REPORTED STRESS AND INJURY OCCURRENCE IN DIVISION I COLLEGIATE STUDENT ATHLETES

by

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ABSTRACT

Experiencing stress is a normal part of life for college students. Injuries is a regular part of life for collegiate student athletes. The goal of this study was to determine if there is an association between reported stress and injury occurrence in student athletes and what stressors were most related to injury occurrence. Participants *(N* =127) included current Division I student athletes. Using their score on the College Student Athletes' Life Stress Scale and injury demographic, it was determined student athletes who had an injury reported significantly more stress than those who were not injured. Stress in the injury category was predictive of injury occurrence. There is a need for those involved in athletics to understand how stress can impact student athletes. Increased stress may put student athletes at additional risk for injury. More research is needed on whether mitigation tactics can help decrease that risk.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF APPENDICES

Page

LIST OF ABBREVIATIONS

SA	Student Athlete
SAs	Student Athletes/Student Athlete's
NCAA	National Collegiate Athletics Association
ISP	Injury Surveillance Program
CSALSS	College Student Athletes' Life Stress Scale
AE	Athlete Exposure
FBS	Football Bowl Subdivision
FCS	Football Championship Subdivision

CHAPTER I

INTRODUCTION

There are over 470,000 student athletes (SAs) participating in collegiate athletics in the United States (Kerr et al., 2015; National Collegiate Athletic Association [NCAA], 2020) and injuries are a common occurrence. There are about 210,000 injuries suffered by NCAA SAs each year (Kerr et al., 2015). The cost of these injuries can add up with an orthopedic injury averaging $9,000 (Fair & Champa, 2019).

Sports medicine professionals and strength and conditioning coaches work to decrease and prevent injuries among their athletes. Rule modifications and equipment changes can also assist in decreasing injury occurrence. However there may be other factors affecting SAs that impact injury rates, such as personal levels of stress (Hamlin et al., 2018; Laux et al., 2015; Mann et al., 2015). There are unique mental and physical stressors reported by collegiate SAs when compared to non-athlete college students (Gabbett et al., 2014; Pa-Panikolaou et al., 2003; Wilson & Pritchard, 2005). There are stressors from missing class and assignments due to travel with athletics, from current injuries, from a lack of sleep, and a variety of other stressors (Madrigal & Robbins, 2020; Wilson & Pritchard, 2005).

Andersen and Williams (1988) developed the stress and athletic injury model showing how stress can lead to athletic injury. There are two pathways described in the model, cognitive appraisal, and physiological and attentional aspects. The cognitive appraisal pathway implies that if an athlete cannot handle the demands of their situation, they cannot properly make decisions in the situation. The physiological and attentional aspects describe how muscle tension brought on by stress can lead to injury as can mental distraction during athletic participation.

There has been continued research into how stress can be a cause of injury. Hamlin et al. (2019) saw an increase in injury rates associated with an increase in academic stress. Laux (2015) found more injuries occurred when a player felt more exhausted or overexerted. Most of the research involving stress is done through participant surveys. Saw et al. (2015) determined questionnaires and self-report measures are effective at measuring reported stress in participants.

One survey was developed for collegiate SAs stress measurement. The College Student Athletes' Life Stress Scale (CSALSS; Lu et al., 2012) is a questionnaire with 24 questions on a 6-point Likert scale, that is used to measure student athlete (SA) stress. It has questions relating to eight different stressors related specifically to SAs: sports injury, performance demand, coach relationship, training adaptation, interpersonal relationships, romantic relationships, family relationships, and academic requirement. The higher the score, the more stress

reported. The higher the number in a specific category, the more the participant is reporting stress in that category. The use of this survey with SAs will allow an investigation of how varying sources of stress are related to injury.

Purpose of the Study

The purpose of this study was to examine if there was a difference in reported stress between injured and uninjured SAs. The secondary purpose was to find out if higher reported stress was associated with more severe injuries. Lastly, the goal was to determine whether higher total stress or high stress in a specific stress category of the CSALSS was predictive of injury.

Significance of the Study

The significance of this study is to illustrate the impact life stress has on injury rates in collegiate SAs. The results of this study can be used by any support staff for collegiate athletic teams. With an understanding of how different categories and sources of stress impact injuries, proper stress management techniques can be instituted to benefit SAs.

CHAPTER II

LITERATURE REVIEW

Although injuries in sports are inevitable, countless hours have been spent by sports medicine and strength and conditioning staff members to develop ways to prevent injuries. One potential contributor to the risk of injury is stress. While college is an innately stressful time, collegiate SAs not only have to deal with life and academic stresses, but also have the added stresses of training and competition. These added stressors may have an impact on injury rates in SAs. If it does, stress management could be used as another tool by athletic trainers and strength coaches to aide with injury prevention. The relationship between stress and injury in collegiate SAs, is highlighted in this literature review.

Prevalence and Cost of Injury Occurrence in NCAA athletics

The NCAA currently has 1,098 member institutions across Division I, II, and III levels (NCAA, 2020). As of 2019, the NCAA (2020) sponsored 25 collegiate sports. There are around 470,000 athletes participating in NCAA athletics across the United States (Kerr et al., 2015; NCAA, 2020). The NCAA collects injury data from most of its member institutions using an Injury Surveillance Program (ISP) run by Datalys Center for Sports Injury Research and Prevention Inc. (Kay et al., 2017). Using these data reports, researchers can determine injury rates associated with participating in NCAA athletics.

From 2009-2014, there were an estimated 176.7 million athlete exposures in all of NCAA athletics (Kerr et al., 2015). An athlete exposure (AE) is defined as a time when one SA participates in one NCAA sanctioned practice or game (Kerr et al., 2015; Kerr et al., 2017). Each exposure can vary in intensity, duration, and activity. Each year there are an estimated 210,674 injuries to NCAA student athletes (Kerr et al., 2015). From 2009-20014, the injury rate for all of NCAA collegiate athletics was 6.0 per 1,000 AE (Kerr et al., 2015; Kerr et al., 2017). The injuries that occur vary in severity from a non-time loss injury, in which the SA does not miss practice or competition (Kerr et al., 2017), to a severe injury which results in loss of participation for more than 21 days (Kay et al., 2017). From 2009-2014, non-time loss injuries accounted for 49% of total injuries with an average injury rate of 4.02 per 1,000 AE (Kerr et al., 2017). In addition, men had a higher rate of injury than women (4.27 to 3.51, per 1,000 AE, respectively; Kerr et al., 2017). From 2009-2014 severe injuries, a loss of participation for more than 21 days, made up just 10% of total injuries reported (Kay et al., 2017). Unlike the non-time loss injuries previously presented, there was a non-significantly lower rate of severe injury per 1,000 AE for males (0.51) than for females (0.54; Kay et al., 2017).

More than half, 63.8%, of injuries occur during practices. However, the injury rate per AE for competition is higher than for practice (Kerr et al., 2015). Regarding time-loss injuries, the main mechanism was contact with other participants, accounting for 44.8% of total injuries in male athletes and 21.5% for

female athletes (Kerr et al., 2017). Injury rates for severe injuries during competition were also significantly greater than those at practice, 1.76 and 0.41, respectively (Kay et al., 2017). Player contact was again the main mechanism of injury, accounting for 40% of all severe injuries (Kay et al., 2017).

In addition to injuries being prevalent within NCAA athletics, an additional concern is the high cost of injury. The Office of the Assistant Secretary for Planning and Evaluation, in the U.S. Department of Health and Human Services, has developed estimates for basic athletic injuries (Fair & Champa, 2019). For those aged 10-19 years, a fracture will cost an average of $4,000, a strain $2,000, and a dislocation $7,000. The National Safety Council puts a price on a general orthopedic injury at $9,000 (Fair & Champa, 2019). During the 2009-2014 recording period for NCAA Datalys, fractures, strains, and dislocations accounted for 51.5% of all injuries, and made up 53.8% of injuries requiring surgery (Kerr et al., 2015).

In Fair and Champa's (2019) evaluation of injury rates in male collegiate sports, it was determined that if contact sports, where body-to-body contact is expected as a part of the game (Meehan et al., 2016), adapted non-contact sport injury rates, there would be 568,600 less injures per year and save over 433 million dollars in collegiate athletics. While the elimination of contact sports is not likely, there have been changes made to sports to help decrease injury rates. Some examples include mandated eye protection in women's lacrosse, modifications to football practice schedules, and wrestling weight class re-

classification (Hootman et al., 2007). While rule and equipment changes can be made to decrease injury rates, there is only so much that can be done in this regard. There are other factors that can influence injury rates, with stress being one of these factors (Hamlin et al., 2018; Laux et al., 2015; Mann et al., 2015).

Perceived Stressors in SAs

Stress is a negative feeling that develops from one's inability to adapt to demands placed on himself by his environment (Lazarus & Folkman, 1984). Attending college creates a unique set of stressors for students. However, being a SA comes with an additional set of stressors not experienced by non-athlete students (Wilson & Pritchard, 2005). Over 85% of all SAs reported that they are stressed by missing classes due to travel and having to make-up missed assignments (Humphrey et al., 2000). Student athletes also reported believing they are treated differently in academia because of their athlete status (Papanikolaou et al., 2003). Wilson and Pritchard (2005) surveyed freshman students at a Division I college using questions from Kohn and Macdonald's (1992) Survey of Recent Life Experiences. There was no reported increase in stress from SAs to non-athlete students. However, there were stressors unique to both groups. Student athletes reported being stressed from "having a lot of responsibilities," "not getting enough sleep," and "extracurricular demand." Meanwhile, non-athletes reported more stress in "financial burdens," "making education decisions," and "being ignored/isolated."

Athletes also must deal with the physical stressors of training, competition, and Injury. There is a direct association between injury occurrence and training time (Gabbett et al., 2014; Kay et al., 2017; Kerr et al., 2017). Consequences of training can be illness, injury, and/or performance decreases (Gabbett et al., 2014). An increase in training has been shown to be related to an increase in injury rate (Gabbett et al., 2014), yet training is necessary to improve athletic performance. The balance between training too much and too little is difficult to achieve and to measure. With injuries being an inevitable result of collegiate athletics, it is not a surprising that they are a primary source of stress for SAs (Madrigal & Robbins, 2020). A survey of reported stressors in 570 collegiate SAs had injury as the most reported stressor (27% of sample; Madrigal & Robbins, 2020). Almost half of the student athletes with an injury at the time of data collection reported their injury as their main stressor (48.5%; Madrigal & Robbins, 2020). Also, SAs have reported increased stressors based on their participation in both advanced academia and athletics. There is evidence to support that an increase in reported stress levels is correlated to an increase in injury among both student and professional athletes.

Relationship between Stress and Injury Occurrence

The stress and athletic injury model developed by Andersen and Williams (1988) is widely accepted and includes two pathways for why stress can lead to athletic injury. The first is negative cognitive appraisal. If an athlete is not equipped to handle the demands of his or her environment, stress responses

may develop, even if his or her appraisal of the situation does not reflect reality (Andersen & Williams, 1988). The second pathway is physiological and attentional aspects. Increased muscle tension can be caused by increased stress. This muscle tension can cause a decrease in mobility, which can lead to potential injury (Andersen & Williams, 1988). Excess stress can also result in a narrowing of concentration and attention (Li et al., 2017), which may lead to a SA not recognizing potentially risky situations in games or practice that can lead to an injury.

Li et al. (2017) evaluated 958 SAs from 2007-2011 to determine the effect of reported preseason anxiety and depressive symptoms on the risk of injury in the prospective season. In the sample, 28.8% reported anxiety symptoms and 21.7% reported depressive symptoms, with 48.5% of those reporting symptoms having both anxiety and depressive symptoms. Student athletes who reported preseason anxiety had significantly higher injury rates than those who did not report anxiety (3.89/1,000 AE to 1.63/1,000 AE; Li et al., 2017). Li et al. (2017) reported no significant difference in injury rates for SAs reporting depression and those not reporting depression. Increased injury rates were also found to be associated with increased periods of academic stress in SAs (Hamlin et al., 2018; Mann et al., 2015). Specific stressors including sleep quality, mood, and energy levels have also been shown to be correlated with injuries in both SA and professional athletes (Hamlin et al., 2018; Laux et al., 2015). A higher reported negative life stress was shown to be associated with an increase in injury rates

among collegiate gymnasts (Petrie, 1992). Student athletes who have a lack of social support and poor coping skills are also more at risk for injury (Smith et al. 1990). Stress can both be a predictor of injury and a cause of injury. With its ability to significantly impact the life of a SA, it is important that stress be assessed and measured correctly so corrective measure can be made.

Measurement of Stress in SAs

There are subjective and objective ways to measure stress. Saw (2015) reviewed both measurement styles of athletes and found subjective and objective measures did not correlate with one another. The subjective measures of training load reflected superior sensitivity regarding athlete well-being (Saw et al., 2015). Objective measures including but not limited to heart rate, biochemical markers, hormone levels, and urine color and output, were not responsive to acute changes in workload (Saw et al., 2015). Subjective measures, reported by the athletes through various surveys, had a moderate to strong correlation with an acute increase in workload (Saw et al., 2015). If these measures are implemented and SAs are compliant in completion, they would provide insight into the impacts of both training and competition on the SAs.

The CSALSS was developed to evaluate sports related stressors along with those that occur to a typical college student (Lu et al., 2012). The CSALSS is a 24-statement survey with a 6-point Likert scale where participants are instructed to rate how often they experience the statement (Lu et al., 2012). The statements are categorized into eight areas where a SA may be experiencing

stress: Sports injury, performance demand, coach relationship, training adaptation, interpersonal relationships, romantic relationships, family relationships, and academic requirements. Each category has a Cronbach's α above .75 except family relationships at .66, however it was deemed acceptable due to its composite reliability being .83 (Lu et al., 2012). When compared to the Athletic Positive State of Mind Scale, the CSLASS had a negative correlation which was expected as an athlete with increased stress would not be expected to have a positive state of mind (Lu et al., 2012). The results of the CSALSS provide specific insight into where a SA is experiencing the most stress in his or her life. The face that SAs experience stress is general knowledge. However, knowing which aspects in life are the most stressful for SAs as a whole or as an individual can allow for specific plans for stress management. With stress being closely intertwined even a potential cause of athletic injury; developing the most accurate mitigation strategy would provide the best chances at decreasing injury risk for SAs.

Summary

Student athletes report different life stressors than non-athlete students. Subjective input from SAs on their perceived stress, through the administration of surveys, has been shown to accurately correlate with physical predictors of stress. Increased stress does have a correlation with an increase in injury. The stress can be from multiple facets of life such as academics, athletics, or general life. There are many reported stressors that have been predictors of injury. Using

the CSALSS, the goal of the following study was to provide insight on which stressor categories SAs are reporting the most and whether they are related to injury occurrence.

CHAPTER III

METHODOLOGY

Participants

Current NCAA Division I SAs (*N* = 127) from a single institution in the Southeastern United States participated in this study. To be included, the participants had to have participated in an NCAA sponsored sport during the fall 2020 semester. The University Institutional Review Board approved all methods and procedures utilized in the study and participants provided consent by answering in the affirmative to informed consent questions to begin the online survey (see Appendix A).

Online Survey

The 29-question survey consisted of two sections. The first part (see Appendix B) included five questions on participant demographics including age, sex, sport, and injuries during the past semester. The second part (see Appendix C) of the survey included 24 questions with a 6-point Likert scale from the CSALSS (Lu et al., 2012). There are 9 categories of reported stressors: total stress, sports injury, performance demand, coach relationship, training adaptation, interpersonal relationships, romantic relationships, family relationships, and academic requirements. There are 144 available points for the total stress score with the other categories each having 18 available points. Higher scores are in-

dicative of higher stress. Currently, there are no normative values associated with the CSALSS for general and/or specific populations of SAs and no reported minimal detectable change value.

Injury Data

Injury data for all participants who reported having an injury during the fall 2020 season were retrieved through the institutional database Vivature. For each injury occurrence, information on injured body part, injury type (i.e. sprain, strain, or contusion), and injury severity (mild 1-7 days, moderate 8–14-day, severe 15+ days of time lost). Time lost was defined as days missed from any sport sponsored event including strength training, practice, and games.

Procedures

Participants were recruited late fall 2020. An email containing a study introduction and a link to the survey were sent to SA's institutional emails. Announcements at team meetings were also made to further recruit SAs. Participants were given a 21-day window to complete the online survey. Reminder emails were sent 7 days and 14 days after the initial recruitment email was sent.

Data Analysis

Descriptive statistics were run to characterize the study sample. An independent sample *t*-test was run to compare reported total stress and CSALSS subcategory scores between non-injured and injured SAs. A one-way analysis of variance (ANOVA) was conducted to determine if overall stress differed among SAs with mild, moderate, and severe injuries. A binary logistic regression was run

including total stress and the CSALSS subcategories to determine if a specific category of stress was predictive of injury occurrence. All statistical procedures were completed using IBM SPSS Statistics for Windows (IBM SPSS Statistics, Version 24.0; IBM Corp., Armonk, NY, US) and statistical significance was set at $p < .05$. Statistical results are presented as (mean ± standard deviation).

CHAPTER IV

RESULTS

Participants

A sample of 127 SAs completed all or part of the survey. Participants were divided by those who reported an injury and those who did not report an injury. Those who had an injury were then grouped by injury severity: mild, moderate, or severe. Demographic information for the participants is reported in Table 1. There were 13 sports represented and their frequencies are reported in Table 2.

Reported Stress and Injury Data

The 53 SAs who reported injuries ($M = 52$ $SD = 18$) when compared to the 74 SAs who did not report injuries ($M = 43$ $SD = 13$) had significantly higher reported stress in the following categories; total stress, $t(125) = 3.18$, $p = .04$, sports injury, $t(125) = 6.26$, $p = .00$, performance demand, $t(125) = 2.13$, $p = .03$, family relationship, $t(125) = 2.64$, $p = .02$, and academic requirements, $t(125) = 3.70$, $p = .01$. Table 3 contains the reported stress means and standard deviations in all subcategories. There was no statistically significant difference of total reported stress across severity of injury, $F(46, 80) = .789$, $p = .808$. The only stress category that was statistically predictive of injury occurrence was sports injury ($p = .020$). See Table 3 for the logistic regression significances in all subcategories.

Table 1

Participant Demographic Information

Sex	Age (years)	Injury Status	Injury Severity	
Males (*n* = 89)	20.9 ± 1.6	Yes (*n* = 42)	Mild	20
			Moderate	16
			Severe	6
		No (*n* = 47)		
Females (*n* = 38)	20.2 ± 1.5	Yes (*n* = 11)	Mild	6
			Moderate	4
			Severe	1
		No (*n* = 27)		

Table 2

Sport Distribution across the Sample

Sport	Frequency
Baseball	29
Football	36
Men’s basketball	5
Men’s cross country	2
Men’s golf	6
Men’s track and field	9
Softball	12
Volleyball	4
Women’s basketball	1
Women’s golf	1
Women's soccer	11
Women’s tennis	5
Women’s track and field	4

Table 3

Reported Total and Subcategory Stress Scores among Injured and Non-Injured Athletes

Category	Injured (*n*)	Mean ± *SD*	Log Reg Sig.
Sports injury*	Yes (53)	9 ± 4	.020
	No (74)	6 ± 3	
Performance demand*	Yes (53)	7 ± 4	.601
	No (74)	6 ± 3	
Coach relationships	Yes (53)	7 ± 4	.544
	No (74)	7 ± 4	
Training adaptation	Yes (53)	6 ± 3	1.000
	No (74)	5 ± 2	
Interpersonal relationships	Yes (53)	5 ± 2	.593
	No (74)	5 ± 2	
Romantic relationships	Yes (53)	5 ± 2	.861
	No (74)	4 ± 2	
Family relationships*	Yes (53)	6 ± 3	.654
	No (74)	5 ± 2	
Academic requirements*	Yes (53)	8 ± 3	.747
	No (74)	6 ± 2	
Total stress*	Yes (53)	52 ± 18	.987
	No (74)	43 ± 13	

Note. * = significant difference *($p \leqq .05$)* between injured and uninjured athletes

CHAPTER V

DISCUSSION

The purpose of this study was to determine if injured SAs report more stress than uninjured SAs and whether there was an association between injury severity and reported stress. The secondary purpose was to determine if reported stress in specific stress categories was predictive of injury occurrence. This study was completed by surveying 127 NCAA Division I SAs at the end of the fall 2020 semester. Athletes were asked to report if they were injured and to fill out the CSALSS summarizing the stress they experienced during the semester. The main finding of this study was that SAs who sustained injuries during the semester reported significantly higher total stress and higher stress in the following categories: sport injury, performance demand, family relationships, and academic requirements than uninjured SAs. In those who sustained injuries, there was no association of higher stress scores to more severe injuries. Out of total stress, sports injury, performance demand, coach relationships, training adaptation, interpersonal relationships, romantic relationships, family relationships, and academic requirements, only high reported stress in the sport injury category was predictive of injury occurrence.

There is little surprise that SAs who reported injuries also reported more stress in the sport injury category. In their 2020 survey of NCAA SAs, Madrigal

and Robbins found that 27% of all SAs reported injury to be their most prevalent stressor and almost half of those with current injuries reported injury as their most prevalent stressor. While this category was not only reported more often in injured SAs, it was also predictive of injury. Once a SA is injured, there are increased psychologic stressors to endure (Nipppert & Smith, 2008). There is also a decrease in self-esteem after injury (Sonestrom & Morgan,1989), which can lead to the development of mood disorders (McGowan, 1994). For example, Li et al. (2017) found that SAs who report anxiety and depression were more likely to be injured than SAs who do not report mood disorders.

The increased stress in the performance demand subcategory by SAs was not predictive of injury in this study but has been associated with injury in the literature. Smith and Smoll (1990) developed a model showing a SA will make cognitive appraisals of athletic situations, taking into consideration the demands, resources, and consequences of the situation. The SAs who had increased levels of worry and concern during their performance were at risk for injury (Reuter & Short, 2005). Based on NCAA injury data, from 2009-2014 there was a higher injury rate for SAs during competition as opposed to practice, and injuries that occurred during competition tended to be more severe (Kerr et al., 2015; Kerr et al., 2017). When combining the Smith and Smoll (1990) model and NCAA injury data with the cognitive appraisal portion of Andersen and William's (1988) model, it is shown that SAs who are not properly equipped to handle the stress of athletic situations may make poor decisions that leave them at higher risk for injury.

In the current study, injured SAs reported higher levels of academic stress than uninjured SAs. Although this category was not predictive of injury in the current study, there is literature to support that it can be. In their study of NCAA Division I football players, Mann et al. (2016) determined that during periods of high academic stress there were more players with injury restrictions and more injury occurrences. Student athlete academic support varies widely from institutions to institution (Judge et al. 2018). Schools who have football bowl subdivision (FBS) football had 53:1 SA to full time academic support staff compared to institutions with football championship subdivision (FCS) teams, who had a 129:1 SA to full time staff ratio (Judge et al. 2018). There is a need for SA academic support yet some SAs may be at a disadvantage due to a school's inability to provide support for them. Institutions with FBS teams had higher average income from athletics than those with FCS teams (Judge et al. 2018). It is important that administrative staff understand how academic stress can leave their SAs at unnecessary risk for injury and provide support when able.

Student athletes who suffered an injury also reported more total negative life stress and high stress in family relationships, however neither category was predictive of injury occurrence. Petrie (1992) determined that SAs with high negative life stress, including lack of family support, had increased injury occurrence. Also, injured SAs were more willing to participate through injury because they felt they would be letting their parents down if they did not participate (Nippert & Smith, 2008). In the CSLASS, the family relationship questions touch on high ex-

pectations, poor communication, and difficult situations involving family. There were no data regarding which specific questions contributed the most to the subsection score. There may be an association with expectation and communication due to the nature of an athlete's injury. Parents may be frequently checking in with the SA to see how rehabilitation is going and if things are not going well, the SA may feel that they are disappointing their family.

Limitations and Future Research Recommendations

The sample in this study was not representative of all NCAA SA populations. There was only a 40% response rate from the sample population. Only 13 out of the 25 sports sponsored by the NCAA were represented by the sample (Kerr et al., 2015; NCAA, 2020). The sample was also made up of SAs from a large public university yet the NCAA has member schools in the public and private sector with varying student body populations (NCAA, 2020). There is a need for longitudinal studies focused on SA stress levels and injury occurrence, involving SAs from all NCAA sports and divisions. Tracking changes in stress levels and injury occurrences over time would allow researchers to better asses the predictive nature of stress. Most studies done have found correlations between different stressors and increased injuries, but none have been able to say that stress/specific stressors cause injury (Andersen & Williams, 1988; Hamlin et al., 2019; Mann et al., 2016) The CSALSS is a great tool because it can provide a lot of information on what specific stressors SAs are experiencing. Support staff can easily administer the survey and know how their specific SAs are feeling. How-

ever, the lack of normative or minimal detectable change values for the survey make it difficult to evaluate study outcomes when one wants to compare results to population averages.

Practical Applications and Conclusions

The findings of this study emphasize that life stress can influence injury occurrence in SAs. The CSALSS is a simple and useful survey that provides a meaningful look into a SA's life. There is a need for those involved in collegiate athletics to understand how much stress their SAs are experiencing and to understand what facets of life are contributing to stress. Coaches should be aware of how their demands on SAs affect how a SA plays. Frequent monitoring of SA stress through self-reported surveys would allow for all invested parties to see how the team and individual athletes are responding to the demands placed on them. Because the presence and/or direction of causation between SA stress and injury are unclear, there should also be a focus on those involved in SA injury rehabilitation to be sure that the SA is properly handling the stress caused by their injury. Educating SAs and implementing proper stress management techniques could potentially lead to a decrease in injury occurrence. Decreased injury rates among SAs would not only benefit SAs but also coaches and the institutions. A lack of injured athletes would keep more active players on rosters and would decrease the financial impact sponsoring athletics has on institutions.

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APPENDICIES

APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd
Murfreesboro, TN 37129
FWA: 00005331/IRB Regn. 0003571

MIDDLE TENNESSEE STATE UNIVERSITY

IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Tuesday, November 10, 2020

Protocol Title	***Reported Stress and Injury Occurences in Division I Student Athletes***
Protocol ID	**21-2055 7q**
Principal Investigator	**Molly Potvin** (Student)
Faculty Advisor	Jennifer Caputo
Co-Investigators	Samantha Johnson
Investigator Email(s)	*mp6p@mtmail.mtsu.edu; jcaputo@mtsu.edu*
Department	Health and Human Performance
Funding	**NONE**

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU IRB through the **EXPEDITED** mechanism under 45 CFR 46.110 and 21 CFR 56.110 within the category *(7) Research on individual or group characteristics or behavior*. A summary of the IRB action is tabulated below:

IRB Action	**APPROVED for ONE YEAR**		
Date of Expiration	**11/30/2021**	*Date of Approval*: 11/10/20	*Recent Amendment*: NONE
Sample Size	FIVE HUNDRED (500)		
Participant Pool	*Target Population:* Primary Classification: **General Adults (18 or older)** Specific Classification: **Current Division 1 Student Athletes at MTSU**		
Type of Interaction	☒ Virtual/Remote/Online interaction ☐ In person or physical interaction – Mandatory COVID-19 Management		
Exceptions	1. Permitted to use M numbers to access to access injury records of the volunteers 2. Online consent followed by Qualtrics survey is permitted.		
Restrictions	**1. Mandatory ACTIVE Informed Consent.** **2. Other than the exceptions above, identifiable data/artifacts, such as, audio/video data, photographs, handwriting samples, personal address, driving records, social security number, and etc., MUST NOT be collected. Recorded identifiable information must be deidentified as described in the protocol.** **3. Mandatory Final report (refer last page).** **4. The protocol details must not be included in the compensation receipt.** **5. CDC guidelines and MTSU safe practice must be followed**		
Approved Templates	*IRB Templates:* Online Informed Consent and Recruitment Email *Non-MTSU Templates:* NONE		
Research Inducement	NONE		
Comments	NONE		

Post-approval Requirements

The PI and FA must read and abide by the post-approval conditions (Refer "*Quick Links*" in the bottom):

- ***Reporting Adverse Events:*** The PI must report research-related adversities suffered by the participants, deviations from the protocol, misconduct, and etc., within 48 hours from when they were discovered.
- ***Final Report:*** The FA is responsible for submitting a final report to close-out this protocol before **11/30/2021 (Refer to the Continuing Review section below)**; REMINDERS WILLNOT BE SENT. **Failure to close-out or request for a continuing review may result in penalties** including cancellation of the data collected using this protocol and/or withholding student diploma.
- ***Protocol Amendments***: An IRB approval must be obtained for all types of amendments, such as: addition/removal of subject population or investigating team; sample size increases; changes to the research sites (appropriate permission letter(s) may be needed); alternation to funding; and etc. The proposed amendments must be requested by the FA in an addendum request form. The proposed changes must be consistent with the approval category and they must comply with expedited review requirements
- ***Research Participant Compensation:*** Compensation for research participation must be awarded as proposed in Chapter 6 of the Expedited protocol. The documentation of the monetary compensation must Appendix J and MUST NOT include protocol details when reporting to the MTSU Business Office.
- ***COVID-19:*** Regardless whether this study poses a threat to the participants or not, refer to the COVID-19 Management section for important information for the FA.

Continuing Review (The PI has requested early termination)

Although this protocol can be continued for up to THREE years, The PI has opted to end the study by **11/30/2021**
The PI must close-out this protocol by submitting a final report before 11/30/2020 Failure to close-out may result in penalties that include cancellation of the data collected using this protocol and delays in graduation of the student PI.

Post-approval Protocol Amendments:

The current MTSU IRB policies allow the investigators to implement minor and significant amendments that would fit within this approval category. ***Only TWO procedural amendments will be entertained per year*** *(changes like addition/removal of research personnel are not restricted by this rule).*

Date	Amendment(s)	IRB Comments
NONE	NONE.	NONE

Other Post-approval Actions:

The following actions are done subsequent to the approval of this protocol on request by the PI/FA or on recommendation by the IRB or by both.

Date	IRB Action(s)	IRB Comments
NONE	NONE	NONE

COVID-19 Management:

The PI must follow social distancing guidelines and other practices to avoid viral exposure to the participants and other workers when physical contact with the subjects is made during the study.

- The study must be stopped if a participant or an investigator should test positive for COVID-19 within 14 days of the research interaction. This must be reported to the IRB as an "adverse event."
- The MTSU's "Return-to-work" questionnaire found in Pipeline must be filled by the investigators on the day of the research interaction prior to physical contact.
- PPE must be worn if the participant would be within 6 feet from the each other or with an investigator.
- Physical surfaces that will come in contact with the participants must be sanitized between use
- **FA's Responsibility:** The FA is given the administrative authority to make emergency changes to protect the wellbeing of the participants and student researchers during the COVID-19 pandemic. However, the FA must notify the IRB after such changes have been made. The IRB will audit the changes at a later date and the FA will be instructed to carryout remedial measures if needed.

Data Management & Storage:

All research-related records (signed consent forms, investigator training and etc.) must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application.

The data must be stored for at least three (3) years after the study is closed. Additional Tennessee State data retention requirement may apply (*refer "Quick Links" for MTSU policy 129 below*). The data may be destroyed in a manner that maintains confidentiality and anonymity of the research subjects.

The MTSU IRB reserves the right to modify/update the approval criteria or change/cancel the terms listed in this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links:

- Post-approval Responsibilities: http://www.mtsu.edu/irb/FAQ/PostApprovalResponsibilities.php
- Expedited Procedures: https://mtsu.edu/irb/ExpeditedProcedures.php
- MTSU Policy 129: Records retention & Disposal: https://www.mtsu.edu/policies/general/129.php

APPENDIX B: STUDY SURVEY DEMOGRAPHIC PORTION

M#:

Age:

Sex:

Sport:

Did you suffer any athletic injury from Aug 2020-November 2020?

Yes

No

APPENDIX C: STUDY SURVEY CSALSS PORTION

Directions: *Below are 24 statements that describe something that annoys/bothers you or makes you uncomfortable in your daily life as a college student-athlete. Please read each one carefully and circle the number that indicates how* ***often*** *you experience it. Your answers are absolutely confidential.*	*Never*	*Rarely*	*Sometimes*	*Quite often*	*Very often*	*Always*
1 I am annoyed by my injury because it has still not yet fully recovered.	1	2	3	4	5	6
2 I worry about my unstable competitive performance.	1	2	3	4	5	6
3 I am annoyed by my disappointing relationship with my coach.	1	2	3	4	5	6
4 I am annoyed with the training program now.	1	2	3	4	5	6
5 I am bothered by poor social skills in handling interpersonal relationships.	1	2	3	4	5	6
6 I am annoyed with not finding time to encounter romantic partners.	1	2	3	4	5	6
7 I am annoyed by my parents' high expectations.	1	2	3	4	5	6
8 I am bothered by a lack of motivation for academic learning.	1	2	3	4	5	6
9 I worry about being frequently injured.	1	2	3	4	5	6
10 I worry about dragging my team down.	1	2	3	4	5	6
11 I am annoyed by my coach's preference for some teammates.	1	2	3	4	5	6
12 I worry that my training is not beneficial to my performance.	1	2	3	4	5	6
13 I am annoyed with being friendless.	1	2	3	4	5	6
14 I am annoyed with being too shy to express myself when I encounter someone I love.	1	2	3	4	5	6
15 I am bothered by difficult situations in my family.	1	2	3	4	5	6
16 I am annoyed when preparing for exams.	1	2	3	4	5	6
17 I am bothered by the slow recovery of my injury.	1	2	3	4	5	6
18 I am afraid of being eliminated from competition because of poor performance.	1	2	3	4	5	6
19 I am annoyed by my coach's bias against me.	1	2	3	4	5	6
20 I am annoyed by my training load because it is too much for me.	1	2	3	4	5	6
21 I am annoyed by my social skills because it seems like nobody likes me.	1	2	3	4	5	6
22 I am annoyed with not getting along with my romantic partner.	1	2	3	4	5	6
23 I am annoyed with communicating with my family.	1	2	3	4	5	6
24 I worry about my academic skills because I do not know how to learn efficiently.	1	2	3	4	5	6

Note: (a) items1, 9, 17 represent "sports injury;" (b) items 2, 10, 18 represent "performance demand;" (c) items 3, 11, 19 represent "coach relationships;" (d) items 4, 12, 20 represent "training adaptation;" (e) items 5, 13, 21 represent "interpersonal relationships;" (f) items 6, 14, 22 represent "romantic relationships;" (g) items 7, 15, 23 represent "family relationships;" and (h) items 8, 16, 24 represent "academic requirements"