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DOI: https://doi.org/10.25035/jsmahs.09.02.05
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Effect of Depression and Anxiety on Rehabilitation Adherence and Injury Recovery in Collegiate Athletes

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Introduction: The noted prevalence of depressive and anxious symptomology both pre-injury and post-injury in collegiate athletes raises concern regarding their ability to maintain appropriate rehabilitation adherence in their recovery from sports injury. The purpose of this study was to further explore the effect of depressive and anxious collegiate athlete symptoms on athletic trainers’ perceptions of rehabilitation adherence and return-to-play. Methods: NCAA Division II and Division III injured collegiate athletes (N = 19, M age = 20.58 ± 1.31) were observed throughout their rehabilitation programs by 5 separate collegiate athletic trainers. Collegiate athlete depressive and anxious symptoms were assessed during preseason retroactively, at the beginning of rehabilitation, and at clearance for full sports participation. Individual athletic trainers most responsible for the rehabilitation programming of their respective collegiate athletes were asked to provide their perceptions of rehabilitation adherence at the end of the programs. Depressive and anxious symptoms were measured with the use of the Hospital Anxiety and Depression Scale, and athletic trainer perceptions were measured using the Rehabilitation Adherence Measure for Athletic Training. Results: 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), thus indicating that depressive and anxious symptoms increased post-injury, but they did not return to preseason levels upon clearance for full sports participation. Collegiate athletes with less depressive and anxious symptoms took on average 70.33 ± 19.87 less days than their more depressed and anxious counterparts to recover from sports injury (P = .010). Depressive and anxious symptoms did not influence the perceptions that the athletic trainers shared relevant to rehabilitation adherence. Discussion: Injured collegiate athletes may be physiologically ready to return to sport far sooner than they are psychologically ready. Collegiate athletic trainers should make a conscious effort to improve the effectiveness of their currently utilized psychosocial interventions to better address the patient depressive and anxious symptoms that they may not be as cognizant of in the rehabilitation process, given the importance of appropriate rehabilitation adherence in producing positive outcomes. Key Words: mental health, physical recovery, injury recovery

INTRODUCTION

Collegiate athletes are often idolized and respected by their non-athlete colleagues on college campuses; however, the very nature of collegiate athletic competition in combination with the ongoing stressors of a traditional college experience can provoke, augment, or expose various psychological issues. Collegiate athletes face pressures to perform and win competitive events in public forums, all while simultaneously navigating relationships, academic demands, and possibly adjusting to life away from home. The demands that accompany the expectations to cope with and manage these activities could lead to various mental health symptoms, such as depressive and anxious symptoms. In fact, the National Collegiate Athletic Association (NCAA) found that about 31% of male and 48% of female NCAA collegiate athletes reported either depressive or anxious symptoms annually during the 2008 and 2012 academic years. The preexisting mental health symptoms reported by collegiate athletes may also increase their likelihood of being exposed to different categories of sports injuries. A sports injury can be defined as an acute injury event
during participation in collegiate sport practices or games with clinical signs of acute tissue damage as determined by team athletic trainers and/or team physicians that leads to a collegiate athlete’s inability to return to a practice or game on the same day.\textsuperscript{5,6} Significantly increased injury rates have been found for collegiate athletes who experienced preseason depressive and anxious symptoms compared to those who did not experience these same symptoms.\textsuperscript{6} Sports injuries may also have effect in which they either create or exacerbate mental health symptoms, as sports injuries in collegiate athletes can lead to negative emotional responses such as the development of anger, anxiety, confusion, or sadness.\textsuperscript{7} These injuries often place additional pressure on collegiate athletes to apply effective coping strategies to maintain a meaningful athletic engagement within their identities. Collegiate athletes continue to be noted as a population vulnerable not only to increased baseline measures of depressive and anxious symptoms but also to an increase in these symptoms post-injury. The prevalence of depressive and anxious symptoms both pre-injury and post-injury in this population raises concern regarding the ability of collegiate athletes to efficiently recover from sports injuries with positive outcomes through the implementation of sports rehabilitation programs.\textsuperscript{8-11}

Athletic trainers (ATs) are certified healthcare professionals who play a crucial role in the physical and psychological recovery of injured collegiate athletes. Collegiate athletes are even often significantly more satisfied with the support received from ATs than the support received from coaches, teammates, and family members after an injury has taken place.\textsuperscript{12} The motivational climate commonly found in athletic training facilities has also been shown to potentially contribute to proper rehabilitation adherence.\textsuperscript{13} This is crucial considering that an appropriate consistent adherence to prescribed physical rehabilitation programs will lead to improved health outcomes such as decreased pain, improved flexibility, increased muscular strength and endurance, and enhanced overall performance.\textsuperscript{14,15} Within the context of this study, rehabilitation adherence was defined as the behaviors an athlete demonstrates by pursuing a course of action that coincides with the recommendation of an athletic trainer. ATs have a need to better understand the depressive and anxious symptoms of their athletes in order to help bolster this rehabilitation adherence and improve the overall positive outcomes found among their athletes. Despite this need, however, many ATs have reported that there is a contemporary need for added information on how depressive and anxious symptoms may influence sports injuries in an effort to develop more efficient psychosocial interventions within injury rehabilitation.\textsuperscript{16} More information on this topic will continue to improve the confidence in their abilities to use contemporary psychosocial interventions to address any physiological or psychological setbacks in relation to rehabilitation adherence. Collegiate ATs may even believe that an increased understanding of the effect of these symptoms in this context may help to improve the existing inconsistent level of injured collegiate athlete rehabilitation adherence, as it can range from 40 to 90% adherent.\textsuperscript{17,18} The athletic training profession supports a contemporary need for further research that examines the effect of depressive and anxious symptoms on sports rehabilitation adherence and injury recovery in collegiate athletes. The purpose of this study was to further explore the effect of depressive and anxious collegiate athlete symptoms on athletic trainers’ perceptions of rehabilitation adherence and return-to-play.

\textbf{METHODS}

\textbf{Participants}

Inclusion criteria relevant to this sample included being 18 years of age or older, having an occurrence of an acute musculoskeletal sports injury (i.e., injured in practice or a
game), and having an experience of an acute musculoskeletal injury that required the inability to engage in full sport participation for at least 4 weeks. It is worth mentioning that this criteria was inclusive of both athletes who required surgical intervention and those who did not. The purpose of the 4-week requirement was to ensure that the injuries sustained required participation in a rehabilitation program for at least a month. ATs used their clinical judgement to determine if they believed the sustained injury would result in a minimum 4-week absence from full sports participation prior to approaching a collegiate athlete about possible participation in this study. Exclusion criteria included the presence of mild traumatic brain injury (mTBI), chronic injuries of insidious onset, diagnosed respiratory diseases, metabolic diseases, cardiac diseases, or autonomic nervous system diseases. All athletes were provided with consent forms and no athlete was penalized in any fashion for deciding not to participate in this study.

Data Collection
The data collection period for this study lasted eight months, starting in June of 2021 and ending in February of 2022. All involved collegiate athletes completed the Hospital Anxiety and Depression Scale (HADS) questionnaire for the first time prior to the start of sports participation in their respective sport seasons. Separate from the direct purposes of this study, the HADS provided the 5 ATs at the participating universities (2 Northeastern universities, NCAA Division II and Division III) with a baseline preseason measure of the depressive and anxious symptoms of their athletes. This allowed these providers to screen for any cases that may have warranted an additional intervention from on-campus counseling services. For the purposes of this study, the information gathered from the initial administration of the HADS was only retrospectively accessed by the researchers for the consenting athletes who met the inclusion and exclusion criteria (no initial HADS scores from consenting athletes were excluded). All involved collegiate athletes were monitored throughout the 2021 summer preseason, the 2021 fall season, and the 2021-22 winter season for sports injury. Once an athlete was injured and they met the inclusion and exclusion criteria, then the athlete would be approached and asked to participate in this study.

Athletes in this study completed the HADS questionnaire for a second time at the beginning of their rehabilitation with their AT and not on the same day of their sports injury. The athletes were approached and asked to participate in this study. The athletes were also provided with consent forms and no athlete was penalized in any fashion for deciding not to participate in this study.

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All questionnaires in this study were administered through Google Forms on either a password-protected tablet, smartphone, or computer desktop. Google Forms offers researchers security and privacy configurations that are compliant with Health Insurance Portability and Accountability Act (HIPAA) regulations. All devices were
thoroughly disinfected in between participant use. The researchers involved in this study followed all state-mandated COVID-19 restrictions and protections when interacting with participants such as mask wearing, social distancing whenever possible, routine cleaning, and consistent hand washing/sanitizing. All researchers in this study completed the Collaborative Institutional Training Initiative (CITI) program training for human subjects before beginning participant recruitment. All collected data was deidentified, kept confidential, and stored in a password-encrypted computer. IBM SPSS 27.0 Statistical Package was used to analyze all collected data at the end of the data collection period.

**HADS**
The HADS is a 14-item questionnaire designed to measure the symptoms of depression and anxiety. The HADS consists of two subscales that are comprised of 7 questions for symptoms of depression (HADS-D) and 7 questions for symptoms of anxiety (HADS-A). Each item on the questionnaire contains responses that are 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). The combined score of emotional distress (sum of HADS-A and HADS-D) ranges from 0 to 42 with individual scores of 11 or higher within each subscale indicating a potential for a clinically significant mood disorder case (for either depression or anxiety). For the purposes of this study, participants who scored an 11 or higher within either of the two subscales and participants who scored an 11 or higher in both subscales were placed into a case/abnormal category (with a total symptom score ranging from 11 – 21+, and non-case and borderline case category total symptom scores ranging from 0-7 and 8-10, respectively). The internal consistencies of the two subscales (HADS-A, HADS-D) following the accumulation of data on 50 patients were computed by calculating Spearman correlations between each item and the total score of the remaining items in each subscale. The correlations ranged from .76 to .41 for the 7 anxiety items with each correlation being found significant beyond P < .01. The correlations ranged from .60 to .30 for the 7 depression items with each correlation being found significant beyond P < .02. Whether the scores of the two subscales could be used as indications of the severity of depression and anxiety was also examined. Spearman correlations between the subscale scores and the psychiatric ratings were calculated and it was found that $R = .70$ for depression and $R = .74$ for anxiety (both results were found significant beyond P < .001).

Through an expansive literature review of 747 studies, the HADS performed well in assessing the symptom severity and caseness of depression and anxiety in both psychiatric and primary care patients and in the general population. Correlations between the HADS-A and HADS-D subscales that were varied from .40 to .74 ($M = .56$) were found; Cronbach’s alphas that varied from $.68$ to $.93$ ($M = .83$) for HADS-A and from $.67$ to $.90$ ($M = .82$) for HADS-D were found. The sensitivity and specificity for both HADS-A and HADS-D of approximately .80 were very similar to the sensitivity and specificity achieved by the General Health Questionnaire (GHQ). Correlations between the HADS and other commonly used questionnaires such the Beck Depression Inventory (BDI), the Clinical Anxiety Scale, and Spielberger’s State-Trait Anxiety Inventory (STAI) were in the range of .49 to .83. The HADS is on par with other similar, but more comprehensive, instruments used for identification of depressive and anxious symptoms.

**RAdMAT**
The RAdMAT is a 16-item questionnaire designed to measure rehabilitation adherence; it is intended to be used by ATs in...
a rehabilitative setting. Each item on the questionnaire contains responses that are individually scored on a scale from 1 to 4 with higher scores indicating a higher level of frequency (i.e., never, occasionally, often, always). Examples of the items in the RAdMAT include statements such as, “attends scheduled rehabilitation sessions” or “has a positive attitude during rehabilitation sessions.” The responses are combined into a total score that ranges from 16 to 64 with higher scores indicating that ATs perceive their athletes as being successfully adherent to their rehabilitation programs. The subscales of attendance/participation, communication, and attitude/effort are all present within the items of the questionnaire. Granquist et al. constructed 3 separate studies to develop the RAdMAT and ascertain the psychometric properties of the instrument. They first surveyed 7 ATs who were active in clinical practice via an online survey in order to generate a list of rehabilitation-adherence behaviors. The surveyed ATs were employed full-time to work with collegiate athletes and were directly involved in conducting or supervising rehabilitation for collegiate athletes in the United States; they were also purposely selected to be representative of overall collegiate ATs (i.e., Division I, Division II, Division III, non-NCAA division, male, female, sports coverage, region of the country) and had attained an average of 11.3 (range: 4 – 30 years) years of experience and a Master’s degree. Granquist et al. identified all of the key words and phrases from their answers to compile a list of adherence behaviors and then placed similar and related items into categories. Secondly, Granquist et al. sent a complete list of 49 identified behaviors to a different set of 12 content experts who had published multiple peer-reviewed articles in their respective fields for input on item content, clarity, and format. The content experts rated each of the 49 behaviors on content and clarity on a 3-point scale (yes, no, maybe) and were allowed the opportunity to reword items, eliminate items, or make additions or clarifications to better represent rehabilitation adherence; a 25-item RAdMAT was created from these final expert revisions.

Lastly, Granquist et al. sent the preliminary 25-item RAdMAT via e-mail to 1000 ATs who were affiliated with the National Athletic Trainers’ Association; these ATs were again representative of all NCAA sports and competition levels. These researchers asked the 164 ATs who responded to each consider 3 athletes (most adherent, least adherent, average) with whom they had worked with and completed a rehabilitation program with within the past year. Each of those athletes was used for 3 separate preliminary 25-item RAdMAT completions from each AT. Each item on the 25-item RAdMAT was rated on a 4-point scale that ranged from 1 (never) to 4 (always); the total possible scores of the 25-item RAdMAT ranged from 25 to 100, with higher scores indicating greater adherence. ATs were also provided with the tasks of completing 3 separate Sports Injury Rehabilitation Adherence Scale (SIRAS) submissions for each of the 3 athletes. The SIRAS was created as a 3-item questionnaire designed to provide rehabilitative practitioners with a method of measuring the rehabilitation adherence of their patients. The SIRAS is looked upon favorably by researchers due its ability to be utilized as a quick, single-session measure or for repeated assessments over several sessions. 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). The SIRAS, by comparison, maintained moderate Cronbach’s alpha coefficients for the 3 different types of athletes (.591 for most adherent athletes, .861 for average athletes, .771 for least adherent athletes). They performed within-subject MANOVAs on the 25 RAdMAT items to successfully demonstrate that the individual items adequately discriminated among adherence
levels. They also conducted separate within-subject ANOVAS on each of the items to examine item discrimination; the univariate $F$ value for adherence effect was statistically significant ($P < .001$) for all 25 items, with all $F$ values over 87. Additionally, their follow-up simple contrasts showed that the 3 different levels of adherence differed significantly ($P < .001$) for each item, with all $F$ values over 55. Granquist et al.21 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 ($R^2 = .704$, $P < .01$); the RAdMAT also maintained a high correlation with the SIRAS ($R = .898$; $P < .01$).

The main advantage of the RAdMAT in relation to this study was the fact that it is reflective of adherence behaviors specific to the athletic training college setting, and it is extremely relevant to all ATs. The RAdMAT is intended to be used by practicing ATs and Granquist et al.21 maintain that its clinical usefulness is of paramount importance. The use of ATs who were currently practicing in the college setting to generate the items of the instrument sets the RAdMAT apart from the SIRAS. The RAdMAT also offers more information with only a slightly longer completion time when compared to the SIRAS; the RAdMAT is at least as good, if not better, than the SIRAS for measuring rehabilitation adherence behaviors in the athletic training setting. Ultimately, the RAdMAT was chosen in this study for its applicability to the athletic training profession, ease of completion, and good psychometric properties (particularly when compared to the more commonly used SIRAS). As Granquist et al.21 concluded, the RAdMAT has sufficient reliability and validity to justify its use in research examining the predictors and outcomes of rehabilitation adherence.

**RESULTS**

The participating 19 collegiate athletes ($M_{age} = 20.58 \pm 1.31$) were predominantly males (89.5%), NCAA Division II collegiate athletes (73.7%), White Caucasian (63.2%), academic seniors (42.1%), and football athletes (63.2%). Foot/ankle injuries (36.8%), knee injuries (21.1%), hip/thigh injuries (21.1%), and shoulder injuries (21.1%) represented the musculoskeletal conditions sustained by the participants. The 5 participating collegiate ATs (3 females, 2 males) had at least 5 years of collegiate athletic training experience and a Master’s degree. The ATs rated their perception of the rehabilitation adherence of their athletes to be $48.41 \pm 9.63$ on scale of 16 to 64 using the RAdMAT. On average, the athletes took $96.63 \pm 31.90$ days to recover (RTP) from their sustained injuries before they were cleared for full sports participation. The distribution of depressive and anxious symptomology (HADS scores and categories) was reported for the participants at baseline (preseason), at the beginning of sports rehabilitation, and at clearance for full sports rehabilitation (see Table 1). Of special note, many of the collegiate athletes (68.4%) reported symptom scores that coincided with the normal HADS category at baseline (for both the depression and anxiety subscales collectively), while the remaining participants (31.6%) reported symptom scores that coincided with HADS category levels elevated beyond normal at baseline (for either the depression and anxiety subscales individually or collectively).
Table 1. The distribution of depressive and anxious symptomology

The mean symptom score of 5.42 ± 6.30 for HADS 1 rose to 11.58 ± 5.26 for HADS 2 after a sports injury had taken place followed by a mean symptom score of 9.63 ± 5.83 for HADS 3 after clearance for full sports participation had been attained. Paired samples t-tests with a significance level of .05 were computed to look for any significant differences between the mean symptom scores of HADS 1, HADS 2, and HADS 3 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). A one-way analysis of variance (ANOVA) with two dependent variables (RAdMAT scores, return-to-play time measure in days) was performed to explore for possible differences with the sample of this study. A factor for the HADS scoring category (normal: 0-7, borderline abnormal: 8-10, abnormal: 11-21+) was maintained within the analysis. All HADS categories did not affect how the ATs in this study rated the rehabilitation adherence of their athletes using the RAdMAT. In all these instances, the within group variability was far greater than the between group variability without any significant F ratios, thus indicating that any variance in RAdMAT scoring was likely not due to the varying levels of depression and anxiety as measured by the HADS. Depressive and anxious symptoms at return-to-play (i.e., HADS 3 administration) had an effect on the amount of time during which the athletes were removed from full sports participation after an injury had taken place. A post-hoc Tukey’s HSD test revealed that a significant difference was found between the effects of HADS 3 category 1 (normal: 0-7) and HADS 3 category 2 (borderline abnormal: 8-10) on RTP (p = .010). Athletes in HADS 3 category 1 took on
average 70.33 ± 19.87 less days than participants in HADS 3 category 2 to recovery from sports injury. The effect of HADS 3 categories on both dependent variables has been displayed for reference (see Table 2).

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Table 2. One-way ANOVA statistics for HADS 3 category effect on study dependent variables [Note. A factor for the HADS 3 depressive and anxious symptoms scoring category (normal: 0-7, borderline abnormal: 8-10, abnormal: 11-21+) was maintained with the analysis.]

CONCLUSION

The initial worrisome finding that 31.6% of the 19 athletes reported depressive and anxious symptoms elevated beyond normal at baseline (i.e., with the administration of HADS 1) was on par with the discoveries of other researchers who studied the prevalence of these symptoms in athlete and nonathlete collegiate students. About half of all collegiate students have previously reported suffering at least one significant mental health problem at either a baseline or follow-up state.23 A previous total prevalence rate for clinically relevant levels of depressive symptoms of 23.7% has been found among collegiate athletes.11 The found significant increase in depressive and anxious symptomology from a baseline state to after sports injury observed in the administrations of HADS 2 (P = .001) and HADS 3 (P = .004) further supported the previous findings of depressive and anxious symptoms increasing because of injury. Symptoms of depression (12%) and emotional stress (30%) have been reported in injured physically active individuals in the past.7 Adult patients have even more recently shown a tendency to report symptoms of depression (12%) and anxiety (10%) within one week after an occurrence of physical trauma.24

Notably, the lack of a significant decrease in symptomology between HADS 2 and HADS 3 indicated that the athletes were not able to return to a baseline level of depressive and anxious symptoms despite having underwent a complete sports rehabilitation program and returning to full sports participation. This suggests that collegiate athletes may be physiologically ready to return to sport far sooner than they are psychologically ready. ATs may not be utilizing psychological interventions that are as effective as their physiological interventions. This problem is further compounded by the fact that contemporary ATs have expressed a significant desire to learn more about useful psychosocial athlete interventions in athletic training.16,25 Most ATs are comfortable with utilizing interventions related to keeping injured athletes involved with their team, using short-term goals, and creating variety in rehabilitation exercises; much fewer ATs have reported understanding the intricacies associated with imagery, effective motivation, and realistic goal setting.16 Additionally, some ATs have not reported ever considering the referral of an athlete for counseling services despite their willingness to acknowledge the importance of psychological services in the rehabilitation process.25,26
Varying degrees of depressive and anxious symptomology also did not impact how the ATs in this study interpreted the rehabilitative adherence of the athletes that they cared for. This is troublesome considering that many athletes attribute the social support received from ATs as being significant factors in their physiological and psychological recovery from a sports injury.\textsuperscript{11} In fact, athletes who do not feel as if they have appropriate social support from their ATs are less likely to report symptoms of mental health conditions.\textsuperscript{27} Thus, ATs and other rehabilitative clinicians need to be able to consistently ingratiate themselves as facilitators of improving psychological health in sports rehabilitation of injured athletes.

**IMPLICATIONS**

As the 2020 Commission on Accreditation of Athletic Training Education professional standards\textsuperscript{28} indicate, ATs should feel empowered to identify, refer, and give social support to their athletes with mental health conditions. They need to continually educate themselves on the psychological interventions that they should be implementing in rehabilitation settings. Beyond learning, ATs should make a conscious effort to effectively utilize these interventions and standardize them into their own clinical practice. The use of imagery, for instance, is a required skill for ATs, however, it has not been reported that athletic trainers feel adequately trained in their ability to utilize imagery with their injured athletes.\textsuperscript{29} The ATs who have used this intervention have used it primarily as a tool to increase confidence, but not necessarily to control emotions, master skills, or set goals. Imagery, and many other psychological interventions such as goal setting, positive self-talk, and anxiety reduction, have gone underutilized and underappreciated despite them being required skills of athletic training. Within collegiate athletics, there is reason to believe that collegiate athletes may be more reliant than professional athletes on the psychosocial intervention capabilities of the ATs that care for them.\textsuperscript{12,30}

The lack of the effect of depressive and anxious symptoms on how the athletic trainers rated the rehabilitation adherence of their athletes may have been a result of either high athletic identities masking certain symptomology expected to be present within rehabilitation or a lack of mental health sensitivity on behalf of the healthcare providers involved. It has been found that higher levels of athletic identity are associated with higher levels of rehabilitation overadherence.\textsuperscript{31} ATs need to be appropriately sensitive to the typical emotional responses to injury and the psychosocial needs of athletes to best design and execute their rehabilitation programs.\textsuperscript{32} Additionally, the result that less depressed and anxious participants took on average less days to recover from sports injury than their more depressed and anxious counterparts further supported conclusions made by previous researchers.\textsuperscript{33,34}

**LIMITATIONS**

Several limitations were expressed in the completion of this study. Participants and practitioners may not have been completely transparent in the completion of the HADS and RadMAT questionnaires. Additionally, the ATs may have displayed subconscious biases towards the recruitment of certain participants and could have benefitted from prior training with the use of the RadMAT. Unforeseen events that may have affected the mental health conditions of the collegiate athletes on campus were not able to be controlled for. The COVID-19 pandemic may have continued to evoke heightened mental health distress within the involved collegiate athletes, thus reasonably increasing their likelihood of depressive and anxious symptomology. The COVID-19 pandemic may have continued to limit the ability of collegiate athletes to appropriately train for their sport throughout the year, thus reasonably...
increasing their likelihood for musculoskeletal injury. This pandemic may have also continued to remove both collegiate athletes and practitioners from their previously normalized environments. All practitioners in this study were assumed to be Board of Certification (BOC) ATC certified and in good standing with the Pennsylvania State Board of Medicine and the New Jersey Department of Health. Lastly, 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.

**FUTURE RESEARCH**

Future researchers should seek to replicate similar studies on the effect of depression and anxiety on sports rehabilitation adherence and injury recovery in collegiate athletes with a much larger, diverse sample and as much standardization of rehabilitative programming as feasible. Future samples should be comprised of collegiate athletes of different sexes, NCAA Division levels, races/ethnicities, and sport types. There should also be added attention to how results may vary between athletes who receive surgical intervention and those who do not given the presumed psychological responses that an athlete may have after surgery. Additionally, athletes outside of the NCAA and high school athletes should be considered for future samples as well. Future researchers should also consider manipulating inclusion and exclusion criteria to examine student-athletes who may have sustained a concussion or are dealing with a serious chronic injury. These recommendations would allow for any future significant findings to become much more generalizable to the overall injured athletes treated by ATs.

Within the recommendation of rehabilitative programming standardization, the effectiveness of various psychological strategies implemented by ATs on outcomes such as rehabilitation adherence and return-to-play should be explored. This exploration may bolster the current level of comfort that contemporary ATs maintain in utilizing psychological tactics as part of their everyday clinical practice. Furthermore, the HADS and other additional depression and anxiety questionnaires should be assessed for aspects of validity and reliability as part of the pre-participation physical examination process among athletes, particularly at the collegiate level. This type of research may permit ATs to feel much more adept in their use of these questionnaires separate from the medical history question portion of any already pre-existing paperwork. Future researchers must also seek to use the RAdMAT questionnaire as this is currently the only known study that has utilized this questionnaire after its creation by Granquist et al. in 2010.

**REFERENCES**


