Student Athletes and Their Attitudes Towards Concussions: Why Student Athletes May not Report Symptoms

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**Abstract**

Each day student athletes run the risk of suffering a Mild Traumatic Brain Injury (mTBI), or concussion, from participating in interscholastic athletics. Concussions and the long lasting effects that they can have on an individual’s long-term health have been in the media in recent years and many people are beginning to take notice of these effects. The purpose of this study was to determine the attitudes in regards to concussions and the effects that those attitudes may have on reporting concussions for high-school student athletes as measured by the Rosenbaum Concussion Knowledge and Attitudes Survey-Student Version (RoCKAS-ST) (Rosenbaum & Arnett, 2010). Student athletes from three high schools, age 14-18 years old, were randomly assigned to an experimental group (n=120) and a control group (n=120). The experimental group was given an educational seminar discussing concussions and the effects that they can have on overall health by a Certified Athletic Trainer. A difference in mean scores between the two groups on the RoCKA-ST was analyzed using an analysis of variance to show a significant difference. The experimental group that received education before taking the survey showed a higher mean score than the control group in concussion knowledge and attitude toward concussions. Education has been shown to have an effect on the rate at which athletes report symptoms as well as overall attitude towards concussions.

Student Athletes and Their Attitudes Towards Concussions: Why Student Athletes May not Report Symptoms

 Rosenbaum and Arnett (2010) described a concussion as “a complex pathophysiological process affecting the brain induced by traumatic biomechanical forces” (p. 44). Concussions are caused by rapid acceleration, deceleration, or rotation of the head that lead to compressive, tensile, and shearing forces on the brain (Williamson & Goodman, 2006). Only 10% of all concussions involve loss of consciousness, while more mild symptoms such as headaches occur about 80% of the time (Broglio, et al., 2010). According to Yard and Comstock (2009) “high school sports drew over 7 million participants during the 2006-2007 school years” (p. 888). Each year high school athletes sustain a total of 100,000 concussions (Yard & Comstock, 2009).

 According to Tator (2012) “there has been a remarkable increase in the past 10 years in the awareness of concussion in the sport and recreation communities” (p. 293). While awareness has been on the rise there has also been widespread dissemination of this knowledge throughout many sports communities (Tator, 2012). This means that although, much of the information that has been learned about concussions and the effects that they can have on an individual’s overall health have not been followed by athletes, parents and coaches. For example, there are still individuals that believe that a concussion has to be accompanied by a loss of consciousness, even though, it is known that about 95% of concussions occur without a loss of consciousness (Tator, 2012).

 While not taking concussions seriously is an important topic there are several other reasons that lead athletes to not report symptoms associated with concussions. Weber and Edwards (2010) stated “the literature has typically shown that the athlete’s expectation concerning post-injury outcome is incorrect and rather negative” (p. 1364). Athletes are have been found to be more open about reporting symptoms when symptom based terms (i.e. dinged, bell rung) were used to describe an injury versus when direct injury questions were asked (Weber & Edwards, 2010). The term Traumatic Brain Injury (TBI) was found to be more negative amongst student-athletes versus the term concussion (Weber & Edwards, 2010).

 Another obstacle that has been found is the amount of concussion grading scales that are available to the medical community. Yard and Comstock stated there are “over 25 concussion grading scales that have been published” (p. 888). These scales differ in concussion grading scales, and return to play guidelines. These guidelines are based on symptoms and the time it takes for symptoms to clear. They are not based on clinical evidence (Yard & Comstock, 2009). This can make it extremely difficult on health care providers because many of these guidelines, such as the Cantu and American Academy of Neurology, have been well documented and used and student-athletes may be discouraged to report symptoms to a health care provider that aligns their guidelines with something like the International Symposium on Concussion in Sport in Prague and Zurich (Yard & Comstock, 2009).

 One of the major problems facing the reporting rates of concussions amongst student athletes is that most of these injuries are considered to be mild (Williamson & Goodman, 2006). As many as 80% of concussions only include symptoms such as headache and fatigue and only 10% will be considered severe (i.e. loss of consciousness) (Broglio, et al., 2010). Most student-athletes do not realize that signs and symptoms associated with a concussion can last from several minutes to several months (Sarmiento, Mitchko, Klein, & Wong, 2010). It is imperative that athletes receive proper education and that they are well prepared for what a concussion can mean, not only at that particular moment, but also later in life (Tator, 2012).

**Purpose Statement**

 The purpose of this study was to determine the attitudes in regards to concussions and the effects that those attitudes may have on reporting concussions for high-school student athletes as measured by the Rosenbaum Concussion Knowledge and Attitudes Survey-Student Version (RoCKAS-ST) (Rosenbaum & Arnett, 2010) when they are properly educated about concussions.

**Research Question**

 What effect did concussion education have on the attitudes in regards to concussions and what effects did those attitudes have on reporting concussions for high school student-athletes as measured by the RoCKAS-ST (Rosenbaum and Arnett, 2010)?

**Null Hypothesis**

There was no significant difference on the effect that proper education had on attitudes about concussion and how those attitudes affected reporting rates in high school student athletes as measured by the RoCKAS-ST (Rosenbaum and Arnett, 2010).

**Methods**

**Study Design**

 This study implemented the true experimental design with a randomized group design where 240 participants were randomly assigned into an experimental group (n=120) that received education regarding concussions and a control group (n=120) that did not receive the education regarding concussions before taking the survey (Thomas, Nelson, & Silverman, 2011)

**Participants**

Participants in this study came from three different high schools in Northwestern New Mexico in San Juan County. The participants for this study were randomly selected by each high school’s athletic training staff by a systematic selection where every 5th name in their student-athlete database was asked to perform in the study (Thomas, Nelson, & Silverman, 2011). A total of 240 student athletes (130 males and 110 females) participated in the study. The range of the age of the participants ranged from 14.5 to 18.1 years of age. Each participant and their parents completed the informed consent form to participate in the study, and the Institutional Review Board (IRB) approved this research study. The participants were randomly assigned to two different groups. The two groups consisted of an even number of participants (n=120). The experimental group received education about concussions prior to taking the survey while the control did not receive the education and only took the survey.

**Instruments**

Student athletes from both groups were given the Rosenbaum Concussion Knowledge and Attitudes Survey-Student Version (RoCKAS-ST). The RoCKAS-ST consisted of 55 items that were divided into five sections. Sections 1 and 2 of the RoCKAS-ST examined knowledge of the causes of concussions through true/false items (Appendix B). These items had a correct answer and knowledge of concussions was assessed (Appendix A). Scores in the 15-18 range show a good knowledge and background of concussions

(Rosenbaum & Arnett, 2010). Section 3 and 4 measured attitude with a 5 -point Likert scale ranging from strongly disagree to strongly agree (Appendix B). Participants received a 1-5 score based on the safety of their response (i.e. 1 point for an unsafe response and 5 points for a safe response). Scores could range from 15-75 with higher scores meaning that the participants have safer attitudes (Rosenbaum and Arnett, 2010). Section five questioned student athletes on their knowledge of the signs and symptoms associated with concussions. Each student athlete placed a check mark next to a sign or symptom that they believed would occur with a concussion. The total of each correct and incorrect check mark was then added to determine how aware student athletes were aware of signs and symptoms associated with concussions. Seven items were also included to assess for poor or inconsistent effort or a lack of thoughtfulness while completing the survey (Rosenbaum & Arnett, 2010). Both groups took the same survey and the experimental group also received education prior to taking the survey.

**Procedures**

 Each group was evenly and randomly assigned. There were 120 participants in the experimental group that received the concussion education and then took the survey and there were 120 participants in the control group that did not receive the educational portion and only took the survey. The participants were all student-athletes at a high school in San Juan County in Northwestern New Mexico. They all came from the similar backgrounds and were all involved in sports that were in the same classification level (4A). The students were all given the same amount of time to complete the survey and were given very detailed directions on how to answer the questions. The students were asked to circle their response with a black pen that was provided to them with the survey. The total amount of time to take the survey was approximately 30 minutes per student athlete.

 The experimental group also received an educational session prior to taking the survey. Education included the *Heads Up* video produced by the National Athletic Trainers Association and also material provided by the CDC Heads up: Concussion in High School Sports. This material was designed to reduce the number of sports related concussions and raise awareness and educate the athletic population (Sarmiento, Mitchko, Klein, & Wong, 2010). The education was athletic specific and was given by a certified athletic trainer. The education included signs and symptoms of concussion, effects of returning to play to soon and possible outcomes from repeated concussions later in life. The educational portion of the study took approximately one hour to complete and then the experimental group was given the survey.

 While taking the survey students were instructed to turn off cell phones and were not allowed to have any MP3 players. This was done to try and avoid distractions while taking the survey. Finally students were instructed to not talk to other participants or look at their surveys. They were instructed that it was extremely important for them to do their own work and provide their own responses.

**Data Analysis**

 A mean score for each section was calculated for both the experimental and control group for the survey. An Analysis of Variance (ANOVA) was conducted to test the differences between the mean scores in the sections. The ANOVA was performed at a significance level of .05.

**Results**

**Demographics**

 The Rosenbaum Concussion Knowledge and Attitudes Survey-Student Version (RoCKAS-ST) (Rosenbaum and Arnett, 2010) was completed by 240 student athletes (130 males and 110 females). There were 80 students from three different area high schools in San Juan County in Northwestern New Mexico. The range of the student athletes’ age was 14.5 to 18.1 years of age with a mean age of 17.2.

**Descriptive Statistics**

 Table 1 in Appendix C illustrates the descriptive statistics for the student athlete’s knowledge about concussions. Table 1 shows that the experimental group had a mean score with the knowledge quiz of 18.4 and the control group had a score of 13.2 when answering the questions regarding concussions in the RoCKAS-ST. This shows that the education portion of the survey did have an effect of the knowledge of the experimental group.

 Table 2 in Appendix C illustrates the descriptive statistics for the student athlete’s attitude towards concussions in section 3 and 4 of the RoCKAS-ST. Table 2 shows that within the control group the mean score was 55.3 while the experimental group showed a mean score of 65.4. This means that the experimental group showed scores that those student athletes have a safer attitude in regards to concussions.

**Statistical Analysis**

What effect did concussion education have on the attitudes in regards to concussions and what effects did those attitudes have on reporting concussions for high school student-athletes as measured by the RoCKAS-ST (Rosenbaum and Arnett, 2010)? Tables 1, 2, and 3 in Appendix C reveal that there was a difference in the two groups when education was given prior to the RoCKAS-ST amongst high school student athletes (F(1, 120)=10, *p=*.000). This is evident by score difference in the knowledge of concussions survey and the attitudes towards concussion survey.

**Discussion**

**Conclusion**

 The purpose of this study was to determine the attitudes in regards to concussions and the effects that those attitudes may have on reporting concussions for high-school student athletes as measured by the Rosenbaum Concussion Knowledge and Attitudes Survey-Student Version (RoCKAS-ST) (Rosenbaum and Arnett, 2010) when they are properly educated about concussions (Rosenbaum & Arnett, 2010). The finding of this study was the education did have an effect on the knowledge and the attitudes towards concussions for high school student athletes. The experimental group had significantly better scores as compared to the control group in the areas of knowledge of concussions and attitudes towards concussions. An hour of educational information regarding concussions showed much-improved scores for the experimental group while the control group did not receive educational information and had low scores on the knowledge part of the survey and showed unsafe responses with the attitudes section of the concussion survey.

**Discussion**

Initiatives have been developed to raise awareness and educate about concussions, help coaches and athletic trainer educate others about concussions, and improve coaches abilities to prevent, recognize, and manage concussions with their athletes (Sarmiento, Mitchko, Klein, & Wong, 2010). It has been found that education such as the CDC’s Head’s Up program is helping to change knowledge, attitudes, and behaviors towards concussions. There needs to be more done to help with the problem. Not only do coaches and athletes need to have the educational information about concussions, but it needs to be expanded to include parents, administrators, and teachers within the student-athlete’s schools (Sarmiento, Mitchko, Klein, & Wong, 2010).

 Concussions are becoming more prevalent amongst high school student-athletes. As media attention about concussions has been on the rise many coaches feel that it is not as important to educate high school student-athletes about concussions (Tator, 2012). Educational opportunities such as mandatory concussion education through state athletic associations, preseason sports team meetings, and locker room posters can have a lasting effect on high school student athlete’s and better prepare them to deal with concussions and report signs and symptoms. (Tator, 2012).

**Recommendations**

 Concussions are a serious problem in high school athletics and proper education can have a lasting effect on the knowledge and attitudes that student-athletes have towards concussions. It is clear that high levels of unreported concussion extend beyond American football and goes into other sports and cultures. Sports teams add more medical staff, but until athletes are aware of the seriousness of concussions and are willing to report injuries nothing can be done (Broglio, et al., 2010).

 According to Tator (2012) “the five “Es” of injury prevention include epidemiology, education, engineering, enforcement/legislation of rules, and evaluation of injury prevention programs to prevent concussion” (p. 293). The measures that are taken should be targeted and sport specific (Tator, 2012). Education should include the participants themselves, but also should include parents, coaches, athletic trainers, therapists, and referees (Tator, 2012). The information that is presented should be as sport specific as possible, even though most is uniform information. It is important to understand the sports that have a higher incidence of concussions, but not fail to forget about sports such as bicycling and skiing when educating about concussions (Tator, 2012).

 There are many strategies and resources available to educate about concussions. Some of these include concussion education and awareness committees that direct education. Concussion road shows are half to full day events that are intended to reach a wide variety of athletes. Websites contain a large number of resources on concussions and can target a large population of athletes. Concussion cards are sport-specific containing signs and symptoms and recommendations for return to play. These can be used with league officials and administrators to ensure that they are aware of concussion management protocols. Preseason meetings with parents and student athletes allow for a large group to be educated. Locker room posters are high visible and easily understood by many athletes. Finally, journal articles, continuing education and webinars allow health care professionals, coaches, and officials to stay up-to-date with current trends regarding concussions (Tator, 2012). All of these work together and share a common goal and that is that the first step in concussion management is education and this is the most effective tool when dealing with concussions with high school student-athletes.

**Summary**

 Education is a vital aspect of managing concussions. Many athletes are unaware of the signs and symptoms of concussions or long-term effects of concussions. It is important that athletes understand what a concussion is and how it can affect them. When athletes better understand the effects of concussions they are more likely to report signs and symptoms and show more positive attitudes when dealing with concussions. If athletes carry negative perceptions of concussion they are less likely to report the signs and symptoms associated with concussions. Education starts with the athlete, but should also be extended to the parents, coaches, referees, and administrators that deal with these athletes on the field and court.

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**Appendix A**

Scoring Key for RoCKAS-St

|  |  |  |  |
| --- | --- | --- | --- |
| *1* | *2* | *3* | *4* |
| Item | Correct Response | Item | Correct Response | Item | “Safer” Response  | Item | “Safer”Response |
| 1 | True | 1 | False | 1 | SD/D | 1 | SA/A |
| 2 | False | 2 | True | 2 | SA/A | 2 | SA/A |
| 3 | True | 3 | False | 3 | SA/A | 3 | SD/D |
| 4 | True |  |  | 4 | SA/A | 4 | SD/D |
| 5 | False |  |  | 5 | SD/D | 5 | SD/D |
| 6 | False |  |  | 6 | SD/D | 6 | SD/D |
| 7 | False |  |  | 7 | SA/A | 7 | SA/A |
| 8 | True |  |  | 8 | SD/D | 8 | SA/A |
| 9 | False |  |  |  |  | 9 | SA/A |
| 10 | True |  |  |  |  | 10 | SA/A |
| 11 | False |  |  |  |  |  |  |
| 12 | False |  |  |  |  |  |  |
| 13 | True |  |  |  |  |  |  |
| 14 | False |  |  |  |  |  |  |
| 15 | False |  |  |  |  |  |  |
| 16 | True |  |  |  |  |  |  |
| 17 | True |  |  |  |  |  |  |
| 18 | False |  |  |  |  |  |  |

Taken from Rosenbaum and Arnett, 2010

Appendix B

**RoCKAS-ST**

**Taken from Rosenbaum and Arnett, 2010**

**Section 1**

Directions: Please read the following statements and circle TRUE or FALSE for each question.

1. There is a possible risk of death if a second concussion occurs before the first one has healed True False

2. Running everyday does little to improve cardiovascular health. True False

3. People who have had one concussion are more likely to have another concussion. True False

4. Cleats help athletes’ feet grip the playing surface. True False

5. In order to be diagnosed with a concussion, you have to be knocked out. True False

6. A concussion can only occur if there is a direct hit to the head. True False

7. Being knocked unconscious always causes permanent damage to the brain. True False

8. Symptoms of a concussion can last for several weeks. True False

9. Sometimes a second concussion can help a person remember things that were forgotten after the first True False

 concussion.

10. Weightlifting helps to tone and/or build muscle. True False

11. After a concussion occurs, brain imaging (e.g. CAT Scan, MRI, X-Ray, etc) typically shows visible physical True False

 damage (e.g., bruise, blood clot) to the brain.

12. If you receive one concussion and you have never had a concussion before, you will become less intelligent. True False

13. After 10 days, symptoms of a concussion are usually completely gone. True False

14. After a concussion, people can forget who they are and not recognize others but be perfect in every other way. True False

15. High-School freshmen and College freshmen tend to be the same age. True False

16. Concussions can sometimes lead to emotional disruptions. True False

17. An athlete who gets knocked out after getting a concussion is experiencing a coma. True False

18. There is rarely a risk to long-term health and well-being from multiple concussions. True False

**Section 2**

Directions: Please read the following scenarios and circle TRUE or FALSE for each question that follows the scenarios.

Scenario 1:

*While playing in a game, Player Q and Player X collide with each other and each suffers a concussion. Player Q has never had a concussion in the past. Player X has had 4 concussions in the past.*

1. It is likely that Player Q’s concussion will affect his long-term health and well-being. True False

2. It is likely that Player X’s concussion will affect his long-term health and well-being. True False

Scenario 2:

*Player F suffered a concussion in a game. She continued to play in the same game despite the fact that she*

*Continued to feel the effects of the concussion.*

3. Even though Player F is still experiencing the effects of the concussion, her performance will be the same True False

 as it would be had she not suffered a concussion.

**Section 3**

Directions: For each question circle the number that best describes how you feel about each statement.

 Strongly Disagree Neutral Agree Strongly

 Disagree Agree

1. I would continue playing a sport while also having a headache that resulted 1 2 3 4 5

 from a minor concussion.

2. I feel that coaches need to be extremely cautious when determining whether 1 2 3 4 5

 an athlete should return to play.

3. I feel that mouth guards protect teeth from being damaged or knocked out. 1 2 3 4 5

4. I feel that professional athletes are more skilled at their sport than high-school 1 2 3 4 5

 athletes.

5. I feel that concussions are less important than other injuries. 1 2 3 4 5

6. I feel that an athlete has a responsibility to return to a game even if it means 1 2 3 4 5

 playing while still experiencing symptoms of a concussion.

7. I feel that an athlete who is knocked unconscious should be taken to the 1 2 3 4 5

 emergency room.

8. I feel that most high-school athletes will play professional sports in the future. 1 2 3 4 5

**Section 4**

Directions: For each question read the scenarios and circle the number that best describes your view. (For the questions that ask you *most athletes* feel, base your answers on how you think **MOST** athletes would feel.)

 Strongly Disagree Neutral Agree Strongly

 Disagree Agree

Scenario 1:

*Player R suffers a concussion during a game. Coach A decides to keep Player R*

*out of the game. Player R’s team loses the game.*

1. I feel that Coach A made the right decision to keep Player R out of the game. 1 2 3 4 5

2. Most athletes would feel that Coach A made the right decision to keep Player 1 2 3 4 5

 R out of the game.

Scenario 2:

*Athlete M suffered a concussion during the first game of the season. Athlete O*

*suffered a concussion of the same severity during the semifinal playoff game.*

*Both athletes had persisting symptoms.*

3. I feel that Athlete M should have returned to play during the first game of the 1 2 3 4 5

 season.

4. Most athletes would feel that Athlete M should have returned to play during 1 2 3 4 5

 the first game of the season.

5. I feel that Athlete O should have returned to play during the semifinal playoff 1 2 3 4 5

 game.

6. Most athletes feel that Athlete O should have returned to play during the 1 2 3 4 5

 semifinal playoff game.

Scenario 3:

*Athlete R suffered a concussion. Athlete R’s team has an athletic trainer on the staff*

7. I feel that the athletic trainer, rather than Athlete R, should make the decision 1 2 3 4 5

 about returning Athlete R to play.

8. Most athletes would feel that the athletic trainer, rather than Athlete R, should 1 2 3 4 5

 make the decision about returning Athlete R to play.

Scenario 4:

*Athlete H suffered a concussion and he has a game in two hours. He is still experiencing*

*symptoms of concussions. However, Athlete H knows that if he tells his coach about*

*the symptoms, his coach will keep him out of the game.*

 9. I feel that Athlete H should tell his coach about the symptoms. 1 2 3 4 5

10. Most athletes would feel that Athlete H should tell his coach about the 1 2 3 4 5

 symptoms.

**Section 5**

Directions: Think about someone who has had a concussion. Check off the following signs and symptoms that you believe someone may be likely to experience **AFTER** a concussion.

 Hives Feeling in a “Fog”

 Headache Weight Gain

 Difficulty Speaking Feeling Slowed Down

 Arthritis Reduced Breathing Rate

 Sensitivity to Light Excessive Studying

 Difficulty Remembering Difficulty Concentrating

 Panic Attacks Dizziness

 Drowsiness Hair Loss

Appendix C

Table 1.

*Descriptive Statistics of the RoCKAS-ST knowledge assessment (section 1 and 2) for the experimental and control group*

|  |
| --- |
| *Group n M SD SE* |
| Experimental | 120 | 18.4 | 10.37 | 2.34 |
| Control | 120 | 13.2 | 8.6 | 1.42 |

Note: Both the Experimental and Control Groups had 120 participants that were randomly assigned.

Table 2.

*Descriptive Statistics of the RoCKAS-ST attitude assessment (section 3 and 4) for the experimental and control group*

|  |
| --- |
| *Group n M SD SE* |
| Experimental | 120 | 65.3 | 17.5 | 2.1 |
| Control | 120 | 55.4 | 16.2 | 1.3 |

Note: Both the Experimental and Control Groups had 120 participants that were randomly assigned.

Table 3.

*Summary Table for ANOVA of the RoCKAS-ST survey*

|  |
| --- |
| *Source SS df MS F P* |
| Between | 240 | 1 | 120 | 10.00 | .000\* |
| Within | 120 | 239 | 5 |  |  |
| Total | 240 | 120 |  |  |  |
| \*p>.05 |