Epidemiology*. 2002; 37: 372-380.
36. Lamb, M. Self Concept and Injury Frequency Among Female College Field Hockey Players. *Athletic Training*. 1986; 21:220-224.
37. O'Neal, HA, Dunn, AL, Martinsen, EW. Depression and Exercise. *International Journal of Sport Psychology*. 2000; 31:110-135.
38. First, MB (Editor). *Diagnostic and Statistical Manual of Mental Disorders*. 4<sup>th</sup> Ed. Washington, DC, 1994, American Psychiatric Association.

## APPENDIX

### CONSENT FORM

#### Consent Form to Participate in a Voluntary Study

- Study Title:** Psychological Conditions and Injury: An Examination of Inherent Relationships in Collegiate Athletes
- Performance Site:** Louisiana State University Athletic Training Room
- Investigators:** The primary investigator is listed below and is available for questions concerning the study, M-F 8:00 am – 6:00 pm.
- Gregory A. Penczek, ATC  
(225) 578-2050
- Purpose of the Study:** The purpose of this study is to investigate injury rates among college athletes with a diagnosed psychological condition
- Subject Inclusion:** Scholarship and non-scholarship athletes, ages 18-26, who are currently enrolled at a major university in the southeast, and have been competing on a varsity intercollegiate athletic team for a minimum of one year.
- Number of Subjects:** Subjects will be randomly selected from the entire population of 540 intercollegiate athletes at the university
- Study Procedures:** Data will be gathered by the investigator via the athletic training database. No interaction between the investigator and participants is necessary upon completion of the consent form.
- Benefits:** There are no direct benefits to the participants. However, examination of these data may identify individuals who are predisposed to injury and provide a guide for developing prevention programs.
- Risks/Discomforts:** There are no physical or psychological risks/discomforts associated with this study. All data will be kept confidential by the investigator(s) and the subjects' identity will remain undisclosed.
- Right to Refuse:** Individuals may choose not to be included or to withdraw from the study at any time with no present or future penalties.
- Privacy:** The LSU Institutional Review Board (which oversees university research with human subjects) may inspect and/or copy the study records.

Upon completion, the results of this study may be submitted for publication, but no names or identifying information will be included in the publication.

**Health Insurance Portability and Accountability Act (HIPPA)**

Records that you give us permission to keep, and that identify you, will be kept confidential as required by law. Federal Privacy Regulations provide safeguards for privacy, security, and authorized access. Except when required by law, you will not be identified by name, social security number, address, telephone number or any other direct personal identifier in screening records disclosed outside of LSU. For records disclosed outside of LSU, you will be assigned a unique code number.

As previously stated, subject identity will remain undisclosed unless disclosure is legally compelled.

**Financial Information:** There is no cost to the participants, as well as no compensation for participating in the study.

**Signatures:** The study has been discussed with me and all of my questions have been answered to my satisfaction. I may direct any additional inquiries regarding the study to the investigator(s). If any questions arise regarding subjects' rights or other concerns, I can contact Robert C. Matthews, Institutional Review Board, (225)578-8692. I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of the consent form.

\_\_\_\_\_  
**Participant Signature**

\_\_\_\_\_  
**Date**

The study subject has indicated to me that he/she is unable to read. I certify that I have read this consent form to the subject and explained that by completing the signature line above, the subject has agreed to participate.

\_\_\_\_\_  
**Signature of Reader**

\_\_\_\_\_  
**Date**

The study subject has indicated that he/she has completely read, or has had this form read to them, and understands this consent form. All questions have been answered and he/she has agreed to submit any further inquiries to the primary investigator(s). I hereby certify that this subject has agreed to participate in the study described above.

\_\_\_\_\_  
**Signature of Witness**

\_\_\_\_\_  
**Date**

## VITA

Gregory Allan Penczek, oldest son of Wayne and Janet Penczek, completed his undergraduate work at Salisbury University, in Salisbury, Maryland. During his time there he earned his Bachelor of Science in corporate fitness in 1996, and completed a second Bachelor of Science in athletic training in 2001. Upon completion of his tenure at Salisbury University, he passed the National Athletic Trainers' Association Certification Exam, making him a Certified Athletic Trainer. He continued his education at Louisiana State University, working to earn a Master of Science in the Department of Kinesiology. While at Louisiana State University, he has worked as a Graduate Assistant Athletic Trainer with the nationally ranked women's gymnastics team. Completion of his assistantship and education is May 2004. Greg is currently engaged to Kristen L. McFadden. Their wedding is date is June 25<sup>th</sup>, 2005. He looks forward to working as an assistant athletic trainer in the collegiate setting, aiding in the prevention, evaluation, treatment, and rehabilitation of athletic injuries.