Review of Literature on the Impact of Concussions on Increased Anxiety and Depression

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ABSTRACT

The purpose of this review of literature is to investigate the effects of concussions on anxiety and depression. Concussions are defined as a head injury caused by trauma or force that leads to a disruption in mental status and/or signs and symptoms of a known concussion. Several studies investigated the relationship between post-concussion depression symptoms and cognitive and memory abilities. Athletes who suffer from depression before they sustain a concussion are more likely to have increased depression and anxiety symptoms post-concussion. It has been shown that multiple concussions have been proven to increase an athletes chance of dealing with anxiety and depression. Multiple concussions have also been shown to increase the chances of athletes suffering from long term anxiety and depression in their future. Many researchers used the Beck Depression Inventory Fast Screen test as a way to evaluate the athlete's depression symptoms. Research has also shown that females have a higher chance of experiencing long term effects from a concussion than males. Further research is needed to determine the exact cause as to why females have a higher chance of experiencing these long-term effects post-concussion compared to their male counterparts. Imaging could also be used in future research before and after a concussion to compare the brain connectivity patterns, which could help explain the cause of the athlete's anxiety and depression symptoms. This review of literature is important because concussion research is ever changing field, and its relationship with anxiety and depression is important for healthcare providers to understand.

Keywords: Depression, Anxiety, Concussion, Sports Related Concussions

RESEARCH QUESTIONS

- What effect does concussions have on depression and anxiety symptoms?
- Are the depressive and anxiety effects of concussions acute or long term?
- Do the number of concussions sustained play a role in depression and anxiety effects?

METHODS

- This research is broken down into three parts: Effects of Sports-Related Concussions Depression and Anxiety Symptoms on Cognitive Function, Long Term Effects of Sports Related Concussions, and Effects of Sports Related Concussion on Brain Connectivity.
- *Effects of Sports-Related Concussions Depression and Anxiety Symptoms on Cognitive Function:* In this section researchers investigated the effects of sports related concussion depression and anxiety symptoms on the athletes cognitive function post-concussion.
- *Long Term Effects of Sports Related Concussions:* Researchers investigated the long term anxiety and depression effects caused by sports related concussions on the athletes quality of life, and they also investigated the prevalence of females having a higher chance of long term symptoms than males in this section.
- *Effects of Sports Related Concussion on Brain Connectivity:* In this section researchers investigated the effects of sports-related concussions on the connectivity in the brain that leads to anxiety and depression symptoms.
- *Information in this review of literature was acquired through Winthrop University Dacus Library online database and Google Scholar.*

RESULTS

Articles	Subjects	Results
Neuropsychological test performance in depressed and nondepressed collegiate athletes following concussion (Riegler et al., 2019)	• 113 Division I Athletes • 17-22 years of age • Involved in a concussion management program at their school	• Memory of an athlete can be negatively affected when suffering from a concussion, while also showing signs of depression • Athletes with depressive symptoms showed more cognitive deficits post concussion than non-depressed counterparts.
Post concussion symptoms of depression and anxiety in division I collegiate athletes (Yang et al., 2015)	• 67 athletes • 71 concussions • Two Big Ten Conference Universities	• 74% of the athletes were sustained by males • Concussed athletes who had depression symptoms at baseline were 4.59 times more likely to experience depression symptoms post concussion and 3.40 more times likely to experience anxiety • Athletes who experienced anxiety at baseline did not experience increased depression and anxiety
Predictors and prevalence of postconcussion depression symptoms in collegiate athletes (Vargas et al., 2015)	• 84 athletes • NCAA Division I University • 44 involved in formal • 9 out of 84 scored a 4 or higher on the Beck Depression Inventory- Fast Screen test at baseline	• 19 out of 84 athletes had a BDI-FS of 4 or more at post-concussion retesting • 17 of the athletes showed a reliable increase in BDI-FS scores • 8 of the athletes had a reliable decrease in their BDI-FS scores • 59 of the athletes did not show a change
Long-term cognitive outcomes in male and female athletes following sport-related concussions (Sicard et al., 2018)	• 196 Participants • 98 males • 98 females • Included 6 sports	• Used the Cogstate Battery test and added the 2-Back test for cognitive testing • Females with a history of concussions responded significantly slower than male counterparts during cognitive testing • Athletes with a history of concussions responded slower and less accurate than their control counterparts
Anxiety, depression, and quality of life: A long-term follow-up study of patients with persisting concussion symptoms (Doroszkiewicz et al., 2018)	• 100 patients • All of the patients seen the same neurosurgeon between 1997 and 2018 • Participants filled out the World Health Organization Quality of Life bref and Depression and Anxiety Stress Scale-42	• Eight patients had just symptoms of depression alone • Eight patients had just symptoms of anxiety alone • 21 patients had symptoms of both • Patients who scored moderate to severe on the DASS-42 also scored poorly on the WHOQL-bref
Association of acute depressive symptoms and functional connectivity of emotional processing regions following sport-related concussion (McCuddy et al., 2018)	• 94 collegiate athletes • 43 had sports related concussions • 51 controls	• Imaging showed that concussed athletes had connectivity differences in regions associated with emotional processing at one month relative to one day post-concussion • The connectivity of the emotional processing regions in the brains is affected by acute mood disturbance caused by sports related concussions

FUTURE RESEARCH

- Suggestions have been made for further researchers to perform longer investigations, and have also called for further research into what actually causes the post-concussion anxiety and depression in athletes. Researchers should investigate the effects multiple concussions and subconcussive blows have on the athletes, and explore the biochemical and biomechanical differences between males and females that leads to women having higher negative cognitive outcomes. Researchers should conduct imaging pre-concussion to be able to compare connectivity and depression symptoms pre and post-concussion, and also incorporate quality of life measures to improve their strategies and enhance the outcome of their research.

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