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Motivations for Underreporting Suspected Concussion in College Athletics

Abstract

Student athletes often fail to report concussion signs and symptoms, thereby putting themselves at risk for delayed recovery and permanent impairment. The present study examined motivations for underreporting concussion symptoms among college athletes enrolled at an NCAA Division I university. One hundred and ninety-three student athletes in high-risk sports completed a multiple-choice survey related to self-reporting of suspected concussion symptoms and reporting of teammates' symptoms. Results indicated that 45% of participants did not report their own suspected concussions during the present season and 50% did not report suspected concussions in teammates. Responses revealed that the primary reason for underreporting a suspected concussion was the belief that the blow to the head was not serious enough. Suggestions are provided for athletes, athletic staff, and coaches to improve players' awareness of the signs, symptoms, and consequences of concussions, as well as to whom and how to report suspected concussions appropriately.

Keywords: concussion, traumatic brain injury, sports, motivations, underreporting

Approximately 3.8 million recreation- and sport-related concussions occur in the United States each year (Langlois, Rutland-Brown, & Wald, 2006). . High-contact sports such as football, soccer, and ice hockey place student athletes at high risk for head injury, and concussions are also seen in such sports as lacrosse, baseball, wrestling, basketball, field hockey, and cheerleading (Centers for Disease Control and Prevention [CDC], 2011; Gessel, Fields, Collins, Dick, & Comstock, 2007). While most individuals recover from acute symptoms within a week or two, these traumatic brain injuries can lead to transient or permanent neurocognitive deficits (Neumann, 2010). Thus, it is vital that student athletes who sustain concussions or who suspect concussions can recognize and report signs and symptoms in both themselves and in teammates.

Research on sports-related concussion (SRC) generally focuses on assessment, management, and prevention of athletic concussions. It is also important, however, to evaluate student athletes' reporting of concussion signs and symptoms. Concerns include whether athletes feel comfortable reporting their head injuries, whether they recognize and report teammates' concussion signs and symptoms, and possible motivations for concealing concussions.

Student athletes failing to report concussions can experience subsequent problems with a variety of untreated symptoms (Comper, Bisschop, Carnide, & Tricco, 2005; Comper, Hutchison, Richards, & Mainwaring, 2012; Laker, 2011; Lewandowski & Rieger, 2009). These symptoms can include both general and specific problems related to physical activity, cognitive ability, emotional regulation, and sleep (Halstead & Walter, 2010). Further complicating this issue is the fact that concussions are not visible injuries; therefore, athletic and medical professionals heavily depend on the individual to self-report concussions (Mainwaring, Hutchinson, Camper, & Richards, 2012). Therefore, athletes of all ages need to be more

informed and repeatedly informed about concussion symptoms, the importance of immediately reporting those symptoms, and possible consequences. Additionally, it is imperative that research examine in more detail why student athletes often fail to report their concussions so the athletic community can take the necessary steps to address this problem.

Definition of Concussion in Sports

Defined at the International Symposia on Concussion in Sport (CIS) in 2001 and modified in 2004, 2008, and 2012, a concussion is comprised of five major features (McCrory et al., 2013, p. 555):

1. Concussion may be caused either by a direct blow to the head, face, neck, or elsewhere on the body with an “impulsive” force transmitted to the head.
2. Concussion typically results in the rapid onset of short-lived impairment of neurologic function that resolves spontaneously. However, in some cases, symptoms and signs may evolve over a number of minutes to hours.
3. Concussion may result in neuropathologic changes, but the acute clinical symptoms largely result in a functional disturbance rather than a structural injury, and as such, no abnormality is seen on standard structural neuroimaging studies.
4. Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course. However, it is important to note that in some cases symptoms may be prolonged.

Problems Related to Concussion

A number of issues can arise in student athletes who sustain concussions. Newly concussed individuals commonly experience problems associated with academics, cognitive function, behavior, and emotions (McCrory et al., 2013; CDC, 2010; Comper et al., 2005). More serious consequences that can arise include persistent post-concussion symptoms, chronic traumatic encephalopathy, and second-impact syndrome, all of which are described below.

Symptoms. Post-concussion symptoms vary, as they are dependent on both the severity of the injury and the individual's resilience (Leddy, Sandhu, Sodhi, Baker, & Willer, 2012). In general, there are four categories in which negative side effects from a concussion have been reported: physical, cognitive, emotional, and sleep-related. Physical symptoms include headache, nausea, balance problems, blurry or double vision, sensitivity to light or noise, confusion, and shock. Cognitive symptoms include a feeling of mental haziness, trouble with maintaining focus, difficulty remembering old and/or new information, repetition of questions, and slowness in responding (Halstead & Walter, 2010). Emotional symptoms include increased irritability, melancholy, heightened emotions, and nervousness. Sleep-related symptoms may include sleeping more or less than usual and difficulty in falling asleep.

With this wide range of symptoms, it is not surprising that so many concussions go unnoticed by the athletes, their teammates, coaches, and guardians. Many of these symptoms may be attributed to other factors, such as illness, lack of sleep, preoccupation with other issues, or side effects of substances ingested. For instance, a soccer player may know she or he is sleeping more than usual and is sensitive to light and noise, but the athlete may not attribute these symptoms to being hit in the head a few days earlier during a soccer game.

Persistent post-concussion symptoms. Although most concussions heal on their own within two to three weeks (Collins, Lovell, Iverson, Ide, & Maroon, 2006), some individuals

experience persistent post-concussion symptoms. In a study conducted by Roe, Sveen, Alvsaker, and Bautz-Holter (2009), 30% of participants reported concussion symptoms three months after their head injury occurred. Such symptoms can include headache, dizziness, fatigue, irritability, difficulty in concentrating and in performing mental tasks, impairment of memory, insomnia, and reduced tolerance to stress, emotional excitement, or alcohol (Jotwani & Harmon, 2010). In adolescents, students with persistent symptoms may have regular headaches, extreme sensitivity to light, and lightheadedness alongside issues with retaining new and old information and symptoms of anxiety (Lee, 2007). Such issues can in fact be misinterpreted as ADHD, social anxiety, or a number of other disorders. Moreover, if symptoms persist, they can lead to long-lasting academic, cognitive, behavioral, and emotional consequences.

Academic/cognitive consequences. A concussion results in a neurochemical imbalance; the brain tries to heal itself by reestablishing the fragile balance between chemicals (McAvoy, 2013). Because of this unstable state, a simple cognitive task like reading or taking a test may cause symptoms to flare. Therefore, when an athlete sustains a concussion, it is important that school personnel realize the possible consequences of concussion on the individual's academic performance. Also, because concussions are unique to each individual, the academic progress of the student athlete may vary greatly, fluctuating between improvement and decline (Glang, Tyler, Pearson, Todis, & Morvant, 2004).

Behavioral and emotional consequences. Several behavioral and emotional consequences may arise in an athlete after a concussion. These emotional outcomes include but are not limited to the following: "mood disturbances including shock, depression, anger, frustration, anxiety, boredom, reduced self-esteem, fear of re-injury, and uncertainty about the future" (Mainwaring et al., 2012, p. 252). With visible injuries, such as a broken leg or

laceration, athletes tend to experience positive emotions because of their obvious and visible recovery. However, with an invisible injury like a concussion, the feeling of optimism is less likely to occur (Mainwaring et al., 2012). Therefore, coaches, medical professionals, teammates, family members, and all other individuals who interact with a newly concussed athlete should be sensitive to these emotional needs.

Chronic traumatic encephalopathy. Chronic traumatic encephalopathy (CTE) is a neurodegenerative disease that occurs years, or even decades, following recovery from head trauma (Gavett, Stern, & McKee, 2011). Because it can be diagnosed only during autopsy, there is no clinical diagnostic tool that can prove a living individual has CTE. By creating written profiles, however, medical and non-medical personnel have reported such common symptoms as increased anger, suicidality, poor episodic memory, and weakened executive functioning skills as the first signs of an individual with suspected CTE. As the disease progresses, individuals may have decreased movement and speech difficulties. These symptoms do not occur immediately following a series of concussions, but appear later in life, with a mean age of onset noted as 43 (Gavett et al., 2011). During their autopsies, individuals who, while alive had suspected CTE brain abnormalities, revealed such evidence as reduction in brain volume due to deterioration of frontal, temporal, and parietal lobes; ventriculomegaly of lateral and third ventricles; cavum septum pellucidum; and damaging of cerebellar tonsils (Saffary, Chin, & Cantu, 2012). CTE has been reported in athletes involved in American football, wrestling, boxing, soccer, and hockey (Gavett et al., 2011). Given that these are all high-impact sports, and given that many athletes sustain multiple concussions, it is now widely believed that these individuals are at an elevated risk for developing CTE later in life.

Second impact syndrome. Second impact syndrome (SIS) occurs when a concussed athlete incurs a second concussion before the first one has healed, typically within seven days (McCrorry, Davis, & Makdissi, 2012). This results in a swelling of the cerebral cortex of the brain and can cause permanent impairment or even death. SIS is most likely to occur in boxers, as these athletes sustain multiple blows to the head in a short time frame. There is limited research on SIS, and it is very rare; however, athletes and coaches who are involved with sports in which multiple blows to the head can occur in a short amount of time should still be aware of this condition (McCrorry et al., 2012).

Motivations for Underreporting of SRCs

Underreporting concussions may stem from the cultural belief that athletes are expected to be tough and behave in the best interest of their team rather than themselves. To many athletes, this means shrugging off a “ding” to the head and getting back in to finish the game. McCrea, Hammeke, Olsen, Leo, and Guskiewicz (2004) examined the underreporting of concussions in high school football players in Wisconsin and found that only 47.3% of the players reported their concussions to someone they trusted. The researchers summarized three common reasons for not reporting athletic concussions: 66.4% of athletes did not believe the injury required medical attention; 41.0% did not want to be suspended from the game; and 36.1% were unaware they could have sustained a concussion in sport (McCrea et al., 2004). For the players who reported their concussions, results indicated that 76% reported their injury to a certified athletic trainer, 38.8% to a coach, 35.9% to a parent, and 27.2% to a teammate (McCrea et al., 2004). Register-Mihalik et al. (2013) documented similar reasons for not reporting the concussion: 70.2% of players with concussions did not believe the injury required medical attention; 36.5% did not want to be suspended from the game; and 14.9% were unaware that they

had sustained a concussion. In contrast, only 48.8% of players who sustained concussions reported their injury to a coach or medical professional. In addition to the aforementioned studies, Chrisman, Quitiquit, and Rivara (2013) found that when high school athletes were given hypothetical scenarios containing symptoms of concussions, all participants indicated they would continue playing or to take a brief break and return to the game. When asked why, athletes' reasons included not wanting to be removed from the game, not being in enough pain, and not knowing the specific symptoms of getting a concussion. Williamson and Goodman (2006) examined underreporting of concussions in youth ice hockey and found that concussions were reported to team personnel only 50% of the time.

With the advancements in our understanding of sport-related head injuries, it is imperative that student athletes are properly educated about the risks associated with refusing to self-report concussions. It is clear that athletes who do not report concussion symptoms are at risk for impairment. More information on motivations for underreporting suspected concussion symptoms may help to educate athletes, coaches, parents, and school personnel more effectively on how, why, and to whom athletes should report suspected concussions. The purpose of this study was to determine the reporting rates of suspected concussion symptoms among college athletes as well as to determine possible factors influencing those rates.

Method

The purpose of this study was to: (1) to determine the percentage of college student athletes who report suspected concussions or the suspected concussions of teammates, (2) to investigate why student athletes refrain from reporting their suspected concussions or the

suspected concussions of teammates, and (3) to determine whether athlete variables, such as their sport or academic level affected concussion reporting rates.

Participants and Setting

Participants in the study were selected through a criterion sample method. Participants who were invited to complete the survey included (n = 283) college athletes at a Division I NCAA university. The university was a mid-size, private university located in the Midwestern region of the United States. Athletes from the university's men's baseball, men's and women's basketball, co-ed cheerleading, men's football, and men's and women's soccer teams were invited to participate. Participants included both female and male athletes whose academic level ranged from first-year students to fifth-year seniors.

Of the student athletes who were sent the survey, 193 student athletes replied, yielding a response rate of 68.2%. Table 1 illustrates the response rate per team, and Table 2 describes the participants by academic level.

Measure

The survey used in this study was adapted from the survey used in McCrea et al.'s (2004) study. The survey was piloted with graduate students at the university. The pilot results indicated that the survey questions and the time frame of college athletic seasons needed to be specified, and so adjustments to the survey were made based on these results. The final survey was created and distributed electronically through the Google forms application in October 2013 to participants in the aforementioned sports. A follow-up email reminding the athletes about the survey was sent one week later. The email containing the link to the survey described participant confidentiality, anonymity, and the option to stop taking the survey at any time. The content of the survey yielded reporting rates of suspected concussion symptoms among athletes at the

university and also identified potential factors that may have influenced those rates. The questions were separated into “before the 2012-2013 athletic season” and “during the 2012-2013 athletic season.” This distinction was made in order to collect data about the most recent season as well as data about suspected concussions during the athletes’ entire collegiate career.

Procedures

The study was submitted for approval to the Institutional Review Board at the university. A letter from the assistant athletic director was included, indicating his approval for the researcher to administer an electronic survey regarding athletic concussions to student athletes from the aforementioned sports.

The researcher attended a coaches meeting at the university, led by the assistant athletic director. During this meeting, the researcher explained the purpose of the survey and asked the coaches to encourage their athletes to participate when they received the email. Participants indicated their consent by clicking into the electronic survey.

The researcher collected the data from October 2013 to November 2013. Student athletes from the aforementioned sports were emailed and asked to take the survey. They received a follow-up email one week later to remind them about the survey. After the initial email request was sent, 162 responses were recorded, and an additional 31 responses were recorded a week later when the second email was sent.

Results

The results of the study were analyzed by calculating the response percentage for each survey question. The survey results yielded ordinal and interval data. .

Research Question One

The data were analyzed by calculating the response percentage of each survey question. These analyses revealed whether or not the university student athletes reported their suspected concussions and the suspected concussions of their teammates during their college athletic careers.

Suspected concussions before the 2012-2013 athletic seasons. Out of the 193 respondents, fourteen percent of respondents suspected they sustained a concussion in college before the 2012-2013 collegiate athletic season. Twenty-one percent of the athletes identified themselves as first-year students and chose the option of “not applicable.” Sixty percent of the athletes indicated that they did not suspect they sustained a concussion, and 5% of athletes surveyed were unsure. Of the 37 participants who suspected they sustained a concussion or were unsure, 36 responded to the next survey question as follows: 61% indicated that they had sustained one known concussion, 28% sustained two concussions, 8% sustained three concussions, 3% sustained four concussions, and no one sustained five or more concussions.

Suspected concussions during the 2012-2013 athletic seasons. Out of the 193 athletes surveyed, 8% of respondents suspected they sustained a concussion during the 2012-2013 athletic season. Of the remaining participants, 87% indicated that they did not have a concussion and 5% of athletes surveyed were unsure. Of the 24 participants who suspected they had a concussion or were unsure, 19 answered the next survey question as follows: 79% indicated that they had sustained one known concussion, 16% sustained two concussions, 5% sustained three concussions, and no one sustained four or more concussions.

Teammates’ suspected concussions during the 2012-2013 athletic seasons. The participants were also asked about the suspected concussions of their teammates. Of the 193

respondents, 60% stated that they suspected a SRC in a teammate during the 2012-2013 athletic season, and 40% responded that they had not.

Research Question Two

The data were analyzed by calculating the response percentage to each survey question. These analyses yielded information regarding why the university student athletes failed to report their suspected concussions or the suspected concussion of a teammate during their college athletic careers. Participants were able to choose more than one motivating reason for not reporting their suspected concussions or the suspected concussion of a teammate.

Reported concussions and motivations before the 2012-2013 athletic season. The 37 student athletes who suspected or were unsure if they sustained a concussion prior to the 2012-2013 athletic season were asked whether they reported their suspected concussion. Sixty-two percent of the concussed athletes answered “yes” and the remaining 38% responded “no.” Of the 23 athletes who reported their own suspected concussions, 19 reported they confided in an athletic trainer, 13 in their coach, 13 in a parent, and 7 in a teammate. The sum of these numbers exceed 23 because a number of athletes confided in more than one person. Of the 14 players who failed to report their suspected concussions, 9 stated it was because they “didn’t think it was serious enough,” 7 indicated they “didn’t know it was a concussion,” 5 indicated they “didn’t want to be pulled out of the game or practice,” 3 indicated they “didn’t want to let down teammates,” and 1 chose “other” (see Table 3). The sum of these numbers exceeds 14 because a number of the players endorsed more than one explanation for their failure to report.

Reported concussions and motivations during the 2012-2013 athletic season. The 24 student athletes who suspected or were unsure if they sustained a concussion during the 2012-2013 season were asked if they reported the suspected concussion. Twenty-two responded as

follows: Fifty-five percent of the concussed athletes answered “yes” and the remaining 45% responded “no.” According to the 12 athletes who reported their suspected concussions, 9 reported their concussion to an athletic trainer, 7 to a coach, 5 to a parent, 2 to a teammate, and 1 chose “other.” Of the 10 players who failed to report their suspected concussions, 7 stated it was because they “didn’t think it was serious enough,” 7 indicated they “didn’t want to be pulled out of the game or practice,” 5 “didn’t know it was a concussion,” and 1 “didn’t want to let down teammates.” (see Table 4).

Reported concussions and motivations for not reporting teammates’ suspected concussions during the 2012-2013 athletic seasons. The 116 student athletes who suspected a teammate had sustained a concussion were then asked whether they reported their teammate’s suspected concussion. Of this group, 50% of the athletes answered “yes”; the remaining 50% responded “no.” According to the 58 athletes who reported their teammates’ suspected concussions, 38 indicated they confided in an athletic trainer, 17 in their coach, 3 in another teammate, 1 chose “other,” and no one reported confiding in a parent. Of the 57 players who failed to report the suspected concussions of their teammates, 23 stated it was because the individual reported it themselves, 13 indicated that the trainer already knew, 10 “didn’t know it was a concussion,” 7 “didn’t want him/her to be pulled out of the game or practice,” 4 “didn’t think it was serious enough,” 3 “didn’t want to let down teammates,” and 2 reported that a doctor checked on the teammate. Table 5 breaks down these motivations in percentages.

Research Question Three

A series of chi-square tests were conducted to determine if there was a relationship between different sets of variables. For all of the analyses conducted, the majority of the cells had an expected count less than five, indicating that the results are not strong indicators.

Participant sport. The first analysis compared the participant's sport with suspected concussions sustained before 2012-2013 athletic seasons. This analysis yielded a result of $X^2(24, N=193) = 52.06, p = .001$, indicating the relationship between these variables was not coincidental. The second analysis compared the participant's sport with the suspected concussions during 2012-2013 athletic seasons. This analysis yielded a result of $X^2(16, N=193) = 14.01, p = .592$, indicating that there was no relationship between the two variables.

Academic level. A chi-square analysis was used to compare the participant's academic level with suspected concussions *before* 2012-2013 athletic seasons variable. This analysis yielded a result of $X^2(12, N=193) = 128.12, p < .001$, indicating that the more years the student was in college, the more likely he or she was to report a concussion. The second analysis compared the academic level variable with the suspected concussions *during* the 2012-2013 athletic seasons. This analysis yielded a result of $X^2(8, N=193) = 8.74, p = .365$, suggesting that there was no relationship between these two variables.

Discussion

The purpose of this study was to determine the percentage of college athletes at a Division I university who report their suspected concussions and the suspected concussions of teammates, as well as the motivations for not reporting an incident. The data reported from before the 2012-2013 athletic seasons indicated that 38% of student athletes did not report their suspected concussions; during the 2012-2013 athletic seasons, 45% of student athletes at the university did not report their suspected concussions to anyone. The student athletes indicated that the strongest motivations for not disclosing the information included "not thinking the concussion was a serious enough injury," "not wanting to be pulled out of the game or practice,"

and “not knowing they sustained a concussion.” For both before and during the 2012-2013 seasons, the strongest motivator for not reporting a suspected concussion was the belief that the concussion was not a severe enough injury.

The data collected from the student athletes supported the predicted hypothesis for research question one. According to Institute of Medicine (IOM) and National Research Council(NRC) (2014), many athletes, coaches, and supporters do not completely understand the consequences of concussions. Register-Mihalik’s (2013a) study documenting the reporting of high school athletic concussions found that 48.8% of athletes did not report their concussions. The results of the present study were commensurate with the high school student’s findings because 45% of the college student athletes in the sample failed to report their suspected concussions.

The prediction for research question two was that the students would choose the three reasons for not reporting concussions that were documented in McCrea et al.’s (2004) study. For both before and during the 2012-2013 seasons, the student athletes chose “didn’t think it was serious enough” as the top reason they failed to report their suspected concussions. An inferred cause for this occurrence is that student athletes at the university are not educated about the potentially harmful effects of a concussion (Leddy et al., 2012). Another possible reason could be because a concussion is not a visible injury or because student athletes may have felt “weak” or afraid of being perceived as weak if they reported their concussion (Report Brief on SRCs in Youth, 2013).

“Didn’t know it was a concussion” was the second highest (28%) motivation for the pre 2012-2013 season and the third highest (25%) for the 2012-2013 season. This implies that many student athletes do not know the signs and symptoms of a concussion. Therefore, the university

may benefit from a formal education program for their student athletes and athletic staff about concussions, a program with information on prevention, the signs and symptoms, and proper management on and off the athletic field.

Kroshus, Baugh, Daneshvar, and Viswanath (2014) recently applied a model based on the Theory of Planned Behavior (TPB) to prediction of concussion symptom reporting among late adolescent and young adult athletes. This theory postulates that “the most important predictor of a behavior is the intention to perform that behavior” (p. 270). The theory examines the importance of *intention*, as predicted by three factors: attitudes, norms, and perceived behavioral control. Thus, knowledge about concussion signs, symptoms, and outcomes by itself is likely insufficient for changing the culture of concussion reporting among adolescent athletes. Factors such as perceived outcomes of reporting, perceived norms, and self-efficacy must also be taken into account.

Limitations

A limitation of this study is the restricted sample of student athletes at only one university, therefore creating a sampling bias. To yield more generalizable results, it is recommended that the study be replicated at universities of varying size and demographics around the country. In addition, 36.8% of responses were collected from the football team due to the size of the football roster. Thus, representation in the sample was heavily skewed toward football players. Furthermore, the study questioned if student athletes sustained a concussion, yet there was no way for the researchers to know if the students accurately knew whether or not they had sustained a concussion. This also applies to reporting teammates' concussions. Adding a

question to the survey about how the student knew she or he sustained a concussion would help address this limitation.

One question asked student athletes if they sustained a concussion during their collegiate athletic career. Because first-year students could not answer this question, there was a “not applicable” option. However, according to the results, some first-year students answered this question. Therefore, this may have not accurately represented the numbers of students sustaining a concussion during their collegiate career. Also, depending on the year of the student (freshman, sophomore, junior, senior), athletes may have had more knowledge about concussions and have had more opportunities to sustain a concussion. Finally, due to the limited sample size, the statistical analysis of the data was not considered strong. Therefore, a larger sample size would have been optimal.

Implications for Future Research

Several participating athletes reported that they did not know that they had sustained a concussion. Thus, it is crucial that universities educate their sports programs about the causes, symptoms, and possible outcomes associated with a concussion. The frequency of use and efficacy of informational programs on concussions both need to be examined with the college athlete population. However, concussion trainings alone are not likely to lead to a cultural shift in recognition of and response to concussions. A recent report by the Institute of Medicine and National Research Council report (2014) on changing the culture related to sport-related concussion in youth emphasized that knowledge alone does not necessarily lead to changes in behavior or attitudes. Thus, future research might expand Kroshus et al’s (2014) study “intention” as a predictor concussion reporting. The intention to report has been associated with perceptions about concussion reporting, perceptions of others’ beliefs about concussion

reporting, and perceived control over reporting. This approach is supported by studies indicating that a more favorable attitude toward reporting possible concussion was associated with higher reporting of concussion (or suspected concussion) events (Register-Mihalik et al., 2013b). Online training also offers promise (e.g., Glang et al., 2010) and warrants further investigation.

In addition, results of the present study indicated that 60% of the athletes knew of a teammate who they suspected sustained a concussion. Several of these respondents indicated that they did not report a teammate's suspected concussion because an athletic trainer witnessed the incident and therefore they did not feel the need to report their teammate's suspected concussion themselves. It is possible that the students simply assumed the trainer had witnessed the incident, the trainer had not treated the athlete, or that the student athlete had lied to the trainer about his or her symptoms but had confided in a teammate. Future research might examine the efficacy *bystander intervention training* and the creation of a caring, informed community around young and emerging adults. This includes educating and changing attitudes among teammates and the people who are around them every day: residence advisors, roommates, people who work the door at the workout facilities, and the people who supervise these individuals.

Overall, a *multifactorial approach* has been recommended for reduction of risk of sport-related concussion (Benson et al., 2013). Such an approach might involve not only educating members of the college campus community about the signs and symptoms of concussions, but also efforts to change the social norms, attitudes, and behaviors surrounding concussions.

Conclusion

The present study investigated whether or not the university's student athletes involved in high-risk sports reported their suspected concussions and the suspected concussions of their teammates as well as the motivations for not reporting suspected concussions. The findings indicated that roughly 45% of athletes did not report their suspected concussions and 50% of athletes did not report the suspected concussions of a teammate. The participants indicated that the highest ranked motivation for not reporting their own suspected concussions was that they did not think their suspected concussions were serious enough injuries. This implies that student athletes may not be aware of the serious repercussions that a concussion can have on their health (Report Brief on SRCs in Youth, 2013).

In order to convey the seriousness of concussions, federal and state governments have adopted legislation providing guidelines for concussion education and management (Frollo, 2014). Many school boards are utilizing resources such as CDC materials (Sarmiento, Mitchko, Klein, & Wong, 2010) and online training programs (Glang, Koester, Beaver, Clay, & McLaughlin, 2010) to fulfill mandates. Goldberger (2014) argues that it is important for collegiate administrations, including athletic programs, to develop similar guidelines to educate student athletes and personnel about SRCs. The results of the current study indicated that student athletes might lack knowledge of what a concussion is and of the possible impact it can have on their well-being. Therefore, athletic programs need to focus on educating students about the signs and symptoms, as well as about the seriousness of a concussion. Programs should also address the importance of athletes' self-advocacy about injuries as well as the importance of reporting the concussion of a teammate.

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Table 1

Response Rate Per Team

Sport	Total Athletes	Participants	Response Rate
Men's Baseball	42	36	85.71%
Men's Basketball	16	4	25%
Women's Basketball	12	10	83.33%
Cheerleading	23	17	73.92%
Men's Football	108	71	65.74%
Women's Softball	26	16	61.54%
Men's Soccer	33	20	60.61%
Women's Soccer	23	19	82.61%
Total	283	193	68.20%

Table 2

Participant Academic Level

Academic Level	Participants	Percentage
First Year Students	63	32.64%
Sophomore	56	29.02%
Junior	38	19.69%
Senior	30	15.54%
5 th Year	6	3.11%

Table 3

Motivations to Not Report a Suspected Concussion before the 2012-2013 Athletic Season

Possible Choices	N	Percentage
Didn't think it was serious enough	9	64%
Didn't want to be pulled out of the game or practice	5	36%
Didn't know it was a concussion	7	50%
Didn't want to let down teammates	3	21%
Other	1	7%

Table 4

Motivations to Not Report a Suspected Concussion during the 2012-2013 Athletic Season

Possible Choices	<i>N</i>	Percentage
Didn't think it was serious enough	7	70%
Didn't want to be pulled out of the game or practice	7	70%
Didn't know it was a concussion	5	50%
Didn't want to let down teammates	1	10%
Other	0	0%

Table 5

Motivations to Not Report a Suspected Concussion of a Teammate during the 2012-2013 Athletic Season

Possible Choices	<i>N</i>	Percentage
Didn't think it was serious enough	4	7%
Didn't want him/her to be pulled out of the game or practice	7	12%
Didn't know it was a concussion	10	18%
Didn't want to let down teammates	3	5%
Individual reported it him/herself	23	62%

The trainer already knew	13	23%
Doctor checked on the teammate	2	4%
