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Describing the Prevalence and Awareness of Sport-Related Concussion in University Intramural  
and Club Sport Participants

Makenzie Brown

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### **Abstract**

*Background:* Concussion injuries are growing in number among athletes across the nation. The majority of concussion research to date focuses on collegiate and high school athletes. University athletes make up a small percentage of the student body population compared to the large number of students that participate in club and intramural sports. These students participate in the same sports, assume the same risks, and may experience the same adverse effects of concussion, often without appropriate medical oversight.

*Purpose:* The purpose of this study was to determine if concussion is a problem among intramural and club sport participants, if these participants are experiencing academic difficulties post-concussion and if they have medical coverage during their participation.

*Study Design:* This study used a descriptive, quantitative survey-based design.

*Methods:* Participants included college students participating in intramural and club sports at eight universities. University recreation departments sent out a 36-item survey using their participant database. This survey assessed demographic questions (e.g., age, sport, previous concussion history), SRC knowledge, barriers to medical care for SRC and commitment level to intramural or club sports.

*Results:* Medical coverage for club games was reported by 62.4% (542/868) and 53.7% (917/1,709) of intramural participants. Approximately 7.3% (63/863) of club sport participants reported sustaining a medically diagnosed concussion during club sport participation. Academic difficulties following concussion were reported by 61.9% (39/63) of these participants. Less than two percent (1.9%, 32/1,710) of intramural participants reported sustaining a medically diagnosed concussion during sport participation. Academic difficulties following concussion were reported by 65.6% (21/32) of intramural respondents.

*Discussion:* University and club sport participants also experience academic difficulties following concussion. Increased efforts are needed to provide academic accommodations and proper medical care for university club and recreation participants that sustain a concussion.

### **Introduction**

Sport-related concussion (SRC) continues to be a hot topic in sports medicine. Recent estimates indicate that approximately 1.6 to 3.0 million sport and recreation-related concussions occur every year in the U.S. (Langlois, Rutland-Brown, & Wald, 2006). Sport-related concussion is best defined as a complex pathophysiological process affecting the brain that is induced by traumatic biomechanical forces (McCroory et al., 2013). The effects of SRC are unique to each injured athlete and often result in a myriad of physical, cognitive, social, and emotional symptoms and impairments (Kontos et al., 2012). The detection and diagnosis of SRC heavily relies on the self-reporting of symptoms by the injured athlete. As a result, approximately 60% of all SRCs go unreported, due to lack of knowledge/awareness, fear of removal from participation and letting teammates down (Meehan, d'Hemecourt, Collins, & Comstock, 2011). The high rate of unreported SRC is alarming, given the negative effects of this injury on the physical, emotional, and academic functioning of the athlete. In an effort to support an on-going need for SRC education, numerous epidemiological investigations tracking concussion rates have been conducted across several National Collegiate Athletic Association (NCAA) sports (Gessel et al., 2007; Hootman et al., 2007). While this research has established current documented SRC injury rates, NCAA varsity athletes are only a small representation of a larger, college-aged intramural and club sport population that participate in the same sports, assume the same risks, and may experience the same adverse effects of SRC, often without appropriate medical oversight. Currently, there are no studies to date examining SRC in university intramural and club sport participants.

There is an average of 501 athletes participating in varsity sports at each of the 346 NCAA colleges and universities (NIRSA, 2007). The rate of SRC has increased 7% over the last

16 years (Hootman, Dick, & Agel, 2007), making the total number of concussion in NCAA sports approximately 3,753 per year. The total number of NCAA athletes comprises approximately 6% of the entire university student body population according to the NCAA Recruiting Facts (NCAA, 2014). This is a very small percentage in comparison to the number of university students that participate in intramural and club sports. Recent estimates indicate that more than 2 million college students participate in club sports (NIRSA, 2007). The sport offerings among intramural and club sport are similar or even identical to varsity sports. Football, basketball, and soccer are among the NCAA sports with the highest incidence rates of SRC, with football having 55% of all concussions collected in a study done by Hootman and colleagues where they surveyed over 15 different sports (Hootman et al., 2007). Many schools have identical or similar (e.g., flag football) intramural and club sport offerings. In addition, other potentially high-risk sports are unique to many intramural and club university programs such as rugby, hockey, boxing, and martial arts. Given the disparity in the number of participants and the similarity of sports being played by both varsity NCAA athletes and intramural and club sport participants, it is hypothesized that SRC is likely a problem in intramural and club sports. Furthermore, the rates of SRC may be higher due to the variability of skill level and physical attributes among intramural and club participants.

Participation among intramural and club sports provide an ideal opportunity for college students to maintain a physically healthy lifestyle (Cooper, Schuett, & Phillips, 2012). Regular physical activity is the number one preventative health measure that adults can take against disease. Universities encourage the participation in fitness activities of their students via their recreation programs. These programs influence students to attend their university as well as increase their likeliness to return to school the following year (Henchy, 2013.). Henchy (2013)

conducted a study where a 143-item survey was sent out to 2,500 students at a southeastern university via email. The survey consisted of questions about recruitment, retention, satisfaction, involvement, and the benefits students have received from participating in university recreational programs. They found that 38% of undergraduate students said that campus recreation programs influenced their decision to continue at the university. Studies have shown that students report they enjoy participating in campus recreation and that it improves quality of life at the university in many ways including: expanded their interest in staying fit, positively influenced their overall health, fitness level, well-being, stress management, and academic performance. (Henchy, 2013.)

Additional research estimating the incidence and effects of SRC in intramural and club participants is needed. While the benefits of participating in sport and recreational activity offers satisfaction, enjoyment, exercise, fellowship, achievement, stress release, and acquisition of lifelong leisure skills (Artinger, Clapham, Hunt, Meigs, & Milord, 2006; Eime, Harvey, Brown, & Payne, 2010), these participants are still at risk for injury. Musculoskeletal injuries are often visible making it easier for university wellness centers to provide care for those who seek treatment. However, SRC is an “invisible” injury that may have delayed signs and symptoms that last for days, weeks, or even months making this injury one of the most intangible diagnoses for university wellness centers (McCrea et al., 2004). These symptoms often interfere with academic performance and can impair physical, social, and emotional functioning (McGrath, 2010). Varsity NCAA athletes receive daily care for their concussion from clinicians trained in SRC management and may receive academic accommodations to aid them in their recovery and preserve academic standing. However, intramural and club participants are often left to seek medical attention on their own and may struggle though their academic work without proper accommodations. Therefore, a mismanaged SRC can negatively influence short-term health and

academic performance resulting in long-term academic and occupational and/or professional consequences.

Research on SRC in this understudied population of college students is necessary to support increased need for medical oversight, SRC education, and academic accommodations for intramural and club participants. The current study describes the prevalence and awareness of concussion in university intramural and club sport participants, and programs will be able to better estimate the impact that concussion may have on their participants and justify additional medical coverage, participant concussion education, and academic support when needed.



## Literature Review

### Definition of Concussion

In current years, public awareness about the consequences of concussion has risen considerably causing an increase in attention from researchers on the biomechanics of this injury (Dashnaw, Petraglia, Bailes, 2012). Concussion is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces (McCroy, et. al., 2012). Concussion occurs when a force is transmitted to the head following a direct hit to the head, face, neck or somewhere else on the body. There are no structural markers of concussion that show up on neuroimaging making this injury a functional impairment. Symptoms present in a wide variety and are typically resolved in a sequential order but may persist over a long period of time (McCroy et al., 2012.) Concussion is considered a subset of minor traumatic brain injury (mTBI), often used interchangeably with mTBI (McCroy et al., 2013). Recent estimates indicate that approximately 1.6 to 3.0 million sport and recreation-related concussions occur every year in the U.S. (Langlois, Rutland-Brown, & Wald, 2006). Concussion rates have increased by 7% over the last 16 years which may be a reflection of improved awareness and ability to better identify this injury (Hootman, Dick, & Agel, 2007). In the past, concussion education among parents, coaches and players was very low resulting in majority of concussions going undiagnosed, which also explains the latest increase in rates (McGrath, 2010). Studies also suggest that coaches should expect to see rates of 5%-10% among their athletes participating in contact sports (McGrath, 2010). In a summary of 16 years of National Collegiate Athletic Association (NCAA) injury surveillance data for 15 sports, football, soccer and ice hockey had the highest frequency of concussions (Hootman, Dick, & Agel, 2007). During contact sports like

these, it is not uncommon for players to collide, fall to the ground, or take an unexpected hit, putting each player at risk to sustain a concussion.

### **Biomechanics of Concussion**

Concussion is caused by a moment of impact to the brain when kinetic energy and force are translated in a linear or rotational mechanism. (Dashnaw, Petraglia, Bailes, 2012). This force may be a direct blow to the head, face, neck, or elsewhere on the body with an impulsive force transmitted to the head (McCroory et al., 2013). The brain is suspended in cerebral spinal fluid (CSF) and when impacted, the brain can abruptly move in the fluid and collide with the skull (Dashnaw, Petraglia, Bailes, 2012). The linear, acceleration-deceleration is when the body collides with another object resulting in a deceleration (Guskiewicz & Mihalik, 2006). The second type of biomechanical force that is associated with concussion is a rotational force and occurs when the head suddenly moves along its axis of rotation while the brain stays relatively still. This usually occurs when the player is not expecting the hit and fails to tense neck muscles or align their body to prepare for the hit (Barth, Freeman, Broshek, & Varney, 2001). After the collision between the brain and skull, a resulting energy crisis develops in the brain making it less able to work properly (Giza & Hovda, 2001).

### **Pathophysiology of Concussion**

Concussion is a result of a complex cascade of ionic, metabolic, and physiologic events. Quickly following the biomechanical injury, axonal stretching leads to a release of the excitatory amino acid (EAA), glutamate (Giza & Hovda, 2001; Katayama, et.al, 1990). The EEA then binds to N-methyl-D-aspartate (NMDA), which allows for an influx of calcium and an efflux of potassium (Dominguez & Raparla, 2014; Giza & Hovda, 2001). The cells try to restore homeostasis by activating the sodium-potassium pump, triggering an increase in glucose use.

During brain trauma, oxidative metabolism is impaired, which is more productive in the production of adenosine triphosphate (ATP) (Giza & Hovda, 2001). In order to keep up with the demand of glucose, accelerated glycolysis is used which has the unfortunate byproduct lactate (Giza & Hovda, 2001). During the acute stages of concussion, elevated lactate levels can result in further damage by inducing acidosis, membrane damage, altered blood brain barrier permeability, and cerebral edema (Dominguez & Raparla, 2014; Giza & Hovda, 2001). Another effect of the metabolic cascade is a reduction in cerebral blood flow by 50% of the normal values (Giza & Hovda, 2001). During this time, the brain may be very susceptible to cell death if another injury were to occur (Dominguez & Raparla, 2014).

### **Symptoms and Effects of Concussion**

Concussion results in a myriad of physical (e.g. headache, nausea), cognitive (e.g. cognitive-fatigue-migraine, headache, difficulty concentrating, fatigue, and dizziness), sleep (e.g. trouble sleeping, sleeping more or less), and/or emotional disturbances (e.g. feelings of sadness, or nervousness) (Kontos et al., 2012). An athlete may present with symptoms immediately following the impact as well as symptoms that may develop during the days and weeks post-concussion. These symptoms can often interfere with the athlete's ability to fully participate in an academic setting, and function interpersonally with peers and parents (McGrath, 2010). Symptom reporting is a subjective measure, meaning that athletes may minimize or deny symptoms for a variety of reasons, including not recognizing symptoms, not wanting to let his or her team down, fear of losing a position on the team, or not wanting to appear weak to others (McGrath, 2010). McCrea et. al., 2004 conducted a study to determine the frequency of underreporting symptoms among high school football players and found that only 47.3% of players who has sustained a concussion actually reported the event (McCrea et al., 2004). A

common measurement used to assess symptoms is the Post-Concussion Symptom Scale (PCSS), which asks the athlete 22 questions about the four types of symptoms. One study determined that the higher the summed score the PCSS, the longer it took the athlete to recover (Iverson, 2007). The study also found that athletes with symptoms of migraine and cognitive symptoms took longer to recover. Depression and anxiety are a result from concussion due to the athlete being withdrawn from their normal activities of daily living (McCrory et al., 2013). Most concussions involve persistent symptoms for five to seven days, but eventually see a full recovery (McGrath, 2010). Following a concussive injury, the athlete should never return to play immediately because during the post injury period the cellular metabolism is dealing with an energy crisis that it is more vulnerable to further injury (Giza & Hovda, 2001). Since this injury requires self-reporting of symptoms, objective measures, such as neurocognitive testing, are used to help diagnose and treat the injury.

### **Assessment and Management Approaches**

It is recommended that concussion assessment and management takes place in a multi-disciplinary setting that involves the injured athlete, parents, coaches, athletic trainers, physicians, and school personnel (McGrath, 2010). The management of concussion combines several approaches that include symptom inventories (e.g., Post-Concussion Symptom Scale [PCSS]), balance assessments (e.g., Balance Error Scoring System: BESS) and computerized neurocognitive testing (CNT) (e.g., Immediate Post-Concussion Assessment and Cognitive Test [ImPACT]) (Covassin et al., 2012). These tests are to be administered preseason on a healthy athlete to acquire a baseline score. If the athlete sustains a concussion later on, the tests are re-administered and compared to baseline in order to track their recovery process. These test allow for a multifaceted approach in managing and diagnosing concussion to be individualized for each

athlete. PCSS is an evaluation of symptoms filled out by the athlete based on the severity of each symptom. BESS is a less sophisticated but cost-effective measure for objective postural stability testing and can measure deficits up to three days after the injury (Covassin et al., 2012).

McGrath and colleagues (2010) proposed a 5-step model for concussion management within a school setting. The first step is concussion education for school personnel along with the family of the athlete so that when managing the injury there is a basic understanding of what is going on. Second requires administering the NCT to obtain baseline measures. The next step is periodically retesting the athlete using Sport Concussion Assessment Tool (SCAT) to monitor their symptom reporting as well as their cognitive functioning. During the athlete's recovery, the fourth step is coordinating academic support efforts among school personnel. Lastly, a return-to-play decision needs to be made before the athlete can be released. The ImpACT test has been shown in the past to predict how long recovery will take for an athlete. When the athlete exhibited 3 of 4 reliable changes in deficits, there was a 94.6% chance they would require at least 10 days until recovery occurred (Lau et al., 2014). ImpACT assess symptom clusters that identify migraines, reaction time, visual memory, and verbal memory which proved very important in identifying athletes who will have a protracted recovery (Lau et al., 2014).

These assessment tools have been used in high schools and collegiate athletes for many years. They have modified and adapted as new research has been conducted to improve the specificity and reliability. As these tests continue to improve, they have become a major tool used by athletic trainers and doctors for concussion management. If athletes participating in intramural and club sports are sustaining concussions, they will also need their concussion managed using this approach.

### **Participation Rates of Club and Intramural Sports**

The National Intramural-Recreational Sports Association (NIRSA) estimates that 11 million college students use recreational facilities annually, more than 1.1 million intramural contests occur, and more than 2 million college students play clubs sports (NIRSA, 2007). Campus recreation has the unique privilege of being able to provide activities that directly affect students' attitudes, abilities, and quality of life (Kaltenbaugh, 2011). Many students enjoy participating in the program and activities offered by their recreational departments. Some of the activities, like intramural and club sports can put the students at risk for injury. A consequence of the large numbers of participants is the risk of lawsuits against the college or university because of some aspect of its campus recreation program (Fields & Young, 2010). Over the last thirty years, tort cases, specifically personal injury, seemed to be the most prominent area of law impacting campus recreation programs (Fields & Young, 2010). Although theoretically organized and supervised by the campus recreation program, club sports are a risk management concern because these teams are usually student run (Mull et al., 2005). Intramural leagues draw in large numbers of student participants and are supervised by hired, student staff overseen by recreational professionals (Lifschutz, 2012). Examining data gathered from 213 university recreation directors on club sport liability, Schneider and colleagues (2008) found that only 35% reported funding access to professional athletic trainers for their athletes. If recreational departments do not provide medical coverage for the participants, the responsibility of finding medical assistance for injuries falls on the athlete, which could increase the number of injuries that go untreated.

## Methods

*Research Design:* This study used a descriptive, quantitative survey-based design.

*Participants:* Participants included college students participating in intramural and club sports at eight universities.

*Instrumentation:* A 36-item survey was used for this study. This survey assessed demographic questions (e.g., age, sport, previous concussion history), SRC knowledge, barriers to medical care for SRC and commitment level to intramural or club sports. The survey had multiple choice, scaled response and free answer questions. It took around 20 minutes to be completed.

*Procedures:* University IRB approval was obtained prior to any research-related activity. University intramural and club sport participants were emailed the survey via the Qualtrics online survey program. Each participating institution distributed the survey to their intramural and club sport email distribution lists. There was no identifying information obtained from the respondents.

*Data Analysis:* Descriptive statistics (e.g., means, standard deviations, percentages) were used to describe demographics, concussion knowledge, and barriers for seeking medical care among respondents. The survey gathered information on the number of self-reported medically diagnosed concussions, “bell ringers,” academic difficulties, and academic accommodations. All data analysis was conducted using SPSS version 20.

## Results

### Response Rates for the Total Sample and Each Participating Institution

A total of 24,295 university club and intramural sport participants were emailed the survey via their respective institution's club and intramural email distribution list. There were a total of 2,402 respondents yielding an overall response rate of 10.1% (2,402/24,295). The response rates for each participating institution are presented in Table 1. There were 153 respondents that indicated not participating in university club and/or intramural sports during their college career and were excluded from the final sample. In addition, survey data from two institutions were also excluded from the study due to response rates less than 2% percent. The final sample included 2,081 club and intramural participants ( $M = 20.00$ ,  $SD = 2.23$  years). There were a total of 333 club and 1,202 intramural participants that completed the survey. There were also 546 respondents that reported previous participation in both club and intramural sports. Out of the 2,080 respondents reporting their sex, 1,156 were male and 924 were female. The sample was comprised of 22.9% (477/2,081) freshman, 22.7% (472/2,081) sophomore, 22.2% (463/2,081) junior, 21% (437/2,081) senior, 9.7% (201/2,081) graduate students, and 1.4% (29/2,081) indicated other (e.g., law student, medical student, etc.). Reported medical coverage for games was higher for both club 62.4% (542/868) and intramural participants 53.7% (917/1,709) compared to club 35.7% (312/874) and intramural practices 11.7% (200/1,713).



Table 1

*Response Rate per Institution*

	# of Emails	Club	Intramural	Both	Response Rate*
University of Alabama	5,350	54	228	99	7.1% (381/5,350)
University of Arkansas	1,897	121	409	139	35.3% (669/1,897)
University of Florida	N/A	N/A	N/A	N/A	N/A
University of South Carolina	5,200	2	201	42	4.7% (245/5,200)
University of Tennessee Knoxville	N/A	68	212	154	N/A% (434/N/A)
University of Mississippi	N/A	N/A	N/A	N/A	N/A
Mississippi State University	N/A	12	63	40	N/A% (115/N/A)
Texas A&M University	11,848	76	89	72	2.0% (237/11,848)
Total	24,295	333	1,202	546	8.57% (2,081/24,295)

\*Participants indicating both were not counted twice for response rate.

University of Mississippi and University of Florida were excluded from the total sample response rate.

### **Medically Diagnosed Concussions and Subsequent Academic Difficulties in University**

#### **Club and Intramural Participants**

Approximately 7.3% (63/863) of club sport participants reported sustaining a medically diagnosed concussion during club sport participation. Of these participants, 33% (20/62) reported sustaining more than one concussion during participation that ranged from two to four injuries. Academic difficulties following concussion were reported by 61.9% (39/63) of these participants and 89.5% (34/38) indicated having academic difficulties lasting longer than one week associated with their injury. Less than two percent (1.9%, 32/1,710) of intramural

participants reported sustaining a medically diagnosed concussion during sport participation. Seventeen percent (5/29) of these respondents reported sustaining multiple concussions, ranging from two to six previous injuries. Academic difficulties following concussion were reported by 65.6% (21/32) of intramural respondents, and the majority of these participants [i.e., 76.1%, (16/21)] reported experiencing academic difficulties lasting longer than one week. Only 21% (12/57) of club and intramural participants that experienced academic difficulties following their concussion sought academic accommodations. The reasons for not seeking academic accommodations following concussion are presented in Table 2.

Table 2

*Reasons for not seeking academic accommodations following a medically diagnosed concussion*

	Club		Intramural	
	Frequency	Percent	Frequency	Percent
Did not think injury was serious enough	24/63	38%	11/32	34.4%
Did not know they could	17/63	27%	5/32	15.6%
Did not have time	11/63	17.5%	4/32	12.5%
Did not know where to go	13/63	20.6%	2/32	6.3%
Other	4/63	6.3%	1/32	3.1%

### **“Bell-Ringers” and Subsequent Academic Difficulties in University Club and Intramural Participants**

There were 37% (306/828) of club and 28.4% (387/1,363) of intramural participants that reported getting their “bell-rung” during participation. Academic difficulties following the participant’s “bell-ringer” were reported by 10.7% (57/534) in this sub-sample of participants. In

addition, 22.8% (189/828) of club and 14.8% (202/1,363) of intramural participants reported getting their “bell-rung” more than once.

### **Seeking Medical Care Following Suspected Concussion in University Club and Intramural Sport Participants**

There were 75% (1,376/1,841) of participants that indicated being “likely” to “extremely likely” to seek medical attention if they were experiencing signs and/or symptoms of concussion. The majority of participants also indicated that the student health center was the first place they would go for medical attention for their concussion (See Table 3). In addition, all participants indicated why they would not seek medical attention following concussion (See Table 4).

Table 3

*Seeking medical attention for concussion in university club and intramural participants*

	Frequency	Percent
Student Health Center	709/1,933	36.7%
Urgent Care	412/1,933	21.3%
Emergency Room	398/1,933	20.6%
Family Doctor	370/1,933	19.1%
Other	44/1,933	2.3%

Table 4

*Reasons that would prevent seeking medical attention for a concussion in university club and intramural participants.*

	Frequency	Percent
Don't think it's that serious	925/2,081	44.4%
Don't have time	714/2,081	34.3%
Insurance does not cover/too expensive	536/2,081	25.8%
Don't know where to go	333/2,081	16%
No health insurance	314/2,081	15.1%
No transportation	279/2,081	13.4%
Health care too far away	214/2,081	10.3%
Other	130/2,081	6.2%

### **Discussion**

The purpose of this study was to determine if concussion is a problem among intramural and club sport participants, if these participants are experiencing academic difficulties post-concussion and if they have medical coverage during their participation. In the intramural population that did sustain a concussion, over half experienced academic difficulties, but only one-third of that group sought academic accommodations. The club sport population was similar in that over half of the participants that sustained a concussion experienced academic difficulties with an even lower percentage that sought academic accommodations. One-third of both, club and intramural participants reported having their “bell-rung,” which could be misdiagnosed concussions also resulting in academic difficulties. For both intramural and club sports, only half of the respondents reported having medical coverage during games and less than a third reported medical coverage during practice. Approximately half of the participants indicated if they were experiencing signs and symptoms of concussion they would not seek medical attention because they do not believe the injury is serious enough.

Over the past forty years, survey research literature has shown a decline in response rates. A large percent of research is done on college students due to their easy access for researchers at institutions. Studies show that web-based student survey have response rates ranging from 14%-70%. This study had a response rate lower than 14%, however after communicating with students, it was revealed that the mass emails put out by intramural and club sport departments are often overlooked. We tried to control for this problem by having the programs export the emails and send the survey from an email other than the mass distribution server, but not all of the schools were able to comply with that request, consequently lowering the overall response rate.

The study encompasses a broad range of questions that has the potential to provide several findings among this population. In the past, majority of concussion research has focused on high school and varsity collegiate athletes. This survey gathered information that can be used and analyzed further in the future to ensure the safety of intramural and club participants. However, this study is limited by the self-reporting characteristic of the survey. A physician did not verify the reported concussions and we did not ask where the concussion occurred (e.g., practice or game). Another limitation to the study is a low response rate. Some sports included in the study are considered non-concussion risk sports and inflated the total number of intramural participants. A consequence of including those sports is that the total concussion percentages differed largely between club and intramural sports due to intramurals having a much larger denominator.

Some of the institutions that participated in the study had a wide variety of activities offered as club and intramural sports. Future research is needed to examine the differences between contact and non-contact sports by excluding non-concussion risk sports. If the list of sports was narrowed down, it may alter the number of reported concussion by the two groups. The survey responses indicated that concussion is a problem among this population and that they are experiencing academic difficulties following the injury. These participants need more access to medical coverage and care in order to help manage their injuries properly. The study could be verified further by completing a similar survey on a more personal platform instead of via email. The survey asked questions about the participant's concussion knowledge and attitudes, which could have a direct correlation with their decisions on how to manage concussion injuries. Providing intramural and club sport participants with concussion education may increase their

likelihood of reporting symptoms after “bell-ringers” and increase their likelihood of seeking academic accommodations following the injury.

The intramural and club sport populations at universities are made up of a larger number of students than the varsity athlete population. The majority of participants in intramural and club sports that reported sustaining a concussion or “bell-ringer” also indicated experiencing academic difficulties following their injury. Unfortunately, only half of these participants receive medical coverage during games and are likely not educated properly on the implications of leaving a concussion untreated. This lack of education is made clear when the participants reported the most inhibiting factors to seeking academic accommodations and medical attention as not believing the injury was serious enough. A concussion left untreated puts the athlete at a higher risk for further injury while also negatively impacting their cognitive ability in the classroom. All of these participants are students at a university with the goal of earning an education. Intramural and club sports need more medical oversight during both practices and games to increase their awareness of concussion and the academic difficulties that follow to ensure university student success.

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