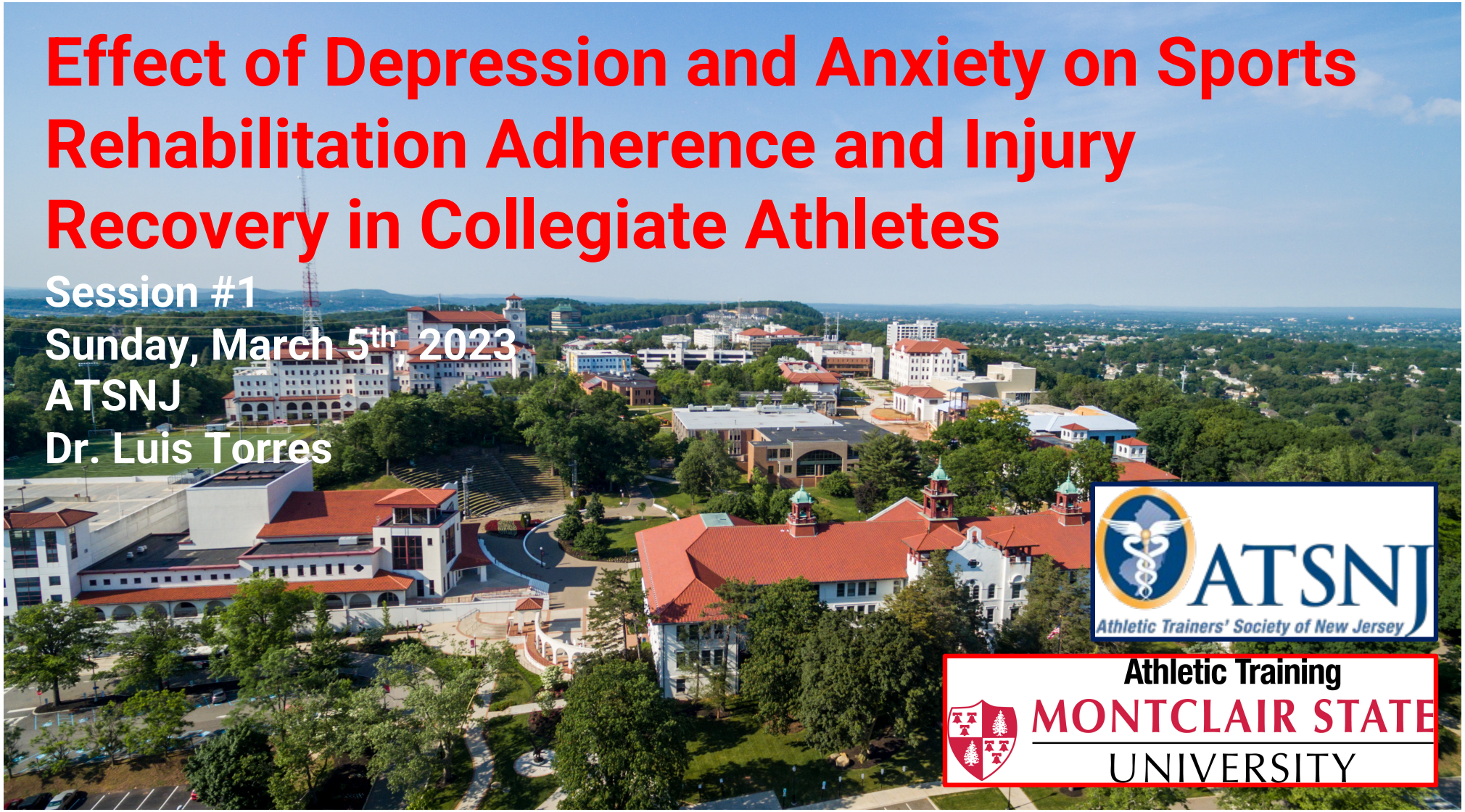
Effect of Depression and Anxiety on Sports Rehabilitation Adherence and Injury Recovery in Collegiate Athletes

Session #1

Sunday, March 5th, 2023

ATSNJ

Dr. Luis Torres



ATSNJ
Athletic Trainers' Society of New Jersey

Athletic Training
MONTCLAIR STATE
UNIVERSITY

Disclosures

- This research was conducted as part of the degree requirements for a Doctorate of Health Science at East Stroudsburg University
- Previously employed as a faculty member and per diem athletic trainer at East Stroudsburg University at the time of this research
- There are no financial disclosures to be shared


adidas


PROTEAM


MONTCLAIR STATE
REDHAWKS


MONTCLAIR STATE
REDHAWKS

Today's Objectives

- Understand the effect of DA on AT perspective of rehabilitation adherence
- Understand the effect of DA on the athlete perspective of rehabilitation adherence
- Analyze the relationship between AT and athlete rehabilitation adherence perceptions
- Evaluate the effectiveness of currently utilized psychosocial strategies in your own clinical practice
- Create new plans to improve upon currently utilized psychosocial strategies

Background

- 46.3% of adolescents have experienced a mental health condition in their lifetime (National Institute of Mental Health, 2017)
  - Nearly half are considered severe mental health disorders
  - Anxiety disorders (25.1%)
  - Various mood disorders (14%)

  - 31% of male and 48% of female National Collegiate Athletic Association (NCAA) student-athletes reported either depression or anxiety symptoms during the 2008 and 2012 academic years (Li et al., 2017; NCAA, 2014)

Introduction

- Collegiate athletes are unique individuals on college campuses
  - Balance athletic and academic responsibilities
  - Face constant pressure to compete in public forums
  - Assume some level of sports injury risk

5-6am Wake up/Breakfast
6-8am Strength/Cond.
8-8:30am Team Meeting
8:30-9am shower classes
9am-2pm Classes-Lunch
2-2:30pm Film Study
2:30-3:15pm Get Taped
3:30-6pm Team Practice
6-7pm Shower/Treatment
7-7:30pm Eat Dinner
7:30-9pm Academic Support/Study Hall
9:30-Midnight Finish Homework/Sleep

Collegeathleteinsight.com
https://collegeathleteinsight.com/average-day-of-college-athlete/

Statement of the Problem

- Scarcity of mental health research (i.e., depression and anxiety) among collegiate athletes (compared to the general population)
- Current depression and anxiety research limited to certain conditions
  - ACL (surgical and non-surgical), TBIs, Total knee arthroplasty procedures
- Athletic trainers feel limited in their abilities to deal with the psychological components of injury
- Rehabilitation adherence
  - Can range between 40 to 90% in collegiate athletes
  - 98.3% of 479 collegiate athletic trainers reported poor adherence from their athletes (Granquist et al., 2014)

Purpose of the Study

The collective purpose of this study was to explore the effect of depression and anxiety on rehabilitation adherence and injury recovery in a collegiate sample to present athletic trainers with information that will assist them in developing better holistic strategies of care for injured athletes.

Methods

Collegiate athlete

Athletic trainer

Non-experimental repeated-measures prospective cohort design

Hospital and Anxiety Depression Scale (HADS)

- 14-item questionnaire designed to measure the symptoms of depression and anxiety (Zigmond & Snaith, 1983)
- Two subscales
  - seven questions for symptoms of depression (HADS-D)
  - seven questions for symptoms of anxiety (HADS-A)
- Each item is individually scored on a scale from 0 to 3 with higher scores indicating a higher level of symptom frequency (i.e., not at all, sometimes, occasionally very often, nearly all the time, etc.)

Hospital Anxiety and Depression Scale (HADS)

Tick the box beside the reply that is closest to how you have been feeling in the past week.
Don't take too long over you replies: your immediate is best.

D	A		D	A	
		I feel tense or 'wound up':			**I feel as if I am slowed down:**
	3	Most of the time	3		Nearly all the time
	2	A lot of the time	2		Very often
	1	From time to time, occasionally	1		Sometimes
	0	Not at all	0		Not at all
		I still enjoy the things I used to enjoy:			**I get a sort of frightened feeling like 'butterflies' in the stomach:**
0		Definitely as much		0	Not at all
1		Not quite so much		1	Occasionally
2		Only a little		2	Quite Often
3		Hardly at all		3	Very Often
		I get a sort of frightened feeling as if something awful is about to happen:			**I have lost interest in my appearance:**
	3	Very definitely and quite badly	3		Definitely
	2	Yes, but not too badly	2		I don't take as much care as I should
	1	A little, but it doesn't worry me	1		I may not take quite as much care
	0	Not at all	0		I take just as much care as ever
		I can laugh and see the funny side of things:			**I feel restless as I have to be on the move:**
0		As much as I always could		3	Very much indeed
1		Not quite so much now		2	Quite a lot
2		Definitely not so much now		1	Not very much
3		Not at all		0	Not at all
		Worrying thoughts go through my mind:			**I look forward with enjoyment to things:**
	3	A great deal of the time	0		As much as I ever did
	2	A lot of the time	1		Rather less than I used to
	1	From time to time, but not too often	2		Definitely less than I used to
	0	Only occasionally	3		Hardly at all
		I feel cheerful:			**I get sudden feelings of panic:**
3		Not at all		3	Very often indeed
2		Not often		2	Quite often
1		Sometimes		1	Not very often
0		Most of the time		0	Not at all
		I can sit at ease and feel relaxed:			**I can enjoy a good book or radio or TV program:**
	0	Definitely	0		Often
	1	Usually	1		Sometimes
	2	Not Often	2		Not often
	3	Not at all	3		Very seldom

Please check you have answered all the questions

- Bjelland et al. (2002)
  - HADS literature review
  - Sensitivity = .80
  - Specificity = .80
    - Both like that achieved by the General Health Questionnaire (GHQ)
  - HADS-A (internal consistency)
    - .68 to .93 (mean .83)
  - HADS-D (internal consistency)
    - .67 to .90 (mean .82)
  - Correlations between HADS-A and HADS-D
    - .40 to .74 (mean .56)
  - Correlations between HADS and other commonly used questionnaires such as the BDI and the State Trait Anxiety Inventory (STAI)
    - .49 to .83

Rehabilitation Adherence Measure for Athletic Training (RAdMAT)

- 16-item questionnaire designed to measure rehabilitation adherence (Granquist et al., 2010)
- Each item is individually scored on a scale from 1 to 4 with higher scores indicating a higher level of frequency (i.e., never, occasionally, often, always)
- The RAdMAT is currently the only known instrument of rehabilitation adherence that was built with the specific intention of use by athletic trainers

RAdMAT

- Granquist et al. found high Cronbach's alpha coefficients for the 25-item RAdMAT (.927 for most adherent athletes, .944 for average athletes, .926 for least adherent athletes)
- Granquist et al. ultimately completed multiple factor analyses of the individual items and decided to eliminate 9 items from the 25-item RAdMAT in order to produce a 3-subscale measure that explained 57.83% of the associated variance and seemed to be the best fit, reducing the amount of repetitive information gathered from the items
- Relationships between adherence level and the 16-item RAdMAT total and subscales were positive, significant, and moderately strong ($r = .704$, $P < .01$); the RAdMAT also maintained a high correlation with the SIRAS ($r = .898$; $P < .01$)

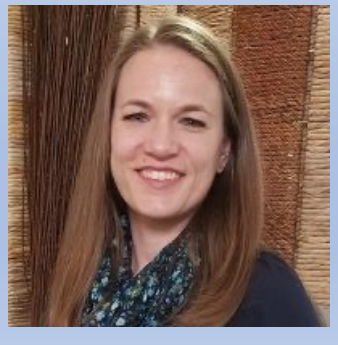
Rehabilitation Adherence Measure for Athletic Training (RAdMAT) (Granquist, Gill & Appaneal, 2010)

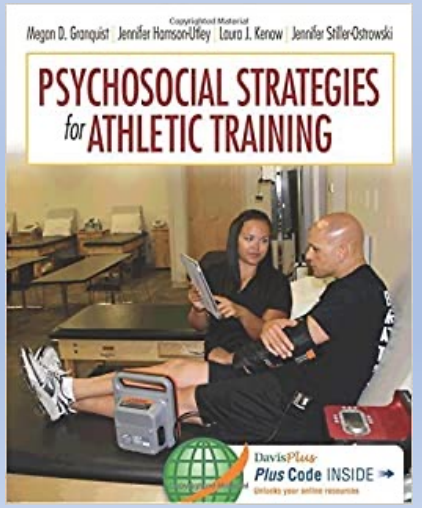
The athlete:	Never	Occasionally	Often	Always
1. attends scheduled rehabilitation sessions…….....	1	2	3	4
2. arrives at rehabilitation on time..……....	1	2	3	4
3. follows the athletic trainer's instructions during rehabilitation sessions……..	1	2	3	4
4. follows the prescribed rehabilitation plan……...	1	2	3	4
5. completes all tasks assigned by the athletic trainer…….	1	2	3	4
6. asks questions about his/her rehabilitation……..	1	2	3	4
7. communicates with the athletic trainer if there is a problem with the exercises…..……	1	2	3	4
8. provides the athletic trainer feedback about the rehabilitation program…….	1	2	3	4
9. has a positive attitude during rehabilitation sessions…….	1	2	3	4
10. has a positive attitude toward the rehabilitation process…….	1	2	3	4
11. gives 100% effort in rehabilitation sessions……	1	2	3	4
12. is self-motivated in rehabilitation sessions……..	1	2	3	4
13. is an active participant in the rehabilitation process……	1	2	3	4
14. stays focused while doing rehabilitation exercises……..	1	2	3	4
15. is motivated to complete rehabilitation……...	1	2	3	4
16. shows interest in the rehabilitation process…….	1	2	3	4

Rehabilitation Adherence Measure for Athletic Training (RAdMAT) (Granquist, Gill & Appaneal, 2010)

Scoring:
The total scale range is 16-64 with higher scores indicating greater adherence.

Subscales:
Attendance/Participation: Items #1-5; subscale range is 5-20.
Communication: Items #6-8; subscale range is 3-12.
Attitude/Effort: Items #9-16; subscale range is 8-32.





Rehabilitation Adherence Questionnaire (RAQ)

- 40-item questionnaire designed to measure rehabilitation adherence (Fisher et al., 1988)
  - Shin et al. (2010) later redeveloped the RAQ into a 25-item questionnaire and validated it for injured athletes
- Each item is scored on a scale ranging from 1 to 4 (i.e., 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree)
  - The responses to each statement are summed for a total RAQ score than can range from 25 - 100

RAQ

- Shin et al. (2010) calculated intra-class correlation coefficients (ICCs) for the each of the six subscales
  - support from significant others = .81
  - pain tolerance = .64
  - scheduling = .72
  - self-motivation = .78
  - perceived exertion = .67
  - environmental conditions = .82
  - All were significant beyond *P* <.01, thus indicating a high level of test-retest reliability within the RAQ
- They also found significant Pearson correlations between most of the RAQ subscales, and the three adherence subscales present in the SIRAS questionnaire (*P* <.05)

Support from significant others (5-item)		0.82
Q46. I know my teammates, family, or friends are there when I need support	0.78	
Q15. My trainer must be present and available to assist me in order for me to initiate and pursue my session	0.72	
Q27. I work harder when my trainer is present during my rehabilitation session	0.70	
Q36. I find rehabilitation to be very lonely and isolating	0.65	
Q41. My teammates, family, or friends give me a lot of support during my rehabilitation	0.57	
Pain tolerance (5-item)		0.79
Q14. My rehabilitation program is physically painful	0.76	
Q42. There are times when I feel that it is just not worth going through my rehabilitation program	0.75	
Q24. I work out until I feel pain and then stop	0.68	
Q6. I find myself missing rehabilitation session because I experience too much pain during my program	0.64	
Q34. I enjoy working out until it hurts	0.56	
Scheduling (4-item)		0.87
Q13. I often miss my rehabilitation sessions because I find better things to do	0.86	
Q32. I sometimes sleep instead of getting up to make my rehabilitation appointment	0.80	
Q45. I sometimes forget about my rehabilitation appointment	0.76	
Q53. My rehabilitation is almost always a high priority for me	0.65	
Self-motivation (5-item)		0.83
Q49. If my season ends, I do, or I will continue with my therapy until my rehabilitation program ends	0.78	
Q5. When doing my exercises, all I think about is to get them over with fast	0.74	
Q38. Because the season is almost over when I become injured, I see no need to do rehabilitation	0.75	
Q51. I do not get anything out of my rehabilitation program	0.67	
Q18. I enjoy doing my rehabilitation program	0.63	
Perceived exertion (3-item)		0.86
Q48. I nearly always work at 100% effort	0.88	
Q21. I find the exercises to be very difficult	0.84	
Q39. I always do my best	0.79	
Environmental conditions (3-item)		0.79
Q56. The training room make me feel unpleasant	0.64	
Q26. I do not like the training room	0.62	
Q2. The training room environment is comfortable and conductive to my needs	0.55	

Research Question #1

Will more depressed and anxious collegiate athletes display significantly lower levels of rehabilitation adherence when compared to their less depressed and anxious colleagues, as measured by the RAdMAT?

Research Question #2

Will more depressed and anxious collegiate athletes display significantly lower levels of rehabilitation adherence when compared to their less depressed and anxious colleagues, as measured by the RAQ?

Research Question #3

Will more depressed and anxious collegiate athletes take significantly longer on average to recover from sports injury than their less depressed and anxious colleagues?


THE RESULTS...

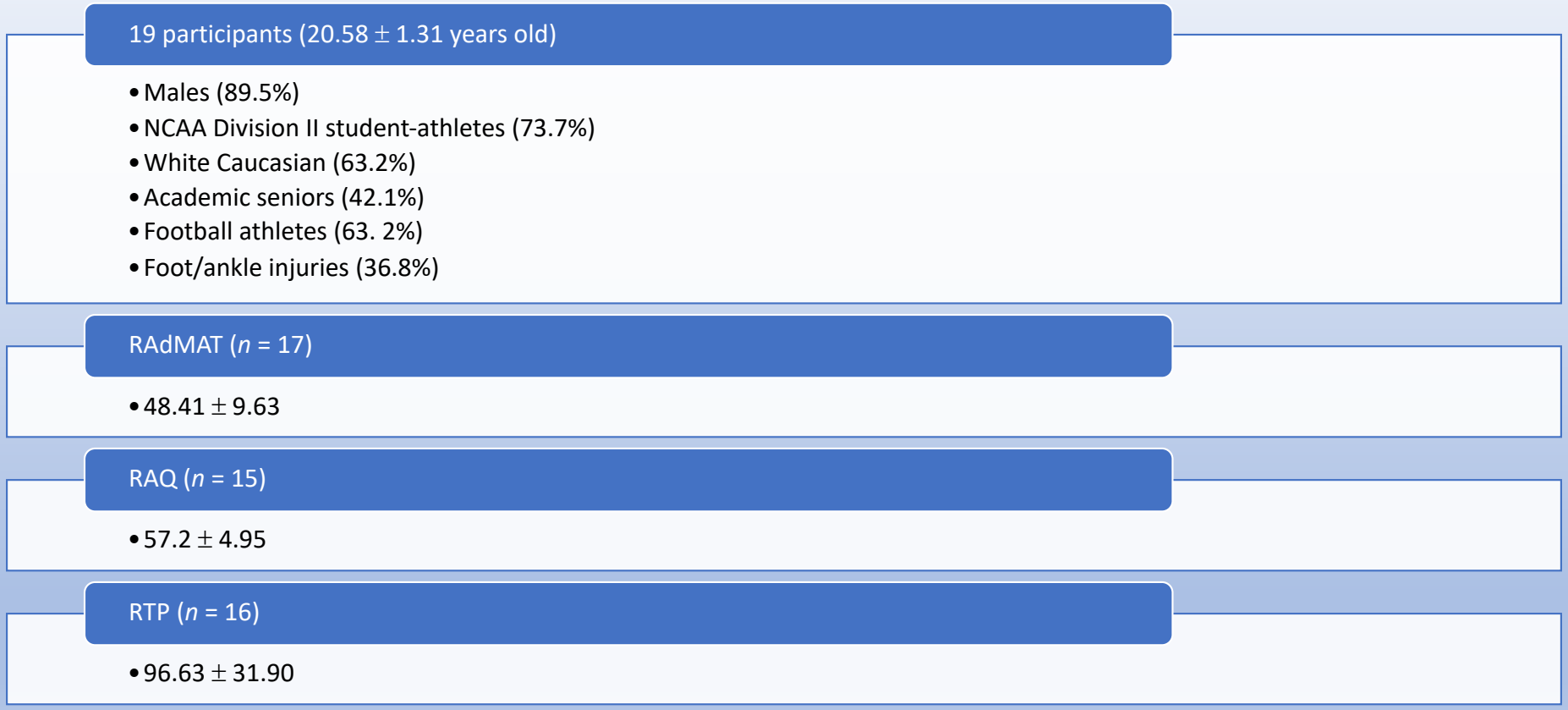

19 participants (20.58 ± 1.31 years old)
• Males (89.5%)
• NCAA Division II student-athletes (73.7%)
• White Caucasian (63.2%)
• Academic seniors (42.1%)
• Football athletes (63. 2%)
• Foot/ankle injuries (36.8%)
RAdMAT (n = 17)
• 48.41 ± 9.63
RAQ (n = 15)
• 57.2 ± 4.95
RTP (n = 16)
• 96.63 ± 31.90

Table 2

HADS Categories at Baseline (HADS 1)

HADS Category	*n*	*%*	*Mean score within category*
Normal	13	68.4	1.77
Borderline Abnormal	2	10.5	8.50
Abnormal	4	21.1	15.75

Note. $N = 19$. Participants scored on average 5.42 ± 6.30 on HADS 1.

Table 3

HADS Categories at the Beginning of Sports Rehabilitation (HADS 2)

HADS Category	*n*	*%*	*Mean score within category*
Normal	5	26.3	4.80
Borderline Abnormal	2	10.5	9.00
Abnormal	12	63.2	14.83

Note. $N = 19$. Participants scored on average 11.58 ± 5.26 on HADS 2.

Table 4

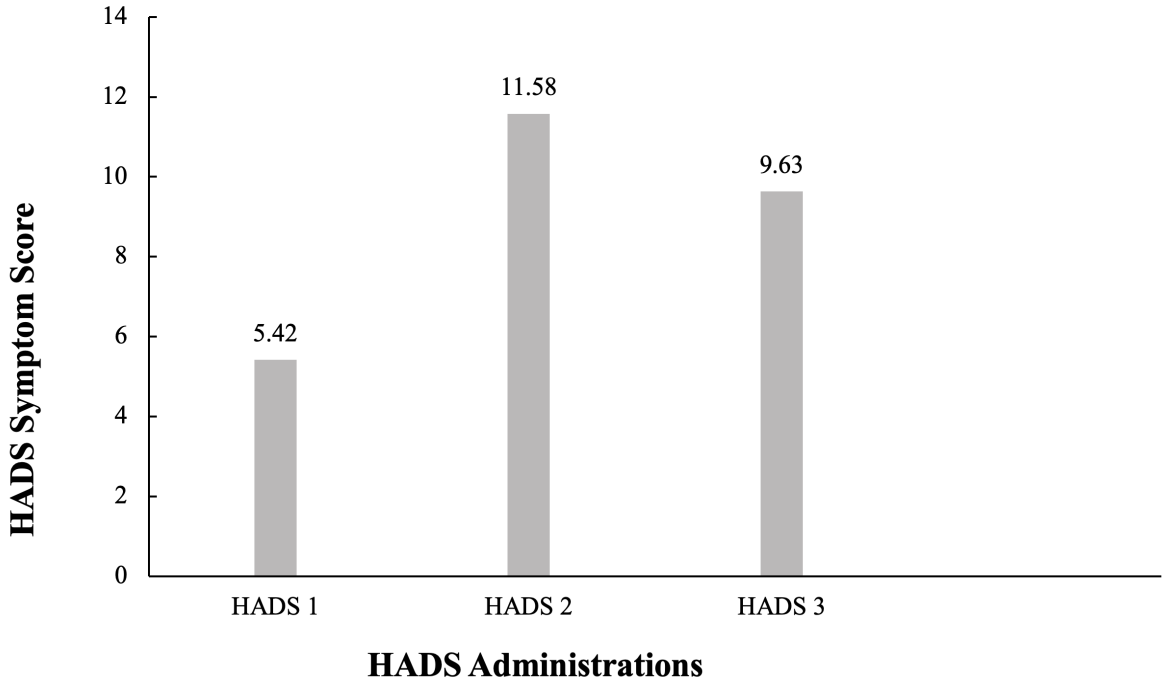
HADS Categories at Clearance for Full Sports Rehabilitation (HADS 3)

HADS Category	*n*	*%*	*Mean score within category*
Normal	6	37.5	3.33
Borderline Abnormal	2	12.5	8.50
Abnormal	8	50%	14.63

Note. $N = 16$. Participants scored on average 9.63 ± 5.83 on HADS 3. Two participants were not cleared at the conclusion of the data collection period. One additional participant did not complete HADS 3.

Figure 1

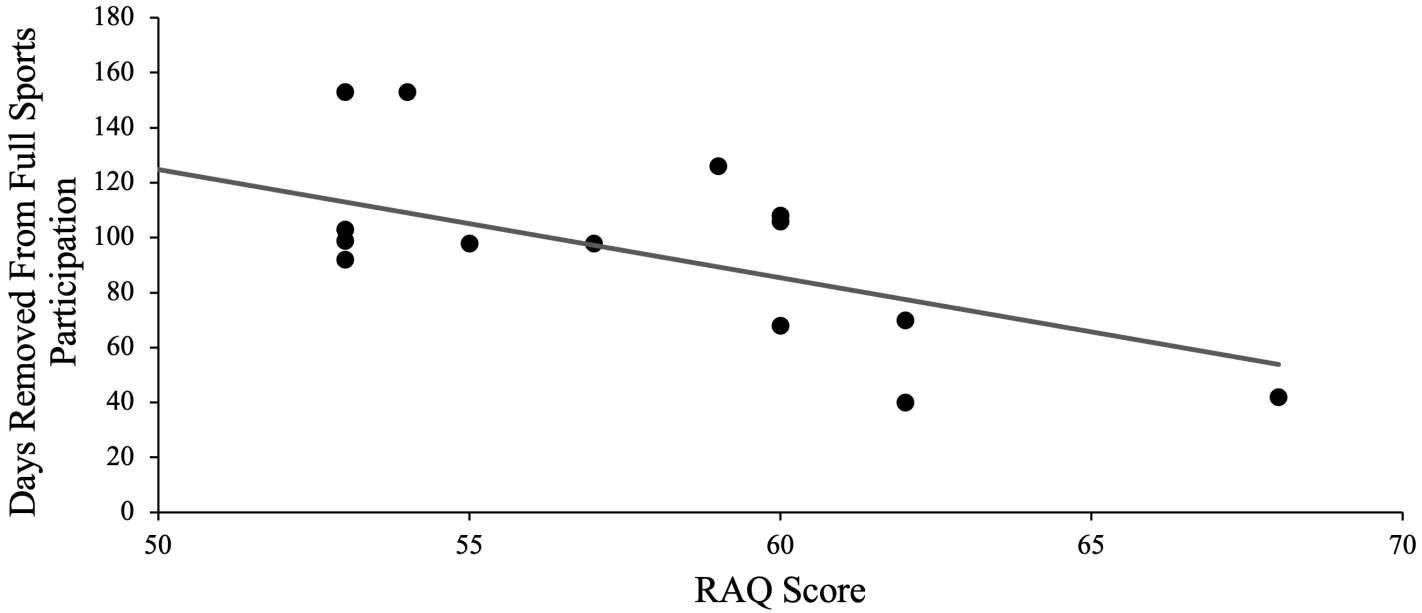
Mean Symptom Scores of HADS Administrations



Significant differences were found between the mean symptom scores of HADS 1 and HADS 2 (p = .001) and the mean symptom scores of HADS 1 and HADS 3 (p = .004).

Figure 2

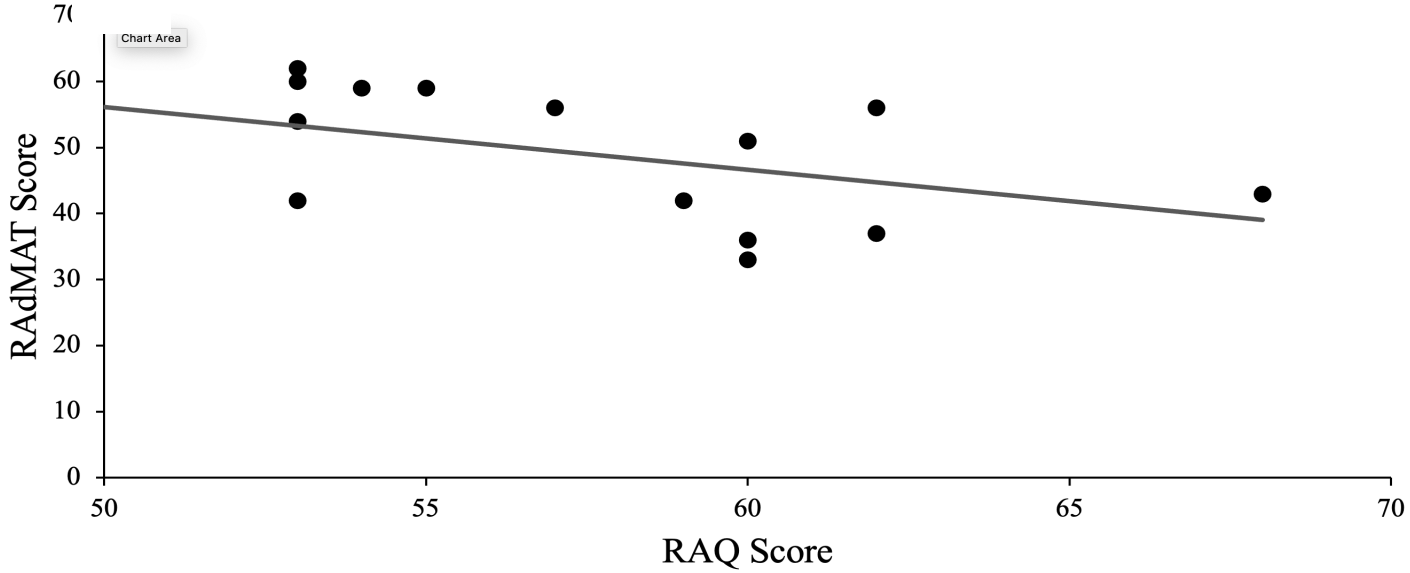
Correlation Between Self-Perception of Rehabilitation Adherence and Injury Recovery



Note. Each dot represents an individual participant. A significant moderate inverse correlation was found between RAQ scores and injury recovery (r = -.59, p = .02).

Figure 3

Correlation Between Self-Perception and Practitioner-Perception of Rehabilitation Adherence



Note. Each dot represents an individual participant. A near significant moderate inverse correlation was found between patient and practitioner perceptions of rehabilitation adherence (r = -.48, p = .06).

Research Question 1

- *Will more depressed and anxious collegiate athletes display significantly lower levels of rehabilitation adherence when compared to their less depressed and anxious colleagues, as measured by the RAdMAT?*
  - Neither HADS 3 nor HADS 1 categories affected how the athletic trainers in this study rated the rehabilitation adherence of the participants
  - In both instances, the within group variability was far greater than the between group variability
  - A significant *F* ratio was not found in either analysis

Research Question 1

Fail to reject!

- FAIL TO REJECT
  - A post-hoc Tukey's HSD test was not performed

Research Question 2

- *Will more depressed and anxious collegiate athletes display significantly lower levels of rehabilitation adherence when compared to their less depressed and anxious colleagues, as measured by the RAQ?*
  - No effect was found from the HADS 1 categories
  - Within the HADS 3 analysis, both the between group (*SS* = 155.57) and within group variability (*SS* = 186.83) were similar
    - F ratio of 4.996 was found to be significant at the .05 level (p = .026)

Research Question 2

- <u>REJECT THE NULL</u>
  - A Tukey's HSD test revealed a significant difference between the effects of HADS 3 category 1 (normal: 0 – 7) and HADS 3 category 2 (borderline abnormal: 8 – 10) on RAQ scores ($p = .021$)
  - Participants in HADS 3 category 1 scored on average 10.17 ± 3.22 more points than participants in HADS 3 category 2 on the RAQ
  - More depressed and anxious collegiate athletes display significantly lower levels of rehabilitation adherence

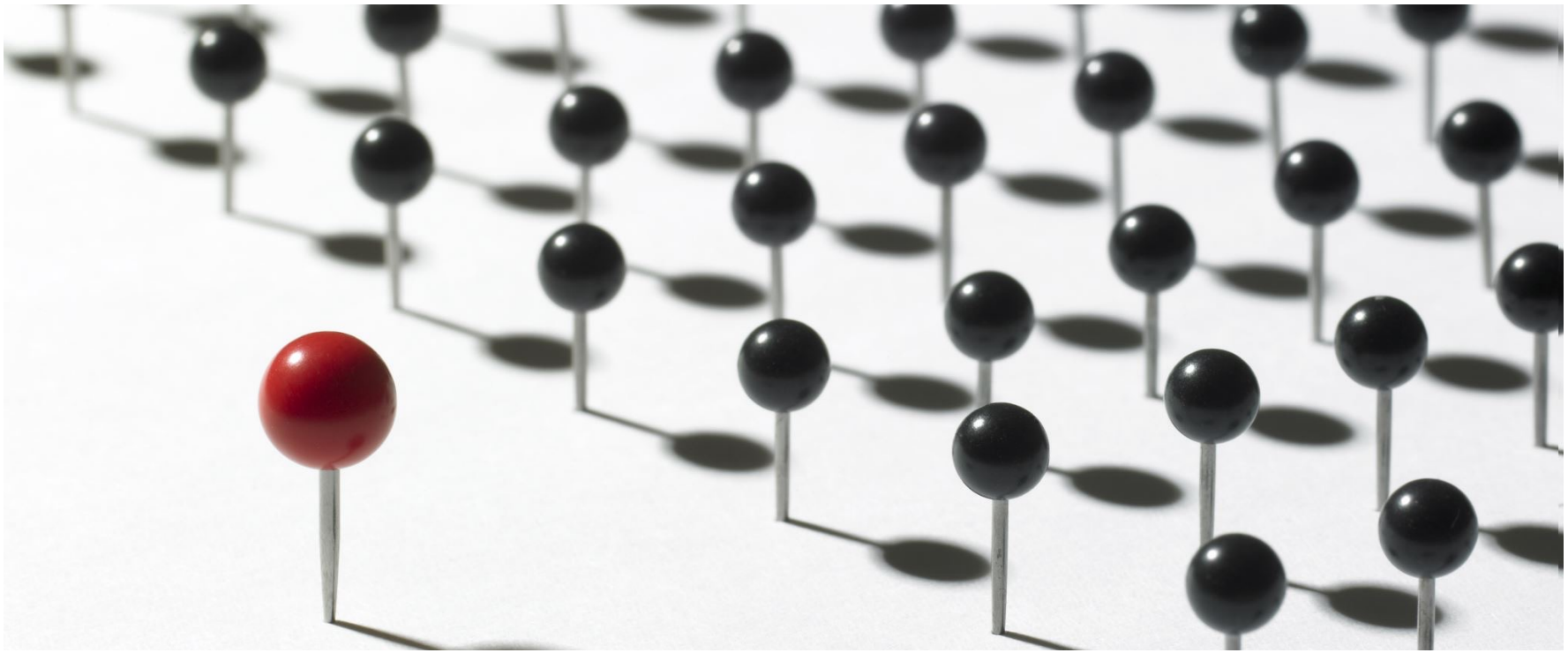
Research Question 3

- *Will more depressed and anxious collegiate athletes take significantly longer on average to recover from sports injury than their less depressed and anxious colleagues?*
  - No effect was found from the HADS 1 categories
  - Within the HADS 3 analysis, both the between group (*SS* = 7552.42) and within group variability (*SS* = 7711.34) were similar
    - F ratio of 6.366 was found to be significant at the .05 level (p = .012)

Research Question 3

- REJECT THE NULL
  - A Tukey's HSD test revealed a significant difference between the effects of HADS 3 category 1 (normal: 0 – 7) and HADS 3 category 2 (borderline abnormal: 8 – 10) on RTP ($p = .010$)
  - Participants in HADS 3 category 1 took on average 70.33 ± 19.87 less days than participants in HADS 3 category 2 to recover from sports injury
  - More depressed and anxious collegiate athletes take significantly longer on average to recover from sports injury

Theoretical and Practical Implications



Theoretical and Practical Implications

- Student-athletes face an apparent elevated baseline risk of depression and anxiety due to a myriad of factors (31.6% in this study)
- Athletic trainers need to strive towards finding interventions that will identify at-risk athletes prior to sports participation
- Most recent AT PPE position statement supports the need to involve questioning related to general mental health statuses (Conley et al., 2014)
  - Depression and anxiety not particularly emphasized
  - Use of widely utilized, well-validated mental health questionnaires *separate* from medical history question portion of existing paperwork not mentioned

Theoretical and Practical Implications

- Collegiate athletes may be physiologically ready to return to sport far sooner than they are psychologically ready
- Athletic trainers may not be utilizing psychological interventions that are as effective as their physiological interventions
- Athletic trainers have expressed a significant desire to learn more about useful psychological athlete interventions

Theoretical and Practical Implications

- Most athletic trainers are comfortable with utilizing strategies related to
  - Keeping injured athletes involved with their team
  - Using short-term goal setting
  - Creating variety in rehabilitation exercises
- Fewer athletic trainers have reported understanding
  - Imagery
  - Effective motivation
  - Realistic goal setting
- Some have not even reported ever considering the referral of an athlete for counseling services (Zakrajsek et al., 2016, 2017)

Theoretical and Practical Implications

- Symptoms of depression and anxiety can affect the ability of student-athletes in their ability to return to sport
- Injured student-athletes are placed in an environment to succeed both physically and psychologically in their rehabilitation programs when they are healing in all the domains of health
- Improvement of self-perception of rehabilitation adherence is needed
  - Self-motivation
  - Strong social support
  - Ascending pain tolerances
  - Schedule flexibility

Theoretical and Practical Implications

- Athletic trainers, and other rehabilitative clinicians, should seek to encourage early, significant investment in terms of commitment from their patients at the beginning stages of rehabilitation
- Must be facilitators of improving psychological health in sports rehabilitation of injured athletes
  - Flexibility with scheduling and missed rehabilitation appointments when appropriate
  - Climate of rehabilitation environment should be motivational, positive, generally inclusive
  - Advocacy of organizational improvements must be paramount

Limitations

- Sampling was limited to two institutions, the Mid-Atlantic region, and NATA District 2
- Collegiate athletes from the National Association of Intercollegiate Athletics (NAIA) were not sampled
- Most of the participants were males, NCAA Division II student-athletes, White Caucasian, academic seniors, and football athletes, and the overall sample size was relatively small (N = 19)
- Naturally occurring on-campus events and life stressors
- Ongoing COVID-19 pandemic
- Lack of rehabilitative guidance

Recommendations for Future Research

- Future samples should be comprised of collegiate athletes of different sexes, NCAA Division levels, races/ethnicities, and sport types
  - Much larger, diverse sample sizes
  - Athletes outside of the NCAA and high school athletes should be considered as well
- Manipulation of inclusion and exclusion criteria to examine collegiate athletes who may have sustained a concussion or are dealing with a serious chronic injury

Recommendations for Future Research

- Standardization of rehabilitative programming utilized by athletic trainers
- Exploration of the effectiveness of various psychological strategies on rehabilitation adherence and injury recovery
- Exploration of depression and anxiety questionnaires as part of the PPE process
- Further usage of the RAdMAT

Summary

- Collegiate athletes display unique risk factors for depression and anxiety at baseline and post-injury due to a myriad of reasons
- Their suggested elevated levels of depression and anxiety raise concern regarding how well they can adhere to their rehabilitation programs and fully recover after a sports injury has taken place
- Supported, well-validated, and consistent questionnaires (i.e., HADS, RAdMAT, RAQ) were used in a non-experimental repeated measures prospective cohort study of 19 collegiate athletes

Summary

- Symptoms of depression and anxiety increased post-injury ($p = .001$), but they did not return to baseline levels upon clearance for full sports participation ($p = .004$)
- Depressive and anxious symptomology did not affect how the athletic trainers perceived the rehabilitation adherence of their athletes
- Athletes with less depressive and anxious symptomology reported more self-adherence to their rehabilitation programs ($p = .021$) and took on average 70.33 ± 19.87 less days to recover from sports injury ($p = .010$)

Purpose of the Study

The collective purpose of this study was to explore the effect of depression and anxiety on rehabilitation adherence and injury recovery in a collegiate sample to present athletic trainers with information that will assist them in developing better holistic strategies of care for injured athletes.

Thank you!