# Q&A: How does mental health affect sports concussion recovery?

November 15 2023, by Francisco Tutella

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Athletes hitting the field for the fall sports season may want to pay just as much attention to their mental health as their physical health. Underlying mental health conditions such as depression and anxiety can

cause symptoms similar to what some athletes report post-concussion, potentially causing an unnecessary delay in their return to sports and other activities, according to a team led by Penn State researchers.

Penn State News spoke with Peter Arnett, professor of psychology and clinical neuropsychologist, and Garrett Thomas, a doctoral candidate in sports neuropsychology, about their research into mental health, concussions and what athletes can do to stay at the top of their athletic careers.

## What does a concussion test look like?

Arnett: One of the tests that we administer is a word list. You read a list of words to the person, and then they tell you back as many words as they can remember. You read it again, they tell you again. You go through three trials, then you do some other things, and after about 20 minutes to a half hour, you ask them to recall as many of the words from that list as they can think of again.

Another one might be a test that we call a cancellation test, where the person has rows of symbols, and there's one particular target they have to look for. They'd see a bunch of different symbols, and say the target is a triangle, they would have to go through these rows, look at all the symbols, and every time they see a triangle, they have to cross it out. That's a pretty good measure of sustained attention and processing speed.

**In a paper published earlier this year, you looked at concussions and underlying depression and anxiety issues and found that someone with depression or anxiety taking a baseline test may look like someone two weeks post-concussion. Can you talk about those findings?**

Thomas: One of my research interests is thinking about what we call

secondary factors or comorbidities, like depression, anxiety and sleep issues. I study how these factors, which are common in college-age populations, including student athletes, might skew someone's testing or performance, even outside of having a concussion. Fatigue, sleep changes and attention problems are all symptoms that aren't just related to concussion. They can be related to a whole host of things, including depression and anxiety.

We found that athletes with depression and anxiety reported a lot more symptoms on that post-concussion symptoms scale, even in the absence of a concussion, compared to other athletes at baseline. Athletes with depression and anxiety at baseline looked the same or comparable to athletes who had just had a concussion within the previous two weeks.

The findings speak to the magnitude of those effects and the impact that depression and anxiety can have on how we evaluate someone. Being aware of those comorbidities at baseline can help us make accurate comparisons after the person suffers a concussion. It contributes to an individualized approach to medicine. Making sure that we're screening for those factors and being able to account for them can help us make a more educated decision about return-to-play and educational activities.

Arnett: When you take this personalized medicine approach or individualized medical approach, you can make a much more accurate determination of what's going on with somebody. Let's take an example of somebody who has comorbid depression and anxiety at baseline, and they get a concussion a year later. If they're still struggling with those problems, they may do worse on post-concussion testing relative to the norms for the sample, but relative to themselves, they may look about the same, because it may be that the general depression and anxiety is sort of reducing their overall attention and memory.

If you weren't aware of the underlying mental health conditions, you can

see that person post-concussion and say, "Wow, this person really is doing poorly cognitively." But it could really be mainly due to depression and anxiety. One of the things that Garrett had highlighted in the paper was that you could keep somebody out of play too long if you didn't know about their depression and anxiety and instead assumed that the problems were due to the concussion.

## How do you treat someone who doesn't have depression or anxiety and gets a concussion versus someone with a concussion and is also struggling with these mental health issues?

Thomas: I think it's about being proactive. A lot of my research has been focused on screening for these issues at baseline when athletes arrive at Penn State from day one of their first year, making sure that we're screening for depression and anxiety or other common mental health issues and referring them for treatment. That way, we're not just waiting for someone to get a concussion but trying to be proactive and treat these concerns from day one. If someone's getting treatment or feeling better, they're probably going to be performing better cognitively as well, which can have benefits in the classroom and on the field.

In terms of treating a concussion, you're following protocol, getting people back to doing what they're supposed to be doing, getting back to their baseline level of activity. For a while, there was this idea that you should sit in a dark room until you feel better. We now know that's actually not helpful and might be harmful.

We want to get people back to getting out and about, moving around, returning to classes, even in a limited capacity, and that would be the same for athletes with or without depression or anxiety. Getting people working with counselors, psychologists, and sports and mental health

professionals is going to be really important.

Arnett: Psychoeducation is really critical. It has been shown in the sports concussion literature that when people are informed about what to expect in terms of their recovery from a concussion, they tend to be much more likely to recover. Creating a kind of expectation that recovery will happen gradually, and encouraging people to engage in a little bit of activity in a controlled setting so they don't make their symptoms much worse, is important. If symptoms do worsen, the person can always scale things back.

## Do you have any recommendations or practical guidance for avoiding concussions or for concussion management?

Arnett: Certainly giving the person time to recover from the concussion that they've had is important, because during the period after a concussion they're at elevated risk for having another concussion.

Another thing that my students and I have found in our research is that people who didn't get sufficient sleep were at a greater risk for concussion. So, getting sufficient amounts of sleep and attending to aspects of wellness in your daily living are important in terms of avoiding concussions. Seven hours or more is usually considered the benchmark for good or optimal sleep.

## How are you and your students involved in the sports concussion program here at Penn State?

Arnett: We've been involved in the program for more than 15 years. When it first started, we conducted individual, face-to-face baseline tests with almost every athlete at Penn State playing on varsity teams, like

football and men's and women's soccer, basketball and hockey. Today, all Penn State student athletes undergo a computerized baseline concussion testing protocol as part of their medical onboarding or pre-participation physical.

## What would you say is the big takeaway for athletes, including student athletes?

Arnett: I think a big takeaway is that mental health issues are really important. We can treat depression, anxiety, problems with sleep and other mental health issues. A good takeaway from our work is that potentially treating these issues could enhance your performance. If you're better able to focus, you're better able to remember things and react quickly.

If you're not depressed, you're not anxious, that might enhance your performance. At the very least, if an athlete is struggling with depression and anxiety, it's important for them to know that they can get treated for that, and treatment potentially could improve their cognitive function and their performance on the field.

Thomas: To piggyback off that, I like to think about treating depression and anxiety with therapy or working with someone you know as being similar to what athletes would do in the training room or in practice or in the weight room. Improving your mental health is something that you build over time and continue to work on to improve the same way you would improve your on-the-field performance.

**More information:** Garrett A. Thomas et al, Affective comorbidity or concussion: Can we tell the difference?, *Translational Issues in Psychological Science* (2022). DOI: 10.1037/tps0000344

Provided by Pennsylvania State University