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Psychological Predictors of Injury in Division III Collegiate Student-Athletes

Jacob Raymond Schlierf
Ithaca College, jschlie1@ithaca.edu

PSYCHOLOGICAL PREDICTORS OF INJURY IN DIVISION III COLLEGIATE STUDENT-ATHLETES

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School of Health Sciences and Human Performance
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CERTIFICATE OF APPROVAL

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MASTER OF SCIENCE THESIS

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This is to certify that the thesis of

Jacob Raymond Schlierf

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Human Performance at Ithaca College has
been approved.

Thesis Adviser: _____

Committee Member: _____

Candidate: _____

Chair, Graduate Program: _____

Dean of HSHP: _____

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ABSTRACT

This study examined five psychological variables that have been reported to predict injury in collegiate athletes at the Division I level in an NCAA Division III population. It was hypothesized that 1) injuries sustained and the number of days missed due to injury would be predicted by life stress, social support, coping resources, trait anxiety, and hardiness; and 2) that life stress would be the strongest psychological predictor. Male and female participants (n = 125) from six Division III sport teams completed surveys measuring each variable, as well as demographical questions regarding gender, sport type, year in school, and previous injury. Participants consented to have their injury data anonymously reported to the researcher. Information was collected towards the beginning and end of each sport season. Two hierarchical multiple regressions were completed, utilizing all psychological and demographical variables. The first regression was performed using the 'number of injuries' as the dependent variable, while the second was performed using 'days missed due to injury' as the dependent variable. Results indicated that hardiness accounted for 17% of the variance in days missed, and previous injury accounted for 11% of the variance in the number of injuries sustained. These findings resulted in the rejection of both hypotheses. Further research exploring the potential influence of these psychological predictors on injury frequency at the Division III level is needed to determine if Division III student-athletes' injuries can be predicted by the same psychological variables that have been reported to predict injury at the Division I level.

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CHAPTER 1

INTRODUCTION

Sport injuries are a growing cause for concern, with millions of athletes at all levels sustaining injuries each year (Petrie, Deiters, & Harmison, 2014). Sport injuries can result in physical hardship, such as difficulty performing daily tasks, temporary or permanent disability, increased susceptibility for future injuries, increased risk of developing musculoskeletal complications later in life, and in extreme cases, death. Many of these injury consequences influence the early termination of individuals' sport careers (Ristolainen, Kettunen, Kujala, & Heinonen, 2012). The temporary and permanent physical disabilities that sport injuries cause are coupled with the psychological ramifications that evolve from the inability to compete or perform to a desired level. Sport injuries often result in feelings such as depression, anger, and low self-esteem; athletes can enter a state of denial, lose their appetite, suffer from insomnia, struggle through feelings of fatigue, and feel a great deal of anxiety (Smith, 1996).

Given the negative consequences of sport injuries, continued research to better understand the injury process and aid athletes in the recovery process is needed. One avenue to explore might be treatment and management of injuries. However, another option is to investigate methods to reliably predict athletic injury. Many physiological injury predispositions can be identified by medical professionals (Dallinga, Benjaminse, & Leinmink, 2012; Kiesel, Butler, & Plisky, 2014). While success has been reported in this area, not every injury is caused by a physiological predisposition. Research conducted on athletes from a myriad of sports and levels has shown that it may also be

possible to predict the likelihood of sustaining injury based upon various psychological characteristics

Two models, the Andersen and Williams (Williams & Andersen, 1998) model, and the Sport Injury Risk Profile (Wiese-Bjornstal, 2010) have been developed with the intent of identifying significant psychological predictors of injury. While each model has its own slate of predictor variables, both models identify similar core psychological components of injury prediction. For example, five of the mutually agreed upon psychological variables in these two models are: 1) the quality and extent of social support an individual is exposed to, 2) the amount of life stress experienced, 3) the hardiness of an individual's personality, 4) the coping resources available to and used by an individual, and 5) the level of individual trait anxiety (Williams & Andersen, 1998; Wiese-Bjornstal, 2010). Each of these variables is discussed below.

Social support refers to the impact of social relationships on an individual; these relationships can help inoculate an individual against experiencing stress by making him or her more confident that they have the necessary resources to face stressful situations (Bianco & Eklund, 2001). Confidence in social support resources can help alleviate the experience of stress, and can aid in the successful resolution of a stressful situation. When social support is reported to be effective, it "reduces ambiguity, complexity, and unpredictability", as well as grants a sense of control by "helping the recipient see realistic alternatives to a stressful situation" (Robbins & Rosenfeld, 2001, p. 279). Having low perceived levels of social support has been reported to magnify the effects of life stress, and increase the likelihood of injury in athletes (Petrie, 1992).

Life stress is the culmination of any event or circumstance in an individual's life that places an added burden on the individual. Life stress can emerge from both positively perceived and negatively perceived events; negative life stress has been reported to have a more severe effect on increasing injury incidence (Passer & Seese, 1983). Athletes who have higher levels of life stress incur injuries 2-5 times more frequently than athletes who report lower levels of life stress (Williams & Roepke, 1993). Life stress is one of the most heavily researched psychological predictors of injury. In a meta-analysis of 40 studies, Williams and Andersen (2007) reported that 85% of the literature surrounding life event stress and sports injury reported a positive correlation; increases in life stress also increased rates of injury.

Hardiness is a personality concept which takes into account the amount of control someone feels in their life, how committed they feel to the activities they are engaged in, and how much they look forward to challenge as a chance for growth (Kobasa, 1979). Athletes who are deemed self-reliant are reported to suffer injuries significantly less frequently than athletes who are not tough-minded and could instead be described as dependent, sensitive, or overprotected (Jackson, Jarrett, Bailey, Kausek, & Swanson, 1978). One study that supports this finding spanned two years and involved interviewing 600 athletes across varying sports and levels. In this study, hardiness was reported to be a significant deterrent to sports injury; increased hardiness led to a decreased likelihood of injury (Wadey, Evans, Hanton, & Neil, 2012a).

Coping resources include anything that a person utilizes to reduce stress or deal with challenging situations, and are typically broken down into four categories: somatic, behavioral, cognitive, and social resources (Campen & Roberts, 2001). Researchers have

reported that athletes with more perceived available resources were significantly less likely to become injured (Hanson, McCullagh, & Tonymon, 1992). Furthermore, athletes have been observed to suffer injuries less frequently when they are subjected to interventions based on increasing the effectiveness of their coping resources (Johnson, Ekengren, & Andersen, 2005).

Trait anxiety is defined by an individual's overall likelihood to respond to stressful situations with anxiety, or "feelings of tension, worried thoughts, and physical changes like increased blood pressure" (American Psychological Association, n.d.b). High levels of trait anxiety have been observed to impact whether an athlete feels tension, anger, or hostility, and have also been correlated with negative overall mood (Lavallée & Flint, 1996). Researchers studying male soccer players reported that trait anxiety, along with stress susceptibility and trait irritability accounted for almost 15% of the variance in injury likelihood (Ivarsson & Johnson, 2010). While trait anxiety is not an overwhelming predictor of sport injury by itself, it often combines with other personality concepts, and other psychological predictors to help form a stronger model of injury prediction.

One area where these psychological predictors have been studied is in the realm of collegiate athletics, specifically in Division I programs. In the United States, there are over 460,000 collegiate student athletes across all three collegiate divisions (National Collegiate Athletic Association, n.d.a). While much research in the field of injury prediction has been completed with collegiate athletes, few studies have centered on Division III student-athletes. The majority of the research has centered on National Collegiate Athletic Association (NCAA) Division I student-athletes. There is little doubt that Division I student-athletes live and compete in very different cultures and

atmospheres than Division III student-athletes. The NCAA, which governs collegiate athletics across the United States, makes clear distinctions between the two divisions. For example, per the NCAA, while there is a "high academic standard", Division I student-athletes are provided a "wide range of opportunities for athletic participation", often resulting in teams traveling across the country to compete (National Collegiate Athletic Association, n.d.b). Division III student-athletes, however, have academics as a "primary focus", and the "division minimizes the conflicts between athletics and academics" by focusing on more local competition (National Collegiate Athletic Association, n.d.c). Due to the lack of injury research with Division III student-athletes, it is unknown whether the findings surrounding the psychological predictors of injury for Division I student-athletes hold true for their Division III counterparts. Understanding the variances of psychological predictors of injury between student-athletes in different divisions could allow for the development of unique interventions for each population. If individually tailored and appropriate preventative measures are taken to help reduce the psychological likelihood of injury, it is possible that the negative experience of sustaining a sports injury could be reduced. If, however, Division I and Division III student-athletes prove to be similar in this area, a more universal and streamlined intervention approach could be adopted.

Statement of Purpose

This study was designed to examine the prevalence and strength of five psychological predictors of injury (social support, life stress, hardiness, coping resources, and trait anxiety) in NCAA Division III collegiate student-athletes. The author investigated whether, like their Division I counterparts, Division III student-athletes' injuries were predicted by these psychological factors.

Hypotheses

The hypotheses for this study were:

1. The psychological predictors of injury which have predicted injuries in Division I student-athletes will also predict injuries in Division III student-athletes.
2. Life stress will be the strongest psychological factor contributing to injury prediction.

Scope of the Problem

While there is a plethora of data surrounding the psychological prediction of injuries in Division I student-athletes, there is limited injury data regarding Division III student-athletes. The Division I student-athlete experience has the potential to be very different than that of the Division III student-athlete. For example, Division I student-athletes typically experience different competitive and academic expectations than Division III student-athletes (National Collegiate Athletic Association, n.d.b; National Collegiate Athletic Association, n.d.c). This study was designed to examine whether the differences between Division I and III extend to the realm of psychologically predicting injuries. Measures of social support (the SSQ), life stress (the LESCA), hardiness (the DRS-15), coping skills (the Brief COPE), and trait anxiety (the SAS-2) were used to evaluate and predict injuries of NCAA Division III student-athletes. Since these psychological measures have been reported to predict injuries in Division I student-athletes, similar results were expected to be found in Division III student-athletes.

Assumptions of the Study

1. Athlete hardiness, anxiety, coping skills, and social support would not change significantly over the course of an athletic season.
2. Physiological predispositions toward sustaining sports injuries (such as previous injuries, incorrect training techniques, or poor nutrition) would not significantly mask the effects of the psychological predictors of injury that were being measured.
3. Injuries sustained by the participants outside the sport context would be reported as such.
4. All injuries sustained by the participants would be reported to the appropriate athletic trainers.
5. Athletic trainers would reliably report injuries to the researcher.
6. Participants would truthfully and accurately complete all surveys.

Definition of Terms

1. Sport injury – "any physical damage sustained by sports participation which required medical attention, resulting in the absence from training or a game" (Ruddock-Hudson, O'Halloran, & Murphy, 2012).
2. Social support – the perceived social network of people that interacts with an individual, often providing a sense that the individual is cared for and can rely on this network of people in times of stress (Bianco & Eklund, 2001).
3. Life stress – "the extent to which major life events (e.g., death of a loved one, losing a job) have been experienced during a set period of time" (Petrie et al., 2014, p. 14).

4. Hardiness – a personality concept which takes into account the amount of control someone feels in their life, how committed they feel to the activities they are engaged in, and how much they look forward to challenge as a chance for growth (Kobasa, 1979).
5. Coping resources – anything that a person utilizes to reduce stress or deal with challenging situations; they are typically broken down into four categories: somatic, behavioral, cognitive, and social resources (Campen & Roberts, 2001).
6. Trait anxiety – an individual's overall likelihood to respond to stressful situations with anxiety or "feelings of tension, worried thoughts, and physical changes like increased blood pressure" (American Psychological Association, n.d.b, p. 1).

Delimitations

1. Other psychological predictors of injury such as additional coping resources and additional personality characteristics, were not included.
2. The participants were only being sampled from one Division III school.
3. Only spring sports were targeted for study.
4. Physiological predispositions towards injuries (other than self-reported previous injury data) were not included in this study.

Limitations

1. With only one data collection period, there was no way to determine if life stress changed for any of the participants over the course of the season.
2. Athletes may not have reported all injuries sustained to their respective athletic trainers.

3. Generalization to all Division III collegiate student-athletes was minimized due to sample size.
4. Only spring sports were included in the study.
5. Participants' age and race/ethnicity was not collected which restricted generalizability.
6. A large portion of the participant pool reported having sustained a previous sport injury.
7. Other psychological predictors of injury (such as pessimism and optimism), not incorporated into the scope of this study, may have had effects on injury predispositions.
8. Physiological characteristics of individuals may have predisposed them to injury and may have overridden psychological predispositions, or lack thereof.
9. Results could not be generalized to youth, high school, or elite-professional athletes.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

Sport injuries can have many effects on the physiological and psychological health of athletes. This review outlines the prevalence, etiology, and components of sport injuries, as well as the physiological and psychological impacts that injury can have on athletes. A major section is devoted to the generally agreed upon models of psychological predictors of sport injuries, namely the Andersen and Williams model and the Sport Injury Risk Profile (Williams & Andersen, 1998; Wiese-Bjornstal, 2010). The predictors from these models that were reviewed included: coping resources, social support, life stress, hardiness, and trait anxiety. Because much of the existing research surrounds NCAA Division I student-athletes, this review concluded with an evaluation of the differences between Division I student-athletes and Division III student-athletes, and explored whether the results that have been documented in Division I could be expected to be found in Division III.

Definition of a "Sport Injury"

In the field of sport psychology, a 'sport injury' was defined as "any physical damage sustained by sports participation which required medical attention, resulting in the absence from training or a game" (Ruddock-Hudson et al., 2012, p. 378). Even though an athlete could have sustained an injury that did not necessitate medical attention and did not result in lost playing time, that injury could not be truly termed a 'sport injury', even if it occurred during sport participation. Injuries could occur for athletes who then continued to play, but have decreased playing time. This event would still be

termed a ‘sport injury’ since game time would still be missed relative to the athlete’s normal playing time.

Prevalence of Injury

When injury rates were examined across various sports, levels, and ages, all organizations that reported injury data displayed a strong prevalence of injury. At the professional level, for example, Major League Baseball reported an average of 438.9 players per year placed on the disabled list between the years of 2002 and 2008 (Posner, Cameron, Wolf, Belmont, & Owens, 2011). In the National Football League (NFL), during the 2007 season, between 8% and 13% of all NFL players were listed on a team’s injury report on any given week (Halcin, 2008). In the Australian Football League (AFL), it was reported that “ninety percent of the time a player will play with a niggling injury” and that “it’s very rare for a player to go into a game one hundred percent fit” (Ruddock-Hudson et al., 2012, p. 380). In the realm of collegiate sports, the NCAA released data that between 1988 and 2004, across 15 sports, there were approximately 13.8 injuries per 1,000 athletic-exposures (A-E’s) in games, and 4.0 injuries per 1,000 A-E’s in practices (Hootman, Dick, & Agel, 2007). Many youth athletes have sustained severe injuries before they entered college or had the opportunity to compete professionally. As of 2009, high school athletes incurred 2 million injuries, 500,000 doctor visits, and 30,000 hospitalizations each year (Darrow, Collins, Yard, & Comstock, 2009). In 2009, the National Athletic Trainer’s Association reported that only 42% of high schools had Athletic Trainers available to assist their student-athletes when they became injured (National Athletic Trainer’s Association, 2009). The pervasiveness of injury across all

levels of sport has resulted in extensive study of the physical and psychological impact of injury on athletes.

Physical Impact of Injury

Sport injuries have interfered with the lives of athletes from all levels (professional, amateur, collegiate, and youth athletes). Injuries for some youth athletes have followed them for the rest of their lives after developing into chronic conditions, and injuries to high caliber athletes have jeopardized their professional, and even personal future. Athletic injuries have influenced the termination of sports careers, and in many cases they have been the sole reason for termination (Ristolainen et al., 2012). Peterson (2009) observed that between 14% and 24% of professional athletes ended their careers due to injuries. Investigation of the physical impact of injury led to the identification of several different levels of severity.

Fatal injuries were the most severe type, and typically involved head trauma or damage to the spinal cord; these types of injuries became more frequent when athletes moved at faster speeds and when they had more frequent violent contact with each other (Kujala, Orava, Parkkari, Kaprio, & Sarna, 2003). Fatal injuries were infrequent, yet unfortunately still occurred. Injuries termed ‘serious’ formed the next level of severity. These included non-fatal head injuries that resulted in permanent brain damage from concussions, as well as non-fatal spinal cord injuries that resulted in complete or partial paralysis (Kujala et al., 2003). Permanently disabling injuries formed the next tier, and they were typically musculoskeletal in nature. They frequently involved the major joints in the body, particularly the knees (Kujala et al., 2003). The major physical effect from

these types of injuries was the increased risk of developing premature osteoarthritis later in life (Kujala et al., 2003).

Athletes who have sustained one injury may be at increased risk for future injuries (Ryan, DeBurca, & Mc Creesh, 2014). For example, in the case of groin and hip injuries, previous groin and hip injuries were the number one predictor and risk factor for future groin and hip injuries (Ryan et al., 2014). Additionally, over an observational span of five years, high school and professional athletes who had a history of knee surgery missed significantly more time and had higher rates of subsequent knee injuries than athletes who had not previously sustained a knee injury that necessitated surgery (Rugg, Wang, Sulzicki, & Hame, 2014). Athletic injuries, especially those at lower levels of sport where medical care was not as readily available, have been linked to functional deficits in the injured body part well after the injury has been treated and resolved (Nadler, 2002). For both severe and minor injuries, there was potential for an athlete to suffer significant pain or disability. There was also the risk of developing a predisposition for future injuries of a similar nature. However, in addition to the physical ramifications of injury, there were many psychological issues that arose as well.

Psychological Impact of Injury

More attention has recently been devoted towards understanding the psychological impact of injuries. Smith (1996) reported that physical disability was often accompanied by depression, tension, anger, and low self-esteem, particularly in competitive, seriously injured athletes. Injured athletes also experienced disbelief, rage, fear, insomnia, loss of appetite, and fatigue (Smith, 1996). Athletes who sustained career

ending injuries experienced responses ranging from depression and substance abuse to suicidal thoughts (Caron, Bloom, Johnston, & Sabiston, 2013).

The Kübler-Ross (1969) grief management theory was one model that researchers have tried to apply to the athletic injury process. The five stages from this model were denial, anger, bargaining, depression, and acceptance (Kübler-Ross, 1969). While the emotions relevant to the various stages of the Kübler-Ross model were evident across the spectrum of injured athletes, "a common sequence of discrete responses to athletic injury has not been documented" (Brewer, 1994, p. 90). Because the Kübler-Ross stages were developed while examining responses to loss of life, it was difficult to make a strong correlation to injury. Brewer (1994) reviewed and critiqued many models and their applicability to sport injury and concluded that the emotional responses of athletes to injury appeared to be more diverse and wide-ranging than models based on discrete stages could predict.

The inability of a stage model to explain and account for differences between individual athletes led to the creation of several cognitive appraisal based models. Cognitive appraisal models were developed by Lazarus and Folkman (1984), Rotella (1985), Weiss and Troxel (1986), Gordon (1986), and Wiese-Bjornstal and Smith (1993). Summarizing these models, Brewer (1994) stated that they all consider injury to be a stressor, and responses to injury are therefore understood through the stress coping process. Brewer (1994) reported that the cognitive appraisal based models take into account both personal factors (such as athletic identity, motivation, coping ability, injury history, trait anxiety, and other personality characteristics) as well as situational factors (life stress caused by injury, impact on daily functioning, length of the healing process,

and the severity of injury). The interaction of personal and situational factors determines how an injured individual uniquely appraises the experience of sustaining an injury. This appraisal influences the emotional and behavioral responses that are then experienced and displayed.

Even in cases where an injury by itself did not cause a significant amount of emotional distress, the period of inactivity where the athlete missed out on regular competition and exercise may have had an adverse effect on the athlete's emotional wellbeing. For example, a group of runners who were prevented from running for two weeks were compared with a group of runners who were able to run without interruption to their schedules. These groups were assessed using the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971) and the Rosenberg Self-Esteem Inventory (RSE) (Smith, 1996). Researchers reported that the two groups, which did not have any significant differences among them in running experience or ability, differed significantly in their moods and their sense of self-esteem (Smith, 1996). The runners who went through the exercise deprivation showed significantly higher levels of depression, tension, and confusion on the POMS scale, and lower self-esteem on the RSE, than the control group (Smith, 1996).

In addition to the stresses caused by the inability to compete, injuries have been reported to remove a large source of stress relief that would normally come from an athlete's regular physical activity (Ruddock-Hudson et al., 2012). Physical activity has been reported to be a natural source of stress relief. It has been negatively correlated with stress-induced increases in heart rate, and support has also been reported for the hypothesis that it allows people to escape the burdens and pressures of their lives (Brown

& Siegel, 1988). A survey of collegiate students by Barney (2014) revealed that physical activity helped people forget about the stressful aspects of their lives, and later granted them a confidence that they could accomplish the tasks that lay in front of them. The absence of an athlete's preferred method of physical activity could result in increased stress and contribute to the overall emotional distress produced by an injury.

However, sometimes athletes have viewed injuries in a positive manner. They perceived that an injury allowed them to acquire extra time to rest and relax for their next game (Ruddock-Hudson et al., 2012). They felt relief that they were no longer under pressure to perform, or that they no longer needed to meet certain expectations. While certain psychological responses, such as depression, anger, or severe mood changes were typical results of an athletic injury (Smith, 1996), individual differences between athletes moderated how they reacted to injury and which symptoms emerged. Ultimately, the reaction to an injury was influenced by how the athlete perceived the situation, and how they perceived themselves.

One model that attempted to explain the emotional process behind sustaining an athletic injury was the Integrated Model of Psychological Response to Sport Injury and Rehabilitation Process (Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998). The Integrated Model depicted the injury that an athlete sustains as a stressor, and the severity of the stress experienced is determined by the cognitive appraisals that the athlete makes (Wiese-Bjornstal et al., 1998). A cognitive appraisal was defined as an evaluation of a situation conducted by an individual where they assessed whether there was cause for stress, and how extreme that stress would be. Cognitive appraisals are personal, and the same situation could be appraised in different ways, depending on the individual. Within

the Integrated Model, the cognitive appraisals of an athlete affected the emotional responses that they experienced such as fear, confusion, sadness, or anger, which then affected the behaviors that the athlete displayed post-injury (Wiese-Bjornstal et al., 1998). This model reinforced the idea that there were many ways for an athlete to react to an injury, and that the individual makeup of the athlete affected their perception of the situation, which determined their emotional response.

Athletes' Perceptions of Injuries

Athletes' responses to injuries were very different from the reaction of the general population. Researchers have reported that when individuals who had a background in sports and exercise became injured, they displayed higher levels of confusion than individuals without an athletic background (Johnston & Carroll, 2000). Confusion from injury has been attributed to the damage an injury does to an athlete's sense of athletic identity. Athletic identity was defined as "the degree to which an individual identifies with the athlete role" (Brewer, Van Raalte, & Linder, 1993, p. 237).

For many athletes, especially at collegiate and professional levels, the term 'athlete' defined who they were and greatly influenced how they behaved and how they lived their lives. Typically, an athlete who had a strong level of athletic identity placed high value on their involvement in their particular sport; their self-esteem, affective status, and motivational status were heavily dictated by how they performed and whether they succeeded or failed in that domain (Brewer et al., 1993). For athletes that reported a high level of athletic identity, other aspects of their identity had less of an impact on how they behaved or how they lived their lives. Often, whether an athlete perceived themselves as succeeding or failing could override an outside evaluation of their

performance, as they were particularly aware and influenced by their self-perceptions (Brewer et al., 1993). This high level of athletic identity could be extremely beneficial to an athlete and it has been suggested that there is a beneficial effect on the performance of athletes who have such high levels (Brewer et al., 1993). However, a high level of athletic identity could also present a great risk whenever the identity was challenged.

Researchers have reported that when an athlete's identity is threatened, the impact on their sense of identity depends on a few criteria. The severity of the impact was revealed to be relative to the number of aspects of self that were lost, in the case of an athlete this could be their identity as an athlete, their perception that they can endure through trials, or in the case of an athlete's first injury, the belief that they are invulnerable. The impact was also revealed to be relative to the relevance and prominence of those aspects, the likelihood of recovering those aspects, the individual's ability to acknowledge and accept the lost aspects, and their ability to create a new self-concept after the loss (Hockey, 2005). Any serious injury could cause great emotional distress in an athlete since it takes away perhaps the largest aspect of self that an athlete has. The possibility of physical recovery may be in doubt, and return to play in the future may be overshadowed by the possibility of the injury reoccurring. Brewer et al. (1993) reported that athletes who identified themselves almost exclusively with athletics, and had very little distinction between the athletic component of their identity and any other components, were vulnerable to depression after an injury.

While a non-athlete could sustain a serious injury without compromising their identity, an athlete sustaining the same injury may find their identity severely challenged. One study has shown that individuals tended to have unstable self-esteem and individual

identity when they highly identified with being an athlete and felt as though their athletic endeavors defined who they were (Lockhart, 2010). Researchers reported that, "an injury that disrupts athletic performance is more psychologically deleterious to athletes with high athletic identity because the injury provokes a perceived loss of identity when the athlete is not able to perform" (Lockhart, 2010, p. 27).

Athletes, who had their primary source of identity damaged, experienced emotional distress in addition to the negative physical aspects of injury. One study that examined the reactions of 21 high level athletes who suffered serious injuries reported that many of the athletes claimed their loss of identity significantly contributed to an experience of isolation (Van Der Poel & Nel, 2011). The periods during their recovery when the athletes felt isolated were associated with times the athletes felt depressed (Van Der Poel & Nel, 2011). The experiences of isolation and depression increased the athletes' likelihood of experiencing mood instabilities during that time (Van Der Poel & Nel, 2011). With all of the negative implications of sport injuries, research has turned towards investigating whether certain athletes are more likely to become injured, and which variables can reliably predict an athlete becoming injured.

Predicting Injury

Researchers have identified various physiological factors that can predispose an athlete to injury and increase the likelihood of sustaining an injury. These physiological predispositions can typically be identified by medical professionals (Dallinga, et al., 2012; Kiesel, et al., 2014). Researchers have also identified multiple psychological variables that can potentially predict an athlete's injury likelihood, such as the amount of stress they experience (Williams & Andersen, 1998). Two models of injury prediction

based on psychological measures have been developed by Williams and Andersen (1998) and Weise-Bjornstal (2010).

The Andersen and Williams Model (1998)

One model that accounted for these psychological variables in the prediction of injury likelihood was the Andersen and Williams model (A&W) (Williams & Andersen, 1998). This model considered an individual's personality, history of stressors, and coping resources. Personality in the A&W model incorporated many measurable concepts such as whether an individual became anxious during competition, their level of motivation directed at achievement, their sense of control and whether it was external or internal, as well as how resilient they were during high pressure or high stress situations (Williams & Andersen, 1998). An individual's history of stressors included any significant life events. These life events included previous injuries, changes in academic or athletic standing, family squabbles, and the death of a loved one. Day-to-day issues, such as normal responsibilities and requirements placed upon an individual were also included. Finally, coping resources referred to how individuals managed stressful events. This included the different ways an individual relaxed, the family and friends they had available to support them in their struggles, stress management techniques and skills, as well as any medicines the individual was taking which could have influenced how they handled stress.

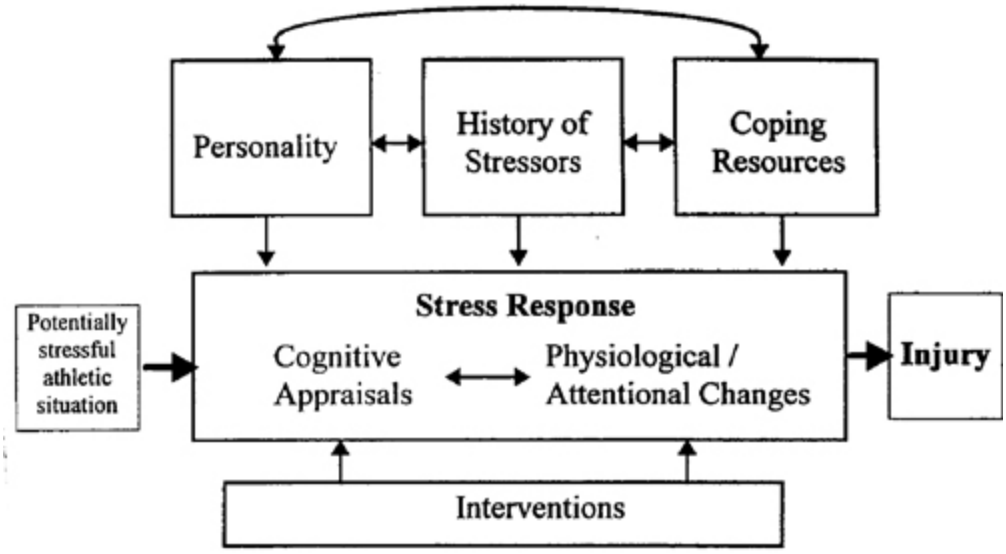

Figure 1. Andersen & Williams Model (Williams & Andersen, 1998).

When an individual is engaged in an athletic endeavor that is potentially stressful, personality, history of stressors, and coping resources interact with the individual's stress response, which is comprised of their cognitive appraisals and their physiological reactions. An individual's cognitive appraisals were defined as the ways in which they interpreted and perceived the demands placed upon them, the resources that they had available to them, and the consequences of potential actions they could take (Williams & Andersen, 1998). Their physiological reactions involved things such as heart rate, muscle tension, and their ability to maintain attention; with more severe physiological reactions, an individual generally finds it harder to concentrate and becomes more distracted. Since the introduction of this model in 1998, much research has been completed that has examined these different psychological variables and their injury prediction power.

Most research that examined the A&W model focused on one or two of the psychological predictors of injury; rarely were all three examined together. For example,

Williams, Tonymon, and Andersen (1991), examined 44 male and 30 female collegiate students who were participating in more than 4 hours of athletics per week in sports such as basketball, tennis, swimming, and volleyball, and reported partial support for the A&W model where coping resources were reported to reduce stress and anxiety. They also observed that high levels of life events (stress) caused peripheral narrowing; this also supported the model (Williams et al., 1991). However, they did not investigate any aspects of personality, thereby ignoring a large portion of the A&W model and not taking into account the potential impact that personality could have had on their results. For example, if they had investigated the amount of trait anxiety in their participant pool, they could have attempted to construct a model mirroring the A&W model and checked its predictor strength. While these findings were partially supportive of the A&W model, additional support was provided from researchers who investigated the interrelation between the three main predictor variables.

Ford, Eklund, and Gordon (2000) investigated six different psychosocial variables that covered all three predictor categories, however they examined their role in the moderation of life stress and injury. They reported that dispositional optimism and hardiness (both personality predictors) displayed moderating effects on injury rates when there was a change in life events (Ford et al., 2000). They observed that, as athletes from seven different sports rated higher on scales of hardiness and optimism, they also sustained significantly fewer injuries than individuals who did not score highly. Hardy, Richman, and Rosenfeld (1991) examined social support (a coping resource) and how it impacted injuries and moderated life stress among 92 female and 78 male collegiate student athletes engaging in the sports of volleyball, gymnastics, field hockey, soccer,

and cross-country. They reported a buffer effect with social support and life stress, where increased social support reduced the negative impact of stressful life events, however no attempt was made to include research on the personalities of the athletes they studied (Hardy et al., 1991). While this study provided valuable information on some of the main predictors of injury, it also did not consider all the variables in the A&W model. However, a review by Johnson (2007) compiled findings regarding many psychological predictors of injury and provided a more complete picture.

Johnson reviewed the predictors of high competitive anxiety, extreme emotional state, drastic life change, poor coping resources, and poor social support, and reported that all had a direct or indirect effect on injury occurrence. Johnson (2007) divided the article into two sections, the first section reviewed the personality variables that can predict injury, and the second reviewed the different types of stressors and coping resources involved in prediction. Within the personality variables section, Krasnow, Mainwaring, and Kerr (1999) reported a positive relationship between perfectionism in female gymnasts and their injury vulnerability; as perfectionism increased so did their vulnerability (as cited in Johnson, 2007). Lavalée and Flint (1996), reported a positive relationship between high levels of competitive trait anxiety in American football athletes and their severity of injury, as well as their days missed due to injury (as cited in Johnson, 2007). A positive relationship between injuries and having an external locus of control was also reported by Pargman and Lunt (1989) in American football players (as cited in Johnson, 2007). Williams, Hogan, and Andersen (1993), examining a sample of American football athletes, reported that athletes with a positive mood or state of mind sustained fewer injuries compared to athletes with more negative moods (as cited in

Johnson, 2007). Finally, Kolt and Roberts (1998) reported that field hockey athletes with lower levels of self-esteem sustained more injuries than their counterparts who had higher self-esteem levels (as cited in Johnson, 2007).

Within the section of Johnson's review concerning stressors and coping resources, Holmes (1970) reported that, among American football players, half of the athletes who reported high levels of life stress, sustained injuries leading them to miss a minimum of 3 days of practice (as cited in Johnson, 2007). Ballet dancers' injuries were reported by Patterson, Smith, Everett, and Ptacek (1998) to be predicted by negative life events as well (as cited in Johnson, 2007). In a study examining baseball, softball, tennis, and track athletes, Hardy and Riehl (1988) reported that both total, and negative, life changes were predictors of injury occurrence (as cited in Johnson, 2007). Williams Tonymon and Wadsworth (1986) as well as Hanson and associates (1992) reported that injuries in volleyball and track and field athletes were predictable based upon the coping resources that the athletes possessed (as cited in Johnson, 2007). Social support was also reported to be a reliable predictor of injury with low social support levels linked to higher injury risk by Smith, Smoll, and Ptacek (1990), and high levels of social support linked to fewer injury occurrences by Hardy and colleagues (1991) (as cited in Johnson, 2007). Since most research in this field focused on only one or two psychological predictors, the review by Johnson (2007) was beneficial in that it provided a compilation of research that helped support the entirety of the A&W model.

One benefit to the A&W model was its simplicity. There were only three main psychological variables influencing the stress response to adverse situations: personality, stressors, and coping resources (Williams & Andersen, 1998). This such model provided

for a straightforward method of predicting injuries that avoided becoming overcomplicated through the addition of too many other variables. While this model was simplistic in the number of predictors it incorporated, the three predictors it utilized were broad in scope. The area most lacking in the A&W model was the miniscule accounting of the physiological side of sport injury. Any of the aforementioned physical predictors of injury could seriously skew the predictive power of the three main psychological categories. Since the A&W model was almost exclusively a psychological predictor model, this limited its ability to predict injury on an individual basis, unless physiological characteristics were considered as well.

The Biopsychosocial Sport Injury Risk Profile (2010)

A more recently proposed model that incorporated psychological variables in the injury prediction equation was the biopsychosocial sport injury risk profile (BPS) (Wiese-Bjornstal, 2010). The BPS model was composed of four main predictor categories: biological, physical, sociocultural, and psychological. The biological and psychological categories were both perceived as internal predictors. The biological category included predictors such as nutrition, fatigue, prior injury, training, conditioning, hydration, and other physiological aspects that could affect injury likelihood (Wiese-Bjornstal, 2010). Alternately, the psychological category included predictors such as personality characteristics (like perfectionism), coping ability and resources available, likelihood of risk taking behavior, mood, ability to maintain attention, goals, beliefs, attitudes, and self-image (Wiese-Bjornstal, 2010).

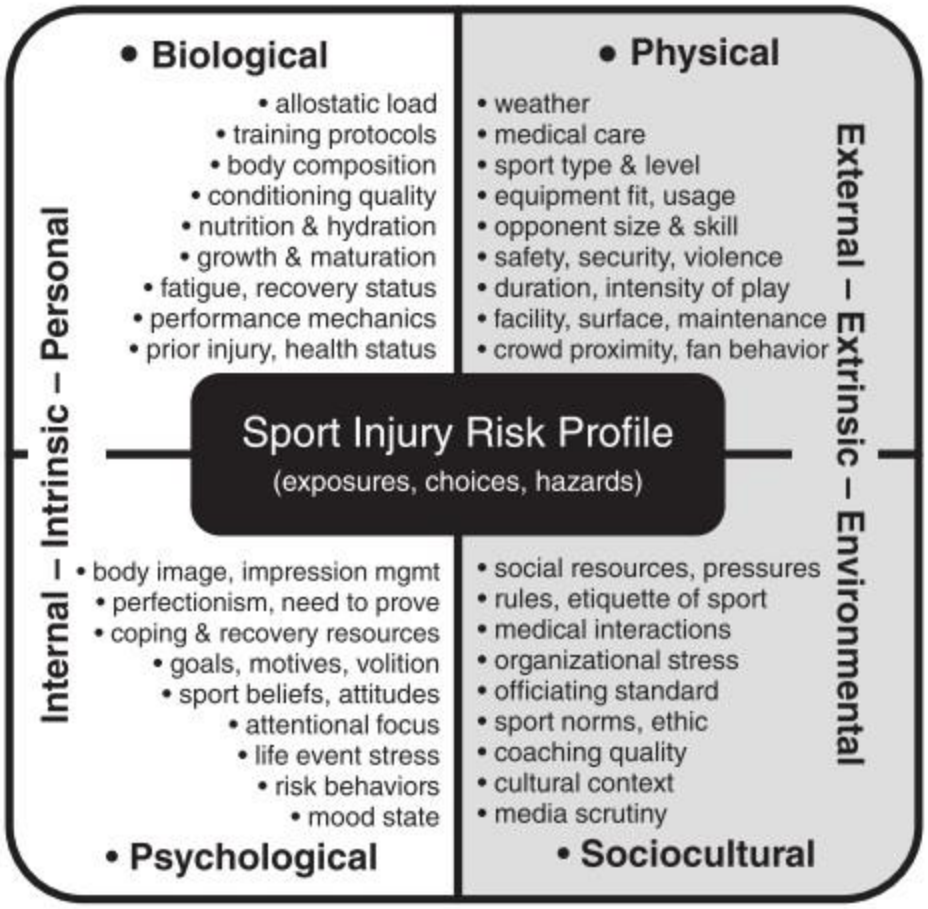

Figure 2. Sport Injury Risk Profile (Wiese-Bjornstal, 2010).

The physical and sociocultural categories were both perceived as external predictors that the individual may have little control over and that could be termed environmental. The physical category referred to predictors such as forces of nature, the sport type, competition level, equipment quality, competition length, facility maintenance, safety, medical care received, and the opponent's physical ability (Wiese-Bjornstal, 2010). The sociocultural category contained those aspects of the environment that did not act physically upon an individual. This category consisted of the ability and competency of coaches, influences from the media, cultural effects, quality of officiating,

rules of the sport, social resources available, and the benefits and pressures that came from those social resources (Wiese-Bjornstal, 2010).

There has been much support of the psychological predictors put forth by the Sport Injury Risk Profile; in fact, many of the predictors reflect the A&W model (Williams & Andersen, 1998). Therefore, much of the literature that supported the A&W model (Williams & Andersen, 1998) also supported the BPS model. One researcher who studied Division III football players, reported that athletes who underwent more life stress were more likely to be injured; this finding supported both the A&W model as well as the BPS model (Luo, 1994). Likewise, researchers examining Division I athletes reported twice as much life stress in athletes who were injured during a season as athletes who were not injured, and injured athletes also had more negative moods (Wiese-Bjornstal, Heniff, & Henert, 1998). Wiese-Bjornstal et al. (1998) examined predictors that were found in both the A&W and BPS models (life stress) as well as one predictor only found in the BPS model (mood). Some researchers examined predictors, like mood, that were only found in the BPS model. They have shown results indicating that the additional predictors included in the BPS model are valid, such as when Smith, Stuart, Wiese-Bjornstal, and Gunnon (1997) reported that preseason mood state, specifically low levels of vigor and high levels of fatigue as measured by a variation of the POMS (Mcnair et al., 1971), was a reliable predictor of injury during the season.

Comparing the Andersen and Williams and the Biopsychosocial Models

The BPS model shared some similarities with the A&W model in that it included both sociocultural, as well as psychological variables. However, the sociocultural aspects of the BPS model went into more depth. The A&W model largely portrayed social

support as an aspect of coping mechanisms, however there could be sociocultural aspects included in an individual's history of stressors. The BPS model included these concepts, such as media scrutiny and social pressures, but it also included concepts such as coaching quality, rules of the sport, sport norms, and cultural context (Wiese-Bjornstal, 2010). The psychological variables that the BPS model included were mostly included in the A&W model. Items such as life event stress, coping resources, attitudes, beliefs, perfectionism, and risk behaviors were all found in some form within the A&W model, even if they might have been a subset of a larger concept (such as attitudes and perfectionism within personality), or their own category, that is, coping resources (Wiese-Bjornstal, 2010).

In comparison, the BPS model appeared to be the more holistic model. It considered four important areas of an individual, the biological, the physical, the sociocultural, and the psychological. Ignoring any of these areas, such as the biological area for example, left room for doubt when trying to predict an injury. For instance, if an athlete had sustained a previous hamstring injury, they would be significantly more likely to re-injure their hamstring again (De Vos et al., 2014). This information would have been an important piece of knowledge to have and apply when trying to predict injury. The A&W model included mostly psychological variables that influenced the likelihood of injury, with a sparing inclusion of some physiological aspects. An apparent benefit to the A&W model was that it required far less information to predict an athlete's susceptibility to injury, while the BPS model required more information and included more than just the psychological aspects of an athlete's life.

Research on Psychological Predictors of Injury

Coping Resources

One of the psychological variables that purportedly helped to predict injuries was the coping resources that an individual had access to. Coping resources were mentioned in both the A&W model and the BPS model. Coping resources were defined as anything that a person utilized to reduce stress or deal with challenging situations, typically identified as either somatic, behavioral, cognitive, or social (Campen & Roberts, 2001). Somatic resources included sleep, meditation, physical relaxation (i.e., listening to music, getting a massage), as well as stretching or exercise (Campen & Roberts, 2001). Behavioral resources included superstitious activities, managing what an individual eats and drinks, reducing other responsibilities, and avoiding certain activities that may cause stress (Campen & Roberts, 2001). Cognitive resources included imagery and visualization techniques, self-talk, and distracting oneself from stressful situations (Campen & Roberts, 2001). Finally, social resources included surrounding oneself with supportive individuals such as coaches, teammates, friends, and family, and sharing with others the emotions that stressful situations bring about (Campen & Roberts, 2001).

Researchers examining track and field athletes from Division I and Division II schools reported that having a high number of coping resources available was associated with a protective effect towards athletic injury, and that athletes with more perceived resources were significantly less likely to become injured (Hanson et al., 1992). The act of coping with stressful and challenging situations consisted of "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman,

1984, p. 141). Williams et al. (1991) established that individuals who have high levels of coping resources typically displayed lower perceived state anxiety when under stressful conditions (such as negative life events and dealing with daily hassles.

Even when life stress was extremely low, and did not appear to impact the prevalence of injury, coping resources were still reported to be significantly higher in non-injured Division I volleyball athletes compared to their injured counterparts with significantly lower levels (Williams et al., 1986). The revelation that coping resources might not just be a buffer for stress, but that they could influence the likelihood of injury separate from other variables was crucial. Another study that examined professional soccer players further supported the influence of coping resources on athletic injury. When over 200 male and female Swedish soccer players, competing regionally, took a life stress questionnaire (LESCA; Petrie, 1992), an anxiety measure (Sport Anxiety Scale; Smith, Smoll, Cumming, & Grossbard, 2006), and a coping skills measure (Athletic Coping Skills Inventory; Smith, Schutz, Smoll, & Ptacek, 1995), 32 of them were identified as being 'high risk' for sustaining an injury based on those psychological predictors (Johnson et al., 2005). Half of those athletes were then initiated into an intervention program based on strengthening key areas of coping skills (such as somatic and cognitive relaxation) as well as various stress management skills; at the completion of the study, 77% of the athletes in the intervention group remained injury free, while only 19% of athletes in the control group remained injury free (Johnson et al., 2005). While, as a whole, coping resources have been reported to predict injury, the social realm of coping resources has received a particular focus in the research literature, and has been reported to be a fairly strong predictor of sports injuries on its own.

Social Support

Social support contained three main features: structural, functional, and perceptual (Bianco & Eklund, 2001). The structural aspect referred to the individuals who formed a network of supporting figures for an individual. Family, friends, teammates, coaches, and anyone else an individual interacted with could provide positive or negative social support and were considered a part of this network. The functional aspect involved all of the interactions and exchanges of support from this network of individuals. Finally, the perceptual aspect referred to the ways that individuals appraised the support that they received from their interactions with individuals in their support network.

A key notion involved in the understanding of social support was its extremely individualized aspect. The concept of social support largely centered on the interactions between the supporter and the individual receiving the support. Therefore, due to this interactive nature, social support was heavily influenced by the characteristics of the support provider as well as the characteristics of the receiver (Bianco & Eklund, 2001). This led to the problem of what might appear to be supportive individuals (or the supportive intentions held by them) actually having an adverse effect on the receiver; the effect was dependent on how the receiver interpreted the actions or words of the supposed supporter (Bianco & Eklund, 2001). Thus, a distinction between social support activities (actions people engage in to be supportive to another individual) and social support messages (the actual implications of those actions and the meanings being communicated through them) was identified (Bianco & Eklund, 2001). Therefore, the same actions and social support activities could have been interpreted into several different social support messages. One supportive action, as simple as an offer to give

aid, could have been interpreted positively by one individual, and could have had a positive effect on that individual's stress levels. They could have interpreted that action as a display of caring. The same action could have had the opposite effect on another individual and could have resulted in increased stress levels. They may have viewed an offer for help as an insult, and worried that their supporter did not have faith in their abilities. Even the most well-intentioned supportive actions could be interpreted negatively and could have the opposite effect than desired (Bianco & Eklund, 2001). Due to the individualized nature of social support, it was best studied through the perceptions of the receiver.

Social support has been reported to provide both a direct mediating effect on the amount of stress an individual perceives, as well as a buffering effect during stressful situations (Bianco & Eklund, 2001). The direct effect of social support rested upon social relationships helping to inoculate a person against experiencing stress, since they are confident that they have the necessary resources to face stressful situations (Bianco & Eklund, 2001). The buffering effect of social support was derived from the ability of an individual to actively draw on their supportive network during times of stress (Bianco & Eklund, 2001). This helped alleviate the stress that was felt and aided in the successful resolution of a stressful situation. Ultimately, the perception by the individual of whether the support was, or was not, effective was reliably connected with decreased stress (Bianco & Eklund, 2001). When support was reported to be effective, it decreased ambiguity, complexity, and unpredictability as well as granted a sense of control by helping an individual realize alternative and practical solutions to stressful situations (Robbins & Rosenfeld, 2001).

Andersen and Williams (1999) used the Social Support Questionnaire (SSQ; Sarason, Levine, Basham, & Sarason, 1983) to identify levels of positive social support in male and female athletes from two Division I schools, and reported that athletes with lower levels had a higher likelihood of injury. This was largely because positive social support could influence stress management in an individual, and was negatively correlated with the number of injuries an athlete received (Shrier & Hallé, 2011). One study that examined over 100 female collegiate gymnasts from Division I schools, and utilized the Life Events Survey for Collegiate Athletes (LESCA; Petrie, 1992), reported that a low score on the LESCA was correlated with an increased likelihood of injury; athletes who had low levels of social support suffered a magnification of that effect where the likelihood of injury increased further (Petrie, 1992). Additionally, Deroche, Stephan, Brewer, and Scanff (2007) reported that the correlation between life stress and injuries increased when the athlete did not have as much support while dealing with stressful situations.

The relationship between life stress and injury was reinforced by a study conducted by Hardy and associates (1991) where 170 male and female student-athletes at a Division I school completed life stress and social support questionnaires. They reported that social support provided a buffer effect on life stress and its effect on injury rates with male athletes. Specifically, as the number of social support providers decreased, and as an individual's perception of their available social support decreased, injury frequency rose as negative life stress occurred (Hardy et al., 1991). Thus, social support providers, and the perception of them by an individual were linked to how severely negative life events affected stress and ultimately injury occurrence. Even though a similar effect was not

reported for women, the existence of other literature that reported similar effects with women led the researchers to claim that this appeared to be an outlier (Hardy et al., 1991).

A recent study reported that there was a negative association between an individual's perceived social support, and the amount of stress that they are under (Brunet, Love, Ramphal, & Sabiston, 2014). This negative association had many possible explanations. One such explanation was that life stress could be interpreted as a distractor which, when increased, could undermine the ability to feel supported, and thus increase injury likelihood. Social support could also be viewed as a buffer, where increased perceived social support would be able to decrease the amount of stress that an individual felt.

Life Stress

Life stress refers to events or circumstances in an individual's life that placed an added burden on them. These events or circumstances could be either positive or negative. While positive life events could have made an individual happy, they included other responsibilities or requirements that were then added on top of any preexisting responsibilities. Negative life events often carried the same burden, but they contained the added aspect of negative emotions and thoughts associated with them. All that was required to initiate a stress response was for an individual to feel as though the demands of a situation were too much for them and that they had insufficient resources to overcome it (Ford et al., 2000). While most researchers have focused on general stressful life events during a year, some have been more specific. Some investigators for example, rather than focusing on life events that occurred within the past year, only examined the

week prior to injury. When surveying weekly stress, they observed that injured athletes suffered a dramatic increase in minor life events that past week, as opposed to their uninjured counterparts (Fawkner, McMurrary, & Summers, 1999).

Life stress has been linked with the development of physical and psychological issues (Rahe & Arthur, 1978; Passer & Seese, 1983). Devantier (2011) hypothesized that significant life events created a demand for an individual to adapt, and that the initial demand caused a stress response to begin, which then increased the injury risk. Aggregate life stress (both positive and negative) has been reported to be a significant predictor of injury frequency in the same study by Hardy and associates (1991) who examined Division I student-athletes. Negative life stress, however, has generally been reported to have a more substantial effect with athletic injuries; increased negative life stress resulted in larger increases in injury likelihoods in Division I and II football athletes when compared to total life stress increases (Passer & Seese, 1983). There are still incidences where researchers reported no direct relation between negative or positive life stress and injury, thus increasing the need for additional research (Petrie et al., 2014).

Researchers who reported a life stress/injury connection have reported that athletes who had higher levels of life stress incurred injuries at a rate of two to five times more frequently than athletes who reported lower levels of life stress (Williams & Roepke, 1993). In a systematic review by Williams and Andersen (2007), they reported that 85% of the literature addressing life event stress and sports injury demonstrated a positive correlation: as life stress increased so did sport injuries. It has largely been agreed upon by life stress researchers that negative stressful life events were what increased an athlete's risk of injury (Andersen & Williams, 1999). However, some

researchers have reported that only some athletes succumbed to the expected results of high life stress, and others have reported little or no evidence of such a relationship existing. In the case of NCAA Division I and Division II collegiate football players, the Division II group displayed a positive relationship between negative life stress and increased injury frequency, while the Division I group did not (Passer & Seese, 1983). Additionally, when Petrie (1993) examined Division I football players, he discovered that life stress influenced injury rates with starters, but that there was no relationship between injury and life stress with nonstarters. The reports that a positive relationship existed between life stress and injury in Division II but not Division I, and that it existed in Division I starters but not nonstarters, made it difficult to draw conclusions about whether the life stress relationship with injury was universal at the collegiate level.

Stress Management. Stress management described the way that an individual could handle stressful or adverse situations. Since Andersen and Williams (1988) reported that stress management played a part in the prediction of athletic injury, the research has both supported and opposed this claim. The mixed support could be attributed to the different ways that researchers defined stress management or coping mechanisms, and what attributes were measured by the scales the participants completed.

Researchers in Denmark observed professional soccer players' injury statuses for 3 months. Prior to this, the researchers inquired about previous injury history over the past 12 months and administered two assessments, the Competitive Trait Anxiety Test (Brand, Graf, & Ehrlenspiel, 2005), and the Athletic Coping Skills Inventory – 28 (ACSI; Smith et al., 1995), that measured trait anxiety and available coping skills (Devantier, 2011). Devantier (2011) reported that coping scores were significantly lower in

participants who sustained injuries than participants who did not sustain an injury. Additionally, the athletes who reported sustaining an injury had sustained significantly more prior injuries. This investigator conducted a logistic regression and reported that previous injury and coping ability accounted for 11% of the variance in injury frequency; trait anxiety was not reported to significantly affect injury likelihood.

In another study, dancers were engaged in a broad based coping skills training over 12 weeks which included imagery, self-talk, and autogenic training; the researchers reported that dancers in the intervention condition missed less days due to injury than dancers in the control group and dancers who only received autogenic training (Noh, Morris, & Andersen, 2007). Through the combination of psychological skills training and autogenic training, the dancers could gain advantages such as relaxed attention and a sharper focus on relevant cues (Noh et al., 2007). The report that psychological skills training reduced days missed due to injury was supported by similar reports on karate performances when exposed to comparable psychological skills training and relaxation/autogenic training with the intent of decreasing anxiety (Weinberg, Seabourne, & Jackson, 1982).

Perna, Antoni, Baum, Gordon, and Schneiderman (2003) created a program that introduced similar cognitive-behavioral based stress management interventions to collegiate rowers. The athletes in the study were initially assessed to determine baselines of medical history, mood, sleep, exercise, and stress. Following the baseline assessments, the rowers were randomly assigned to either a cognitive-behavioral stress management group or a control group (Perna et al., 2003). This group of investigators reported that the intervention group experienced fewer illness and injury days compared to the control

group $F(1, 29) = 7.05$, $p < .05$. Similar results were reported by Rogers and Landers (2005) who examined the mediating effect that coping mechanisms and stress management had on negative life event stress in high school varsity soccer athletes. They reported that coping skills buffered the effect of negative life event stress; they also observed that negative life stress generally predicted a higher occurrence of injury.

While research exists that supports a relationship between coping, stress management, and injury (Devantier, 2011; Noh et al., 2007; Perna et al., 2003; Rogers & Landers, 2005), researchers have also reported inconclusive or negative results regarding the prediction power of coping and stress management on injury. Kolt, Hume, Smith, and Williams (2004) examined 20 gymnasts in New Zealand engaged in a stress management intervention for 24 weeks and then observed them for 9 months. While no effect was reported on the occurrence of injury, the researchers claimed they would have needed a larger sample size to make a more precise conclusion. Similarly, Ivarsson, Johnson, and Podlog (2013) examined 56 Swedish soccer players who completed the Brief COPE (Carver, 1997), and reported that maladaptive coping did not have a significant relationship with injury prevalence. While these results failed to support coping resources as a predictor of injury, more studies would be needed to discount the relationship entirely. For example, Brougham, Zail, Mendoza, and Miller (2009) and Carver and Scheier (1994) reported that maladaptive coping resources produce more anxiety and stress, which have been observed to influence injury.

Personality

An individual's ability to handle and manage stressful situations was somewhat contingent on their personality. The term personality in this case referred to the

"individual differences in characteristic patterns of thinking, feeling, and behaving" (American Psychological Association, n.d.a). There were multiple aspects of personality, such as hardiness and optimism, which were identified as potentially playing some role in predicting injury likelihood in athletes. Some of the original personality components identified by Andersen and Williams (1988) were an individual's locus of control, their hardiness, and their inherent competitive trait anxiety. When observing injury rates in professional Swedish soccer players, Ivarsson & Johnson (2010) discovered that there were 4 personality characteristics that showed higher levels in injured athletes: somatic trait anxiety, psychic trait anxiety, stress susceptibility, and trait irritability. Since the construction of the original model to predict injury by Andersen and Williams (1988), other aspects of personality such as optimism, self-esteem, mistrust, and trait irritability have also been investigated. The three personality traits that appear to have the strongest relationship to injuries, and which also have received the most research attention, are hardiness, trait anxiety, and optimism. With the amount of research behind each aspect of personality, they were each deserving of in depth analysis and an exploration of the current literature surrounding them.

Hardiness. There were three key elements that composed the element of hardiness. An individual could display one, or all, of these characteristics (Hull, Van Treuren, & Virnelli, 1987). The first element of hardiness was control. Individuals who displayed this characteristic believed that the events and experiences in their lives were controllable by themselves, or at the very least they believed that they had some measure of influence over them (Kobasa, 1979). The second aspect was commitment. For an individual to be classified as committed, they needed to have the "ability to feel deeply

involved in or committed to the activities of their lives" (Kobasa, 1979, p. 3). Finally, the last aspect of hardiness was challenge. For an individual to be positively classified under this category, they needed to look forward to change as an exhilarating opportunity for growth which challenged them as individuals (Kobasa, 1979). Initially, these aspects of hardiness were investigated to establish whether they had any bearing on individual health. The outcome was that, of the three aspects of hardiness, only commitment and control were related to health, and a deficiency in either was linked to poorer health (Hull et al., 1987).

In their early research to validate the inclusion of hardiness in their prediction model, Andersen and Williams (1988) examined tough-minded football players. Football players at a Division I school who were deemed 'self-reliant' were reported to suffer injuries significantly less frequently than players who were dependent, sensitive, or overprotected (Jackson et al., 1978). More recently, in a two-year study with over 600 athletes at club, regional, and international levels, hardiness was reported to be a significant deterrent to sports injury, with increased hardiness leading to decreased likelihood of injury (Wadey et al., 2012a). The athletes completed a qualitative follow up study, and those who scored highly in hardiness also had a large and effective pool of "problem and emotion-focused coping strategies" which they could use both before and after injuries (Wadey, Evans, Hanton, & Neil, 2012b, p. 891). These strategies allowed athletes to reappraise major life events and their significance; specifically, they could view major life events as developmental opportunities rather than devastating and draining experiences (Wadey et al., 2012b). After this re-assessment, the athletes were then able to increase their understanding of the stressful situations they were in, and

worked to create a constructive method in which to deal with those situations (Wadey et al., 2012b). Salim, Wadey, and Diss (2016) similarly reported that athletes who rated high in hardiness and sustained an injury "experienced stress-related growth from having an emotional outlet, which enabled them to reframe their injury and experience positive affect" (p. 154). Finally, hardy athletes implemented a plan of action which enabled them to turn what would normally be a stressful situation into a developmental and learning experience; this transformation from a debilitating to a developmental experience then strengthened and reinforced that athlete's level of hardiness (Wadey et al., 2012b). Athletes without a high score in hardiness typically used more "avoidance coping strategies", such as denial or mental disengagement, which were partially what make them more likely to become injured (Wadey et al., 2012b, p. 891).

These effects of hardiness have been observed by other researchers as well. Hull, Van Treuren, and Propsom (1988) and Pagana (1990) reported that low hardiness scores were linked to individuals making "unhealthy attributions about both negative and positive situations" (Ford et al., 2000, p. 310). These poor attributions had the potential to increase susceptibility to many physical and psychological health issues (Ford et al., 2000). Conversely, individuals who rated higher in hardiness often interpreted both negative and positive events in a less stressful manner, usually because they saw them as something desirable and controllable (Ford et al., 2000). There was also evidence that hardiness had a direct effect on illness. Wiebe and McCallum (1986) surveyed a sample of college students and reported that, while health practices had as strong a direct impact on illness as hardiness, hardiness accounted for most of the variance when indirect effects were taken into consideration. Yet, some of the researchers who exclusively examined

the health benefits of hardiness did not report that hardiness provided any of the stress-moderating effects that were reported in studies evaluating injury predisposition (Roth, Wiebe, Fillingim, & Shay, 1989). The body of research surrounding hardiness as a predictor of injury through the moderation of stress is still small. While hardiness was most often included as an item that mediated the effect of life stress on injury, progress has been made to the point where measures have been constructed that examine mental toughness. These measures included aspects of hardiness, most notably the aspect of control (Sheard, Golby, & van Wersh, 2009).

Trait Anxiety. Trait anxiety was defined as an individual's overall likelihood to respond to stressful situations with anxiety, or, "feelings of tension, worried thoughts, and physical changes like increased blood pressure" (American Psychological Association, n.d.b). In a study on Swedish competitive male soccer players, athletes who became injured during the season were reported to have significantly more somatic trait anxiety ($F(1,43) = 5.43$, $p = 0.025$) and psychic trait anxiety ($F(1,43) = 4.32$, $p = .044$) than their non-injured counterparts (Ivarsson & Johnson, 2010). Trait anxiety, along with stress susceptibility and trait irritability were reported to account for almost 15% of the variance in injury likelihood among these athletes; this supported the injury prediction models that have theorized the relationship between trait anxiety and injury occurrences (Ivarsson & Johnson, 2010). Though trait anxiety was not a large predictor, in a sample of Division I football players, the damaging effects of other predictor variables such as life stress were only present when in conjunction with other variables, such as trait anxiety (Petrie et al., 2014). This made trait anxiety an integral part of the injury prediction process.

Trait anxiety was reported to show a "direct positive relationship with negative life event stress" in a study that involved Swedish soccer players (Ivarsson et al., 2013, p. 22). In this study trait anxiety along with daily stress and negative life stress reliably explained 24% of the variance in injury frequency. While trait anxiety did not explain the full 24% of the variance, its inclusion in the model further promulgated its predictive power. Similarly, a relationship between trait anxiety and maladaptive coping was reported by Barrell and Terry (2003); ballet dancers with higher levels of trait anxiety were observed to "use more maladaptive, emotion-focused coping strategies compared with low trait anxious athletes" (p. 59). Likewise, Johnson and Ivarsson (2011) examined youth soccer players and reported that trait anxiety combined with levels of mistrust, life stress, and poor coping skills explained 23% of injury incidence. They also reported that those athletes who became injured had significantly higher levels of trait anxiety prior to injury than their uninjured counterparts (Johnson & Ivarsson, 2011). Additionally, Petrie (1993) analyzed Division I collegiate football players by administering the LESCA (Petrie, 1992), the Sport Competition Anxiety Test – Adult (SCAT-A; Martens, 1977), and the ACSI (Smith et al., 1995) prior to the start of the season. At the completion of the sport season, Petrie (1993) collected data identifying the total number of days missed due to injury for each participant and reported that a hierarchical multiple regression determined that trait anxiety along with coping skills and positive life stress explained 60% of the variance in injuries among starters.

Lavallée and Flint (1996) worked with Canadian collegiate football and rugby players and examined trait anxiety. They reported that high trait anxiety was a significant predictor of injury, and that it also played a large part in the "degree of tension/anxiety,

anger/hostility, and total negative mood" of the athletes (Lavallée & Flint, 1996, p. 298). While trait anxiety as a predictor of injury was not usually the primary focus in injury prediction studies, it was involved in some manner. Though trait anxiety was not as large a predictor as life stress or social support, it was shown to contribute a significant predictive power. In fact, out of all of the variables presented in the A&W model, trait anxiety was the only concept that received consistent support across the body of research (Blackwell & McCullagh, 1990; Lavallée & Flint, 1996; Petrie, 1993; Petrie et al., 2014). As trait anxiety fell under the category of personality, it often was combined with other aspects of personality to gain a larger predictive power.

Optimism. While trait anxiety and hardiness remained the most heavily researched personality aspects, some of the findings regarding other aspects of personality deserved attention as well. Optimism, for example, has been observed to have a significant impact on the likelihood of an individual sustaining an injury. Optimism was measured in a two-year longitudinal study by Wadey, Evans, Hanton, and Neil(2013) examining over 600 athletes from professional and amateur levels. These investigators reported that as participants reported greater levels of optimism, their likelihood of sustaining injury decreased. They suggested that the negative relationship between optimism and injury likelihood existed because individuals who were measurably more optimistic, typically engaged in better physical and psychological health practices. Athletes with higher levels of optimism have been observed to make purposeful and effective efforts to promote their health using strategies such as: ensuring they received appropriate nutrition, taking time to get a good amount of rest, and exercising regularly for an appropriate frequency and duration (Carver, Scheier, & Segerstrom, 2010).

Additionally, optimistic individuals have been reported to employ better, and more adaptive, coping mechanisms during stressful situations. According to Aspinwall and Taylor (1992), and Schou, Ekeberg, and Ruland (2005), those mechanisms included preparing for and predicting future stressors, as well as engaging in instrumental coping (utilizing a task oriented approach to stress). Athletes who had high levels of optimism possibly experienced a less drastic stress response during challenging and demanding athletic situations because they perceived themselves as having the necessary resources or abilities to cope with the situations they encountered (Wadey et al., 2013). In fact, Prati & Pietrantoni (2009) proposed that highly optimistic individuals actively seek out stressful situations instead of avoiding them, as they see them as opportunities for growth. To relate optimism more directly to injury prediction, Wadey et al. (2013) conducted a study where they observed over 600 university athletes for a period of 2 years. Their primary goal was to study the effects that dispositional optimism had on injury frequency. The researchers used the Life Orientation Test – Revised (LOT-R; Scheier, Carver, & Bridges, 1994) to determine the levels of optimism in each athlete. Of the over 600 athletes observed over the 2 years, over 100 sustained injuries. They reported that as optimism levels rose, individuals became less likely to sustain an injury (Wald test = 8.45, $p < 0.01$; OR = 0.91, CI = 0.86-0.97).

Predicting Injury in Collegiate Athletics

Collegiate Athletics

According to the latest data, in the United States there were over 450,000 NCAA collegiate student athletes (National Collegiate Athletic Association, n.d.a). A good deal of research in the field of injury prediction has been completed with collegiate athletes,

most of that research has focused on Division I athletics, while only a very few studies have investigated Division III athletics. In the United States, the NCAA, which is a governing body for collegiate sports, divides colleges into three different divisions. Divisions I schools typically had the largest budgets and could grant scholarships to promising athletes (National Collegiate Association, n.d.b). While there was a "high academic standard", the focus of Division I athletic programs was far more sports based than academic based, as there were more opportunities for competition (which included long distance travel) (National Collegiate Association, n.d.b). There also appeared to be a strong emphasis placed upon athletic results and championships. Division II schools were also able to grant scholarships, but focused more on the balance between academics and athletics (National Collegiate Athletic Association n.d.c). Division III schools, unlike Division I and II schools, were not able to grant scholarships and they made academics the highest priority for their student athletes; Division III schools also were the largest division with regard to the total number of student-athletes (National Collegiate Athletic Association, n.d.c).

Comparing Divisions

The focus placed on athletics versus the focus placed on academics was not the only difference between divisions, although it was a large one. Limited research has been completed that compared the divisions. Of the injury related research that has been completed, the majority has been done on Division I athletes. For instance, researchers working with Division I female ice hockey players reported that they struggled with three main areas of stress, their relationships with others, their educational requirements, and the specific stressors of playing their sport (Heller, Bloom, Neil, & Salmela, 2005).

However, the researchers discovered that the strongest and most prominent source of stress came from sport specific stressors. The key areas where these student athletes struggled were: adjusting to loftier goals than they were used to, undergoing deep scrutiny, and adjusting to a higher level of competition. No similar studies that investigated Division II or III female ice hockey players were found, although it would be useful to know if similar stressors were experienced to the same degree.

Many similarities and differences between Division I, II, and III student athletes have been identified, one major similarity was athletic identity. Researchers who examined athletic identity in Division I versus Division III sports reported that there were no significant differences between divisions, but that there was a difference between genders, with males possessing stronger levels than females (Sturm, Feltz, & Gilso, 2011). This finding has been observed in other studies as well (e.g., Meyer, 1990; Miller & Kerr, 2002; Sack & Thiel, 1985). It appeared that during the progression through college, females developed an increased commitment to their student role rather than their athletic role (Sturm et al., 2011). Many males, over the same time period, came to view their sport as a potential job (Parker, 1994).

Another similarity between divisions was that both Division II and III lacrosse players responded in surveys that academics were significantly more important to them when they chose their colleges (Pauline, 2010) However, Division I players were more concerned with financial aid than their Division III counterparts (Pauline, 2010). Finally, while it may have appeared that Division I athletics carried more stress and therefore would increase the likelihood of injury, the point has been made that people can “not only survive, but thrive” and grow as a result of this stress specifically related to Division I

athletics (Galli & Reel, 2012, p. 297). However, while personal growth may indeed have occurred, it was still unknown whether the student-athletes were significantly more likely to sustain injury than their Division II or III counterparts who were supposedly not under as much stress. It was also unknown whether the same psychological variables (life stress, social support, coping resources, trait anxiety, and hardiness) that appeared to predict injuries with Division I student-athletes maintained their predictive power with Division II or III student-athletes.

Investigating Division III

Most research on psychological predictors of injury has been completed with Division I student-athletes. High levels of coping resources were reported to significantly predict a lower likelihood of injury in Division I athletics (Hanson et al., 1992; Williams et al., 1986). Andersen and Williams (1999), Hardy et al. (1991), and Petrie (1992) reported that increased social support significantly predicted a lower likelihood of injury in Division I. Negative life stress has been reported to increase the likelihood of injury at the professional level (Williams & Andersen, 2007) as well as in Division I schools (Petrie, 1993). Division I student-athletes have been reported to incur more injuries when they have lower levels of hardiness (Jackson et al., 1978), and this effect has also been observed at the regional and international level in Europe (Wadey et al., 2012a). Finally, high levels of trait anxiety have been reported to significantly predict higher likelihoods of injuries in Division I student-athletes (Petrie, 1993; Petrie et al., 2014).

While there was evidence that life stress, coping resources, social support, trait anxiety, and hardiness were predictors of injury in Division I and professional athletes, there was extremely limited information about student-athletes at the Division II or III

levels. Only one study by Luo (1994) was found that explicitly examined Division III student-athletes. This study, where researchers only examined the life stress relationship with injury, was unpublished but was cited and explained in an article by Wiese-Bjornstal (2009). Explicit details of the study were not provided; Fawkner and associates (1999) reported that it was a retrospective study that used a minor hassles scale to predict injury. However, since the measurement of daily hassles occurred post-injury, the results may have been influenced by increased stress from injuries.

Since Division III athletics possibly presented a different environment to student-athletes, the question arose as to whether the same psychological predictors of injury that have proven reliable with Division I student-athletes were applicable and evident across the divisional line. The ultimate goal behind understanding the psychological predictors of injury was to be able to identify athletes who were at risk according to these predictors. Interventions could then have been developed that would be aimed at improving the psychological realms where weaknesses may have existed, and the likelihood of sustaining an injury could have been decreased.

Because little was known about the Division III student-athlete population, developing interventions for them would have been premature. It was unknown whether the Division III population adhered to the injury prediction models that have only been demonstrated with Division I student-athletes thus far. Therefore, the conclusion reached was that all major psychological predictors of injury would need to be investigated at the Division III level to both further validate the existing models, as well as provide direction for the development of future interventions.

CHAPTER 3

METHODS

This chapter includes an overview of the participants, the five variables studied (hardiness, social support, life stress, coping resources, and anxiety), the survey instruments used to measure each of these variables, and the procedures followed. Also presented is an overview of how the data were analyzed in relation to the research questions and hypotheses.

Participants

Participants consisted of 125 student-athletes (n = 90 male and n = 35 female) attending a small, private, NCAA Division III college. Only sport teams that tallied and reported total injuries to an athletic trainer at the end of the year were eligible to participate. Participating teams included men's baseball (n = 20), lacrosse (n = 35), and crew (n = 35), as well as women's softball (n = 19), crew (n = 3), and track and field (n = 13). Participants' ages ranged between 18 and 23, and the participants included freshmen (n = 42), sophomores (n = 28), juniors (n = 23), and seniors (n = 32). Eighty percent (n = 100) of the participants self-reported that they had sustained a previous sport injury at some point in the past. Of those participants, reporting an injury, 40 reported having sustained an acute injury, 8 reported having sustained a chronic injury, 30 reported sustaining both chronic and acute, and 22 reported that their previous injury was neither acute nor chronic; 51 participants reported that they had sustained a sport injury within the current season. All student-athletes on each of the participating teams were eligible to participate. A power analysis for multiple regression with five variables (α =

.05 and β = .95) was completed, revealing a target sample size for this study to be between 120 and 135 participants. All subjects provided informed consent (Appendix A).

Demographics

Participants were also asked to provide demographical data, including gender, sport played, year in school, and injury status (Appendix B). The injury status questions were dichotomous: yes/no and concerned whether the participant had ever sustained an injury that required medical attention, and, if they had, whether they were acute, chronic, or if they had occurred in the current season.

Measures

In order to construct accurate injury risk profiles for all participants, five measures were utilized in this study. The Social Support Questionnaire (Sarason et al., 1983) analyzed how much social support was perceived by each participant, as well as how satisfied they were with the support they were receiving. The Life Event Survey for Collegiate Athletes (Petrie, 1992) measured stressful events in each participant's life. The Dispositional Resilience Scale-15 (Bartone, 2007), measured the personality trait of hardiness. The Brief COPE (Carver, 1997) evaluated the amount of adaptive and maladaptive coping mechanisms that a participant used when under stress. Finally, the Sport Anxiety Scale-2 (Smith et al., 2006) measured trait anxiety.

The Social Support Questionnaire (SSQ)

The Social Support Questionnaire (SSQ; Sarason et al., 1983) consisted of 27 items and two subscales: the individual's perceived number of sources of social support, and how satisfied they were with the support that they were receiving from those sources (Sarason et al., 1983) (Appendix C). The SSQ was reported to have an internal reliability

of α = .97 and it has been highly correlated with other measures of social support in collegiate undergraduate students (Sarason et al., 1983). Each item on the SSQ asked the participant to identify up to 9 individuals whom they could count on, go to, would help them, or would support them, etc. After the sources of support were identified, each participant then used a 6-point Likert-type scale to describe how satisfied they were with these sources of social support. The following anchors were used: (6) very satisfied, (5) fairly satisfied, (4) a little satisfied, (3) a little dissatisfied, (2) fairly dissatisfied, and (1) very dissatisfied. The first subscale consisted of taking the average of all identified sources of social support (from all questions), this average was the SSQ number score which could range from 0 to 243, with high scores indicating a high number of available social support providers. The second subscale consisted of taking the average of all satisfaction scores (from all questions), this average was the SSQ satisfaction score which could range from 0 to 162, with high scores indicating high satisfaction with the social support being provided.

Perhaps due to survey fatigue, with the SSQ being the longest of the measures utilized, some participants did not fully complete this measure. In order to generate scores for as many participants as possible, scores were calculated as long as a participant responded to at least 14 of the 27 items (i.e., half of the survey). The SSQ number score (how many social supports were perceived) and the SSQ satisfaction score (perceived confidence in social supports) from those participants who completed the entire SSQ was highly correlated with the scores from participants with at least 14 completed responses $r(115) = 1.00$, $p < .001$. To consolidate the SSQ scores into one variable, the average SSQ number score (which could range from 0-9) for each participant was multiplied with

their SSQ satisfaction score (which could range from 0-6), generating an overall total score.

The Life Event Survey for Collegiate Athletes (LESCA)

The Life Event Survey for Collegiate Athletes, or LESCA (Petrie, 1992), was a 69-item questionnaire that had an additional 5 optional free response items (Appendix D). Each question pertained to a particular life event that an individual may have experienced in the past year. The LESCA has been reported to have a test-retest reliability of $\alpha = .76$ to .84 (Petrie, 1992). Convergent validity (.58) has also been reported between the LESCA and the Social and Athletic Readjustment Rating Scale when examining collegiate football players (SARRS; Bramwell, Masuda, Wagner, & Holmes, 1975), which also measured life stress (Petrie, 1992). Additionally, evidence for construct and criterion related validity has been reported with correlations of $r = .55$ ($p < .001$) and $r = .22$ ($p < .05$) between the negative and positive life-stress scores and the SARRS respectively (Petrie, 1993). LESCA negative life stress has been reported to account for 11-22% of the variance in injury when low social support was present, and positive life stress has been reported to account for 14-20% of variance in injury when high social support was present (Petrie, 1992). Participants marked the events that they experienced in the last year with a checkmark; they left blank the space next to the events they had not experienced. For each event that a participant experienced, they assigned a number between -4 and +4 to that event. This number described the degree to which a positive or negative effect was experienced. A score of -4 indicated that the event was extremely negative, while a score of +4 indicated the event was extremely positive. The LESCA was analyzed via three different scores, the negative score, the positive score, and the

aggregate score. For the aggregate score, all of the positive and all of the negative scores were summed together providing a single score. The positive score was derived from the sum of all positive responses, while the negative score was derived from the sum of all negative responses.

The Dispositional Resilience Scale-15 (DRS-15)

The Dispositional Resilience Scale-15 (DRS-15; Bartone, 2007) consisted of 15 items that assessed the three aspects of hardiness: commitment, control, and challenge (Appendix E). The DRS-15 was a shortened form of the DRS (Bartone, Ursano, Wright, & Ingraham, 1989), which contained 30 items and was reported to predict depression and health outcomes. The DRS-15 scores correlated (r = .84) with the original DRS scores. With collegiate freshmen the test-retest coefficient of the DRS-15 was α = .78, which showed a high level of reliability (Bartone, 2007). In addition, Cronbach's alpha for the DRS-15 was found to be α = .78 when studying United States military personnel (Escolas, Pitts, Safer, & Bartone, 2013). Items on the DRS-15 ranged from statements such as "I feel that my life is somewhat empty of meaning" (from the commitment subscale), to "How things go in my life depends on my own actions" (from the control subscale), to "I enjoy the challenge when I have to do more than one thing at a time" (from the challenge subscale) (Escolas et al., 2013). Test takers rated each of these 15 items on a 4-point Likert type scale. Response anchors ranged from claiming the statement as not at all true (0), a little true (1), quite true (2), or completely true (3). The total sum of all 15 responses was the participant's final hardiness score, which ranged from a low of 0 to a high of 45, with a higher score indicating higher levels of hardiness.

The Brief COPE

The Brief COPE (Carver, 1997) was a 28-item questionnaire that asked participants what they usually did when they experienced stress (Appendix F). The Brief COPE contained responses to stress that were maladaptive, such as "I use alcohol or other drugs to get me through it", as well as responses that were adaptive such as "I try to see it in a different light, to make it seem more positive". The participants rated how often they engaged in each coping method with a number between 1 and 4. A ranking of 1 indicated they did not do it at all, 2 indicated they did it a little, 3 indicated they did it a medium amount, and 4 indicated they did it a lot. There were a total of 14 subscales (self-blame, self-distraction, active coping, denial, substance abuse, use of emotional support, use of instrumental support, behavior disengagement, venting, positive reframing, planning, humor, acceptance, and religion), and each subscale consisted of the responses from two questions. The internal reliability of these scales ranged from $\alpha = .50$ to $\alpha = .90$ (Carver, 1997).

These subscales have been combined into two larger categories in recent research (e.g., Ivarsson et al., 2013). The active coping, instrumental support, emotional support, positive reframing, planning, religion, humor, and acceptance scales made up the adaptive coping category; denial, substance use, behavioral disengagement, venting, and self-blaming made up the maladaptive category. This maladaptive coping category has been used in recent research (Ivarsson et al., 2013) to predict injury likelihood due to the fact that it has been reported to be significantly related to injury frequency in past studies by Ivarsson and Johnson (2010) and Williams and Andersen (1998). The maladaptive score can range between 10 and 40 with higher scores indicating higher usage rates of

maladaptive coping resources. The adaptive score can range between 16 and 64 with higher scores indicating higher usage rates of adaptive coping resources.

The Sport Anxiety Scale – 2 (SAS-2)

The Sport Anxiety Scale – 2, (Smith et al., 2006) or SAS-2, was a 15-item questionnaire that presented participants with different situations that might cause nervous, anxious, or tense feelings and behaviors (Appendix G). On a 4-point Likert scale, participants were asked to think about the situations before or during sport competitions and rate statements such as "I feel tense in my stomach", "I worry that I will not play well", and "I have a hard time focusing on what my coach tells me to do". The following anchors were used: (1) not at all, (2) a little bit, (3) pretty much, and (4) very much. The SAS-2 was scored by adding all of the responses, which generated a value between 15 and 60. Scores closer to 60 indicated a higher level of cognitive and somatic trait anxiety (Smith et al., 2006). For all 15 items on the SAS-2, internal consistency has been reported to be $\alpha = .91$, with test-retest coefficients $\alpha = .87$ (Smith et al., 2006). The SAS-2 has demonstrated construct validity by correlating highly (.90) with the original Sport Anxiety Scale (SAS), which has been demonstrated to measure cognitive and somatic trait anxiety (Smith et al., 2006).

Procedures

After Institutional Review Board (IRB) approval was acquired, participant recruitment began. The first step of participant recruitment consisted of contacting the head coaches of the teams that were targeted for the study. Due to time restrictions of the researcher after IRB approval, only spring sports were recruited for participation. The head coaches were asked to provide, or to allow the researcher to provide, information

about the study to the student-athletes on their teams. The student-athletes were told that the research being completed was exploring the relationship between individual psychological characteristics and injury. In exchange for their participation, all student-athletes were offered a chance in a raffle to win a gift card.

Once teams indicated their desire to participate, a time was arranged (with the coach) for the team to meet with the researcher. The researcher provided participants with two copies of an informed consent document. Participants tore off and kept the first copy for themselves, and signed the second copy. In addition, all participants were informed about the purpose of the study and what to expect from their participation. All participants were asked to allow access to their total number of injuries that semester, as well as the total number of days missed due to injury. All injury information was provided by the head athletic trainer, and participants were informed of the methods that would be used to ensure confidentiality. After reading and agreeing to the informed consent document, participants were asked to complete paper forms of five measures: the SSQ, the LESCA, the DRS-15, the Brief COPE, and the SAS-2 (in that order), as well as the demographical questions. Participants completed the forms in a group setting, but were asked not to communicate with their teammates during the process. Participants took between 30 and 45 minutes to complete the surveys.

Through collaboration with the head athletic trainer, injury information was summarized at the completion of the various sport seasons. The number of injuries and number of days missed were associated with the participants and their test scores, using randomly assigned numbers for each individual. Prior to recording all data, the researcher compiled a list linking the name of each participant with a random number. To ensure

anonymity and confidentiality for the participants, the list linking names to numbers was then transferred to the head athletic trainer. The researcher no longer retained a copy of the list. The head athletic trainer then input all injury data for each participant, removing their name from the list and leaving only the injury information linked to a random number. This allowed for survey data to be linked to injury data. The list was then transferred back to the researcher. Additionally, only the researcher had access to the test scores of the student-athletes. Again, all test scores were kept anonymous. There was no linking of the test scores to student-athletes and/or their injury status to coaches, athletic trainers, or any other personnel.

Research Questions

Research Question 1

Would the same psychological measures of social support, life stress, hardiness, coping resources, and trait anxiety that have been reported to predict injuries in Division I student-athletes also predict injuries sustained by Division III student-athletes?

Hypothesis 1

The psychological measures of social support, hardiness, life stress, coping resources, and anxiety will predict Division III student-athlete injuries.

Research Question 2

Would life stress, which was the strongest predictor of sport injuries in Division I student-athletes, be the strongest predictor of sport injuries in Division III student-athletes?

Hypothesis 2

Life stress will be the strongest predictor of sport injuries in Division III student-athletes.

Data Analysis

Initially, means and standard deviations were determined for all variables measured. Then, means and standard deviations of the responses from each of the five scales were computed with regard for each sport, and for gender. Then, correlations were drawn between all variables and the total number of injuries sustained, as well as with the total number of days missed due to injury. A hierarchical multiple regression was then conducted ($\alpha = .05$), with the variables being separated into two blocks. The first block was comprised of the gender, sport type, previous injury, and year in school variables, as differences were not expected between them. The second block consisted of the LESCA, SSQ, DRS-15, Brief COPE, and SAS-2 results. This analysis was run twice, once with the total number of injuries sustained as the dependent variable, and once with the total number of days missed due to injury as the dependent variable.

CHAPTER 4

RESULTS

Injury Data

Throughout the duration of this study, a total of 83 injuries were reported by the head athletic trainer. These injuries resulted in a total of 449 days missed. As is shown in Figure 3, the baseball and men's lacrosse teams sustained the highest average number of injuries per person.

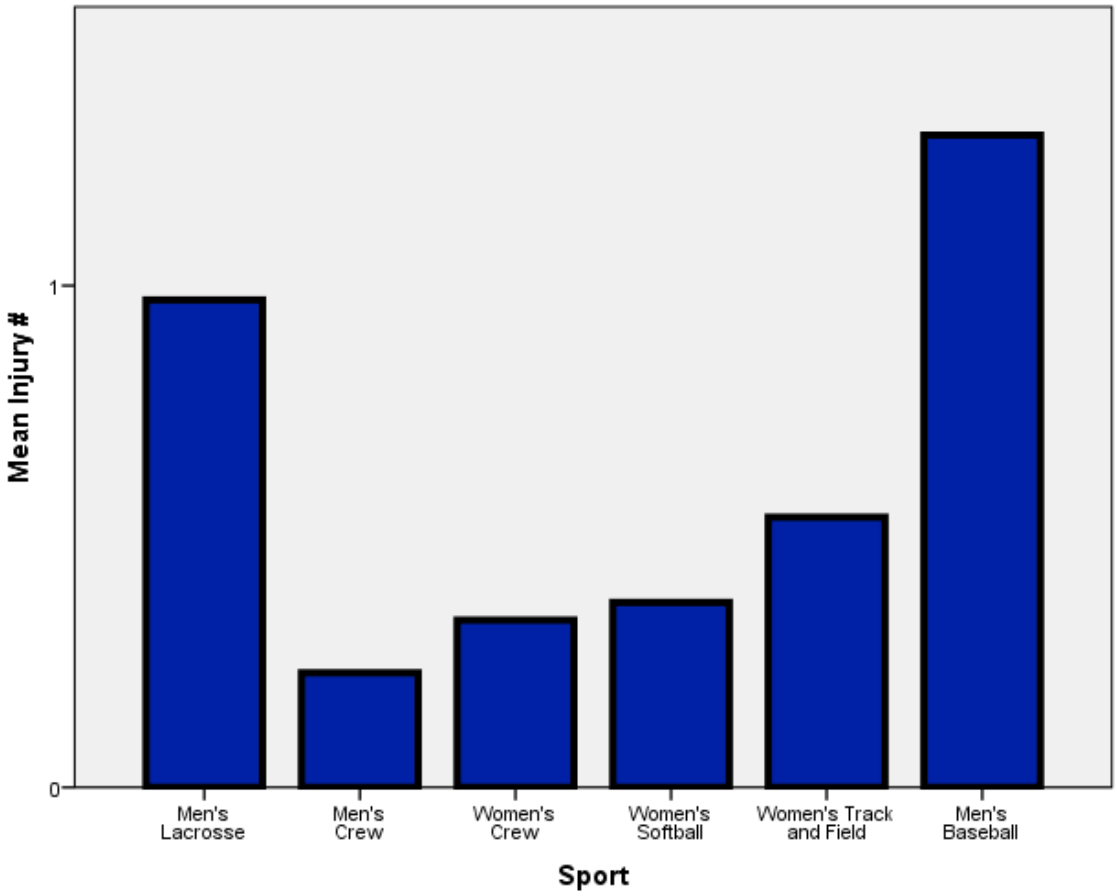

Figure 3. Average injuries sustained per person in each sport.

Likewise, Figure 4 shows that men's lacrosse and baseball reported the highest average days missed.

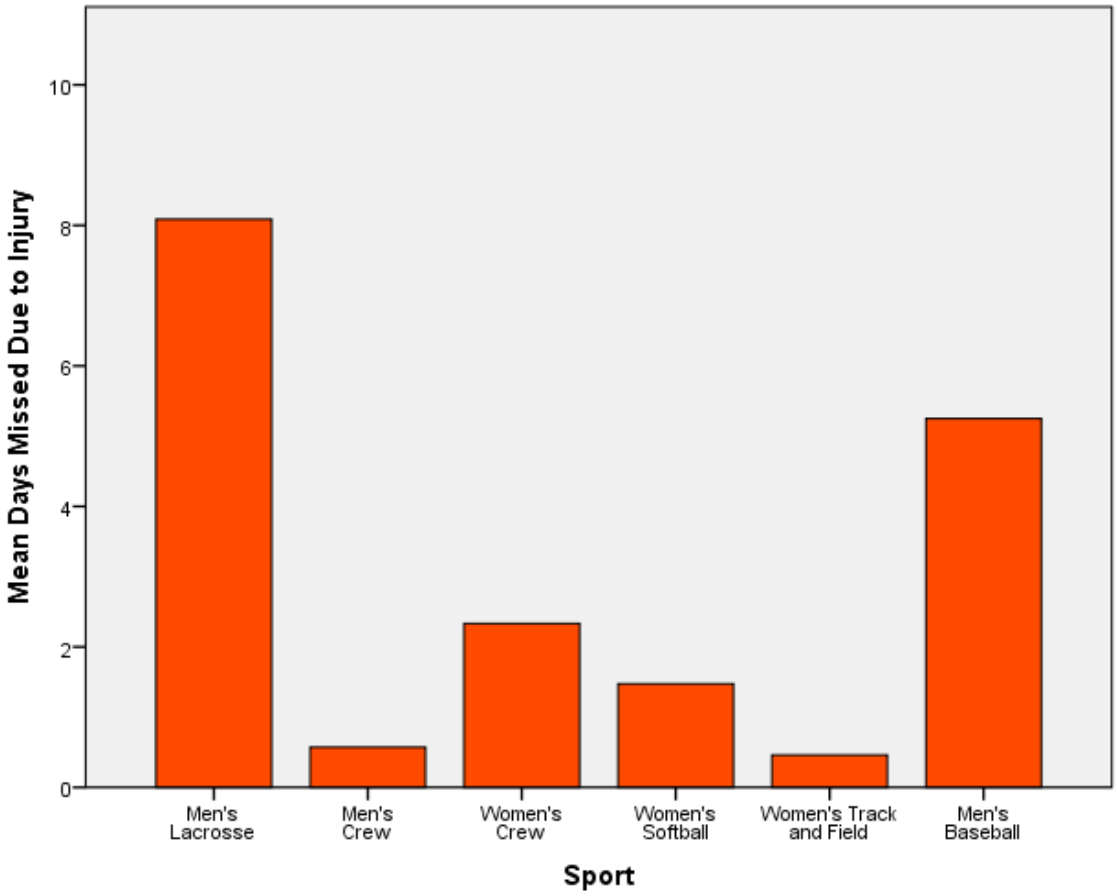

Figure 4. Average number of days missed per person in each sport.

Hardiness

The reliability of the DRS-15 was acceptable with a Cronbach's alpha of α = .74. The mean score on the DRS-15, which could range from 0-45, was *M* = 29.67 (*SD* = 5.10), indicating a moderate hardiness score. Males scored an average of *M* = 30.15 (*SD* = 4.70) and females scored an average of *M* = 28.42 (*SD* = 5.90). An independent *t*-test revealed that there were no significant differences between scores for males and females

(p = .10). A statistically significant difference in scores between sports was determined by a one-way ANOVA $F(5,112) = 2.85$, p = .02. A Tukey post hoc test revealed that the women's crew team scored significantly lower (M = 19.67, SD = 8.15) than the men's lacrosse team (M = 30.65, SD = 4.63, $p < .01$), the men's crew team (M = 29.88, SD = 5.14, p = .01), the women's softball team (M = 28.94, SD = 5.56, p = .04), the women's track and field team (M = 29.83, SD = 4.22, p = .02), and the men's baseball team (M = 29.72, SD = 4.16, p = .02). No significant differences were found between participants based on year in school, as determined by a one-way ANOVA, $F(3,114) = 1.46$, p = .23. The DRS-15 was completed in full by most participants.

Social Support

The SSQ was found to be highly reliable with a Cronbach's alpha of α = .98. The mean score on the SSQ was 23.43 (SD = 13.36). Males reported that they perceived significantly less support and less confidence in their support (M = 21.10, SD = 12.5) than females (M = 29.09, SD = 13.84) according to an independent t-test, $t(118) = 3.08$, p = .003. A one-way ANOVA revealed no significant differences between the scores from any of the sports surveyed $F(5,114) = 1.93$, p = .09, and there were no significant differences between scores based on the participant's year in school $F(3,116) = 1.68$, p = .18. Some participants did not complete all questions on the SSQ.

Life Stress

The reliability of the aggregate LESCA score was questionable, but acceptable, with a Cronbach's alpha of α = .68. However, the positive and negative LESCA scores were acceptably reliable with a Cronbach's alpha of α = .72 and α = .74 respectively. The mean positive score on the LESCA (M = 10.79, SD = 9.27) indicated relatively low

levels of positive life stress; there were no significant differences between the positive scores for males and females according to an independent *t*-test, $t(123) = -1.81$, $p > .05$. The mean negative score on the LESCA ($M = -13.58$, $SD = 10.77$) indicated relatively low levels of negative life stress, with males reporting significantly less negative life stress ($M = -12.23$, $SD = 10.48$) than females ($M = -17.06$, $SD = 10.86$) according to an independent *t*-test, $t(123) = -2.29$, $p = .02$. A one-way ANOVA revealed no significant differences between the scores from any of the sports surveyed $F(5,119) = 1.62$, $p = .16$. There were no significant differences between scores based on the participant's year in school $F(3,121) = .84$, $p = .48$. The LESCA did not require a response to each item, therefore it was unknown whether all participants answered it in full.

Coping

The reliability of the Brief COPE was acceptable with a Cronbach's alpha of $\alpha = .78$. The maladaptive score of the Brief COPE (indicating how frequently participants coped with stress in an unhealthy manner) was questionable with a Cronbach's alpha of $\alpha = .69$. The mean maladaptive score on the Brief COPE ($M = 17.66$, $SD = 4.06$) indicated low usage rates of maladaptive mechanisms; males did not score significantly different than females according to an independent *t*-test, $t(119) = .01$, $p = .99$. A one-way ANOVA determined that there were no significant differences between the scores from any of the sports surveyed $F(5,115) = 1.25$, $p = .29$. Similarly, there were no significant differences between scores based on the participant's year in school $F(3,117) = 1.04$, $p = .38$. The mean adaptive score on the Brief COPE ($M = 42.33$, $SD = 7.12$) indicated a medium to high usage rate of adaptive coping mechanisms. The Brief COPE was completed in full by most participants.

Anxiety

The reliability of the SAS-2 was excellent with a Cronbach's alpha of α = .92. The mean score on the SAS-2 (*M* = 25.68, *SD* = 7.74), indicated low levels of cognitive and somatic anxiety; there was no significant difference between males and females according to an independent *t*-test, $t(120) = 1.25$, $p = .21$. A one-way ANOVA determined that there were no significant differences between the scores from any of the sports surveyed $F(5,116) = 1.02$, $p = .41$. Again, there were no significant differences between scores based on the participant's year in school $F(3,118) = .99$, $p = .40$. The SAS-2 was completed in full by most participants.

Correlations

A Pearson correlation was conducted to determine the relationship between all demographic and psychological predictor variables. None of the variables shared a strong relationship with each other, however some statistically significant relationships emerged. These relationships are depicted in Table 1.

Table 1

Correlations Among Demographic and Psychological Variables

Variable	1	2	3	4	5	6	7	8	9
1. Year									
2. Previous Injury	.20*								
3. SSQ Total	.17	.06							
4. LESCA Negative	-.04	-.12	.19*						
5. DRS-15 Total	.04	.18*	.42*	.33*					
6. COPE Maladaptive	-.08	.02	-.25*	-.23*	-.32*				
7. SAS Total	-.06	.01	-.17	-.30*	-.20*	.46*			
8. Injury Number	-0.11	.18*	-0.18	-0.03	-0.02	0.03	0.05		
9. Days Missed	-.80	.07	-.23*	-.12	-.21*	0.05	0.16	.54*	

Note: Correlations marked with an asterisk (*) were significant at $p < .05$.

Multiple Regression Model

The first regression examined the predictive power of both blocks on the number of injuries that a student-athlete sustained during the period of study. This regression

revealed two significant predictors that are displayed in Table 2. In the first block, both gender (p = .03) and previous injury (p = .01) significantly predicted whether a student-athlete sustained an injury. In the second block, only previous injury (p = .02) significantly predicted future injury. None of the psychological variables that were included in the regression revealed any significant relationship with number of injuries sustained. The F-test for the second block was not significant, so no regression equation could be derived that included any of the tested psychological variables. However, the F-test for the first block was significant (p = .02) and the r^2 value revealed that the first block accounted for 11% of the variance in number of injuries sustained.

Table 2

Hierarchical Regression Analysis for Number of Injuries

Step/Predictor	*B*	*SE* B	β	*t*
Step 1				
Gender	.63	.28	.24	2.23*
Sport	.12	.07	.19	1.83
Year	-.18	.09	-.18	-1.94
Previous Injury	.72	.29	.25	2.57*
Step 2				
Gender	.57	.31	.21	1.84
Sport	.13	.07	.20	1.88
Year	-.17	.10	-.17	-1.72
Previous Injury	.73	.30	.24	2.44*
SSQ Total	-.01	.01	-.12	-1.10
LESCA Negative	.00	.01	-.01	-.05
DRS-15	.00	.03	-.01	-.06
COPE Maladaptive	-.02	.03	-.06	-.52
SAS Total	.01	.02	.08	.69

Note: Values marked with an asterisk (*) were significant at p < .05.

The second regression examined the predictive power of both blocks on the total number of days missed due to injury. This regression is displayed in Table 3. In the first

block there were no variables that significantly predicted how many days were missed due to injury, and the F-test was not significant, so a regression equation could not be formed. In the second block, only the DRS-15 (p = .04) significantly predicted the number of days missed due to injury. The F-test for the second block was statistically significant (p = .03), and the R-square value revealed that the second block accounted for 17% of the variance in days missed due to injury.

Table 3

Hierarchical Regression Analysis for Days Missed Due to Injury

Step/Predictor	*B*	*SE* B	β	*t*
Step 1				
Gender	1.45	2.07	.08	.70
Sport	-.80	.50	-.17	-1.61
Year	-1.25	.70	-.17	-1.80
Previous Injury	2.47	2.12	.11	.25
Step 2				
Gender	2.70	2.20	.14	1.23
Sport	-.78	.49	-.17	-1.60
Year	-1.32	.70	-.18	-1.90
Previous Injury	3.33	2.13	.15	1.56
SSQ Total	.00	.07	.00	.04
LESCA Negative	-.04	.09	-.05	-.44
DRS-15	-.42	.20	-.24	-2.08*
COPE Maladaptive	-.33	.24	-.15	-1.36
SAS Total	.24	.13	.20	1.82

Note: Values marked with an asterisk (*) were significant at p < .05.

Summary

Analysis provided insight into the reliability of the measures used, the correlational relationships between variables, and the predictive significance for injury of some psychological variables. All measures had an acceptable level of reliability; no measure had a Cronbach's alpha of less than α = .68. There were several small but

significant relationships between variables. Pearson correlations showed that previous injury was significantly and positively correlated with year in school, hardiness scores, and number of injuries sustained in the current season. There was a positive correlation between social support scores and negative life stress, as well as with hardiness, and a negative correlation between social support scores and maladaptive coping scores, as well as with days missed due to injury. Negative life stress scores were positively correlated with hardiness, and negatively correlated with maladaptive coping and trait anxiety. Hardiness scores were negatively correlated with maladaptive coping, trait anxiety, and days missed due to injury. Maladaptive coping was positively correlated with trait anxiety, and finally, days missed due to injury was positively correlated with injury number. Hierarchical multiple regression analyses showed that, when injury number was used as the dependent variable, gender and previous injury significantly predicted future injury. When days missed due to injury was used as the dependent variable, hardiness significantly predicted future injury.

CHAPTER 5

DISCUSSION

Examining the Models

Both the demographic variables of gender and sustained previous injuries revealed a significant relationship with the number of injuries sustained during the season studied. While these relationships were small, they combined to account for 11% of the variance in number of injuries. The personality characteristic of hardiness was the only variable that displayed a significant relationship with the number of days missed due to injury. While none of the other measured variables displayed a significant interaction, the regression equation still accounted for 17% of the variance in the number of days missed due to injury. Overall, too little evidence existed to accept the first hypothesis that Division III student-athletes' injuries would be significantly predicted by the same psychological variables that have been reported to predict injuries in Division I student-athletes. *Therefore, the first hypothesis, as well as the second hypothesis that life stress would be the strongest predictor of injury, were both rejected.* However, while both hypotheses were rejected, the revelation that hardiness significantly impacted injury prediction warranted further discussion, as did the fact that none of the other measured psychological variables revealed any significant relationships.

The significant relationship between previous injury and the number of injuries sustained during the study period was expected. This relationship has been reported before by Ryan et al. (2014). While previous injury significantly predicted number of injuries sustained, the correlation between previous injury and number of injuries was weak ($r = .18$, $p < .05$), and there was a complete absence of a relationship between

previous injury and number of days missed due to injury. The lack of a relationship between previous injury and number of days missed might be due to the self-report method that was utilized to collect the previous injury data. Participants may have misunderstood the criteria that were used to define injury for this study, or they may have reported an incorrect or incomplete injury history.

The relationship between gender and number of injuries was significant in the first block of the regression, which analyzed the number of injuries sustained. However, gender was no longer a significant predictor of injury once the demographical block had been taken into account and the psychological measures were included in the regression. Gender did not reveal any significant relationship with days missed due to injury. Overall, there was too little evidence to declare gender a significant predictor of injury, but more research is warranted to identify whether such a relationship might exist.

While hardiness did not influence the total number of injuries sustained, it was found to have a small but significant effect on the total number of days missed due to injury. This mirrored research by Jackson et al. (1978) where tough-minded football players were injured less frequently than their counterparts who were less tough-minded. Hardiness was the only significant variable in the regression that accounted for 17% of the variance in days missed. As was detailed previously, hardiness has not had the same level of support in psychologically predicting injuries, compared to other variables like life stress. The results from this current study might indicate hardiness to be a more significant predictor among Division III student-athletes than Division I student-athletes. The majority of research on Division I student-athletes indicated life stress as the strongest predictor of sport injury (Williams & Andersen, 2007). The current study

indicated no evidence of stress as a predictor at the Division III level, yet there was evidence that hardiness is a predictor. Still, there have only been a handful of studies (Andersen & Williams, 1988; Jackson et al., 1978; Wadey et al., 2012a) that have intentionally investigated the influence of hardiness on athletic injury (investigators in the three studies reported that as hardiness increased injury frequency decreased). The paucity of studies that previously investigated this relationship warrants more research at all levels of sport.

Life stress did not have the hypothesized influence on the number of injuries sustained or the number of days missed due to injury. This contrasts with many studies that have reported life stress as a major influencing factor (Fawkner et al., 1999; Hardy et al., 1991; Passer & Seese, 1983; Williams & Andersen, 2007; Williams & Roepke, 1993). Petrie (1993) reported that life stress significantly increased the frequency of injury among Division I student-athletes who were classified as starters. However, student-athletes who were not starters did not show signs of life stress impacting their frequency of injury. Although the athletes in the Petrie (1993) study were on the same teams, no similarities between starting and non-starting groups were reported.

One proposed interpretation of the discrepancy between starters and non-starters was put forward by Petrie (1993), stating that starters experienced more life stress, particularly that of a positive nature, than their non-starter counterparts. However, the same did not hold true for other psychological measurements such as coping ability and anxiety, where the starters scored the same or better than the non-starters. Therefore, Petrie was cautious in drawing conclusions that the role of a student-athlete on a team

influenced the results. It is possible that results from the current study, when compared to research completed on Division III student-athletes, could be interpreted similarly.

While Petrie (1993) distinguished between starters and non-starters, no such data was collected in this current study. However, it is possible that Division I student-athletes experience more positive life stress than their Division III counterparts (i.e., due to more demanding environments and higher expectations). This possibility could result in a stronger correlation between life stress and injury at the Division I level, compared to Division III. Distinguishing between starting roles for participants, as well as between Division I and III student-athletes, could prove a useful tool for future research. Understanding the inherent differences in stress could allow researchers to create a more comprehensive model of injury prediction.

No effect was observed between social support and injury frequency or duration. Survey fatigue might have been one possible reason for this absence of effect. The SSQ was the longest survey measure presented to the participants and many participants did not complete the measure. This finding necessitated a change in the method of calculating scores so that participants who responded to most, but not all the questions on the SSQ, could still be included in the study. Had there been more time provided for completing the measures, or had there been a different, shorter, measure used to analyze social support, different results may have been reported.

One unexpected finding in the current study was that males scored significantly lower on the SSQ than females, but females reported more negative life stress on the LESCA. Even though there was a significant difference between life stress levels of males and females, the overall life stress reported was low. There was not an overt and

obvious cause for such low life stress scores, however they may be due to the culture of Division III athletics, the environment of the particular teams that were surveyed, or the time that the surveys were completed (at the beginning of the season rather than near the end). The discrepancy between SSQ scores and LESCA scores differs from previous research (Andersen & Williams, 1999; Petrie, 1992), linking poor social support with more life stress. It might be expected that since males reported poorer social support, that they would have experienced more life stress than females, however this was not the case. Gender was the only variable where the LESCA and the SSQ scores differed significantly; the sport played and the participant's year in school had no significant effect. Therefore, more research is needed to determine whether a relationship between social support and life stress exists at the Division III level.

Several significant correlations between variables (see Table 1) were revealed during the analysis. Previous injury was positively related with hardiness in that sustaining a previous injury appeared to be indicative of a higher hardiness score. Although a cause and effect relationship was not established, sustaining a previous injury may lead to the development of hardiness in an individual; perhaps the experience of coping with a previous injury could lead to increased resilience and enhanced coping skills. This relationship should be further explored. Negative life stress was positively correlated with social support and hardiness. As hardiness and social support scores increased, less negative life stress was experienced. In short, high levels of hardiness and social support may act as a buffer to negative life stress as previously reported (Bianco & Eklund 2001; Ford et al., 2000; Hardy et al., 1991; Wadey et al., 2012b).

Negative life stress was negatively correlated with both trait anxiety and maladaptive coping. This finding arose because negative life stress was measured as a negative number (with larger negative numbers indicating more negative life stress). Thus, as negative life stress increased, trait anxiety and maladaptive coping also increased. The relationship with trait anxiety was expected, as Ivarsson et al. (2013) reported that increased levels of trait anxiety are related to increased stress. However, the relationship between negative life stress and maladaptive coping (as participants reported more frequent maladaptive coping activities they experienced less negative life stress) was unexpected. In spite of maladaptive coping methods (emotional outbursts, drug and alcohol use, etc.) being perceived as poor methods of reducing stress, the frequent usage of these coping methods was not indicative of increased negative life stress. The relationship observed between maladaptive coping and life stress may indicate that the presence of coping mechanisms, even if they are maladaptive, could still act as a buffer towards life stress. However, this relationship should be investigated further as previous research has indicated that maladaptive coping resources produce more anxiety and stress (Brougham et al., 2009; Carver & Scheier, 1994).

Hardiness scores were positively correlated with social support scores, indicating that as hardiness increased, the number and quality of perceived social support providers increased as well. Kobasa (1979) reported that a key element of hardiness is a sense of control. Robbins and Rosenfeld (2001) reported that effective social support granted individuals a sense of control in their lives, thus the current relationship between hardiness and social support is in line with previous research. Hardiness also had a negative relationship with maladaptive coping; as hardiness scores increased, the amount

of maladaptive coping that was utilized decreased. This negative correlation between hardiness and maladaptive coping aligns with a previous report by Wadey et al. (2012b) depicting individuals high in hardiness to have effective problem and emotion based coping resources. Hardiness was also negatively correlated with trait anxiety; individuals with high levels of hardiness reported low levels of trait anxiety. Based on how individuals high in hardiness approach stressful situations (see Kobasa, 1979), it would be expected that individuals high in hardiness not react to stressful situations with as much anxiety as individuals with low levels of hardiness. The A&W model (Williams & Andersen, 1998) represented the relationships between the variables of hardiness, trait anxiety, coping, social support, and life stress; these relationships were also found in the current results, however the variance explained of injury frequency or days missed due to injury was low. One possible explanation for the presence of relationships between variables, yet little variance explained, could have been that the sample size was not large enough to detect the variance explained by these predictors.

Social support was negatively correlated with maladaptive coping, indicating that as social support decreased, more maladaptive coping resources were utilized. No researchers directly examinined social support and maladaptive coping. However, since both are forms of coping with stress, these results might indicate that if there is a lack in one coping resource, another resource might be sought out to provide a similar effect. Maladaptive coping was also positively correlated with trait anxiety; as maladaptive coping resources were used more frequently, trait anxiety levels rose. While there is limited research examining the relationship between maladaptive coping and trait anxiety, Lavallée and Flint (1996) reported that trait anxiety played a large role in the

"degree of tension/anxiety, anger/hostility, and total negative mood" of athletes (p. 298). The influence of trait anxiety might lead individuals to cope with their stress and anxiety in maladaptive ways. A similar relationship between trait anxiety and maladaptive coping was reported by Barrell and Terry (2003); higher levels of trait anxiety were correlated with increased use of maladaptive, emotion-focused coping strategies.

Johnson et al. (2005) reported positive coping resources to be a deterrent to injury. Yet in the current study, negative coping resources were not linked to increased injury. Previous evidence of a possible effect of coping resources on injury was also reported by Williams et al. (1986). The current study, however, did not reveal any evidence of such an effect or relationship; therefore, more research is necessary to fully understand whether coping resources should be studied as a factor of life stress, or as a separate predictor variable.

Contrary to recent research by Johnson and Ivarsson (2011) who reported trait anxiety to have a significant effect (among other variables) on injury frequency, results from this study revealed no significant effect for trait anxiety. Given the results from this current study with Division III student-athletes, and others with Division I student-athletes (see Petrie's 1993 findings where trait anxiety impacted injury frequency), one may hypothesize that the lack of effect found in this study was due to the differences between Division I and III athletics. However, research by Johnson and Ivarsson (2011) was completed on high school soccer players. This difference negates, in part, that trait anxiety is only reported at the Division I level. Additionally, as was reported previously, hardiness and trait anxiety had a negative correlation in the current study (as hardiness increased trait anxiety decreased); therefore, it is possible that the effect of trait anxiety

was being mediated by the effect of hardiness. These results suggest a need to further investigate the variable of trait anxiety and how it interacts with sport injury, across all levels of sport.

Survey fatigue might explain why variables that have been reported as reliable predictors in past research were not revealed to be significant in this study. Participants took between 30 and 45 minutes to complete the surveys. Some participants did not complete all questions on every scale, especially on the SSQ. This situation necessitated the computation of a total score based upon the average response, as long as the participant responded to at least half of the questions on the SSQ. The LESCA did not require a response to every item; therefore, it was unknown whether all participants read and analyzed each possible source of life stress that was presented. The shorter scales (the DRS-15, the Brief COPE, and the SAS-2) were completed in full by most participants.

There are additional potential explanations of the discrepancies between the results of the current study and previous research. The current study consisted of a population that differed significantly from populations in previous injury prediction research. Due to time restraints on the data collection period, only spring sport participants were recruited for participation and all data was collected in the first week of the season. Some of the sports that were included in the current study, such as crew (which was a small sample [n = 3]), and lacrosse have not been previously included in studies examining psychological predictors of injury. Softball and baseball were only included in one study (Johnson, 2007) and track and field was included in two (Hanson et al, 1992; Johnson, 2007). Much of the research that has examined psychological

predictors of injury has involved other sports such as football (Andersen & Williams, 1988; Jackson et al., 1978; Lavalée & Flint, 1996; Luo, 1994; Passer & Seese, 1993; Petrie, 1993; Petrie et al., 2014) and soccer (Devantier, 2011; Ivarsson & Johnson, 2010; Ivarsson et al., 2013; Johnson et al., 2005; Johnson, 2007; Johnson & Ivarsson, 2011; Rogers & Landers, 2005). The majority of these studies consisted of either Division I student-athletes or professional athletes. There are marked demographical difference between NCAA Division I athletics and Division III athletics. In 2015, female Division I student-athletes were 66% White and 12% African-American, while in Division III athletics the ratio was 80% White and 5% African American (Lapchick & Baker, 2016). Likewise, male Division I student-athletes were 58% White and 22% African-American, while in Division III athletics the ratio was 74% White and 11 % African-American (Lapchick & Baker, 2016). It is possible that demographical differences between Division I and Division III, such as the racial, cultural or socioeconomic background of student-athletes, could explain why significant effects were found in previous research and not in this current study. Additionally, the current study included both contact (baseball, softball, lacrosse) and non-contact (crew, track and field) sports. Since the majority of previous research was conducted only with contact sports, the inclusion of non-contact sports may have influenced the results. Per the A&W model, the mechanism of sport injury is often the result of stressors influencing attentional shifts. Attentional shifts and distractions could be more relevant, and dangerous, in contact sports than in non-contact sports. More research is needed to investigate whether the results reported in research with contact sports can be generalized to non-contact sports.

Another factor that may have influenced the results was the number of participants who sustained an injury prior to participation. Eighty percent of the student-athletes that completed surveys reported that they had sustained a sport injury at some point in their past. Sport injuries can have negative psychological influences and can lead to an increased physiological predisposition towards future injury (Ryan et al., 2014; Smith, 1996). Sport injuries can have beneficial effects as well. Salim and associates (2016) reported that athletes who rated high in hardiness and sustained an injury "experienced stress-related growth from having an emotional outlet, which enabled them to reframe their injury and experience positive affect" (p. 154). If the current study had a larger sample size, it would have been prudent to separate the participants into two groups, those who had sustained a previous injury and those who had not. This separation would have helped account for the influence of a previous injury. However, due to the small sample size of 125 participants, a separation into two groups could have reduced any statistical significance from the results.

Other approaches could have been taken in regards to collecting and analyzing the current data. More psychological predictors could have been measured and included in the model (i.e., the relationship between additional aspects of personality and injury). Including a greater number of variables could allow for the creation of a model that would better approximate the A&W model. Future research should consider additional variables, such as pessimism and optimism, which were not included in this study.

Additionally, the method of measuring life stress could have been conducted on a weekly basis rather than on a 'one-time' basis which examined events in the previous year. Only one survey period was available which necessitated the use of the LESCA

(Petrie, 1992). Collecting life stress on a weekly basis and focusing on current stressors rather than aggregate yearly stressors might have influenced the relationship between life stress and injury frequency.

Finally, injury was recorded as a continuous variable rather than categorical. The decision to collect data in that manner was based on previous research. However, injury could have been recorded categorically where injury either did, or did not occur. Recording categorical data would have necessitated the use of a logistical regression to analyze the impact of the psychological variables that were measured. A logistical regression may have revealed different relationships between the measured variables and injury.

Practical Applications

Although the results did not reveal significant relationships between most of the examined psychological predictors and injury with Division III student-athletes, practical applications may still exist. For example, professionals who work with Division III student-athletes (such as coaches and administrators) may need to consider and be aware of the possibility that Division III student-athletes may not respond to factors such as life stress, social support, coping resources, or trait anxiety in the same manner as their Division I counterparts regarding injury.

However, professionals should be aware that in regards to the psychological variables that were measured in the current study, hardiness was found the most likely to influence injury. The construct of hardiness, which is easily and quickly assessable prior to the start of a season, could significantly impact the total number of days missed due to injury in Division III student-athletes. It is unknown whether increased hardiness leads to

sustaining less severe injuries and taking less time to heal, or whether it enhances the rehabilitation process, thus reducing the total days missed. Although the exact effect of hardiness is unknown, professionals could develop and provide interventions that increase hardiness with the intent of decreasing time missed due to injury.

It is uncertain whether subjecting Division III student-athletes to interventions based on improving the psychological variables of life stress, social support, coping resources, or trait anxiety would be beneficial, although these interventions have been reported to impact injury frequency at the Division I level. While such interventions might have a positive impact on one's overall quality of life, the positive impact of these interventions on the injury frequency with Division III student-athletes cannot be assumed.

CHAPTER 6

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was designed to assess whether various psychological variables (life stress, social support, hardiness, coping resources, and trait anxiety), that have been reported to predict the frequency of sport injuries in Division I student-athletes, would also predict sport injuries in Division III student-athletes. A total of 125 male (n = 90) and female (n = 35) athletes participated in this study, with each completing a survey packet evaluating each of the aforementioned variables. Demographical information regarding sport played, year in school, and previous injury information was also collected. Each participant was surveyed at the beginning of his or her season. At the end of the season, the head athletic trainer provided the researcher with injury information for each participant while maintaining anonymity through a random number identification system.

All measures used were revealed to have acceptable reliability. Two hierarchical multiple regressions were completed to determine if any of the psychological or demographical variables significantly predicted the number of injuries sustained, or the total number of days a student-athlete missed due to injury. Gender and previous injury were revealed to significantly predict the number of injuries sustained, but only previous injury maintained predictive significance (responsible for 11% of the variance) once all variables were accounted for. Additionally, while the total number of days missed was significantly predicted by hardiness, it only accounted for 17% of the variance.

Therefore, based upon the results of this study, Division III student-athletes did not follow the same injury prediction pattern as their Division I counterparts.

Conclusions

The results of this study yielded the following conclusions:

1. Approximately 11% of the variance in number of injuries appeared to be significantly predicted by whether participants had sustained a previous injury.
2. Approximately 17% of the variance in days missed due to injury appeared to be significantly predicted by hardiness on the DRS-15.
3. Days missed due to injury were not significantly predicted by gender, year in school, sport type, previous injury, life stress, social support, coping resources, or trait anxiety.
4. Number of injuries were not significantly predicted by gender, year in school, sport type, life stress, social support, coping resources, trait anxiety, or hardiness.

Recommendations

The following are recommendations for further study.

1. Further research is needed at the Division III level in order to overcome the limitations of the current study. The following suggestions are offered:
    a. Efforts should be made to shorten survey completion time in order to avoid survey fatigue and ensure more complete and accurate data collection. This goal could be accomplished by administering one survey per day, over 5 consecutive days.
    b. Future research should include more psychological predictor variables such as pessimism and optimism.

c. Future studies should include a larger number of participants and divide participants into two groups, participants with previous injuries and those without previous injuries, thus accounting for the statistical influence that history of injury could have on future injury.

d. Researchers should explore the best method of recording injury data, whether as a continuous variable or categorical.

e. Data should be collected across a more diverse range of sports, both contact and non-contact.

f. Data should be collected across multiple populations of Division III student-athletes to account for various regional or institutional differences.

g. Data should be collected across student-athletes in both starting and non-starting roles.

h. Participants should be tracked across seasons and surveyed each season to ensure their psychological profiles remain updated.

i. Future studies should include a diverse population, and data should be collected about the race/ethnicity of participants to allow for generalization.

2. The psychological variable of hardiness should be further measured at the Division III level to confirm whether it is indeed a viable predictor of injury at this level.

    a. Additionally, the construct of hardiness should be investigated to ascertain why high levels of hardiness were significantly linked to the total number of days missed due to injury.

   b. Researchers should explore whether high levels of hardiness lead to sustaining less severe injuries that require less time to heal, or whether hardiness enhances the rehabilitation process and reduces time held out due to injury.

3. The psychological variables of life stress, social support, trait anxiety, and coping resources should be further explored at the Division III level to verify whether or not they are viable predictors of injury at this level.
4. Research should compare how Division I and Division III student-athletes score on measures that have been used in the psychological prediction of injury.
   a. Researchers should better identify cultural and institutional differences between Divisions I and III athletes, as well as how such differences are linked to or expressed in the psychological profile of student-athletes, and ultimately if such differences might play a role in injury prediction.
5. Different methods for measuring psychological variables should be explored to ascertain which are most useful in predicting injury.
   a. The variable of life stress should ideally be measured weekly or daily, rather than aggregating all life stress over the previous year. This frequency would enable a more accurate tracking of stress and would provide the opportunity to explore patterns of stress impacting injury.
   b. In order to avoid survey fatigue, a shorter measure to reliably ascertain social support levels should be explored.
6. Researchers should attempt to collect additional data on the impact of previous athlete injury.

   a. Future studies should examine whether previous injuries strengthen, weaken, or have no effect on the psychological variables that have been reported to influence injury, particularly hardiness.

7. Studies are needed to test whether introducing interventions to increase hardiness in Division III student-athletes are effective in reducing the likelihood of sustaining a sport injury.

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APPENDIX A

Informed Consent Document

Purpose of this study:
This study is examining the psychological characteristics of Division III collegiate student-athletes. It is designed to study the frequency of athletic injury.

Benefits of the study:
By participating, you will be entered in a raffle for a $25 gift card to a local business. There are not any other tangible benefits from participating in this study, however, through answering and contemplating the survey questions, you may become more self-aware.

What you will be asked to do:
You will be asked to completely fill out this survey packet, and give your consent for the Head Athletic Trainer of your school to report the number of injuries you sustain, as well as the total number of days you are held out due to injury during this spring semester of 2015.

Risks:
There are no foreseeable risks for participating in this study. All information gathered will be kept confidential. Only the researcher and their supervisor will have access to your survey responses, and only the researcher, their supervisor, and your athletic trainer will have access to your numerical injury data. The Head Athletic Trainer will not divulge any details surrounding any injury to the researcher.

If you would like more information about the study:
Please contact the researcher, Jacob Schlierf, at jschlie1@ithaca.edu if you would like to get more information about the study or if you would like a copy of the results.

Withdrawal from the study:
You understand that you may withdraw from this study at any time without any penalty. You may turn in a blank survey, and you may skip any questions on the survey. If you would like to withdraw from the study, you may contact the researcher at jschlie1@ithaca.edu.

(initial)_____

How the data will be maintained in confidence:
Participation in this study will be confidential, all data generated will be kept confidential. Only the researcher, Jacob Schlierf, and their supervisor Dr. Justine Vosloo, will have access to informed consent documents and completed surveys which will be kept in a securely locked cabinet. All data will be kept for at least 5 years.

You have read the above information and understand its contents. By signing this document you agree to participate in this study and acknowledge that you are 18 years of age or older.

Name (PRINT):_____ Date:_____

Signed (SIGN):_____

By signing this document you give your permission for your Head athletic trainer to report the numerical value of how many injuries you sustained in the 2015 Spring semester matching the description of "physical damage sustained by sports participation which required medical attention, resulting in the absence from training or a game" to the researcher. You also give your permission for your Head athletic trainer to inform the researcher how many days you were held out due to those injuries.

Signature:_____ Date:_____

APPENDIX B

Demographical Data

Instructions: Please circle the appropriate answer for each category.

1. **Gender:** Male Female

2. **Sport:** Lacrosse Baseball Softball
   Crew Track and Field

3. **Year in school:** Freshman Sophomore
   Junior Senior

4. **Previous Injury:** Have you sustained at least one injury which required medical attention prior to taking this survey? (If yes, please answer questions 5, 6, and 7)

   Yes No

5. **Acute injury:** If the answer to question 4 is yes, were any of the injuries you sustained acute? (i.e. a traumatic event usually impact related whether with another athlete or in a fall, often resulting in the break of a bone, the inability to bear weight on a limb, severe tenderness in a limb, or the inability to move a joint in a full range of motion)

   Yes No

6. **Chronic injury:** If the answer to question 4 is yes, were any of the injuries you sustained chronic? (i.e. an injury caused by overuse of a particular body part which typically results in pain during physical activity and swelling afterwards, as well as constant aching outside of physical activity)
   Yes No

7. **Recent Injury:** Have you sustained an injury that required medical attention and resulted in the absence of at least one practice or competition in your current season?

   Yes No

APPENDIX C

Social Support Questionnaire

Instructions:

The following questions ask about people in your environment who provide you with help or support. Each question has two parts. For the first part, list all the people you know, excluding yourself, whom you can count on for help or support in the manner described. Give the person's initials and their relationship to you (see example). Do not list more than one person next to each of the letters beneath the question.

For the second part, circle how satisfied you are with the overall support you have. If you have no support for a question, check the words "No one," but still rate your level of satisfaction.

Do not list more than nine persons per question.
Please answer all questions as best you can. All your responses will be kept confidential.

Example:

Who do you know whom you can trust with information that could get you in trouble?

No one	1) T.N. (brother)	4) T.N. (father)	7)
	2) L.M. (friend)	5) L.M. (employer)	8)
	3) R.S. (friend)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

1. **Whom can you really count on to listen to you when you need to talk?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

2. **Whom could you really count on to help you if a person whom you thought was a good friend insulted you and told you that he/she didn't want to see you again?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

3. **Whose lives do you feel that you are an important part of?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

4. **Whom do you feel would help you if you were married and had just separated from your spouse?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

5. **Whom could you really count on to help you out in a crisis situation, even though they would have to go out of their way to do so?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

6. **Whom can you talk with frankly, without having to watch what you say?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

7. **Who helps you feel that you truly have something positive to contribute to others?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

8. **Whom can you really count on to distract you from your worries when you feel under stress?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

9. **Whom can you really count on to be dependable when you need help?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

10. **Whom could you really count on to help you out if you had just been fired from your job or expelled from school?**

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

11. With whom can you totally be yourself?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

12. Whom do you feel really appreciates you as a person?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

13. Whom can you really count on to give you useful suggestions that help you to avoid making mistakes?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

14. Whom can you count on to listen openly and uncritically to your innermost feelings?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

15. Who will comfort you when you need it by holding you in their arms?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

16. Whom do you feel would help if a good friend of yours had been in a car accident and was hospitalized in serious condition?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

17. Whom can you really count on to help you feel more relaxed when you are under pressure or tense?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

18. Whom do you feel would help if a family member very close to you died?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

19. Who accepts you totally, including both your worst and your best points?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

20. Whom can you really count on to care about you, regardless of what is happening to you?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

21. Whom can you really count on to listen to you when you are very angry at someone else?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

22. Whom can you really count on to tell you, in a thoughtful manner, when you need to improve in some way?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

23. Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

24. Whom do you feel truly loves you deeply?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

25. Whom can you really count on to console you when you are very upset?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

26. Whom can you really count on to support you in major decisions you make?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

27. Whom can you really count on to help you feel better when you are very irritable, ready to get angry at almost anything?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

APPENDIX D

Life Events Survey for Collegiate Athletes

Listed below are 69 events that sometimes occur in the lives of collegiate athletes. These events often produce change within an individual's life that require some adjustment by the individual. For each event that you have experienced within the last year (12 months):

1. Place a check under the column 0 months to 1 year to indicate that you experienced the event within the last year. Please make sure that each check corresponds to the event that has happened to you in the 1-year timeframe. Remember, only respond to those events that you have experienced within the last year. If you have not experienced an event within the last year, leave that item blank.
2. Indicate what kind of an effect it had on your life when the event occurred. A rating of -4 would indicate that the event had an extremely negative effect on you. A rating of +4 would indicate that the event had an extremely positive effect on you. For those events that have happened more than once, indicate the *average* effect across all occurrences.

   The events are listed in no particular order, and there are *no* right or wrong answers. Please respond to each event honestly as applies to you.

	0 months to 1 year	**Rating**
1. Marriage		
2. Death of mate (boyfriend, girlfriend, spouse, significant other)		
3. Major change in sleeping habits (increase or decrease in amount of sleep)		
4. Death of close family member(s) a. Father b. Mother c. Brother d. Sister e. Grandfather f. Grandmother g. Other		
5. Major changes in eating habits (increase or decrease in food intake)		

6.	Death of close friend(s)		
7.	Outstanding personal achievement		
8.	Male: mate pregnant		
9.	Female: becoming pregnant		
10.	Sexual difficulties		
11.	Being fired from job		
12.	Being apart from mate (boy/girlfriend, spouse, etc) due to sport		
13.	Serious illness or injury of close family member(s) a. Father b. Mother c. Brother d. Sister e. Grandfather f. Grandmother g. Other		
14.	Major change in the number (more or less) of arguments with mate		
15.	Major personal injury or illness		
16.	Major change in the frequency (increased or decreased) of social activities due to participation in sport		
17.	Serious injury or illness of close friend		
18.	Breaking up with mate (boy/girlfriend, etc)		
19.	Beginning a new school experience (beginning college, transferring colleges, etc)		
20.	Engagement		
21.	Academic probation/ineligibility		
22.	Being dismissed from dorm or other residence		
23.	Failing an important exam		
24.	Major change in relationship with coach (better or worse)		
25.	Failing a course		
26.	Major change in the length and/or conditions of practice/training		
27.	Financial problems concerning school		

28.	Major change in relationship with family member(s) (better or worse)		
29.	Conflict with roommate		
30.	Male: mate having an abortion		
31.	Female: having an abortion		
32.	Major change in the amount (more or less) of academic activity (homework, class time, etc)		
33.	Pressure to gain/lose weight – due to participation in sport		
34.	Discrimination from teammates/coaches		
35.	Major change in relationship(s) with teammates (better or worse)		
36.	Suspended from team for nonacademic reasons		
37.	Trouble with academic counselor		
38.	Major change in use of alcohol/drugs (increased or decreased)		
39.	Beginning sexual activity		
40.	Major change in relationship(s) with friend(s) (better or worse)		
41.	Recovery from illness/injury/operation		
42.	Major change in level of athletic performance in actual competition (better or worse)		
43.	Divorce or separation of your parents		
44.	Major change in level of responsibility on team (increased or decreased)		
45.	Receiving an athletic scholarship		
46.	Not attaining personal goals in sport		
47.	Major change in playing status on team		
48.	Injury to teammates		
49.	Being absent from school (classes) because of participation in sport		
50.	Troubles with athletic association and/or athletic director		
51.	Difficulties with trainer/physician		
52.	Major changes in playing time (playing more or less)-due to injury		

53.	Major errors/mistakes in actual competition		
54.	Losing your athletic scholarship		
55.	No recognition/praise of accomplishments from coaching staff		
56.	Pressure from family to perform well		
57.	Loss of confidence due to injury		
58.	Unable to find a job		
59.	Change in coaching staff		
60.	Female: menstrual period/PMS		
61.	Major change in level of academic performance (doing better or worse)		
62.	Making career decisions (applying to graduate schools, interviewing for jobs, etc)		
63.	Being cut/dropped from the team		
64.	Continual poor performance of team		
65.	Change in graduation schedule		
66.	Major change in family finances (increased or decreased)		
67.	Major change in attitude toward sport (like/enjoy more or less)		
68.	Victim of harassment/abuse (sexual, emotional, physical)		
69.	Victim of personal attack (rape, robbery, assault, etc)		
	Other events might have occurred to you in the past year (and affected you in a positive or negative manner) but were not included in this list. If there were such events, please list them below.		
70.	_____		
71.	_____		
72.	_____		
73.	_____		
74.	_____		

APPENDIX E

Dispositional Resilience Scale-15

Below are statements about life that people often feel differently about. Check the box to show how much you think each one is true. Give your own honest opinions…There are no right or wrong answers.

	Not at all true	**A little true**	**Quite true**	**Completely true**
1. Most of my life gets spent doing things that are meaningful				
2. By working hard you can nearly always achieve your goals				
3. I don't like to make changes in my regular activities				
4. I feel that my life is somewhat empty of meaning				
5. Changes in routine are interesting to me				
6. How things go in my life depends on my own actions				
7. I really look forward to my daily activities				
8. I don't think there is much I can do to influence my own future				
9. I enjoy the challenge when I have to do more than one thing at a time				
10. Most days, life is really interesting and exciting for me				
11. It bothers me when my daily routine gets interrupted				
12. It is up to me to decide how the rest of my life will be				
13. Life in general is boring for me				
14. I like having a daily schedule that doesn't change very much				
15. My choices make a real difference in how things turn out in the end				

APPENDIX F

Brief COPE

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel, when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Then respond to each of the following items by filling in one number on the column to the right for each, using the response choices listed just below. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU--not what you think "most people" would say or do. Indicate what YOU usually do when YOU experience a stressful event.

1= I usually don't do this at all

2 = I usually do this a little bit

3 = I usually do this a medium amount

4 = I usually do this a lot

	#		#
1. I turn to work or other activities to take my mind off things.		16. I give up the attempt to cope.	
2. I concentrate my efforts on doing something about the situation I'm in.		17. I look for something good in what is happening.	
3. I say to myself "this isn't real.".		18. I make jokes about it.	
4. I use alcohol or other drugs to make myself feel better.		19. I do something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	
5. I get emotional support from others.		20. I accept the reality of the fact that it has happened.	
6. I give up trying to deal with it.		21. I express my negative feelings.	
7. I take action to try to make the situation better.		22. I try to find comfort in my religion or spiritual beliefs.	
8. I refuse to believe that it has happened.		23. I try to get advice or help from other people about what to do.	
9. I say things to let my unpleasant feelings escape.		24. I learn to live with it.	
10. I get help and advice from other people.		25. I think hard about what steps to take.	

11. I use alcohol or other drugs to help me get through it.		26. I blame myself for things that happened.	
12. I try to see it in a different light, to make it seem more positive.		27. I pray or meditate.	
13. I criticize myself.		28. I make fun of the situation.	
14. I try to come up with a strategy about what to do.			
15. I get comfort and understanding from someone.			

APPENDIX G

Sport Anxiety Scale-2

Reactions to Playing Sports

Many athletes get tense or nervous before or during games, meets, or matches. This happens even to pro athletes. Please read each question. Then, circle the number that says how you USUALLY feel before or while you compete in sports. There are no right or wrong answers. Please be as truthful as you can.

	Before or while I compete in sports:	Not At All	A Little Bit	Pretty Much	Very Much
1.	It is hard to concentrate on the game.	1	2	3	4
2.	My body feels tense.	1	2	3	4
3.	I worry that I will not play well.	1	2	3	4
4.	It is hard for me to focus on what I am supposed to do.	1	2	3	4
5.	I worry that I will let others down.	1	2	3	4
	Before or while I compete in sports:	Not At All	A Little Bit	Pretty Much	Very Much
6.	I feel tense in my stomach.	1	2	3	4
7.	I lose focus on the game.	1	2	3	4
8.	I worry that I will not play my best.	1	2	3	4
9.	I worry that I will play badly.	1	2	3	4
10.	My muscles feel shaky.	1	2	3	4
	Before or while I compete in sports:	Not At All	A Little Bit	Pretty Much	Very Much
11.	I worry that I will mess up during the game.	1	2	3	4
12.	My stomach feels upset.	1	2	3	4
13.	I cannot think clearly during the game.	1	2	3	4
14.	My muscles feel tight because I am nervous.	1	2	3	4
15.	I have a hard time focusing on what my coach tells me to do.	1	2	3	4