

Post-injury Depression and its impact on the Recovery of College Athletes

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Abstract

The world of competitive athletics is an arduous one. There are many great victories and many more losses. In an environment such as athletics, it is easy to overlook or try to push past issues pertaining to mental health, especially regarding depression. Depression in athletes can present as loss of motivation, loss of pleasure in their sport, isolating from their teammates, lack of concentration, or feeling worthless to themselves and the team. There are three different pathways of depression: the inflammatory pathway, gut microbiome imbalances, and irregular neurotransmitter levels. The focus of this research will be the Inflammation response to depression and the effect it has on physical health such as injuries and recovery in division 1 athletes. Quantifying injuries and related depressive symptoms via a survey distributed to all student athletes at a small mid-major university in the southeast United States.

1. Introduction

Division 1 collegiate athletics is one of the biggest stages for sports in the country, second only to professional leagues. Only two percent of athletes will have the opportunity to play at the division 1 level.¹ The bracket of competition is unparalleled. Athletes must fight to earn their spot each and every day. In this environment of elite athletes and intense competition, it can be easy to ignore other battles that take place outside of what people can watch on TV. Athletes' mental health is one of those battles. These top tier athletes have had the idea of toughness ingrained in them from the first moments of their athletic careers, careers that can begin as early as the age of 8.² Single sport specificity has become mainstream for seventh and eighth graders, rather than the end of high school.³

Children are being taught they must be both physically and mentally tough to endure such levels of competition. This idea of toughness makes it difficult to talk about such things as mental health struggles. Athletes are commonly afraid they will be looked down on for being weak or not as good as others. This makes athletes ignore and try to overcome what they might be feeling. One of the leading struggles that athletes face is depression.⁴ Given that these stigmas and expectations permeate the entire community, issues such as depression have been overlooked and pushed aside. This culture of disregarding mental health struggles extends to administration, coaches as well as the athletes themselves.

It is estimated that 24 % of athletes at the division 1 level show signs of clinical depression.⁴ Depression in athletes can present as loss of motivation, loss of pleasure in their sport, isolation from their teammates, lack of concentration, or feeling worthless to themselves and the team.⁵ Struggles with depression not only impact mental wellbeing but also hinder physical health and performance.

To better understand the physical effects of depression one must explore the physiology of depression. Currently there are three understood physiological pathways that are thought to underlie depression: the inflammatory pathway, gut microbiome imbalances, and irregular neurotransmitter levels. Although perhaps interconnected, each theory lends a different perspective of the role of physiology in the expression of depression. The neurotransmitter pathway of depression refers to aberrant levels of these molecules in synapses between neurons. Serotonin, dopamine and norepinephrine are three of the main neurotransmitters involved in depression.⁶ Treatment following a

neurotransmitter model of depression includes pharmacotherapy that alters the uptake between neurons at the synapse. This process, in theory, allows the neurotransmitters to act longer within the body, thereby diminishing the symptoms of depression.

The second leading theory of depression is the gut microbiome. Bacteria are essential to the body. They help us break down food and extract nutrients in our gut. There are 10 times as many bacteria cells in the human body as there are human cells.⁷ Many of these bacteria reside in the gut. An imbalance of certain species of these bacteria has the ability to affect brain and immune functioning.⁸ It is suggested that certain species of bacteria contribute to depression symptoms and that depressive states may cause alteration to the microbiota species leading to more severe symptoms of depression.⁸

The final pathway and perhaps the most important for this research is the pathway of inflammation. Inflammation, part of the body's innate immune response, most commonly occurs in response to an injury. Inflammation consists of immune cells being released into the site of the trauma. These immune cells include macrophages, lymphocytes, neutrophils, cytokines, and fibroblasts.⁹ All of these cells act to combat injury, prevent infection, and aid in the healing process. One main type of cell is neutrophil cells. Neutrophil cells fully consume intruder cells through phagocytosis.

These neutrophil cells are more abundant within the body of someone exhibiting symptoms of depression. This process can slow healing when coupled with depression.¹⁰ A side effect of depression is increased inflammation throughout the body. Inflammation also can influence mood. This experience is known as sickness behavior, whereby when someone is sick in the traditional way, they may feel tired, groggy, irritable and have impaired concentration.¹⁰ Injury and depression are both creating an immune response, feeding from one another and exacerbating the injury along with depression. This means more neutrophils performing phagocytosis of other cells. During this process, after the other cell has been engulfed, an oxygen free radical is released from the reaction. This molecule has a lone valence electron making it extremely reactive with the tissues surrounding it. This can cause more damage to the body and slow recovery even more and put our athletes at a greater risk of injury.¹¹

In order to prevent these negative outcomes of injury and increased depression in athletes, we must create environments that promote positive physical and mental health. During recovery, if an athlete is in an environment that is causing extra stress, exacerbated feelings of loneliness, and unhelpful resources this will increase the symptoms of any depression and greatly impact the healing process in a negative way. The athlete's belief in the healing process put forward by doctors and trainers, social support, and pressure to meet return deadlines are all ways an athlete can feel extra stress.¹²

This research aims to better understand the relationship between depression and injury at a small mid-major university to better aid athletes in recovery of their bodies and minds. Specifically, this research examines how many athletes are being injured, their experiences with depression, emotional and athletic reactions to injury, and the support athletes experience during their recovery process. From the data collected in the survey, recommendations will be made for ways to promote a better environment to enhance physical and mental health of injured athletes and to ensure athletes can perform at their best.

2. Methods

2.1 Participants

In order to assess the relationship between injured athletes, non-injured athletes, experiences of support during injury, and struggles with depression, questions were embedded in an annual athletic mental health survey. The survey was issued to 245 Division one athletes. 122 athletes responded, representing a 49.7% response rate. Of the 122, 66 athletes reported being injured at least one time during their division 1 career. To qualify for the present study, the injury had to have taken them out of regular team activities for over one week. Of the 66 athletes who experienced injury, 52 had been injured for at least one week or more and represented the participants in this study.

2.2 Materials

2.2.1 injury response questionnaire

For the purposes of this study, the author developed survey questions assessing the athlete's emotional response during their time of injury. We wanted to know who or what was integral in their healing process, as well as if anything

negatively or positively impacted this process. Some answer choices were set on a Likert scale, while others were yes or no along with open-ended questions. For the Likert scale questions, answer choices ranged from 1-5: 1= strongly disagree, 2= disagree, 3=undecided, 4=agree, 5=strongly agree. The open-ended questions were designed to be free response questions that athletes could identify specific details that were particularly helpful or unhelpful to them during their time of injury. There were also questions that identified the athletes' support systems outside of the athletics department. We also wanted to know how the athletes were included in team activities, if at all, and how they were impacted by inclusion or exclusion from team events during their injury. There were also questions to better understand if they had struggled with mental health prior to injury and if they sought help from a counseling service during their recovery process.

2.2.2 patient health questionnaire – 9

The PHQ is used within healthcare as a time efficient depression screening tool. It asked nine questions in relation to struggles related to one's mood within the last two weeks, as categorized by the Diagnostic and Statistical Manual of Mental Disorders, 5th edition. The questions ask how often the person struggled with experiences such as having little pleasure in doing things, feeling bad about themselves, feeling down or hopeless, trouble concentrating, difficulty sleeping, and feeling as if they would be better off dead. Scores range from 0 to 27. A score of 0-4 indicates no presence or depressive symptoms, a score of 5-9 suggests mild symptoms, 10-14 indicates moderate symptoms, 15-19 indicates moderate to severe symptoms, and a score of 20-27 indicates severe depressive symptoms.

2.3 Procedures

We obtained approval from the institutional review board of the university along with the Athletics department to conduct this survey. The survey was administered to all student athletes via Qualtrics, an invitation for which was sent via email by a university athletics administrator. They had a three-week period to complete the survey, with a reminder to complete the survey being emailed once per week. The survey could be completed on the athlete's own time, and it took approximately 20-30 minutes depending on how many questions the athletes were eligible to answer depending upon injury status. Athletes were reassured that all responses would remain anonymous to everyone except the Athletics Mental Health Coordinator and that the way they responded would in no way impact their playing time or standing with their coaches, scholarships, or the administration. The Athletics Mental Health Coordinator reviewed the data initially and redacted any personally identifying information of coaches, athletes, or administration prior to sharing the data with the primary author.

3. Results

3.1 Participants

A total of 115 athletes completed the first question of "Have you ever been injured during your time at [this university]?" 66 answered yes and 49 answered no. The second question of "How many times have you been injured?" was answered by 65 participants, with athletes having been injured the following number of times: once= 28, twice=26, three times=3, and more than 3 times=8. The next question finalized our participant pool by narrowing down the amount of time missed from team activity. Figure 1 denotes the amount of time athletes missed team activities, with the majority of athletes missing activities for 2-4 weeks. 53 athletes reported having been out for one week or more and thus were eligible for this study. (See Figure 1) One remaining participant declined to respond to the remaining questions, leaving 52 total participants for this study. Out of these 52, 21 athletes were currently injured at the time of the study.

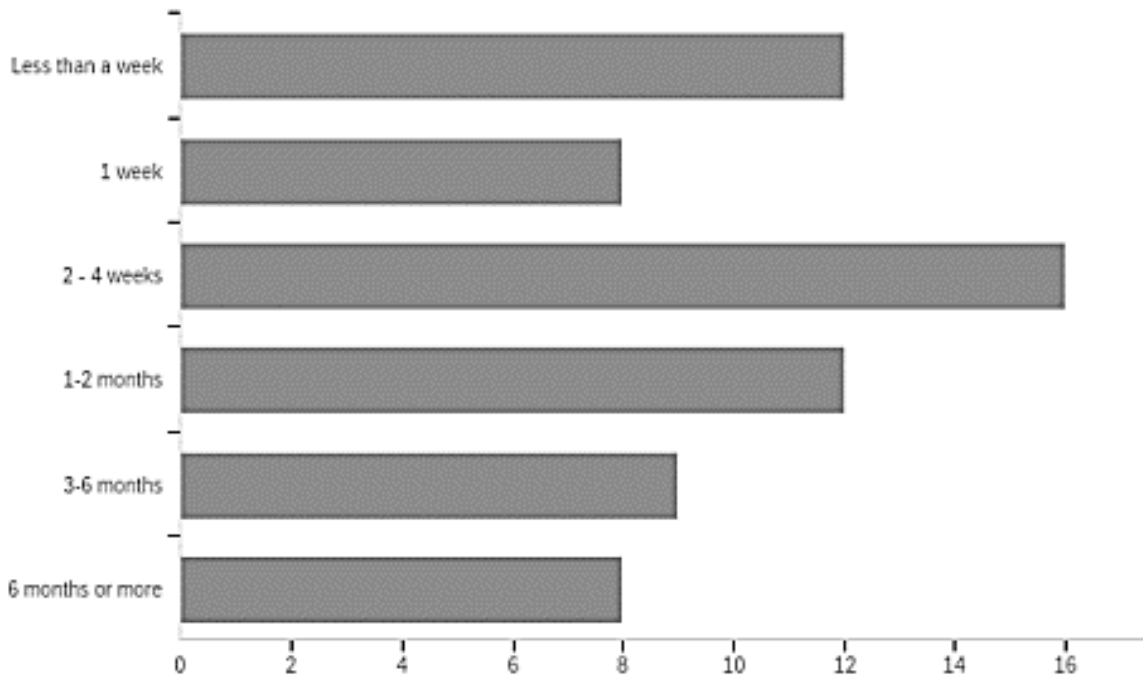


Figure 1

Less than a week=12, 1 week=8, 2-4 weeks=16, 1-2 months=12, 3-6 months=9, 6 months or more=8.

3.2 Athlete Mental Health

3.2.1 depression

We analyzed the depression scale scores of participants who were injured and out of team activities for more than one week. We found that injured athletes had an average PHQ score for depression of 6.03 (SD=5.84). The minimum depression score was a 0.0 and a maximum score for injured athletes on the PHQ was 21.0.

3.2.2 prior mental health struggles and formal support

The participants who reported an injury during their careers were asked if they struggled with mental health prior to their injury. Of the 43 participants that answered the question, 17 of them reported having struggles with mental health prior to injury, whereas 26 reported no prior struggles. The participants also were asked if while they were injured, they sought help from a mental health counselor. Of the 43 participants that answered this question, 9 participants answered yes, and 34 participants answered no.

3.3 Environment

3.3.1 overall environment

In an effort to examine the overall environment the athletes were experiencing during their recovery we asked them to respond to the following statements on a Likert scale. (See Table 1)

Table 1. “How Do you feel about the following statements?”

Statements	#Strongly Disagree	# Disagree	#Undecided	#Agree	#Strongly Agree
During my recovery process, my coaches were there for me when I needed them.	1	4	7	25	15
My athletic trainers supported me throughout my recovery the best they could.	2	7	6	23	14
My teammates were supportive of me during my recovery.	1	1	6	25	19
I felt the trainers and coaches communicated well about my injury status.	1	14	14	18	5
I still felt like a valuable member of the team.	1	4	9	26	12
Administration was helpful when I needed them.	1	1	21	21	8
My professors were understanding of my situation.	0	2	15	22	13
I felt sad that I could not play, practice or lift with my teammates.	0	4	2	12	34
I felt discouraged at some point in my recovery process.	0	3	3	16	30
I felt left out of team activities.	4	19	2	15	12

I felt pressured to return to team activities before I was ready.	6	24	5	9	8
I felt like my coach saw me as less valuable to the team.	12	18	11	7	4
I felt excluded by teammates during my injury.	14	22	9	6	1

3.3.2 travel to away events

To determine whether injured athletes still felt as if they were part of the team when their team was traveling, we asked them “Did you travel with your team to away events during your injury?” 43 % (22) athletes traveled with their teams, leaving 57% (29) who did not. For those who did not travel with their teams they also answered the question of “Did you find staying home difficult?” Of those who did not travel with the team, 54% found it difficult to stay home.

3.3.3 difficulty staying behind

The participants were asked a follow up open ended question if they answered yes to finding staying at home difficult. Twelve participants responded, with representative responses as follows:

“It was hard to not be able to be included in the fun parts of being on a team, which includes traveling to competitions.”

“I was the only one who had to stay home because I had surgery and was unable to travel, so having none of my friends in town was very lonely.”

“Having to stay away and watch your team do what you love is just extremely hard.”

“It was very isolating.”

“It just sucks not being around the team and experiencing the energy and fun of the game.”

3.3.4 outside support

The participants were asked to identify outside sources of support. These sources were non-campus related and non-athletics department related (see Table 2). This was to identify other resources to whom the participants were reaching out for help during the time of their recovery.

Answer	%	Count
Parents	34.75	41
Siblings	19.49	23
Religion	9.32	11
Non-teammate friends	17.80	21
Past coaches	4.24	5
Adults outside of athletics	13.56	16
None	0.00	0
Other	0.85	1

Table 2

3.4 Community

3.4.1 teammates

These next questions were open-ended prompts to better understand the community surrounding the athletes, their support systems, and emotional responses to injury in their own words. The first question addressed the role of teammates in supporting injured athletes, specifically asking, “If applicable, what did your teammates do to support you while you were injured?” Representative responses as follows:

“Supported me during my down moments about my injury and assured me everything was going to be okay. Some reached out.”

“A few of my teammates always check on me but a lot of the time I feel overlooked.”

“Told me that it would be okay, and helped me with anything I needed.”

“They brought me a gift, and some of the ones I'm closer with would let me talk about my feelings with them.”

“They would sometimes ask how I was doing. Other than that, nothing really.”

“Always reaching out and keeping me updated.”

3.4.2 involvement in team activities

To gain better knowledge of the various ways injured athletes were included in practices or games while they were unable to actively play or practice, we asked them how they were incorporated into the day-to-day activities of the team. Specifically, athletes were asked, “In what ways were you incorporated into practice or games while injured?” Representative responses as follows:

“Sometimes I helped warm up the [specific position players] and I always went to pick up the food after games.”

“I essentially just showed up to practice and sat out on the [side] while I watched everyone [participate], which was very hard for me because I just wanted to be out there running with them too.”

“I was allowed to sit on [side] and help with anything they needed.”

“I would go sit and watch the practices.”

“I did everything I could that excluded me from using my injured part.”

“Got balls for coaches, helped out around the [playing area] as much as possible.”

3.4.3 helpful resources

In order to assess the full scope of the healing environment we wanted to know if there was any positive person within the immediate community that stood out to the participants as being particularly helpful during their time being injured. Athletes were asked, “Within the [present university] community (Team, Coaches, Trainers, Administration and Professors.) Was anyone especially helpful and/or caring towards you throughout your recovery?” Representative responses as follows:

“Trainer/Coaches.”

“Everyone does the bare minimum. Wouldn't expect it otherwise tho. There are 200 athletes and not just one.”

“Physical Therapist.”

“Strength & Conditioning Coach.”

“My teammates.”

“Sports Medicine Staff & Coaches.”

3.4.4 unhelpful resources

Similarly, we wanted to know if any person was not helpful to them during their time of injury within the immediate community. As such, we asked athletes, “Was anyone unhelpful during your recovery?” Representative responses as follows:

“Our team trainer was not helpful and I had to seek out my own solutions which were expensive and inaccessible so I still feel as though the issue is unresolved.”

“Sometimes my coach.”

“Felt that I was rushed into playing and it may have hurt me a bit.”

“I had a difficult time with a professor because I sustained a severe concussion and would not perform well in the class.”

“I would tell my coaches that I was only supposed to do 1/2 of practice and they seemed mad at me for it and would never remember to tell me when it was the halfway point (since we don't have a clock in the [play area] I can't look for myself and didn't want to ask all of the time to make it seem like I wanted to leave practice early)”

3.4.5 coach support

We then asked the participants more specific questions about certain members of the athletic community on campus and how their coaching staff was able to support them while they were injured. First, athletes were asked, “If applicable, what did your coaches do to support you while you were injured?” Representative responses as follows:

“Made it clear that I had to put my health above all else and that they would not hold it against me if I had to remove myself from competition or practice.”

“The new coaching staff made sure that I was supported and had a daily plan to follow. Was understanding when I needed to get out of a practice.”

“They kept me doing things at practice.”

“They threw with me during rehab, very encouraging, and let me go to PT during practice. Told me to do things that wouldn't affect my injury and work as much as I could until I was healthy and communicated with trainers to see if I was able to do practice activities.”

“Asked how I was doing.”

“Told me to text them when I got my MRI results but other than that, nothing.”

3.4.6. range of emotions

To assess the participants' emotional responses to their injury we asked them to describe the emotions they were feeling during their most severe injury. Representative responses as follows:

“I was on the verge of quitting and felt lost.”

“I was very sad and felt very lonely. I felt like no one understood what I was going through.”

“Very angry with myself for getting injured, and feeling depressed because I viewed myself as less of an athlete.”

“Doesn't feel good to not be involved. A roller coaster of emotions.”

“Frustration and confusion.”

“Alone.”

3.4.7 impact of emotions on recovery

Following up directly to the previous question, we asked the participants to describe how they believe their emotions may have impacted their recovery. Representative responses as follows:

“They exhausted me to the point of putting less energy into my recovery because I was so tired from my emotions”
“Slowed it because I started not to care”
“It affected all aspects of my life, especially my ability to get schoolwork done and want to do anything besides sleep.”
“I feel that they made it feel harder than it was because of how upset I was.”
“At first when I was very upset with myself, I felt it hindered me.”
“I think it gave me a lot of negativity and hopelessness.”

3.4.8 creating a better environment

We then asked the participants for their accounts on what could be done better to form a healing environment that they could thrive in. Representative responses as follows:

“More communication, helpful feedback and support from trainers, and check-ins.”
“Having someone to talk to that is involved in sports about being upset with myself for getting injured without feeling like I'm being dramatic.”
“Less pressure on me. “
“I felt like my coaches didn't believe me that I was in so much pain and didn't care. Maybe they did but it didn't really come off that way.”
“Maybe talk more openly about my feelings with coaches or see someone.”
“Surround myself with the people that can be there for me the most.”

3.4.9 additional comments

Finally, we asked the participants a closing question that was meant for them to add any additional information they felt necessary to include. Specifically, we asked athletes, “Is there anything else you would like to say on this subject?” Representative responses as follows:

“ATR (Athletic Training Room) does the best they can, but many athletes need more than ice and rest.”
“Not at this time.”
“I didn't start seeing a counselor BECAUSE of my injury, I already had one and it helped with the recovery.”

4. Discussion

4.1 Participants

The participants of this study consisted of athletes across multiple teams, representative of both men's and women's sports, from a small mid-major division one athletics program. The full scope of the sample size being 52 participants. A full 57.4% of athletes completing this survey had been out of team activities for more than one week given an injury sustained during their time at the university. Most of the athletes are suffering from injury in their careers furthering the importance of this issue.

4.2 Depression and injury

The results of the PHQ, suggest that injured athletes who have been out for more than one week are, on average, showing mild symptoms of depression. However, the scores range broadly from no indication of depression (score = 0) to severe depressive symptoms (score = 21). This indicates that athletes may have very different experiences with depression following injury. Although research predicts that injured athletes experience more depression than uninjured athletes⁴, given the cross sectional nature of this study it was difficult to compare the two groups. Out of 115 athletes who answered the question of have you been injured at your time at the present university, 66 responded

with yes. That is 57.4% of athletes surveyed. This percentage of athletes are at a higher chance for depression and coupled with the inflammatory response, the prior research in this field indicates that these athletes are more likely to experience delayed healing times, get injured again, and suffer from worsening depressive symptoms.¹⁰ Additionally, 17 athletes reported struggling with mental health problems prior to their injury. During recovery from their injury, nine athletes sought help from a mental health counselor. 34 athletes did not seek formal help during their recovery. These athletes who did not meet with a counselor could potentially have increased their rate of recovery by doing so. So increased education to coaches, athletes, and trainers around the benefits of seeking professional support when athletes are injured may be helpful.

4.3 Support Systems And Environment

Athletes have a wide range of outlets for them to use for support during their recovery. The data implies that they rely heavily on support from their teammates, coaches, and trainers. However, the support they need is not always given. There are 245 athletes and there are a limited number of trainers available. Not all athletes feel their coaches are accommodating their needs. Yet, the teammates of injured athletes have not fallen short in their support of the injured athletes. There were negative and positive responses referring to certain individuals, notably athletic training staff, physical therapists, and coaches. Athletes during injury are in a vulnerable spot for their mental health and aggravating the situation with unnecessary policies or stress that may prolong the athletes time away from the field and have a negative impact on their mental health.¹² Keeping the injured athletes involved in team activities as much as physically able is an important factor in their recovery as indicated by the data. The athletes also felt pressure to return to the team activities or attempt more dynamic recovery exercises before they were medically cleared from both outside sources as well as from themselves. This act of rushing the recovery has the potential to prolong the athlete's absence. If they are pushed to do something their body is not physically ready for, whether that be them pushing themselves or being outright pushed by a coach or trainer, they will aggravate their injury further, potentially exacerbating any experienced depression, and thereby add more time to their recovery.

4.4 Emotional Response

Of the responses provided, the emotions experienced by athletes during injury were very similar. Being away from their team left them feeling lonely, sad, angry, and frustrated. These difficult emotions may play a role in experiences of depression, and as a result of potential inflammation, inhibit, prolong, or complicate athlete recovery. Not only may these emotions affect their abilities to recover but also hinder them in other areas of their lives, such as academic success, social interactions, and sleep schedules.

4.5 Experiences

The athletes provided personal experiences that aided and hindered their recovery. Some athletes had poor experiences with their athletic trainers. According to athletes, trainers could have done a better job communicating with the coaches on what the athletes are able to do and how the recovery is proceeding. The athletes also may need more specific treatment. Not all athletes will respond to one modality of recovery. In one case ice and rest may aid an athlete whereas another may need something entirely different. The athletes and trainers should aim to communicate and listen to each other to find the best treatment options.

When athletes had a daily plan or activities to keep them active during practice, they felt like they were still a member of the team and could help in some way even if not at their full capacity. Being able to do their rehab during practice and be around the team and coaches was important. Having effective communication between athlete and coach is crucial. When a coach did not alert a player when their practice limit was met or was understanding if an activity became too much for an athlete to handle had negative impacts and were not conducive to positive healing environments.

There were athletes who reported having positive experiences with their coaches and training staff. These athletes found that the athletic training staff were helpful and listened to their concerns. They also reported that they had positive feedback from coaches who did what they could to keep them around the team and made them feel valued. Having an outlet to talk about their emotions is also an improvement that can be made. This could be in the form of an athletic counselor or a group of athletes with shared experiences. This could be a support group formed of other athletes who are injured with a mental health counselor as a leader.

5. Limitations

This research was done at a single small, mid-major school with a limited sample size. Although the participants varied in sport, gender, and year in school; there is a benefit to increasing the sample to multiple universities and including a larger number of athletes. The university also has a more limited number of different sports teams, only containing 14 teams across 8 sports. Expanding the research to more teams of different sports could be beneficial. This study was also cross-sectional in nature. As a result, we were unable to follow the athletes prior to and throughout their recovery. Many also were relying on recall to report past experiences. This inability to assess mental health in a longitudinal way could also be a limitation of this study.

6. Recommendations

Based on prior research in this field, as well as the data collected from this study, we have compiled recommendations to best care for our athlete's mental health in times of injury. First, athletics programs need to understand that every athlete is different. One may be able to play through a certain level of pain while another will need time off to recover and rest. Coaches, teammates, and trainers should always do their best to be understanding and listen to an athlete when they voice a concern about an injury. Access to comprehensive treatment should be a priority, as all athletes deserve the best possible care a university is able to provide.

Next, athletes want to feel like they are a part of the team and help that team to achieve its goals, this includes injured athletes. Incorporating injured athletes into practice, in a positive and productive way, as is physically possible, will help injured athletes stay connected to their teammates even when they cannot compete with them. This could be something as little as allowing them to set up drills or even designing a part of practice they may or may not be able to take part in.

As is evidenced by the literature and this study, it can be difficult for athletes to talk about how they feel. A place where athletes can feel comfortable sharing their feelings when injured and receiving help is important. Not all athletes will need a professional counselor but the opportunity to ask for help if needed is important.

Finally, the athletic training staff, coaches, and administration should be putting athletes' mental and physical health above all else to foster an environment cohesive with positivity, understanding, and athletic excellence.

7. Acknowledgments

I would like to thank the athletics department and especially my athletic director Janet Cone for allowing us to conduct this research and being so helpful along the way. Your support means everything. I would also like to thank Dr. Laura Jones. Without her, none of this would be possible. I cannot thank you enough for your guidance, support, and patience to make this research a reality.

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