

RESEARCH ARTICLE

Psychosocial Components of Concussion Reporting Among Adolescent Athletes

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KEYWORDS:

Concussions

Adolescents

Osteopathic

Underreporting

Education

Neurology

Introduction: Addressing the current trends of underreporting concussion-related symptoms by adolescent athletes is a critical aspect of improving adolescent athlete health and longevity. The literature is replete with papers on educational interventions regarding concussion symptomatology, however, there is a relative lack of research on interventions that target the behaviors of the athlete. The goal of this study was to identify specific reasons why adolescent athletes may conceal concussions from medical personnel.

Methods: A qualitative phenomenological approach was employed using focus group discussions to identify common themes as barriers to concussion reporting. Topics such as injury history, knowledge of concussion symptomatology, personal influences, and other psychosocial factors such as peer influences and masculinity were discussed. Data were coded individually by a research team member followed by a member check process to ensure the validity of the themes obtained.

Results: Nineteen high school varsity athletes participated in the focus groups. Four common themes were derived from the responses given by the participants: symptomatology awareness, external influences, self-pride, and current concussion educational program flaws. These themes were supported by participants as reasons why concussion symptoms may be withheld from medical personnel.

Conclusion: Applying the osteopathic tenet of a person being a unit of mind, body, and spirit, concussion education should aim to target the multiple behavioral aspects of each person rather than just concussion symptomatology education. Findings from this study provide evidence to support the development of a reliable and effective concussion intervention program that leads to an increase in reporting among adolescent athletes.

INTRODUCTION

As participation in high school and collegiate sports in the United States continues to rise, concussions and head injuries have become major talking points in both the sports and medical communities. With concussions having an incidence rate of 26.1 per 100,000 athlete exposures in the general athletic population, this topic merits attention.¹ The adolescent population is particularly at an increased risk for concussion complications as

it is during these years that there is continuous neurocognitive development.² The occurrence of a head injury during this neurocognitive developmental period has the potential to progress and worsen if not adequately recognized and reported.³ During times of brain insult and injury, neuronal cells require additional metabolic support. Therefore, in an adolescent athlete who is currently experiencing or has recently experienced concussion-associated symptoms, the brain is more vulnerable to subsequent injury.⁴ Continuing to participate in practices and games while experiencing concussion symptoms puts an adolescent athlete's health and longevity in danger due to the risk of receiving concomitant concussive blows. This may increase the risk for developing diseases such as chronic traumatic encephalopathy (CTE) in the future.⁵

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Of significant concern is the documented lack of reporting by adolescent athletes at the time of the initial insult.⁶ Current literature has shown that the majority of athletes are able to correctly recognize the signs and symptoms of a concussion, yet many still do not report their injury and continue to participate.⁷ Literature also shows that females are more likely to report their head injuries than males, and adolescent athletes with pre-existing psychiatric conditions are more likely to endorse and report post-concussive symptoms.⁸ It has also been suggested that psychosocial factors may impact an adolescent athlete's reporting behaviors.⁹ Despite this knowledge, the target of most interventions for adolescent athletes is based on education regarding the recognition of concussion symptoms and need for treatment.¹⁰

Uncovering barriers to reporting is paramount in changing the behaviors of young athletes. By applying the osteopathic tenet of viewing a patient as mind, body, and spirit, a more comprehensive and holistic approach to decreasing concussion rates and increasing reporting may be achieved. The purpose of this research was to explore the social and psychological factors that influence an adolescent athlete's decision to report concussions. These factors included masculinity and toughness, peer influences, coaching influences, and other external influences. This data may provide a basis for designing more effective interventions to increase adolescent athletes' reporting of concussions.

METHODS

A qualitative phenomenological approach was employed using focus group discussions to identify common themes, as potential barriers to concussion reporting. This study was approved by the Edward Via College of Osteopathic Medicine's Institutional Review Board.

Study Population

Convenience sampling techniques were employed to solicit student athletes from a local high school to take part in the study. Permission was obtained from the athletic director and district superintendent for these athletes to attend the recruitment presentation. Male and female students between the ages of 15-18 years who were current members of a varsity sports team were invited to participate. In addition, students must have earned their varsity letter to participate in the study. Students who did not understand English were excluded from this study, as the focus groups and informed consent process were conducted using the English language.

Participants were recruited via a presentation for both the students and parents at the high school. Upon completion of the presentation, parental/guardian consent and student assent forms were sent home with participants to complete if they were interested in taking part in the study. Upon completion of the informed consent process and meeting the inclusion criteria, the student was included in the study with the ability to withdraw at any point.

Study Procedures

Participants were assigned to groups based on their school schedule availability. Four focus group sessions were conducted with three groups of five participants and one group of four participants. Each focus group consisted of a 45-minute open group discussion with two members of the research team facilitating the discussion. The focus groups took place in a classroom at the participants' high school. This study took place over the course of two weeks with two focus groups conducted per week. Each student participated in one 45-minute session. Saturation of salient themes was achieved at the completion of the fourth focus group session, thus negating the need for further recruitment.

At the start of each focus group, participants were asked to complete a questionnaire to gather demographics and their athletic history. Using a moderator guide, the researchers asked each student athlete to elaborate on 16 questions regarding previous injury history, background knowledge on concussions, personal influences, psychosocial attitudes, and opinions on current concussion interventions in which they had participated (Appendix). This structured approach used previously suggested topics in the literature to guide a group discussion in an attempt to reduce systematic error.¹¹ Before discussing each topic aloud, the moderators first asked the participants to privately write down their responses in a journal that was provided to them. Gathering both verbal and written responses helped limit the anxiety that subjects might feel in sharing their responses aloud, as well as helped limit subjects conforming to the beliefs and ideas of others around them. The discussion was audio recorded without any identifying information being linked to the participant at any time. All data obtained remained completely confidential; athletes were assigned a random identification (ID) number that remained separate from their identity. Participants were referred to by their ID number rather than name during the audio portion of the focus groups in order to maintain confidentiality. Upon completion of data collection, the audio recordings were transcribed and coded along with the journaling portions of the focus group. Hard copies of the journals were destroyed upon completion of data transcription into a digital form.

Using the transcripts and journals, each member of the research team individually identified common ideas and themes throughout the gathered data. Upon completion of the individual coding process, a member check process was employed using a separate research team member to ensure validity of the themes obtained. Once these were identified, the research team met together to weigh and evaluate the importance of each idea and theme together, visualizing the relationships between them. Descriptive analysis was used for demographic information.

RESULTS

Demographics

Nineteen students took part in the focus group discussions. Demographics of the participants are shown in Table 1.

TABLE 1:
Demographics

	MEAN (YEARS)	SD
Age	17.7	.45
Years Involved in Sport	8.2	4.19
		N (%)
Gender	Male	10 (53%)
	Female	9 (47%)
Race	Caucasian	9 (53%)
	African American	9 (47%)
	Asian	1 (5.3%)
Sports*	Baseball	2 (11%)
	Basketball	1 (5.3%)
	Football	10 (53%)
	Lacrosse	4 (21%)
	Soccer	7 (37%)
	Track	8 (42%)
	Volleyball	2 (11%)
Wrestling	4 (21%)	

Demographics. SD = Standard deviation

*Most participants participated in multiple sports at the varsity level

Reasons for underreporting

Four themes were identified as potential reasons for the underreporting of head injuries and concussions among adolescent athletes. Table 2 shows extracted themes as well as sub-themes derived from each.

Symptomatology Awareness

Regarding symptomatology awareness, 100% of participants indicated knowledge of common concussion signs and symptoms. While somatic symptoms (physical sensations or feelings) were mentioned by all participants, cognitive changes commonly seen in concussed athletes such as confusion, amnesia, and impaired judgment failed to be mentioned. It was also found that more severe concussion symptoms were expressed more

often than minor symptoms. Many milder symptoms such as cognitive changes, mild headaches, and nausea were not mentioned by participants. The thoughts on concussion signs and symptomatology were similar among the participants with one participant stating:

"... I was dizzy, the light hurt my eyes, I had a bad headache, loud noises would get on my nerves and make me angry."

As well as,

"...if you can't see, you can't walk straight, then you just shouldn't play because football isn't your life..."

While these physical changes were mentioned by all participants, cognitive changes that are commonly observed in concussed athletes were not cited as being a part of the original insult or recovery phases.

External Influences

External influences such as parental influences, coaching influences and repercussions, and peer influences had an impact on participants' reporting behaviors. Ninety-five percent of participants stated that at least one of these three factors would influence their decision to report or conceal their concussion. Among these athletes, 42% of participants mentioned these factors as reasons that they may conceal their concussions and remain in the game. There were conflicting responses given on this topic with one participant stating:

"... my coach would most likely want me to keep playing but after the game he would want me to see a doctor."

While another participant stated,

"My coach would require me to get my head injury checked out due to liability, however, I think he would greatly encourage me to return playing."

The views on parental influences and peer influences were unanimous among participants who stated that external influences would influence their reporting behaviors with the participants stating that their parents would want them to report their injury immediately. There also seemed to be a strong sense of commitment towards teammates, which suggests an influence on their reporting behaviors. One participant stated:

"I think teammates have the most influence on my reporting, so if my teammates could tell that I wasn't playing the way that I normally do, I would trust them to let me know."

This was confirmed by an additional participant stating:

"They (my teammates) have my best interest at heart so if they saw that I couldn't do my job on the field, then they would want me to sort it out."

TABLE 2:
Major themes and subthemes

ORIGINAL TOPICS	EXTRACTED THEMES	SUBTHEMES
<i>Previous Injury History</i>	Symptomatology Awareness	Cognitive changes vs somatic changes
<i>Concussion Knowledge</i>	Symptomatology Awareness	Cognitive changes vs somatic changes
<i>Personal Influences</i>	External Influences	Parental influences, coaching influences, peer influences
<i>Psychosocial Indicators</i>	Self-Pride	Masculinity, toughness
<i>Intervention Experiences</i>	Current Concussion Intervention Flaws	Player directed, lack of follow-up, symptom focused

Identified and extracted themes and subthemes for concussion concealment among participants.

Overall, the influence of team members seemed to be the biggest factor in whether or not the participant would report the injury.

Self-Pride

The theme of self-pride was one which came up repeatedly among participants when discussing reasons why a concussion may not be reported. Appearing masculine and tough were common themes that were brought up by 84% of participants. These participants stated the importance of “looking tough” in the eyes of both their peers and competitors. One participant stated:

“...people do not try to show any signs of weakness when they are injured.”

Another participant said,

“...it is important to show how much of a warrior that I am” and “I try to show as little pain as I can, and I try to play through my injuries.”

This theme was again confirmed by a separate participant:

“...showing weakness means you aren’t strong enough to play.”

Perhaps the most revealing statement given by a participant was,

“Football is for tough people, and if you aren’t tough you can’t play it. You hear people talking about you: ‘he’s weak, he doesn’t really want to play.’”

Overall, the concept of self-pride was a unanimous factor in the reasoning for why athletes may withhold concussion symptoms from their coaches and medical personnel.

Current Concussion Intervention Flaws

Various opinions were given on the issues with current concussion interventions. Over half of the participants (58%) were in agreement that changes needed to be made. One participant stated a video intervention should be designed that could benefit both the players and the coaches.

“...if they showed the coaches too, the coaches could get a feel for it and maybe not hold it against players when they get hurt.”

This not only points to issues with the current concussion interventions, but also the influence that coaches have on the reporting behaviors of their players. In addition to educating the coaches as well as the players, the lack of follow-up throughout the season was mentioned by participants. One participant stated,

“...we talked about it before but throughout the season we didn’t. We did tackle drills, but we didn’t talk about concussions anymore.”

In addition to the aforementioned issues with current interventions, current interventions are also symptom-driven, and the lack of psychosocial components were apparent. Additional comments of the educational interventions being “long” and “boring” were also suggested as areas needed for improvement.

COMMENT

The aforementioned themes derived from the data obtained provides information that suggests a change may be needed in current concussion education protocols in order to improve concussion reporting among adolescents. In agreement with the previous literature, most participants could correctly identify the more serious concussion symptoms such as dizziness, photophobia, and difficulty walking.⁷ On the contrary, more subtle symptoms such as nausea, vomiting, and mild headaches were not mentioned among participants in this study. This may suggest that because these symptoms are less severe and more concealable, they are less likely to be reported. Another consideration is that these symptoms are more generalized and may be attributed to a variety of other causes such as a viral illness. Overall, the findings suggest that adolescent athletes are relatively knowledgeable in recognizing the signs and symptoms of a concussion and are capable of identifying concussion-like symptoms in themselves. However, even with this knowledge, many adolescent athletes are still not reporting their symptoms. The fact that most interventions are driven by symptom recognition suggests the primary reasons for underreporting are not being addressed.

Despite the awareness of these symptoms, young athletes continue to participate and ignore the long-term health repercussions of concussions. It seems that the adolescent mindset is engraved with showing toughness in their sport by playing through their symptomatic head injuries. Rather than choosing to remove themselves from a game or practice to be evaluated, many adolescent athletes forgo such an intervention despite possessing the knowledge of both acute and long-term complications of a concussion. The belief that playing through a concussion injury makes you tough and that removing yourself from a game shows weakness elucidates an attitude that needs attention. There is minimal research addressing these psychosocial factors and their role in concussion reporting, illustrating an avenue and target for future interventions in an attempt to change behavior.

Our data also indicated that there needs to be more effective communication between athletes and the coaching staff regarding concussion reporting. It seems that some adolescent athletes make the assumption that their coaches would want them to continue to participate in their sports despite showing signs and symptoms of a concussion. Assuming coaches have their athletes' best interests at heart, this highlights either a misunderstanding with athletes' interpretation of their coach's views, or simply a lack of communication with the athletes by the coaches. Although many athletes stated they would feel comfortable reporting their concussions to a teammate, this may not result in the injured athlete being removed from play whereas reporting to the coaching staff should. In the adolescent setting specifically, it may be the coach who needs to step up as a role model and educator in proper concussion reporting to protect his or her athletes from potentially harmful complications. There needs to be a sense of comfort and trust between coaches and athletes in order for proper concussion reporting to occur. Ensuring that athletes are aware of the coaching and athletic staff's stance on the issues

of concussion reporting can help to eliminate assumptions and discrepancies. Coaches can then take measures to make themselves more approachable and address issues such as an athlete's perceived toughness or the feeling of letting teammates down.

Limitations

This study has several limitations. The small sample size may limit generalizability, although it was believed that a point of saturation had been reached. Additionally, as a result of choosing an adolescent population, it was necessary to obtain permission from not only the participants and their guardians, but also from the district superintendent and school personnel. For this reason, the data obtained was limited to participants from one school and thus may limit the external validity of the study. Recall bias may have also been present as participants were asked to recount on past situations that they had encountered. Finally, the data was obtained via focus groups and it is possible that some of the verbal responses were influenced by the participants' peers instead of discussing their actual views on concussion reporting.

Future Research

Future research should incorporate athletes who participate in different sports and in different geographic areas in order to improve the external validity of the findings. Future research should also aim to revise current concussion interventions in an attempt to include a more holistic form of education. The interventions should include the behavioral aspects of concussion reporting together with the current practices of symptom recognition.

CONCLUSION

By current standards, adolescent athletes continue to underreport their concussion injuries, hindering them from being evaluated by a physician. This makes these athletes more vulnerable to a second injury, which increases their risk for long-term neurocognitive complications. Concussion reporting in adolescent athletes is an issue that is multifactorial in nature, stemming from an athlete's attitude toward concussion reporting. Our findings suggest that continuing to target awareness of concussion symptoms through interventions will not necessarily translate into increased concussion reporting. It may be beneficial for future interventions to include not only education, but also address behaviors, attitudes, and misinterpretations regarding concussion reporting. Viewing athletes as a whole, and incorporating all aspects of their well-being, as physicians do with their patients, is the first step to improving the safety of our adolescent youth.

AUTHOR DISCLOSURES:

No relevant financial affiliations.

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