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Athletic Identity and Intention to Report Concussions in High School Athletes

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ATHLETIC IDENTITY AND INTENTION TO REPORT CONCUSSIONS IN HIGH SCHOOL ATHLETES

by

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ABSTRACT

Context: Lack of concussion reporting remains a problem as high school athletes report about fifty percent of all concussions. **Purpose:** The study sought to determine if there is a relationship between athletic identity and athlete's intention to report concussions. **Methods:** The sample consisted of 78 high school athletes (*m* age = 16.19 $\pm$ 0.88, 56 males, 22 females). Participants were administered the Athletic Identity Measurement Scale (AIMS) and Intention to Report Subscale which served as dependent measures. The presence of AI was determined by comparing AIMS score to previous norms. A linear regression was used to determine the relationship between AI and intention to report. Regression analysis examined the influence of demographic variables on AI and intention to report. Finally, multiple one-way analysis of variance (ANOVA) were conducted to examine differences between groups for AI and intention to report. All statistical analyses were conducted utilizing SPSS 25.0. Significance levels were set at an *a priori* 0.05. **Results:** Athletes in the study had an athletic identity as demonstrated by similar AIMS scores to previous norms. AI was not related to intention to report ($p = 0.740$). Age significantly influenced reporting intention ($p = 0.20$), as athletes get older their intention to report decreased. Athletes with a previous history of a "ding/bellringer" had significantly lower intention ($p = 0.048$), but previous history of concussion did not affect reporting intention to report ($p = 0.118$). Additionally, previous concussion education did not influence intention ($p = 0.612$). **Discussion:** Adolescents do have an established AI as compared to other athletes. This study sought to find out if there was a relationship between AI and intention. No relationship existed between AI and intention; however, clinicians should not discount the influence identity may play in concussion reporting intention. Although AI did not influence intention to report in our study, other identities may be more influential. Additionally, incorrect

terminology when discussion concussions, such as ding and bellringer, lead to decreased reporting. Clinicians should continue to work to educate athletes on the importance of concussion reporting and utilizing proper terminology.

INDEX WORDS: Mild traumatic brain injury, MTBi, Adolescent, Injury reporting, Identity

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DEDICATION

For my brother John who was the inspiration for this project and helped motivate me throughout.

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I wish to express my gratitude to my committee members Tamerah Hunt, Megan Byrd, and Samuel Wilson, who supported me and helped me develop my writing.

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CHAPTER 1

INTRODUCTION

Nearly eight million high school athletes participate in sports every year, making them one of the most at-risk populations to sustain a concussion (National Federation of State High School Associations, 2015). The Center for Disease Control in their Morbidity and Mortality Weekly Report found that 15.1% of all high school students reported sustaining at least one concussion in the past 12 months, with 6% reporting two or more (DePadilla et al., 2018). Students who participated in at least one sport had an incidence rate of 21.4%, compared to only 7.6% in students who did not participate in sports. A similar incidence rate was found by McCrea and colleagues (2004), who found 15.3% of high school football players had sustained a concussion during the previous season. This demonstrates the incidence of concussions has remained relatively stable at a high rate over the years. The high number of concussions that high school athletes sustain is concerning, as it can impact athletes' health. However, even more concerning, it is estimated only about 50% of all concussions sustained are reported to a coach or medical professional (McCrea et al., 2004). One problem with concussions is there is confusion on the definition, as incorrect terminology like "ding," "bell ringer," or "getting your bell rung" is still widely used throughout the sports world (Register-Mihalik, Guskiewicz, et al., 2013).

The Concussion in Sport Group defined a Sports Related Concussion (SRC) as:

A traumatic brain injury induced by biomechanical forces. Several common features that may be utilized in clinically defining the nature of a concussive head injury include:

1. SRC 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. SRC typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, signs and symptoms evolve over a number of minutes to hours.

3. SRC may result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.
4. SRC results in a range of clinical signs and symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases, symptoms may be prolonged (McCrory et al., 2017, p. 2).

It is important players understand the definition of a concussion and report suspected concussions, as the injury can cause both physical and psychological damage.

Delayed reporting or non-reporting of concussion symptoms can lead to serious health problems (Bey & Ostick, 2009). Post-Concussion Syndrome and Second Impact Syndrome are two possible consequences of concussions (Bey & Ostick, 2009). Athletes who sustain a brain injury often experience identity changes as well as a sense of loss, which can lead to difficulty coping or psychiatric distress after injury (Bryson-Campbell et al., 2013). Collegiate athletes with delayed reporting missed an average of 4.9 more days due to injury compared to athletes who were removed from play immediately (Asken et al., 2016). Further, athletes with delayed reporting were 2.2x more likely to have prolonged recovery (>8 days) (Asken et al., 2016). Considering many athletes who sustain a concussion fail to report and the potential consequences associated with not reporting, it is vital to emphasize the importance of concussion reporting. Additionally, many factors can affect an athlete's intention to report a concussion. Therefore, it is important to identify reasons why athletes may be less likely to report.

Research has explored reasons why athletes do not disclose a suspected concussion and several common reasons have been identified. In the first study of its kind, McCrea and colleagues (2004) examined why high school football players did not report concussions and found 66% of the players did not think the injury was serious, 41.0% did not want to leave the game, and 22.1% did not want to let their teammates down. Similarly, in a sample of male and female high school athletes, participants did not report because they did not think it was serious enough to report (70.3%), did not want to be removed

from the game (36.5%), and did not want to let down teammates (27.0%) and coaches (23.0%) (Register-Mihalik, Guskiewicz, et al., 2013). Likewise, reasons for not reporting do not appear to differ by gender; Miyashita and associates (2016) found no statistical difference in the rationale for not reporting in high school athletes. Similarly, in another sample of high school athletes, the top three reasons for not reporting were the same among males and females, including not thinking the injury was serious, not wanting to lose playing time, and not wanting to let their team down (Wallace, Covassin, & Beidler, 2017). Based on the current literature, it appears there are three major categories as to why athletes do not report: lack of knowledge, personal reasons, and social motivation.

Considering the problem of underreporting, research has been conducted to better understand athletes' intention to report and factors that influence their intention. As defined by Ajzen (1991), "intentions capture the motivational factors that influence a behavior" (p. 181). The higher a person's intention, the more likely they are to perform the behavior in question. The Theory of Planned Behavior (TPB) states that a person's attitude, perceived subjective norms, and perceived behavioral control (PBC) are predictors of a person's intention to perform a behavior (Ajzen, 1991).

The TPB constructs, attitude, subjective norms, and PBC, can be applied to concussion reporting to predict athletes' intention to report concussions. In this case, attitudes represent the athlete's beliefs about the consequences (positive or negative) of reporting a concussion (Kroshus, Baugh, et al., 2014). An athlete may believe reporting a concussion is in their best interest for their health or they may believe the risk of losing playing time outweighs reporting. Subjective norms are the perceived pressure from social influences like teammates, coaches, or parents to either report or not report a concussion (Kroshus, Baugh, et al., 2014). Athletes may have a positive social environment where concussion reporting is encouraged by coaches, parents, and/or teammates. Alternatively, athletes may feel pressure to keep playing from these sources because their absence from the game could hurt their team's performance. Finally, PBC is the degree to which athletes believe they can perform the behavior and the relative ease to report a concussion (Kroshus, Baugh, et al., 2014). For example, athletes who have daily access to medical care could potentially be more confident in reporting a concussion because of the perceived ease

compared to someone who lacks medical resources (Wallace, Covassin, Nogle, et al., 2017b). Research has explored how well these factors are able to predict an athlete's intention to report concussions.

Attitudes, subjective norms, and PBC predicted between 45.1% to 71% of the variance in intention to report in high school athletes (Beakey et al., 2016; Register-Mihalik, Linnan, et al., 2013). The results indicate these factors can predict an athlete's intention to report with moderate success. A concussion education program aimed at altering these factors showed athletes who received the education had higher reporting intention than both their baseline scores and the control group (Sullivan et al., 2018). Currently, there is minimal evidence that addressing an athlete's attitudes, subjective norms, and PBC may be effective in improving intention to report, which could lead to better reporting. An athlete's attitude and subjective norms are related to common reasons why athletes do not report such as "not wanting to stop playing" and "fear of letting down teammates." Personal and social influences are also an important part of identity formation, which could also play a role in predicting athletes' intention to report concussions. Identity may also be a prediction of intention because the constructs from the TPB also relate to identity formation.

Identity is a person's self-definition based on their goals, values, and beliefs; all of which shape their behavior (Waterman, 1985). Identity is influenced by two major sources, a person's view of themselves and their experiences (personal identity) and others' options of the person (social identity) (Tusak et al., 2005). Adolescence is an impressionable time when identity is developed and involvement in athletics can create a strong Athletic Identity (AI). Athletic identity is the extent to which an individual identifies with their athletic role (Brewer, Van Raalte, & Linder, 1993). An athlete not wanting to stop playing would influence their personal identity and not letting down their team would influence their social identity which would both influence the development of their AI.

One goal of adolescence is the development of one's identity (Erikson, 1959). In a retrospective study, AI scores in female gymnasts were lowest at age 10, peaked at 15, and remained consistent through college until the cessation of sports (Houle et al., 2010). In a follow-up study, current and former athletes had the same AI scores at ages 10 and 15, but AI decreased in former athletes at their current age (Houle

et al., 2010). High school athletes who want to play sports in college or professionally have higher AI compared to athletes who do not (Handley et al., 2018; Wiechman & Williams, 1997). Additionally, male athletes generally have higher AI than female athletes (Wiechman & Williams, 1997). Having a strong AI may be beneficial and has been linked to increased physical activity and sports participation in children and adolescents (C. B. Anderson et al., 2009). However, when an athlete's AI is threatened it can serve as a negative influence.

AI may be threatened when injury takes an athlete away from their sport. High AI in injured collegiate athletes was positively correlated to over-adherence to rehabilitation programs (Hilliard et al., 2017). Athletes who over-adhere to rehabilitation programs risk further injury or re-injury as the injured body part is not yet ready for the additional stress. Athletes who underwent anterior cruciate ligament reconstruction experienced the most decrease in AI between six to twelve months in the rehabilitation process (Brewer et al., 2010). Athletes who progressed more slowly in rehabilitation experienced a greater reduction in AI (Brewer et al., 2010). Brewer and his colleagues (2010) hypothesized these changes may be self-protective in nature and AI decreases to help the athlete cope with being away from their sport for an extended period of time. Athletic identity has also been shown to alter athletes' response to injury after a concussion.

Increased AI, amotivation, and performance anxiety have all demonstrated to be positively correlated to concussion symptom score after a concussion in youth athletes (O'Rourke et al., 2017). Furthermore, AI and amotivation were related to stronger concussion symptoms up to twenty-eight days post-injury, with those two factors explaining nearly 50% of the variance in symptom score (O'Rourke et al., 2017). Athletes with higher AI may be at a higher risk for prolonged and more severe concussion symptoms because athletes have a harder time adjusting to the injury, which slows recovery. Perceiving identity loss after a traumatic brain injury in adults was positively correlated with depression and loss and negatively correlated with adjustment and self-esteem (Carroll & Coetzer, 2011). When an athlete's athletic identity is threatened it can lead to poor adjustment and psychological distress (Carroll & Coetzer, 2011). One hockey player described this process as "coming to terms with the new me" another relayed

the distress they felt, “Everything I'd ever worked for and everything I ever wanted to do was gone and my life had changed” (Todd et al., 2018, p. 9). High AI can lead to difficulties after injury. However, little research has explored how AI affects injury reporting.

Recreational basketball players with high AI (>75th percentile) had more positive attitudes towards playing through pain and injury and had higher behavioral tendencies to do so compared to the moderate and low group (Weinberg et al., 2013). AI score was able to explain 43% of the variance in behavioral tendencies to play through injury (Weinberg et al., 2013). Only 6% of Australian football (soccer) players thought it was safe to play through an injury, yet 58% were still willing to do so (Finch et al., 2002). This number rose to 80% for those players who thought their position would be in danger if they stopped playing (Finch et al., 2002). In a sample of National Collegiate Athletic Association (NCAA) Division 1 men’s ice hockey players, high AI was not significantly associated with the odds of non-reporting of a concussion (Kroshus, Kubzansky, et al., 2015). However, when AI was combined with perceived reporting norms it was associated with significantly higher odds of non-reporting, with 37.3% of the variance explained. AI and perceived reporting norms explained significantly more variance than reporting norms alone (25.5%) (Kroshus, Kubzansky, et al., 2015). Athletes with a strong AI, who perceive unsafe reporting norms from their peers may be less likely to report a concussion. However, more research is needed to confirm this speculation.

It is apparent that concussion underreporting is a problem as only about half of concussions are being reported (Register-Mihalik et al., 2017). Of the three most common reasons why athletes do not report, lack of knowledge has received the most attention, with mandates to educate adolescent athletes about the possible dangers of concussion (Baugh, Bourlas, et al., 2014). Athletes’ personal reasons and social motivations to continue playing are addressed less often. These two reasons for not reporting align with the two major influences which shape an individual’s identity (1) a person’s beliefs, and (2) other’s opinion of the person (Tusak et al., 2005). Because identity influences behavior AI could serve as an important motivator in concussion reporting. There is currently minimal evidence that AI might negatively affect injury reporting in college athletes (Kroshus, Kubzansky, et al., 2015; Weinberg et al.,

2013). Athletic identity could be a negative motivating factor for injury reporting as athletes want to preserve their self-identity and do not want to be removed from their sport. Currently, there is a lack of research that examines the effect of AI on injury reporting attitudes in high school athletes, especially in relation to concussion reporting intention. Therefore, the purpose of this study is to examine the relationship between AI and intention to report concussions in high school athletes. The first research question was (1) Does AI exist in high school athletes. It was hypothesized the high school athletes would have an athletic identity. Secondly, (2) What is the relationship between AI and intention to report concussions? The hypothesis was there will be a relationship between AI and intention to report concussions.

CHAPTER 2
REVIEW OF LITERATURE

Intention to Report Concussions and Athletic Identity

Introduction

The following review of literature will cover intention to report concussions and athletic identity. Nearly eight million high school athletes participate in sports every year, making them one of the most at-risk populations to sustain a concussion (National Federation of State High School Associations, 2015). The Center for Disease Control identifies concussions as a major health concern (Center for Disease Control and Prevention, 2016). Concussions affect many athletes. An overall concussion incidence rate of 0.23 and 0.43 per 1000 athletic exposure, participation in a practice or game, in high school and collegiate athletes, respectively (Gessel et al., 2007). At the conclusion of their collegiate sports career 33.5% of athletes self-reported a history of at least one concussion, with 22.2% reporting greater than three (Llewellyn et al., 2014). Similarly, the CDC in their Morbidity and Mortality Weekly Report found that 15.1% of all high school students reported sustaining at least one concussion in the past 12 months, with 6% reporting two or more (DePadilla et al., 2018). Males and those who participated in sports were at a higher risk for sustaining a concussion compared to females and those who did participate in sports (DePadilla et al., 2018). A similar concussion rate was found previously by McCrea and colleges (2004), who found 15.3% of high school football players had sustained a concussion during the previous season. This shows the incidence of concussions has remained relatively stable at a high rate over the past 15 years. The high number of concussions athletes sustain is concerning. However, even more concerning, it is estimated only about 50% of all concussions sustained are reported to a coach or medical professional (McCrea et al., 2004). Concussions can cause both physical and psychological damage, so it is important athletes that athletes report potential concussions.

Delayed reporting or non-reporting of concussion symptoms can lead to serious health problems (Bey & Ostick, 2009). Post-Concussion Syndrome is when athletes experience prolonged concussion

symptoms lasting weeks to months (Bey & Ostick, 2009). Second Impact Syndrome is a medical emergency in which an athlete sustains a second hit before the brain is fully recovered which leads to diffuse cerebral swelling (Bey & Ostick, 2009). Second Impact syndrome is seen most often in athletes under the age of eighteen years old (Bey & Ostick, 2009). Concussions can also have psychological consequences. Athletes who suffer from a brain injury often experience identity changes and a sense of loss, which can lead to difficulty coping or psychiatric distress after injury (Bryson-Campbell et al., 2013). Collegiate athletes with delayed reporting missed an average of 4.9 more days due to injury compared to athletes who were removed from play immediately (Asken et al., 2016). Additionally, athletes with delayed reporting were 2.2x more likely to have prolonged recovery (>8 days) (Asken et al., 2016). In youth athletes, those with previous undiagnosed concussions had significantly higher symptom scores and were more likely to report a loss of consciousness (Meehan et al., 2013). Given a high number of athletes who sustain a concussion and fail to report it as well as the possible short and long-term consequences associated with not reporting, it is important to understand an athlete's intention to report concussions and factors such as athletic identity that could identify athletes who may be less likely to report a concussion.

Concussion

The Concussion in Sport Group defined a Sports Related Concussion (SRC) as:

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4. SRC results in a range of clinical signs and symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases, symptoms may be prolonged (McCrory et al., 2017, p. 2).

Unfortunately, incorrect terminology like "ding" or "bell ringer" is still commonly used leading to confusion on the definition of concussion (Register-Mihalik, Guskiewicz, et al., 2013). Confusion about the definition of concussion may contribute to concussion underreporting.

Concussion Under-reporting

Estimates suggest only about 50% of all concussions sustained by high school athletes are reported (Register-Mihalik et al., 2017). Concussion diagnosis is largely based on self-report symptoms from athletes (Notebaert & Guskiwicz, 2005). Unfortunately, many of the signs and symptoms of concussion are not visible so coaches and medical staff are reliant on self-reported symptoms by the athletes (Williamson & Goodman, 2006). In Canadian youth hockey, official injury reports ranged from 0.25-0.61 per 1000 player game hours (PGH), whereas athletes' retrospective self-reported concussion incidence was 6.65-8.32 per 1000 PGH (Williamson & Goodman, 2006). Based on this study there appears to be a significant gap in the concussions being sustained and the number that are reported. High school athletes reported 48.8% (41/84) of the concussions and 12.3% (72/584) of the bell ringer events (Register-Mihalik, Guskiewicz, et al., 2013). Similarly, another study found 49% of the concussions were reported (Register-Mihalik et al., 2017). Based on current research it appears as many as half of all concussions go unreported in high school athletes. Because concussion diagnosis is often reliant on self-report from athletes it is important to understand why athletes do not report.

Table 1
Top Reasons for not Reporting Concussions in High School Athletes

Author, date	Population	Reporting percentage	Reasons for non-reporting
McCrea et al., (2004)	1532 high school varsity football player	15.3% reported a previous history of concussion 47.3% reported their concussion	66.4% did not think it was serious enough 41.0% did not want to leave the game 36.1% did not know it was a concussion 22.1% did not want to let down teammates
Register-Mihalik et al., (2013)	167 high school athletes (97 males and 55 females) (football, soccer, lacrosse, or cheerleading)	53.3% reported a previous concussion or bell-ringer 16.9% reported **all** events 41/84 (48.8%) of concussive events were reported 72/584 (12.3%) of bell ringer events were reported	70.2% did not think it was serious enough 36.5% did not want to be removed from a game 27.0% did not want to let down teammates 23.0% did not want to let down coaches 14.9% did not know the event was a concussion 13.5% did not want to be removed from practice
Miyashita et al., (2016)	454 high school athletes (212 females and 242 male) (football, cheerleading, soccer, basketball, wrestling, volleyball, and lacrosse)	66% of girls and 56.2% of boys reported no history of concussion 26.4% of girls and 30.2% of boys reported all concussions 2.4% of girls and 7.4% of boys reported none of their concussions 5.2% of girls and 6.2% of boys sometimes reported	There was no difference in reasons for reporting between gender: Did not believe it was serious Did not want to miss playing time Thought I could tough it out Did not want coach to get mad
McDonald et al., (2016)	77 female high school athletes (soccer, softball, basketball, volleyball, track, cross country, dance, cheer, equestrian, swimming, gymnastics, tennis, bowling, and motocross)	29.9% reported a previous history of concussion 10 individuals played with symptoms they did not report	The injury was not a big deal (n=5) Wanted to keep playing (n=3) symptoms “wouldn’t last long” (n=2).
Wallace et al., (2017a)	288 high school athletes (198 males and 90 females) (football, wrestling, volleyball, basketball, and soccer)	20.2% reported a previous history of concussion	The top five reasons for not reporting were 46.2% did not think it was serious 36.5% did not want to lose playing time 29.5% did not want to let their team down 25.3% it was the end of the season and they did not want to miss a game 24.7% did not want to have to go to the doctor

Barriers to Concussion Reporting

Literature has established that concussion under-reporting is a serious problem. Identifying factor which influence reporting and specific reasons athletes do not report concussions is an important next step. A seminal work by McCrea et al. (2004) found the reason high school football players did not report their concussion was 66.4% of athletes did not think the injury was serious, 41.0% did not want to leave

the game, 36.1% did not know it was a concussion, and 22.1% did not want to let their teammates down. Another study by Register-Mihalik (2013) discovered of the 74 athletes who did not report their concussion 70.2% did not want to stop playing, 36.5% did not want to be removed from the game, and 27.0% did not want to let their team down. The top 3 three reasons for not reporting concussions were the same among male and female high school students 1) they did not think it was serious, 2) they did not want to lose playing time, and 3) they did not want to let their team down (Wallace, Covassin, & Beidler, 2017). Similar reasons for not reporting were seen in former college athletes who did not report because 78.9% did not want to leave the game/practice, 71.8% did not want to let the team down, 70.4% did not know it was a concussion, and 70.4% did not think it was serious (Kerr et al., 2016). Reasons for not reporting a concussion can be seen in greater detail in table 1. Based on current literature, reasons for not reporting fall into three general categories: lack of knowledge, personal motivations, and social influence.

Lack of knowledge

The problem of underreporting concussions and concussion symptoms due to a lack of knowledge first spawned the idea of educating athletes about concussions. The assumption was that if students were better educated about the signs and symptoms and possible dangers of returning to play with a concussion, reporting would increase (Sarmiento et al., 2010). The first legislation regarding concussion and youth athletes was the Zackary Lystedt Law passed in Washington on May 14, 2009 (Adler & Herring, 2011). By July 1, 2014, all fifty states and the District of Columbia had passed similar legislation (Baugh, Bourlas, et al., 2014). One of the primary components of the legislation is requiring concussion education for athletes (Zackery Lystedt law, 2009). However, legislation does not specify what should be included in this education (Baugh, Bourlas, et al., 2014).

Although there is a wide variety of concussion education available, there is evidence that programs increase athletes' concussion knowledge (Mrazik et al., 2015). Test scores increased by 22% after the Sports Legacy Institute Community Educators (SLICE) program and the number of students who passed increased from 34% to 80% from pre to posttest (passing >50%) (Bagley et al., 2012). Athletes were better able to identify concussion symptoms after watching a video about concussions compared to

the control group who watched a video about nutrition (Hunt, 2015). Increases in concussion knowledge were sustained at three months in hockey players after watching a Smart Hockey educational video (Cook et al., 2003). Similarly, Caron and associates (2018) found an increase in concussion knowledge immediately post-intervention and athletes retained the information two months post-intervention. One middle school participated in the Head Safety in Youth Sports program the previous year and score 7% higher on the pre-test compared to the schools that had not received the education prior (Elliott et al., 2016). Despite increases in concussion knowledge, these studies have failed to explore if these increases in knowledge result in behavioral changes.

Studies have shown that concussion knowledge and previous education have a positive effect on reporting. Previous concussion education was associated with better reporting (72%) compared to those without (36%) in soccer players (Bramley et al., 2012). Athletes with concussion education have shown better concussion knowledge and better attitudes towards concussion and were significantly less likely to play with symptoms than those without concussion education (72 % vs 88%) (Kurowski et al., 2015). A significant positive relationship was found between previous concussion education and intention to report a future concussion in youth athletes (Donnell et al., 2018). Athletes who had received previous education were 3x more likely to intend to report when controlling for other sociodemographic factors (Donnell et al., 2018). After an educational intervention in youth hockey athletes, although total number of penalties was the same between the two groups, the intervention group had significantly less cross-checking and checking from behind penalties (Cook et al., 2003). These findings provide minimal evidence that after an educational intervention athletes may be more likely to avoid dangerous in-game behavior.

Alternatively, no correlation was found between concussion education and the ability to identify symptoms or consequences of concussion in football players (Cournoyer & Tripp, 2014). Wallace and associates (2017b) found concussion knowledge did not predict athletes' concussion reporting. Kurowski and colleagues (2014) also found concussion knowledge was not associated with self-reporting behavior in high school athletes. One study showed attitude towards concussion, not knowledge, was associated with discontinuing to play with symptoms in high schoolers (Register-Mihalik, Guskiewicz, et al., 2013).

Literature shows inconsistent evidence on weather concussion knowledge influences high schoolers concussion reporting behavior. Similar mixed findings have been seen in college athletes.

NCAA Division two men's and women's soccer and basketball players scored significantly higher on a concussion knowledge post-test after an educational intervention (Miyashita et al., 2013) During the season, six athletes sustained a concussion and three of the athletes said the educational had a positive effect on the management of their concussion (Miyashita et al., 2013). Alternatively, 56% of male and female college athletes indicated they had no knowledge of the possible dangers of concussion (Kaut et al., 2003). Six NCAA Division one hockey teams were asked to recall what type of concussion education they had received (Kroshus, Daneshvar, et al., 2014). Recall rates varied widely by method: email of NCAA concussion information sheet (two teams, 0%, 26%), hard copy of NCAA concussion information sheet (three teams, 31%, 74%, 76%), NCAA concussion information sheet posted in locker room (one team, 26%), lecture from the athletic trainer (five teams, 28-83%), educational video (one team, 92%). Although the team who received the video had a high recall rate, none of the interventions showed a significant change in knowledge, attitude, or perceived norms (Kroshus, Daneshvar, et al., 2014). Perceived reporting norm got significantly worse after a group of male junior ice hockey players watched *Concussions in Ice Hockey* (Kroshus, Baugh, Hawrilenko, et al., 2015). After watching the video, the players thought their peers had more positive attitudes towards not reporting a concussion. Again, there is contradicting evidence to the effect of concussion knowledge on altering concussion reporting behavior. Another reason athletes choose not to report concussions is their personal commitment to their sport.

Personal Reasons

Athletes invest time and energy into sports and do not want to be removed from play due to a concussion. Only fifty percent of athletes would "always" report a concussion if they knew they would have to sit out of practice (Kurowski et al., 2014). The mean attitude towards concussions in a sample of high school athletes was 79.9% of the total score, indicating relatively positive attitudes (Register-Mihalik et al., 2017). Interestingly, an increased number of concussions was associated with a decreased

probability of reporting concussion symptoms during practice or a game and an increased probability of participation with symptoms. Every three previous concussion was associated with a decrease in attitude of 7.2 points (Register-Mihalik et al., 2017). It may be that athletes who have had an increased number of concussions in the past have missed practices and games due to the injuries and are afraid to miss more. A qualitative study of hockey players showed athlete's want to be a hero or ice warrior who fights and intimidates the other team (Cusimano et al., 2017). A female soccer player said "You just want to keep playing. You're always going to think it's something little and it will go away…like can't you just play through it?" (Chrisman et al., 2013, p. 332). The time of the season can affect the players' attitudes. In a study with 288 high school athletes, 25.3% did not report a concussion because it was the end of the season and they did not want to miss a game (Wallace, Covassin, & Beidler, 2017). One female hockey player kept playing against a doctor's advice because "it's the best part of the season now" (Cusimano et al., 2017, p. 376). One coach described the reason NCAA Division one football players do not report is because "They're afraid of not being who they believe they are," as athletes are invested in their identity as an athlete (Lininger et al., 2019, p. 25).

Social Influence

The social atmosphere of sports, including coaches and teammates, can positively or negatively impact an athlete's decision to report a concussion. College athletes (26.5%) reported experiencing pressure to continue playing from at least one of the following: coaches, teammates, parents, and fans (Kroshus, Garnett, et al., 2015). Thirty-three percent of the athletes were categorized as "high pressure" and felt pressure from all sources and had significantly lower intention to report concussion than the low pressure (little pressure from any source) or team pressure (pressure from coaches and teammates) groups (Kroshus, Garnett, et al., 2015). Athletes who experience more perceived pressure to continue playing may be less likely to report a concussion.

As the leader of the team, coaches may influence the decisions athletes make to report or not report a concussion. College freshman perceived more coaching support for reporting a concussion compared to juniors or seniors (Baugh, Kroshus, et al., 2014). Likewise, athletes who felt a secure

attachment with their coach, rather than an anxious attachment, were significantly more likely to report a concussion. In a qualitative study, a high school football player said "The coaches call you bad words if you come out. They say, 'when you're hurt come out,' but they don't mean it (Chrisman et al., 2013, p. 333). Hockey coaches want players to accept that "physical violence is a part of hockey" and were dismissive of symptoms "You don't know it's a concussion, it could just be a headache (Cusimano et al., 2017, pp. 376–377). Athletic directors and athletic trainers when interviewed noted that coaches can exert a negative influence on players reporting and perceive players as "soft" for reporting an injury (Lininger et al., 2019, p. 25). Coaches can act as either a positive or negative influence on players' concussion reporting depending on their attitude towards concussions. An athlete's teammates can have a similar influence.

Teammates who believed there were negative health consequences of playing with concussion were more likely to encourage teammates to seek help (Kroshus et al., 2016). Additionally, athletes who believed their teammates supported concussion symptom reporting were more likely to encourage a teammate or alert a coach of a suspected concussion (Kroshus et al., 2016). Alternatively, in a sample of football players, 22% agreed or strongly agreed an athlete with a concussion has a responsibility to play in an important game (B. L. Anderson et al., 2016). Almost 35% of rugby players knew a teammate had sustained a concussion, but over half did not report it (26/41) (Fraas et al., 2014). Forty percent of junior Australian football players admired players who played injured (Finch et al., 2002). However, in the same sample between 22%-35% of the players felt pressure from teammates to continue playing (Finch et al., 2002). Again, it appears teammate can either encourage or discourage concussion reporting. Another factor that may influence concussion reporting is socioeconomic status as resources like access to an athletic trainer, transportation, and insurance can vary.

Socioeconomic Status

Low socioeconomic status (SES) is associated with decreased overall health in youth (Poulton et al., 2002). In Canada, for every 10% increase in the population with no high school diploma, the rate of TBI increased by 13% and living greater than 30 minutes from the hospital increased the rate by 21%

(Amram et al., 2015). In the United States, parents with low health literacy, where health literacy was significantly correlated to low SES, less high school education, and birth outside the United States, reported more barriers to receiving care on nights or weekends and difficulty traveling to the hospital (Yin et al., 2012). Another study found that parents with daily internet access and use were significantly more aware of concussions compared to parents who only had access every 3-5 or 1-2 days per week (Bloodgood et al., 2013). The barriers parents face directly affect their children. Additionally, the SES of the school a child attends can also be a factor.

Schools in areas with lower SES or that have a greater number of people living below the poverty line often have access to fewer resources, like access to an athletic trainer. A nationwide survey of youth revealed higher-income families ($75,000-$124,999) were significantly more likely to report receiving previous concussion education compared to lower-income families (<$35,000) (Donnell et al., 2018). Concussion knowledge scores were compared between five middle schools (Elliott et al., 2016). The middle school which scored the highest had an 8.7% lower poverty rate than the school which scored the lowest, suggesting a possible connection between SES and concussion knowledge (Elliott et al., 2016). Likewise, concussion knowledge was significantly higher in suburban high schools compared to urban high schools (27.1+/-4.2 vs 28.3+/- 4) (Wallace, Covassin, Nogle, et al., 2017a). Students at the urban schools were more likely to think it was okay to play with a concussion. At the urban schools, those that had an athletic trainer on staff had significantly higher concussion knowledge compared to those without (28.03+/-4.1 vs 26.25+/-4.1) (Wallace, Covassin, Nogle, et al., 2017a). Similarly, high schools with an athletic trainer had significantly higher concussion reporting (24.8%) compared to high schools without an athletic trainer (19.4%) (Wallace, Covassin, Nogle, et al., 2017b). Schools that are able to employ an athletic trainer tend to have higher SES and more available resources. The same is true of suburban schools compared to urban schools (Wallace, Covassin, Nogle, et al., 2017a). Alternatively, one study found no association between household SES and history of sustaining a concussion (LaRoche et al., 2016). In spite of this, it appears most research suggests higher SES may be associated with increased

concussion knowledge and better reporting. However, more research is needed to fully understand this relationship. In addition to SES, concussion reporting may differ between males and females.

Gender

Notable gender differences have been observed in concussion reporting. In a large-scale retrospective cross-sectional analysis of patients from the Vanderbilt Sports Concussion Center (VSCC), researchers found younger, male football players most likely to play through a concussion (Kuhn & Zuckerman, 2017). In a sample of high school athletes, multivariate analysis showed that older age and being female were associated with increased concussion knowledge and being younger and a female were associated with better self-report behavior (Kurowski et al., 2014). High school females athletes were more likely to report concussions and after an educational intervention were more likely to intend to report in the future (Miyashita et al., 2016). Research supports that female high school athletes tend to have better concussion reporting than males. Collegiate male athletes had significantly higher rates of non-reporting than female athletes (42.9% vs 14.9%) (Kerr et al., 2016). Additional analysis revealed football players were most likely not to report, while female non-contact athletes were least likely not to report (Kerr et al., 2016). Collegiate female athletes were more likely to encourage teammates in concussion reporting than male athletes (Kroshus et al., 2016). There is a trend in current literature suggesting that female athletes may have better concussion reporting habits than male athletes.

One possible explanation for these differences is males tend to have more conformity to masculine gender roles which encourage a mentality of winning at all costs, overcoming challenges, and defeating opponents (Steinfeldt JA et al., 2009). One study found that female youth athletes were significantly less likely to be worried about perceived negative stereotypes for caring about concussions (Bloodgood et al., 2013). Males athletes may be more concerned with not appearing weak because the concept of masculinity is heavily emphasized in many male sports like hockey and football (Chrisman et al., 2013; Cusimano et al., 2017). High school male athletes were significantly more likely than female athletes to not report a concussion because they thought their coach would be mad and their coach and teammates would think they were weak (Wallace, Covassin, & Beidler, 2017). Athletic directors, athletic

trainers, and coaches in interviews thought one reason NCAA Division one football players may be reluctant to report concussions is masculinity and aggression are accentuated in sports (Lininger et al., 2019). One participant described the idea of masculinity as ‘‘That’s just ingrained. It’s a show of weakness and it’s a sense of manliness and pride to play hurt’’ or athletes ‘‘don’t want to be perceived as a wimp’’ for reporting a concussion (Lininger et al., 2019, p. 26). Kroshus and associates (2017) found athletes, male or female, who conformed to masculine gender norms displayed decreased concussion reporting. There is minimal evidence that masculinity may be an important factor in concussion reporting, but more research is needed. Obviously underreporting of concussions is a problem. There are barriers like lack of knowledge, personal motivations, social influences, SES, and gender, which affect players’ decisions to report or not.

Intention

In light of the problem of underreporting, studies have been conducted to better understand athletes’ intention to report and factors that influence their intention. As defined by Ajzen (1991), “intentions capture the motivational factors that influence a behavior” (p. 181). Generally speaking the higher a person’s intention the more likely they are to perform the behavior in question. The Theory of Planned Behavior (TPB) states that a person’s attitude, perceived subjective norms, and perceived behavioral control (PBC) are good predictors of a person’s intention to perform a behavior (Ajzen, 1991). A person’s intention then influences their behavior (Ajzen, 1991). Additionally, attitudes, subjective norms, and PBC all interact and influence each other (Ajzen, 1991). Ajzen (1991) also believed there may be a direct link between PBC and behavior.

The TBP constructs, attitude, subjective norms, and PBC, can be applied to concussion reporting to predict athletes’ intention to report concussions. In this case, attitudes are the athlete’s beliefs about the consequences (positive or negative) of reporting a concussion (Kroshus, Baugh, et al., 2014). An athlete may believe reporting a concussion is in their best interest for their health or they may believe the risk of losing playing time outweighs reporting. Subjective norms are the perceived pressure from social influences like teammates, coaches, or parents to either report or not report a concussion (Kroshus,

Baugh, et al., 2014). Athletes may have a positive social environment where concussion reporting is encouraged by coaches, parents, and/or teammates. Alternatively, athletes may feel pressure to keep playing from these sources because their absence from the game could hurt their team's performance. Finally, PBC is the degree to which athletes believe they can perform the behavior and the relatively easy to report a concussion (Kroshus, Baugh, et al., 2014). Athletes who have daily access to medical care may have more confidence in reporting a concussion than athletes who lack medical resources.

Direct attitude, direct subjective norms, and direct PBC accounted for 58% of the variance in intention to report concussions in high school varsity athletes (Register-Mihalik, Linnan, et al., 2013). No connection was found between intention and behavior, but increased intention was associated with decreased playing with symptoms (Register-Mihalik, Linnan, et al., 2013). A study conducted across three high schools produced similar results where the three factors, concussion knowledge, and year in school explained between 71%, 45.1%, and 58.9% of the variance in reporting intention in each school, respectively (Beakey et al., 2016). The same study observed concussion knowledge had a negative effect on intention in two of the schools and no effect in the third school and year in school negatively affected intention in all three schools (Beakey et al., 2016). The results from this study contradict other research that has shown concussion education has a positive effect on reporting. An intervention study used concussion education based on altering students' attitudes, subjective norms, and PBC and found the intervention group had higher intention compared to both their baseline scores and the control group (Sullivan et al., 2018). There is minimal evidence that targeting athletes' attitudes, subjective norms, and PBC can be effective in altering reporting intention. Similar findings have been seen in college athletes.

A survey of 256 collegiate hockey players confirmed that attitudes, subjective norms, and self-efficacy were all significantly correlated with concussion reporting intention (Kroshus, Baugh, et al., 2014). Additionally, reporting intention was significantly correlated with reporting behavior, which indicates a person's intention it related to their actual behavior. Another study with hockey players also found a strong correlation between intention and behavior (0.53) (Kroshus, Baugh, Daneshvar, et al., 2015). Every one unit increase in athletes' intention scores related to a 1.63x increased chance of

symptom reporting (Kroshus, Baugh, Daneshvar, et al., 2015). Athletes with higher intention to report a concussion may also be more likely to report a concussion when it happens. Nearly 65% of the variance in concussion reporting intention was explained by concussion knowledge, concussion attitude, subjective norms, and history of previous concussion (Kroshus, Baugh, Daneshvar, et al., 2015). In a large sample of first-year cadets (n = 972) those with high intention were more likely to report concussions compared to those with low intention (69.9% vs 45.6% respectively) with a moderate effect size (Register-Mihalik et al., 2018). Research has shown that intention can be a good predictor of actual behavior (Kroshus, Baugh, Daneshvar, et al., 2015; Kroshus, Baugh, et al., 2014). Intention to report and reporting behavior are influenced by more than just concussion knowledge. Two other major influencing factors are athletes' personal commitment to their sport and the loyalty they feel to their team. Both of these factors influence a person's identity.

Athletic Identity

One possible factor that may influence intention is a person's identity. Identity is a person's self-definition based on their goals, values, and beliefs all of which shape their behavior (Waterman, 1985). Adolescence is an especially important time of identity development (Erikson, 1959). Identity is influenced by two major sources, a person's view of themself and their experiences (personal identity) and others' options of the person (social identity) (Tusak et al., 2005).

Individuals have multiple identities that are organized into a salience hierarchy (Curry & Weaner, 1987). The location of an identity in this hierarchy affects the likeliness of it being invoked in a situation and followed by the associated behaviors (Curry & Weaner, 1987). Individuals often seek out situations that align with identities which are important to them. Some common identities are peer, kinship, sport, religious, academic, and romantic identities (Curry & Weaner, 1987). The time commitment sports require means athletes can develop a strong athletic identity, which in turn will influence their behavior.

Athletic identity (AI) is the extent to which an individual classifies herself/himself as an athlete (Brewer et al., 1993). AI is a self-concept and a social role, so it can be influenced by an individual's beliefs as well as others (Brewer et al., 1993). Individuals with stronger athletic identities will ascribe

greater importance to sports involvement and interpret events in terms of the implications they will have on their athletic role (Brewer et al., 1993). Brewer and associates (1993) believed AI could lead to positive or negative outcomes. Strong AI can lead to a positive self-view and have a positive effect on athletic performance (Brewer et al., 1993). Alternatively, a strong AI could potentially lead to difficulty coping with an injury or career termination (Brewer et al., 1993). One common way AI is measured is with the Athletic Identity Measurement Scale.

The Athletic Identity Measurement Scale (AIMS) was developed by Brewer and associates (1993) as a way to assess AI in individuals. Across three populations (male and female psychology students, introductory psychology students, and male football players) the AIMS showed good internal consistency ($\alpha = 0.93$, 0.83, and 0.81) and had a 14 day test-retest reliability of 0.89 (Brewer et al., 1993). Handley and associates (2018) validated AIMS in a high school population and found an internal consistency of $\alpha = 0.89$. The AIMS was originally a ten-item survey, but after confirmatory factor analysis, three items were dropped due to poor performance, resulting in a seven-item survey (Brewer & Cornelius, 2002). The AIMS has shown reliability in males, females, athletes, and non-athletes (Brewer & Cornelius, 2002). Originally, the AIMS was found to be unidimensional, but evidence suggests it may be comprised of three factors: social identity (e.g., "Most of my friends play sports"), exclusivity (e.g. "I have many goals related to sports"), and negative affectivity (e.g. "I feel badly when I do not do well in sports") (Brewer & Cornelius, 2002). The AIMS was normed for male and female athletes and non-athletes from a sample of 2,865 individuals ranging from 13-55 (20.61+/-3.86) (Brewer & Cornelius, 2002). For athletes to be in the 75^{th} percentile for AIMS, a score >43 in males or >41 in females (Brewer & Cornelius, 2002). The 50^{th} percentile is a score of >39 and >38 and the 25^{th} percentile is >35 and >33 for males and females, respectively (Brewer & Cornelius, 2002). The AIMS was validated in a group of adolescent swimmers with disabilities and four subscales were identified: self-identity (e.g., "I consider myself an athlete"), social identity (e.g., "Most of my friends play sports"), exclusivity (e.g., "Sport is the most important part of my life"), and negative affectivity (e.g., "I feel badly when I do not do well in sports") (Martin et al., 1995). Cronbach's alpha for each subscale were self-identity ($\alpha = .72$), social

identity (α = .65), exclusivity (α = .72), and negative affectivity (α = .64). Athletic Identity is a social construct that can be altered by experiences and social environment.

Experiences during adolescence shape one's identity (Erikson, 1959). Adolescence is an impressionable time and involvement in athletics can create a strong AI. In one study, AI scores in female gymnasts were lowest at age 10, peaked at 15, and remained consistent through college until the cessation of sports (Houle et al., 2010). In a follow-up study, current and former athletes had the same AI at age 10 and 15, but AI decreased at individuals' current age in former athletes (Houle et al., 2010). Athletes have different sport orientations which they use to evaluate their performance. Win orientation is the desire to win and avoid losing and athletes evaluate themselves compared to others, while goal orientation is focused on achieving personal goals and success is evaluated relative to herself/himself (Daniels et al., 2005). Daniels and colleagues (2005) found the relationship between sports participation and AI was moderated by different sport orientations in boys and girls. Win orientation mediated the relationship in girls and goal orientation mediated in boys (Daniels et al., 2005). Youth swimmers with disabilities also had AI that was significantly correlated with competitiveness and win orientation (Martin et al., 1995). Minor, professional, and retired hockey players described the important role hockey played in their lives (Todd et al., 2018). One retired professional hockey player summed it up by stating "I defined myself in, in hockey and sports, and working hard and playing hard…these are things that, that my life revolved around," (Todd et al., 2018, p. 7). There are many factors which can affect the strength of an individual's commitment to their AI.

The strength of AI varies by gender. Wiechman & Williams (1997) found that high school male athletes have higher AIMS scores than female athletes. Male college students scored higher on the AIMS subscales of social identity and exclusivity (Phoenix et al., 2005). In elite sprinters, males scored higher on the subscale of self-identity, whereas females scored higher on social identity and exclusivity (Babić et al., 2015). Alternatively, another study found that sex had no effect on AI (Handley et al., 2018). Lantz & Schroeder (1999) discovered that athletes who conformed to masculine roles had higher AI, regardless of gender, and athletes who conformed to feminine roles had lower AI. Conformity to masculinity was

influenced by year in school, position, and AI in collegiate football players (Steinfeldt & Steinfeldt, 2012). Based on current research males may tend to have higher AI than females, but evidence is not conclusive. Level of competition is also thought to alter AI.

High school athletes who expect to play in college had higher AI (Handley et al., 2018; Wiechman & Williams, 1997). Comparing AI among elite, recreational, and non-athletes revealed the subscale of social identity was greatest in male elite then recreational, followed by non-athletes, whereas exclusivity and negative affect scores were equal between elite and recreational (Lamont-Mills & Christensen, 2006). Elite female athletes had higher social identity and exclusivity compared to recreational or non-athletes, but negative affect was equal between elite and recreational athletes (Lamont-Mills & Christensen, 2006). The results suggesting elite athletes see themselves as occupying the role of athlete more than recreational or non-athletes. In national and international Lithuanian wheelchair basketball players, international athletes had significantly higher AI than national athletes (Skučas, 2014). These results are similar to non-disabled athletes which suggest AI increases with participation level. Conversely, AI was not affected by competition level in a group of world, international, and prospective athletes (Tusak et al., 2005). No difference in AI was found between elite English youth football (soccer) clubs (Mitchell et al., 2014). Athletes who were dissatisfied with their season had greater decreases in AIMS scores late in the season (Brewer et al., 1999). Athletes who are unhappy with their team's performance tend to disassociate and experience decreases in their AI. Canadian international athletes spoke about the necessity to compartmentalize sports from other areas of their life to maintain their AI and the focus to compete at an elite level (Poucher & Tamminen, 2017). Athletes must sacrifice social relationships and other identities for sport, but athletes often frame this as a choice as one athlete stated "I've got my whole life to do that stuff" (Poucher & Tamminen, 2017, p. 64). Athletes who compete at higher levels of competition may have greater athletic identity as they must sacrifice in other areas to compete. AI is thought to have an effect on physical activity.

Athletic identity has explained 23% of the variance in physical activity in children and 15% of the variance in sports participation in adolescents (C. B. Anderson et al., 2009). Children with higher AI are

more likely to participate in physical activity and as they get older increased AI is associated with an increased chance of sports participation. In a sample of individuals with acquired disabilities, AI was associated with an increased intention to participate in sports (Perrier et al., 2012). In long-distance runners, there was a significant positive association between AIMS score and compulsive exercise test scores (moderate effect size) (Turton et al., 2017). Runners in another study were classified as either obligatory or non-obligatory based on their scores on the Obligatory Exercise Questionnaire (OEQ), where scores > 50 indicated obligatory exercise (Gapin & Petruzzello, 2011). In obligatory runners, AIMS scores were significantly higher (Gapin & Petruzzello, 2011). AI may be a positive influence on sport and exercise participation, but there is evidence there can also be a negative effect as high athletic identity has been linked to compulsive exercise. When AI becomes too strong that it overpowers all other identities, it can lead to something known as identity foreclosure.

Athletic Identity foreclosure is exclusive adherence to the athletic role without exploration of other roles such as occupation (Brewer & Petitpas, 2017). The large time commitment sports require and specialization during adolescence may cause AI foreclosure, as individuals do not have the opportunity to explore other identities. Identity foreclosure has been linked to substance abuse and burnout in athletes (Brewer & Petitpas, 2017). Collegiate athletes with identity foreclosure and high AI showed less career maturity than their peers (Murphy et al., 1996). Division one, two, and three athletes who had coaches discourage certain majors had a significantly lower grade point average (GPA) than those who did not (Beron & Piquero, 2016). Additionally, athletes who had no interest in other academic experience and choose a major because it was easy also had a lower GPA. Athletes who expected a professional or Olympic career had a lower GPA. Alternatively, parents having a degree, having a job, rating graduating as important, and having a positive attitude towards their major was all associated with a higher GPA (Beron & Piquero, 2016). In another sample of college athletes, the subscales of social identity and exclusivity had a negative effect on the rigorousness of the chosen major, where exclusivity was significant (Foster & Huml, 2017). For every one standard deviation increase in exclusivity, students chose a major with a .13 standard deviation decrease in rigor (Foster & Huml, 2017). Athletes who

identified more exclusively with their AI tended to choose easier majors so less time is needed to be spent on academics. In contrast, in Portuguese international athletes, AI was significantly and positively correlated to more self-efficacy about making career decisions (Cabrita et al., 2014). Athletes who do not explore other roles and are solely focused on athletics can have difficulty coping upon career termination. One possible cause of career termination is injury.

One study assessed changes in AI after injury in high school students, but only two students from the sample sustained injuries, so statistics could not be run (Handley et al., 2018). Athletes who underwent anterior cruciate ligament reconstruction experienced the most decrease in AIMS score between six to twelve months in the rehabilitation process (Brewer et al., 2010). Athletes who progressed more slowly in rehabilitation experienced a greater reduction in AI (Brewer et al., 2010). Brewer and his colleagues hypothesized these changes may be self-protective in nature and AI decreases to help the athlete cope with being away from their sport for an extended period of time. A positive correlation was seen between AI and rehabilitation overadherance in injured college athletes (small to medium effect size) (Hilliard et al., 2017). The subscale of negative affectivity prediction equation for "attempt to expedite rehab" was significant but weak and explained 15% of the variance (Hilliard et al., 2017). Athletes who do not experience a decrease in AI after injury may be more likely to overadhere to rehabilitation programs which can lead to further injury. Another study in Slovenian athletes, who were classified as world-class, international-rank, promising athletes national rank or uncategorized, showed athletes with increased AI were more motivated and had higher rehabilitation scores (Masten et al., 2014). However, in this study, athletes with decreased AI and masculinity and increased emotional liability were most at risk for adjustment difficulties (Masten et al., 2014). There are inconsistent results on how AI affects response to injury as studies have shown both positive and negative effects. In patients with spinal cord injuries (SCI), AI was positively correlated with life satisfaction and negatively correlated with depression and anxiety (Tasiemski & Brewer, 2011). Athletes who could still play their favorite sport after SCI had increased AI and satisfaction and decreased depression (Tasiemski & Brewer, 2011). Wheelchair badminton players who sustained SCI and continued participation retained or increased their social

network and AI remained relatively constant and helped facilitate acceptance and adjustment (Hawkins et al., 2014). One participant said "Sports makes me feel relaxed and when I play sports I almost forget I'm disabled," (Hawkins et al., 2014, p. 271). Maintaining higher AI in SCI patients may help the individuals feel less identity loss after injury. Concussions are injuries that can lead to long periods of being unable to play sports or even possibly be a season or career-ending injury. Concussive injuries have also been linked with identity changes after injury.

A scoping review by Bryson-Campbell and associates (2013) found 72% of brain injury survivors report a change in identity and in nine of the eleven articles post-injury identity was described as missing something that was once valued and participants experienced a sense of loss. Ratings of past self-concept were significantly higher than ratings of present self in adults with TBI, indicating that the present self was regarded negatively in comparison to pre-injury self (Carroll & Coetzer, 2011). Perceived loss of identity was positively associated with depression and loss (grief) and negatively associated with adjustment and self-esteem (Carroll & Coetzer, 2011). Individuals who perceive a loss of identity have a harder time adjusting. A minor hockey player who sustained a concussion discussed the difficulties of dealing with changes in identity and "coming to terms with the new me," (Todd et al., 2018, p. 9). After injury, many hockey players noted a sense of isolation from the team as a concussion is an "invisible" injury and outwardly it can appear as if nothing is wrong (Todd et al., 2018, p. 10). In youth athletes, AI, amotivation, and performance anxiety were all positively correlated to concussion symptoms symptom score (O'Rourke et al., 2017). Athletic identity and amotivation related to stronger concussion symptoms up to 28 days (48% variance) (O'Rourke et al., 2017). Due to the potential consequences of concussive injuries athletes may not want to risk losing their AI by reporting their injury.

AI could be a negative motivating factor for injury reporting as athletes want to preserve their self-identity and do not want to be removed from their sport. Recreational basketball players with high AI ($>75^{th}$ percentile) had more positive attitudes towards playing through pain and injury and had higher behavioral tendencies to do so compared to the moderate and low group (Weinberg et al., 2013). AI score was able to explain 43% of the variance in behavioral tendencies to play through injury (Weinberg et al.,

2013). Only 6% of Australian football (soccer) players thought it was safe to play through an injury, yet 58% were still willing to do so (Finch et al., 2002). This number rose to 80% if the players thought their position would be in danger if they stopped playing.

Despite knowing the dangers of playing injured, athletes are still willing to do so. In a sample of NCAA Division 1 men's ice hockey players, high AI was not significantly associated with the odds of non-reporting of concussion (Kroshus, Kubzansky, et al., 2015). However, when AI was combined with perceived reporting norms it was associated with significantly higher odds of non-reporting, with 37.3% of the variance explained. AI and perceived reporting norms explained significantly more variance than reporting norms alone (25.5%) (Kroshus, Kubzansky, et al., 2015). Athletes with a strong AI and who perceive unsafe reporting norms were more likely to not report a concussion. Athletic identity could potentially decrease an athlete's intention to report a concussion. There is minimal evidence that collegiate athletes with a strong AI may be less likely to report injuries and more likely to play through injuries (Kroshus, Kubzansky, et al., 2015; Weinberg et al., 2013). Currently, there is a lack of research that examines how AI affects injury reporting attitudes in high school athletes, especially in relation to concussions. Future research should explore the effect of AI in adolescent populations and how it affects attitudes about injury reporting and concussion reporting.

Conclusion

It is apparent that concussion underreporting is a problem as only about half of concussions are being reported (Register-Mihalik, Valovich McLeod, Linnan, Guskiewicz, & Marshall, 2017). Of the three most common reasons why athletes do not report, lack of knowledge has received the most attention, with mandates to educate adolescent athletes about the possible dangers of concussion (Baugh, Bourlas, & Perry, 2014). Athletes personal reasons and social motivations to continue playing are addressed less often. These two reasons for not reporting align with the two major influences which shape an individual's identity 1) a person's beliefs 2) and other's opinion of the person (Tusak et al., 2005). Because identity influences behavior AI could serve as an important motivator in concussion reporting. There is currently minimal evidence that AI might negatively affect injury reporting in college athletes

(Kroshus et al., 2015; Weinberg et al., 2013). Athletic identity could be a negative motivating factor for injury reporting as athletes want to preserve their self-identity and do not want to be removed from their sport. Currently, there is a lack of research that examines the effect of AI on injury reporting attitudes in high school athletes, especially in relation to concussion reporting intention.

CHAPTER 3

MANUSCRIPT

Introduction

Nearly eight million high school athletes participate in sports every year, making them one of the most at-risk populations to sustain a concussion (National Federation of State High School Associations, 2015). The Center for Disease Control in their Morbidity and Mortality Weekly Report found that 15.1% of all high school students reported sustaining at least one concussion in the past 12 months, which reached 21.4% in students who participated in at least one sport (DePadilla et al., 2018). The high number of concussions that high school athletes sustain is concerning, as it can impact an athletes' health. However, even more concerning, it is estimated that less than half of all concussions sustained are reported to a coach or medical professional (McCrea et al., 2004). One problem with concussions is there is confusion on the definition, as incorrect terminology like "ding," "bell ringer," or "getting your bell rung" is still widely used throughout the sports world (Register-Mihalik, Guskiewicz, et al., 2013). It is important players understand the definition of a concussion and report suspected concussions, as the injury can cause both physical and psychological damage.

Delayed reporting or non-reporting of concussion symptoms can lead to serious health problems (Bey & Ostick, 2009). Athletes with delayed reporting were 2.2x more likely to have prolonged recovery (>8 days) (Asken et al., 2016). Considering many athletes who sustain a concussion fail to report and the potential consequences associated with not reporting, it is vital to emphasize the importance of concussion reporting. Additionally, many factors can affect an athlete's intention to report a concussion. Therefore, it is important to identify reasons why athletes may be less likely to report.

Research has explored reasons why athletes do not disclose a suspected concussion and several common reasons have been identified, such as not believing the injury was serious, not want to leave the game, and not want to let down their teammates and coaches (McCrea et al., 2004). Likewise, reasons for not reporting do not appear to differ by gender; Miyashita and associates (2016) found no statistical difference in the rationale for not reporting in high school athletes. Similarly, in another sample of high

school athletes, the top three reasons for not reporting were the same among males and females, including not thinking the injury was serious, not wanting to lose playing time, and not wanting to let their team down (Wallace, Covassin, & Beidler, 2017). Based on the current literature, it appears there are three major categories as to why athletes do not report: lack of knowledge, personal reasons, and social motivation.

Considering the problem of underreporting, research has been conducted to better understand athletes' intention to report and factors that influence their intention. As defined by Ajzen (1991), "intentions capture the motivational factors that influence a behavior" (p. 181). The higher a person's intention, the more likely they are to perform the behavior in question. The Theory of Planned Behavior (TPB) states that a person's attitude, perceived subjective norms, and perceived behavioral control (PBC) are predictors of a person's intention to perform a behavior (Ajzen, 1991).

The TPB constructs, attitude, subjective norms, and PBC, can be applied to concussion reporting to predict athletes' intention to report concussions. In this case, attitudes represent the athlete's beliefs about the consequences (positive or negative) of reporting a concussion (Kroshus, Baugh, et al., 2014). An athlete may report a concussion because they believe it is good for their long-term health or they may believe the risk of losing playing time outweighs reporting. Subjective norms are the perceived pressure from social influences like teammates, coaches, or parents to either encourage or discourage a behavior (Kroshus, Baugh, et al., 2014). Athletes may have a positive social environment where concussion reporting is encouraged by coaches, parents, and/or teammates. Alternatively, athletes may feel pressure to keep playing from these sources because their absence from the game could hurt their team's performance. Finally, PBC is the degree to which athletes believe they are capable of performing the behavior and the perceived difficulty of the task (Kroshus, Baugh, et al., 2014). For example, athletes who have daily access to medical care could potentially be more confident in reporting a concussion because of the perceived ease compared to someone who lacks medical resources (Wallace, Covassin, Nogle, et al., 2017b). Research has explored how well these factors are able to predict an athlete's intention to report concussions.

Attitudes, subjective norms, and PBC predicted between 45.1% to 71% of the variance in intention to report concussion in high school athletes (Beakey et al., 2016; Register-Mihalik, Linnan, et al., 2013). An athlete's attitude and subjective norms are related to common reasons why athletes do not report such as "not wanting to stop playing" and "fear of letting down teammates." Athletes who sustain a brain injury often experience identity changes as well as a sense of loss, which can lead to difficulty coping or psychiatric distress after injury (Bryson-Campbell et al., 2013). Personal and social influences are also an important part of identity formation, which could also play a role in predicting athletes' intention to report concussions.

Identity is a person's self-definition based on their goals, values, and beliefs; all of which shape their behavior (Waterman, 1985). Identity is influenced by two major sources, a person's view of themselves and their experiences (personal identity) and others' options of the person (social identity) (Tusak et al., 2005). Adolescence is an impressionable time when identity is developed and involvement in athletics can create a strong Athletic Identity (AI). Athletic identity is the extent to which an individual identifies with their athletic role (Brewer, Van Raalte, & Linder, 1993). An athlete not wanting to stop playing would influence their personal identity and not letting down their team would influence their social identity which would both influence the development of their AI. However, when an athlete's AI is threatened it can serve as a negative influence.

Injury can threaten an athlete's AI as it can take an athlete away from their sport. Perceiving identity loss after a traumatic brain injury in adults was positively correlated with depression and loss and negatively correlated with adjustment and self-esteem (Carroll & Coetzer, 2011). When an athlete's athletic identity is threatened it can lead to poor adjustment and psychological distress (Carroll & Coetzer, 2011). High AI can lead to difficulties after injury.

Recreational basketball players with high AI (>75th percentile) had more positive attitudes towards playing through pain and injury and had higher behavioral tendencies to do so compared to the moderate and low group (Weinberg et al., 2013). AI score was able to explain 43% of the variance in behavioral tendencies to play through injury (Weinberg et al., 2013). Only 6% of Australian football

(soccer) players thought it was safe to play through an injury, yet 58% were still willing to do so (Finch et al., 2002). This number rose to 80% for those players who thought their position would be in danger if they stopped playing (Finch et al., 2002). In a sample of National Collegiate Athletic Association (NCAA) Division 1 men's ice hockey players, high AI was not significantly associated with the odds of non-reporting of a concussion (Kroshus, Kubzansky, et al., 2015). However, when AI was combined with perceived reporting norms, it was associated with significantly higher odds of non-reporting, with 37.3% of the variance explained. AI and perceived reporting norms explained significantly more variance than reporting norms alone (25.5%) (Kroshus, Kubzansky, et al., 2015). Athletes with a strong AI, who perceive unsafe reporting norms from their peers may be less likely to report a concussion. However, more research is needed to confirm this speculation. In NCAA football players, athletes with high AI were less likely to report a concussion both during a game and twenty-four hours post injury compared to athletes with lower AI (Wayment et al., 2019). There is some evidence that AI may influence athletes reporting behavior, however, little is known about AI in high school athletes.

It is apparent that concussion underreporting is a problem as only about half of concussions are reported (Register-Mihalik et al., 2017). Of the three most common reasons why athletes do not report, lack of knowledge has received the most attention, with mandates to educate adolescent athletes about the possible dangers of concussion (Baugh, Bourlas, et al., 2014). Athletes' personal reasons and social motivations to continue playing are addressed less often. These two reasons for not reporting align with the two major influences which shape an individual's identity (1) a person's beliefs, and (2) other's opinion of the person (Tusak et al., 2005). Because identity influences behavior, AI could serve as an important motivator in concussion reporting. Athletic identity could be a negative motivating factor for injury reporting as athletes want to preserve their self-identity and do not want to be removed from their sport. There is currently evidence that AI might negatively affect injury reporting in college athletes (Kroshus, Kubzansky, et al., 2015; Wayment et al., 2019; Weinberg et al., 2013). However, there is a lack of research that examines the effect of AI on injury reporting attitudes in high school athletes, especially in relation to concussion reporting intention. Therefore, the purpose of this study is to examine the

relationship between AI and intention to report concussions in high school athletes. The first research question was (1) Does AI exist in high school athletes. It was hypothesized the high school athletes would have an athletic identity. Secondly, (2) What is the relationship between AI and intention to report concussions? The hypothesis was there will be a relationship between AI and intention to report concussions.

Methods

Participants

A convenience sample of 78 student athletes (71.8% male) from local high schools participated in the present study (height M = 68.55 $\pm$4.38; weight M = 171.60 $\pm$ 40.93. Students ranged from 13-17 (M = 16.19 $\pm$ 0.88). Fifty percent of the sample identified as Black/African American and 44.9% identified as White/Caucasian, while the other 5.1% identified as another race or multiracial. The majority of the athletes played football (44.9%) or basketball (39.7%). The other athletes participated in cheer (6.4%), baseball (3.8%), softball (2.6%), lacrosse (1.3%), and volleyball (1.3%). To be eligible for the study athletes must have been participating in a High School Association sanctioned sport and be between the ages of 13-17 years old. Students were excluded from the study if they were academically ineligible or suspended from sports participation.

Instrumentation

A 21-item survey was developed by adapting and combining two previously validated scales Athletic Identity Scale (AIMS) and the Theory of Reasoned Action Questionnaire (Brewer et al., 1993). Demographic questions included: participants' age, sex, height, weight, race/ethnicity, sport played, plans to participate in sports during college, previous number diagnosed of concussions, number of previous bell ringers or dings, and previous concussion education.

Athletic Identity (AI) was measured with the Athletic Identity Measurement Scale (AIMS) (Brewer et al., 1993). The AIMS consists of 7-items which are rated on a 7 point Likert-type scale ranging from one "strongly disagree" to seven "strongly agree". The AIMS can be scored uni-

dimensionally or multidimensionally. The AIMS has a possible score of 7-49. The three sub-scales of AIMS are social identity ("Most of my friends are athletes"), exclusivity ("I have many goals related to sports"), and negative affectivity ("I feel bad about myself when I do poorly in sport") (Brewer & Cornelius, 2002, p. 104). For this study, a unidimensional score was calculated by summing all seven items, where a higher score indicates a stronger identification with an athletic role. Across three studies AIMS showed good internal consistency ($\alpha = 0.93$, 0.83, and 0.81) and had a 14-day test-retest reliability of 0.89 in college students (Brewer et al., 1993). The AIMS showed reliability in males, females, athletes, and non-athletes (Brewer & Cornelius, 2002) In high school students, an internal validity of $\alpha = 0.89$ was found for AIMS (Handley et al., 2018). A Cronbach alpha was performed too determine the internal consistency ($\alpha = 0.778$).

Intention to report concussions was measured with a subscale of the Theory of Reasoned Action/Theory of Planned Behavior (TRA/TPB) questionnaire which was developed and validated in an adolescent population by Register-Mihalik et al. (2013). Previous work shows a high internal consistency with a reported Cronbach's $\alpha = 0.94$. The sub-scale consists of 3-items scored on a 7-point Likert-type scale ranging from one "strongly disagree" to seven "strongly agree". The scale is scored by totaling the 3 items, with higher scores indicating more favorable intention to report concussions. The intention scale had a Cronbach alpha of $\alpha = 0.972$.

Procedures

The study was approved by the Institutional Review Board. A descriptive cross-sectional survey design was used. Upon receiving approval from the school district, the principal at each school was contacted to arrange data collection. The athletic trainer at each school handed out Parental Informed Consent forms to the athletes. Upon returning the signed Parental Informed Consent form, the athletic trainer gave the athlete a Minor Assent form and a copy of the survey. Completed surveys and Minor Assent forms were returned to the PI. Data was collected over three months. The survey had a total of 21 items and took approximately 10 minutes to complete. No identification or Protected Health Information was collected on the surveys as it was single administration.

Data Analysis

The surveys were scored and transferred to SPSS (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) for statistical analysis. All data was examined for outliers. All analysis was conducted in SPSS 25.0 with an alpha level set *a priori* to 0.05. Descriptive statistics were calculated for demographic variables. To explore the relationship between AI and intention a linear regression was conducted. To further explore AI separate linear regressions were run for age and previous number of concussions. Two one-way analysis of variance (ANOVA) for AI were calculated to examine the difference between means for sex and plans to play in college. A linear regression was run to see if there is an association between intention and age. One-way ANOVAs were conducted to identify any difference in intention between sex, previous concussion education, history of a previous ding/bellringer, and a history of a previous concussion. A chi-squared analysis was conducted to determine if reporting a history of a concussion was dependent on reporting a history of a ding/bellringer.

Results

Descriptive Statistics

Sixty-one (78.2%) of the athletes planned to play in college. Less than half (46.2%) of the athletes reported receiving previous concussion education. Twenty-four athletes (30.8%) reported a history of a ding/bellringer, while 22 athletes (28.2% reported a history of a concussion. There was a significant relationship between reporting a history of a ding and reporting a history of a concussion X^2 (1, n = 78) = 11.539, p = 0.001. A follow up analysis revealed a Phi = 0.385, indicating a moderate relationship between history of ding/bellringer and history of concussion.

The scores on the AIMS ranged from 17-49 with the most frequently reported scores of 41 and 44 points which together accounted for 23% of the total sample. The frequencies and percentages for AIMS scores are reported in Table 1. Percentiles were calculated for AI with a score of 42 points indicating the 50^{th} percentile, which is comparable to AIMS norms of male athletes (39 points) and female athletes (38

points) (Brewer & Cornelius, 2002). Table 2 shows the percentiles for AI compared to the norms established by Brewer & Cornellus, (2002).

Inferential Statistics

Athletic Identity

Two separate linear regressions were conducted to determine if age and number of previous number of concussions were associated with AI. The number of previous concussions explained 6.1% of the variance in AI ($F(4.965) = 0.247$, $R^2 = 0.061$, $p = 0.029$). Each increase in the number of previous concussions resulted in an average increase of 2.8 points increase in AI. However, age was not statistically associated with AI ($p = 0.417$). One-way ANOVAs were calculated to examine differences in AI by sex and plans to play in college. A statistically significant difference existed for AI score between athletes who plan to play in college and those who do not, but the Levene test showed the assumption of equal variance was violated. The Welch correction was used and found a significant difference between groups ($F(1,19.17) = 5.994$, $p = 0.24$), where athletes who planned to play in college had a higher AI (41.69 ± 5.482 points) compared to those who did not (35.88 ± 9.340). There was no significant difference between groups for sex and AI ($p = 0.534$).

Athletic Identity and Intention to Report

A linear regression revealed no statistically significant relationship existed between AI and intention ($p = 0.740$). However, age was significantly associated with intention ($F(5.625) = 0.263$, $R^2 = 0.069$, $p = 0.020$) as age explained 6.9% of the variance in intention. Older athletes had decreased intention to report. Every one year increase in athletes' age resulted in a decrease in intention score of 1.7 points.

Intention to Report

The effect of sex, previous concussion education, previous history of dings/bellringers, and previous history of concussion on intention was examined utilizing one-way ANOVAs. Sex ($p = 0.637$), previous concussion education ($p = 0.612$), and previous history of concussion ($p = 0.118$) were not statistically significant. There was a difference in intention between groups with and without a previous

history of a ding/bellringer ($F(1,76) = 4.038$, $p = 0.048$). Athletes who reported no history of a ding/bellringer had an average intention score of 17.19 ± 5.64 and athletes with a positive history of a ding/bellringer had an average score of 14.38 ± 5.84.

Discussion

The aims of this study were to determine if athletic identity exists in high school athletes and examine if there is a relationship between athletic identity and intention to report concussions. High school athletes have an AI which seems to be stronger when they plan to play in college and have had at least one concussion. AI and intention were not significantly related. However, older age was associated with decreased reporting intention. Additionally, athletes reporting a history of a ding/bellringer had decreased intention to report. Finally, previous concussion education had no effect on intention to report.

Few studies have examined AI in high school athletes despite this group comprising one of the largest athletic populations. The results of this study show that many high school athletes have an AI as demonstrated by the sample having similar percentile cut offs to previously established norms (Brewer & Cornelius, 2002). These findings indicate high school athletes show similar scores to other non-high school male and female athletes. The comparison between high school athletes' AI and established norms can be seen in Table 2. Sports play an important role in shaping adolescents' identities. Previous research has established an adolescent's identity is altered by their environment and social influence (Dumontheil, 2015). Given the amount of time high school athletes dedicate to sports, it is reasonable that high school athletes will develop an AI. The more someone identifies with their athletic role the more they will prescribe importance to situations that align with the role. Sports involvement will be more important to these individuals, aligning with our findings that athletes who plan to play sports in college have a stronger AI.

Nearly 80% of the athletes planned to play sports in college, with those that did exhibiting a significantly higher AI. These results were also true regardless of age, as athletes age was not significantly related to AI. Athletes who plan to play in college anticipate continuing to participate in sports strengthening their athletic identity. Athletes who do not plan to play in college may have a lower

AI as they begin to think about their transition out of sports. Furthermore, other identities would be more important to these individuals. Previous research has shown that college student athletes identify strongly with their AI and academic/student identity (Benson et al., 2015; Wayment et al., 2019). Athletes who do not want to play sports in college will likely identify more with their academic identity. One implication of high school athletes wanting to play in college having stronger AI, is it could lead to transition difficulty if they are not able to play in college. Few high school athletes go on to play in college, yet most of the athletes in our sample were planning to do so. High AI has been associated with difficulties transitioning out of sport in college and elite athletes (Giannone et al., 2017; Lavallee et al., 1997). Another study by Russell and associates (2018) found college freshman who were no longer participating in sports experienced high levels of stress. Athletes who plan to play in college could experience difficulties if they are unable to play in college or maintain their sports participation. Future studies should explore how planning to play sports in college and AI affect athletes' transition out of sport. Previous number of concussions was also related to AI.

Previous number of concussions explained 6.1% of the variance in AI, where the higher the previous number of concussions, the stronger the individuals' AI. The findings in the current study contradict much of the current literature that support AI tends to decrease after injury. Athletes who underwent anterior cruciate ligament reconstruction experienced the most decrease in AIMS score between six to twelve months in the rehabilitation process (Brewer et al., 2010). Further, athletes who progressed more slowly in rehabilitation experienced a greater reduction in AI (Brewer et al., 2010). Ratings of past self-concept were significantly higher than ratings of present self in adults with TBI, indicating that the present self was regarded negatively in comparison to pre-injury self (Carroll & Coetzer, 2011). Alternatively, the athletes in our sample were all currently participating in their sport which could account for their higher AI. Athletes who do not experience a decrease in AI after injury may be more likely to over adhere to rehabilitation programs in an attempt to return to sports faster. As seen in Hilliard et al. (2017), positive correlation was seen between AI and rehabilitation over-adherence in injured college athletes (small to medium effect size). We asked athletes to report diagnosed concussions,

but athletes were not asked if they missed any time away from their sport due to the injury or how long they were away. AI may either serve as a motivator to return to sport after injury or time away from sports could lead to decreases in an individual's AI. Athletes who return to sport after a concussion may have the chance to evaluate their AI after it has been threatened by injury and it strengthens as a result of their return to sports participation. AI influence on intention to report was also examined.

For our second research question, there was not a statically significant relationship between AI and intention in this study. It is possible that other identities are more important to athletes and AI has no effect on intention. In college football players, AI was negatively correlated with concussion reporting both immediately and within 24 hours, whereas academic identity was positively correlated to reporting immediately, within 24 hours, and reporting on behalf of a teammate (Wayment et al., 2019). The importance of one's AI compared to other identities could alter behavior. Kroshus et al. (2015) found that AI only significantly influenced concussion reporting intention when combined with perceived reporting norm in college athletes. There is evidence that AI may affect concussion reporting intention in college athletes, however results in high school athletes may not be influenced as their identity is still developing.

High school athletes may not have solidified their AI to the point it influences their intention to report (Houle et al., 2010). Sports is a unique environment and a decision to report a concussion often needs to be made quickly. Athletes may not have time during a game to effectively evaluate the repercussions of their decision. AI may only affect athletes after injury because their identity is threatened and there is time to evaluate the threat. When they are in the moment on the field, they may not feel that their identity is threatened by a possible concussion. Additionally, AI may not influence intention to report because other factors have predicted intention.

Attitude, subjective norms, and PBC have successfully predicted intention to report in high school and college athletes (Beakey et al., 2016; Kroshus, Baugh, Daneshvar, et al., 2015; Register-Mihalik, Linnan, et al., 2013). After a concussion education based on altering students' attitudes, subjective norms, and PBC found the intervention group had higher intention compared to both their baseline scores and the control group (Sullivan et al., 2018). Nearly 65% of the variance in concussion

reporting intention was explained by concussion knowledge, concussion attitude, subjective norms, and history of previous concussion (Kroshus, Baugh, Daneshvar, et al., 2015). AI may not influence intention as other factors have explained a significant amount of the variance in intention to report. Athletic identity does not measure these factors, which could explain the lack of significance. Although AI was not associated with intention, age is thought to influence athletes' intention.

Age was negatively associated with intention, explaining 6.9% of the variance. As athletes get older their intention to report decreases. The decrease in intention may be due to more perceived pressure to play and fear of losing playing time or their spot on the team. High school athletes have previously reported not wanting to let down their teammates or coaches by reporting a concussion (Register-Mihalik et al., 2017). This concern could increase as athletes get older as they place more importance on sports. Older athletes may feel pressure from their coaches to remain in the game(McCrea et al., 2004). College freshman perceived more coaching support for reporting a concussion compared to juniors or seniors and had the least reported undiagnosed dings and bell ringers (Baugh, Kroshus, et al., 2014). Athletes may not want to disappoint their coaches by reporting an injury. Additionally, peer relationships may influence athletes' intention as they age. Thirty-five percent of junior Australian football players felt pressure from teammates to continue playing while injured (Finch et al., 2002). Older athletes may experience decreases in intention to report as they feel pressure to not report a concussion from social influences and a perceived pressure to play injured. In addition to age, it is believed intention varies by sex.

Intention in this study did not differ by sex, contrary to most of the current literature. Previously, researchers have found that females have better concussion reporting and intention to report future injuries (Kerr et al., 2016; Kurowski et al., 2014; Miyashita et al., 2016). One possible explanation for these differences is males tend to have more conformity to masculine gender roles which encourage a mentality of winning at all costs, overcoming challenges, and defeating opponents (Steinfeldt JA et al., 2009). One study found that female youth athletes were significantly less likely to be worried about perceived negative stereotypes for caring about concussions (Bloodgood et al., 2013). Males athletes may be more concerned with not appearing weak because the concept of masculinity is heavily emphasized in

many male sports like hockey and football (Chrisman et al., 2013; Cusimano et al., 2017). Yet in our study no differences in intention to report were observed between sexes. Differences between males and females may be changing due to the cultural shift as there is less conformity to traditional gender norms. Girls youth participation in sports has increased greatly over the past decade and has helped neutralize traditional domestic gender roles (Messner, 2011). Differences in sex may no longer be present due to the shift in gender ideologies that have been occurring in sports (Messner, 2011). Further research should explore how sex and gender identity affects athletes' intention to report.

Interestingly, athletes with a history of a ding/bellringer had significantly lower intention than those with no previous history. However, there was no significant difference in intention with a history of a concussion. The Chi-squared statistic showed a moderate connection between those that reported concussion and dings (Phi = 0.385), but there were still some athletes who did not report a history of both. It is likely athletes who reported a history of a concussion also reported the injury, alternatively athletes who reported a history of a ding did not report the injury as their intention was lower. Previous research has shown differences in reporting rates due to terminology. High school athletes reported 48.8% of the concussions and 12.3% of the bell ringer events they recalled (Register-Mihalik, Guskiewicz, et al., 2013). Similarly, an increased number of concussions was associated with a decreased probability of reporting concussion symptoms during practice or a game and an increased probability of participation with symptoms. It is vital to continue to encourage the use of proper terminology when talking about concussions and educate parents, coaches, and athletes that dings/bellringers should be reported as they are likely to be concussions. Previously, it has been hypothesized that concussion education should improve concussion reporting intention. Not only did our study found a lack of athletes reporting receiving concussion education, it also did not influence intention to report.

Less than half the athletes in the sample reported receiving concussion education, which is similar to other reports (Cournoyer & Tripp, 2014; McDonald et al., 2016). Our study also showed no association between previous concussion education and intention. Legislation does not specify what should be included in concussion education (Baugh, Bourlas, et al., 2014). In the state of Georgia, only parents are

required to receive concussion education in the form of an information sheet (Return to Play Act of 2013, 2014). It is concerning that athletes are not required to receive any form of concussion education, yet self-reporting is the most common method of diagnosis. Additionally, the education the athletes reported receiving had no effect on their intention in this study.

There is evidence to support that concussion education improves concussion knowledge (Bagley, 2012, Hunt, 2015, cook, 2003, Caron, 2018, Elliott, 2016). However, changes in concussion knowledge have shown mixed results on behavioral or attitude changes in high school athletes (Bramley et al., 2012; Cournoyer & Tripp, 2014; Donnell et al., 2018; Kurowski et al., 2014; Register-Mihalik, Guskiewicz, et al., 2013; Wallace, Covassin, Nogle, et al., 2017b). Based on the TPB we would expect attitude and subjective norms to influence intention to report, not concussion knowledge. Because AI influences athletes' attitude, we hypothesized that AI would influence intention to report. These findings were not found in the current study. However, high school athletes do have an AI, which is shaped by social influence. Future research should explore how social norms influence intention to report and can be integrated into concussion education. There is a need for more research on concussion education that targets behavioral changes. Clinicians should continue to work to educate athletes on the importance of concussion reporting and utilizing proper terminology.

Limitations

There are several limitations to the study. First, we assumed the athletes would answer honestly. Self-report can be subject to inaccurate recall or social desirability. The athletic trainers at each school administered the surveys. Athletes may have reported higher intention because they believed that is what the athletic trainer would want them to select. However, before completing the survey athletes were reminded their responses would remain confidential and their answers would not affect their sport participation in any way. The second limitation was data collection happened over a period where some athletes were surveyed at the end of their season and some were at the beginning. There is some evidence that time of season may affect reporting as athletes may want to play in important games such as playoffs

(Register-Mihalik et al., 2017). All the athletes in this study were actively participating in their respective sport at the time of the survey helping to mitigate these effects.

Conclusion

Research supports that athletes often do not report their concussions due to personal motivations to remain in their sport and social influence from peers (McCrea et al., 2004). The lack of knowledge about concussions has been addressed most often, by the legislative mandates for concussion education (Baugh, Bourlas, et al., 2014), however this may not translate to intention to report. This study sought to find out if there was a relationship between AI and intention. No relationship existed between AI and intention; however, we know that PBC, subjective norms, and attitudes have explained intention in high school athletes. According to the Theory of Planned Behavior, attitudes and social norms play a strong role in intention to report, which led to the hypothesis that as a social construct, athletic identity would play a strong role in intention to report as well. In our sample, this was not the case. Athletes may use sports to fulfill their social needs, which factors into developing social norms, however, this may not influence subjective norms enough to directly influence reporting intention in adolescents. Athletic environments that have supportive social norms for reporting concussions should led to an increase in reporting, especially if they identify as an athlete. AI may not explain intention directly, but may change their attitudes, subjective norms, and PBC surrounding concussion. Future studies should further examine the social and personal motivations influence on intention to report.

CHAPTER 4

DISCUSSION

Concussions continue to be a major health problem as it is one of the most frequent injuries to occur in high school students, especially student athletes (DePadilla et al., 2018). Research has explored reasons why athletes do not disclose a suspected concussion and several common reasons have been identified, such as not believing the injury was serious, not want to leave the game, and not want to let down their teammates and coaches (McCrea et al., 2004). Current education efforts have not shown great success in altering athletes reporting behaviors (Mrazik et al., 2015). In fact, there is some evidence that concussion education leads to a decrease in concussion reporting (Beakey et al., 2016; Kroshus, Daneshvar, et al., 2014).

Previous concussion education research has focused on increasing concussion knowledge to enhance concussion reporting but has not accounted for other reasons why athletes do not report. Intention to report and reporting behavior are influenced by more than just concussion knowledge. Two other major influencing factors are athletes' personal commitment to their sport and the loyalty they feel to their team. Many of these reasons may be influenced by the presence of a developing athletic identity in adolescent athletes.

AI has been studied almost exclusively in the college population, with additional studies in elite athletes. Little is known about AI in high school athletes and even less on how having an AI can attitudes and reporting intention. Previous literature has established that AI influences many areas of life including career maturity and exploration (Cabrita et al., 2014; Foster & Huml, 2017). Strong AI has also been linked to identity foreclosure (Brewer & Petitpas, 2017). Finally, AI can cause transition difficulty after career termination from both injury (Brewer et al., 2010; Bryson-Campbell et al., 2013) and retirement (Benson et al., 2015; Giannone et al., 2017). It is clear that within our sample, adolescents do have an established AI and is consistent with collegiate athletes. Given that high school athletes have an AI, we expected similar findings and implications.

An athlete's identity and their identity related goals may influence their intention to report. Previous research has established athletes often do not report concussion symptoms due to a desire to continue to play and a fear of disappointing their teammates and coaches (Register-Mihalik et al., 2018) We hypothesized AI may influence intention to report, as athletes who identified strongly with their AI may have a strong desire to remain in their sport. Our results show that in high school athletes, AI does not influence their intention to report. A person's identity, specifically their athletic identity, is continuing to develop during high school. While we expected athletic identity to influence reporting intention, in the high school population other identities, such as peer, familial, or academic identity may play a stronger role in decision making. These findings should guide future research that explores other identities, such as peer or academic identity, influence on athletes' intention to report.

Clinicians should not discount the influence identity may play in concussion reporting intention. Although, AI did not influence intention to report in our study, other identities may be more influential. Research has supported that athletes use sports to fulfill their social needs (C. B. Anderson et al., 2009), which factors into developing social norms; however this may not influence subjective norms enough to directly influence reporting intention in adolescents. Athletic environments that have supportive social norms for reporting concussions should led to an increase in reporting, especially if they identify as an athlete.

AI may not explain intention directly, but may change their attitudes, subjective norms, and PBC surrounding concussion. Researchers and clinicians have recommended a multifaceted approach to concussion education, however this research supports the inclusion of personal factors, such as identity, social environment and PBC to ensure concussion education can successfully influence reporting intention. This change to concussion education is expected to target behavior changes and addresses the many reasons athletes choose not to report.

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APPENDIX A

Expanded Methodology

Hypotheses, Definitions, Assumptions, Limitations, and Delimitations

Research Questions and Hypothesis

1 – What is athletic identity in high school athletes?

H1 – High school athletes will have an AI.

2 – What is the relationship between athletic identity and intention to report concussion?

H2 – There will be a relationship between athletic identity and intention to report concussion.

Definition of Terms

1. *Concussion* - "A concussion is an injury caused by a blow to the head or sudden movement of the body followed by a variety of signs and symptoms that may include any of the following: headache, dizziness, loss of balance, blurred vision, ''seeing stars'', feeling in a fog or slowed down, memory problems, poor concentration, nausea, or throwing up. Getting ''knocked out'' or being unconscious does NOT always occur with a concussion." (Register-Mihalik et al., 2017)

2. *Athletic Identity* – Athletic identity is the extent to which an individual identifies with their athletic role (Brewer, Van Raalte, & Linder, 1993).

3. *Intention* - "intentions capture the motivational factors that influence a behavior" (Ajzen, 1991, p. 181)

Assumptions

1. Student athletes will be able to read the survey
2. Students will answer honestly

Limitations

1. AIMS reading level was not changed
2. Self-report is susceptible to inaccurate recall and social desirability
3. Time of data collection – some athletes were near the end of their season, while others were at the beginning

Delimitations

1. Convenience sample of local Southeast Georgia High Schools

APPPENDIX B

Tables

Table 2

AIMS Scores Frequencies for High School Athletes

AIMS Score	Frequency	Percent
17	1	1.3
18	1	1.3
23	1	1.3
27	1	1.3
28	1	1.3
29	2	2.6
30	1	1.3
31	1	1.3
32	1	1.3
34	2	2.6
35	3	3.8
36	4	5.1
37	1	1.3
38	1	1.3
39	3	3.8
40	5	6.4
41	9	11.5
42	6	7.7
43	4	5.1
44	9	11.5
45	3	3.8
46	3	3.8
47	5	6.4

48	7	9.0
49	3	3.8

Table 3

Percentiles of AIMS in High School Athletes Compared to Norms

	Cook et al., 2020	Brewer & Cornelius, 2002	
Percentile	High school athletes	Male Athletes	Female Athletes
100	49	49	49
95	48.05	47	46
90	48	46	44
85	47	45	43
80	46.20	44	42
75	45	43	41
70	44	42	41
65	44	41	40
60	43	41	39
55	42	40	39
50	42	39	38
45	41	38	37
40	41	37	36
35	40	37	35
30	39	36	34
25	36.75	35	33
20	35.80	33	32
15	34	31	30
10	29.90	29	27
5	26.80	25	24

APPENDIX C

Instrumentation

Age:

Grade/Year in school:

Height:

Weight:

Sex: ☐ Male ☐ Female ☐ Other/Prefer not to answer

What is your race/ethnicity?

Check all that apply

☐ Asian or Pacific Islander ☐ Black/African American

☐ Hispanic/Latino ☐ American Indian/Native American

☐ White/Caucasian ☐ Other _____

What sport do you currently play? _____

Do you plan to play sports in college? ☐ Yes ☐ No

Have you had a "ding" or a "bell ringer"? ☐ Yes ☐ No

If so, how many? 1 2 3 4+

Most recent (year) _____

Have you had a diagnosed concussion? ☐ Yes ☐ No

If so, how many? 1 2 3 4+

Most recent (year) _____

Have you ever received concussion education? ☐ Yes ☐ No

If yes, what type? _____

Please circle the number that best reflects the extent to which you agree or disagree with each statement regarding your sports participation.

1. I consider myself an athlete.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

2. I have many goals related to sport.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3. Most of my friends are athletes.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

4. Sport is the most important part of my life.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

5. I spend more time thinking about sport than anything else.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

6. I feel bad about myself when I do poorly in sport.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

7. I would be very depressed if I were injured and could not play my sport.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

A concussion is an injury caused by a blow to the head or sudden movement of the body followed by a variety of signs and symptoms that may include any of the following: headache, dizziness, loss of balance, blurred vision, ‘‘seeing stars’’, feeling in a fog or slowed down, memory problems, poor concentration, nausea, or throwing up. Getting ‘‘knocked out’’ or being unconscious does NOT always occur with a concussion.

Based on the previous definition, please circle the number that best reflects the extent to which you agree or disagree with each statement.

“When I experience possible concussion symptoms…”

1. I intend to report.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

2. I plan to report.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3. I will make an effort to report.
   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

APPENDIX D

Institutional Review Board Forms

Georgia Southern University
Office of Research Services & Sponsored Programs

Institutional Review Board (IRB)

Phone: 912-478-5465
Fax: 912-478-0719
IRB@GeorgiaSouthern.edu
Veazey Hall 3000
P.O. Box 8005
Statesboro, GA 30460

To: Cook, Natalie; Hunt, Tamerah; Byrd, Megan; Wilson, Samuel

From: Office of Research Services and Sponsored Programs

Approval Date: 10/2/2019

Expiration Date: 9/30/2020

Subject: Approval with Conditions from the Georgia Southern University Institutional Review Board - **Expedited Review**

After a review of your proposed research project numbered: **H20015**, titled **"Athletic Identity and Intention to Report Concussions in High School Athletes,"** it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable. You are authorized to enroll up to a maximum of **400** subjects.

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research **with the understanding that you will abide by the following conditions:**

- **You are approved to conduct research at the following schools for which you have obtained letters of cooperation:**
  - **Portal Middle/High School**
  - **Statesboro High School**
  - **Southeast Bulloch High School**
  - **South Effingham High School**
  - **Effingham County High School**

Additional schools may be added to this study by submitting additional letters of cooperation.

Brief study description: The purpose of this study is to examine the relationship between athletic identity and intention to report concussions.

If at the end of this approval period there have been no changes to the research protocol; you may request an extension of the approval period. In the interim, please provide the IRB with any information concerning any significant adverse event, **whether or not it is believed to be related to the study**, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator **prior** to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a *Research Study Termination* form to notify the IRB Coordinator, so your file may be closed.

Sincerely,

Eleanor Haynes

Eleanor Haynes
Compliance Officer

Dear Parent or Guardian,

You are receiving this flyer to inform you about a research study that is taking place in your child's school. I am a graduate student in athletic training and work with a faculty advisor in the Department of Health Sciences and Kinesiology at Georgia Southern University. I am trying to understand how high school students' athletic identity affects their intention to report a concussion. To do this effectively, I want to survey athletes in Bulloch County, Effingham County, and Evans County and see if athletic identity changes an athletes' willingness to report a concussion. This is where I need your help.

If your child takes part in this study, they will complete a short one-time survey prior to practice. The survey will take about 10 minutes to complete. The questions ask about demographic information, athletic identity, and concussion reporting intention. No identifying information will be collected on the survey.

I believe that this study will help your athletic trainer understand why athletes may not report a concussion and help lead to better care of athletes in the future. It will also contribute to concussion research and help make concussion education more effective.

Allowing us to use your child's data for research and presentation is voluntary and their responses will remain completely confidential. If you choose to allow your child to participate in this study, please sign the consent form and return it to the researcher. All participants have the right to stop at any time without affecting their athletic status, class grade or any judgement made by the researchers. If you have any questions or concerns regarding this study, please call or write my thesis advisor Tamerah Hunt. The telephone number is 912-478-8620 and the email address is thunt@georgiasouthern.edu. Your time and cooperation is greatly valued and appreciated.

Regards,

Natalie Cook, ATC

WATERS COLLEGE OF HEALTH PROFESSIONALS

DEPARTMENT OF HEALTH SCIENCES AND KINESIOLOGY

Parental Informed Consent
Athletic identity and intention to report concussions in high school athletes

My name is Natalie Cook and I am a graduate student at Georgia Southern University. I am completing this research as part of my thesis project.

Your child has the option to take part in a research study. The goal of this form is to give you information about what would happen in the study if your child chooses to take part and help you decide if you want your child to participate.

- This form explains what would happen if your child joins this research study.
- Please read it carefully. Take as much time as you need.
- Please ask the research team questions about anything that is not clear.
- You can ask questions about the study at any time.
- If you or your child choose not to be in the study, it will not affect their sport participation and they will not be penalized in any way.
- If you say 'Yes' now, you can still change your mind later.
- You can quit the study at any time and will not be penalized if you decide not to take part in the study or to quit the study later.

Concussions are a major health problem and can lead to short and long-term health consequences if left untreated when they are not reported. The purpose of my research is to see if there is a relationship between athletic identity and intention to report concussions to better understand why concussions are not reported and improve concussion reporting in the future.

Your child has the option to take part in this research because their school has been selected to participate in this survey. If you allow your child to participate in this research study they will be asked to take a ten minute survey one day prior to practice. The survey includes demographic questions which ask about things like age, height, and weight. Additional questions ask about the child's athletic identity and their intention to report concussions. The survey is approximately 20 questions in length and should take about 10 minutes to complete. Your child will only complete the survey once. No identifying information will be collected.

There is minimal risk to your child in this study. Some questions could potentially make children feel uncomfortable or embarrassed. However, there are no greater risks to participants than those associated with daily life. If a child should become uncomfortable, they will be referred to the school guidance counselor or school nurse.

The benefits to society include contributing to research that helps understand concussion reporting and leads to better concussion reporting in the future.

The information collected in this study will be kept in a secure locked office on the Georgia Southern University's Statesboro Campus. The only people who may access this information are

myself and my three professors, Dr. Tamerah Hunt, Dr. Megan Byrd, and Dr. Samuel Wilson who will help with data collection and data analysis.

Deidentified data from this study may be placed in a publicly available repository for study validation and further research. You or your child will not be identified by name in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions."

Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact me or my faculty advisor, Dr. Tamerah Hunt whose contact information is located at the end of this document. For questions concerning your rights as a research participant, contact the Georgia Southern University Institutional Review Board at 912-478-5465.

Participation of your child in this study is completely voluntary. They may end their participation at any time by telling the person in charge or not returning the survey. They do not have to answer any questions they do not want to answer. There is no penalty for deciding not to participate in the study; your child may decide at any time they don't want to participate further and may withdraw without penalty or retribution.

"All information will be treated confidentially. There is one exception to confidentiality that we need to make you aware of. In certain research studies, it is our ethical responsibility to report situations of child or elder abuse, child or elder neglect, or any life-threatening situation to appropriate authorities. However, we are not seeking this type of information in our study nor will your child be asked questions about these issues."

I am asking your permission for your child to participate in this study and will provide him/her with a simplified "assent" letter description before enrolling them in this study.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H20015.

Title of Project: Athletic identity and intention to report concussions in high school athletes
Principal Investigator: Natalie Cook, ATC. Email: nc06472@georgiasouthern.edu
Other Investigator(s): Megan Byrd, PhD. Email: mmbyrd@georgiasouthern.edu, Samuel Wilson, PhD. Email: sjwilson@georgiasouthern.edu
Research Advisor: Tamerah Hunt, PhD, ATC. Phone: 912-478-8620, Email: thunt@georgiasouthern.edu

_____ _____
Participant Signature Date

I, the undersigned, verify that the above informed consent procedure has been followed.

_____ _____
Investigator Signature Date

GEORGIA SOUTHERN UNIVERSITY

WATERS COLLEGE OF HEALTH PROFESSIONALS

DEPARTMENT OF HEALTH SCIENCES AND KINESIOLOGY

MINOR'S ASSENT

Hello,

I am Natalie Cook a graduate student at Georgia Southern University and I am conducting a study on *Athletic identity and intention to report concussions in high school athletes*.

You are being asked to participate in a project that will be used to learn about concussion reporting. If you agree to be part of the project, you will fill out a survey. It will take you about 10 minutes to complete.

You do not have to do this project. You can stop whenever you want. If you do not want to answer some of the questions, it is ok, and you can go back to practice, and nothing bad will happen. You can refuse to do the project even if your parents say you can.

None of the teachers or other people at your school will see the answers to the questions that I ask you. All of the answers that you give me will be kept in a locked cabinet in a room at Georgia Southern University, and only myself or my three teachers, Dr. Tamerah Hunt, Dr. Megan Byrd, and Dr. Samuel Wilson, will see your answers. We are not going to put your name on the answers that you give us, so no one will be able to know which answers were yours.

If you or your parent/guardian has any questions about this form or the project, please email me at nc06472@georgiasouthern.edu or call my advisor, Dr. Hunt, at 912-478-8620. Thank you!

If you understand the information above and want to do the project, please sign your name on the line below:

Yes, I will participate in this project: _____

Child's Name: _____

Investigator's Signature: _____

Date: _____