

Sport-related Concussion Reporting and Coach-Athlete Attachment Among Collegiate Student-Athletes

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Abstract:

Between 2001 and 2015, 3.4 million traumatic brain injury (TBI) occurrences in the U.S. were accounted for by sport participation. It is estimated between 12% and 60% of athletes delay seeking care after sustaining a concussion. Differences in sport-related concussion (SRC) reporting have been attributed to several different factors. Whereas prior research related to SRC reporting behavior focus on normative and competitive pressures to continue play, less attention is given to the interpersonal context in which reporting takes place. Grounded in attachment theory, this study investigated relationships between coach-athlete attachment and help-seeking behavior. Findings suggest that as coach-athlete anxiousness increases, not reporting increases. and as coach-athlete secureness increases, not reporting decreases. Logistic regression analyses indicate that secure coach attachment significantly predicts greater likelihood of SRC reporting. These findings underscore the important role coach-athlete relationships may have on care-seeking behaviors of student-athletes and can inform individual and group interventions promoting SRC reporting.

Keywords: athlete wellness | coach-athlete attachment | concussion reporting

Article:

Concussion is a subset of mild traumatic brain injury (TBI) caused either by a direct blow to the head, face, neck or elsewhere on the body with a force diffused to the head (Institute of Medicine & National Research Council, 2014; McCrory et al., 2013). Between 2001 and 2015, 3.4 million instances of TBI were accounted for by sport participation (Centers for Disease Control and Prevention, 2015). Such head trauma may result in neurocognitive impairment (e.g. executive functioning, attention, learning and memory, reaction time, reasoning, and judgment), sensorimotor difficulties (e.g. alterations to vision and hearing, sensitivity to light, changes in muscle tone, paralysis, trouble balancing or walking), somatic symptoms (e.g. headache, fatigue, dizziness, chronic pain, sleep disturbances), as well as a myriad of psychosocial impairments (e.g., delusions, hallucinations, mood disturbances, agitation, aggression, confusion, impulsivity, and diminished quality of life) (CDC, 2015; Guskiwicz et al., 2004; Bellanger, & Vanderploeg, 2005; Broglio, & Puetz, 2008; Emanuelson, Andersson Holmkvis, Bjorklund, & Stalhammer, 2003; Kontos, Covassin, Elbin, & Parke, 2012; Kuehl, Snyder, Erickson, & Valovich McLeod,

2010). These symptoms can impair academic performance and negatively impact psychosocial functioning (Halsted, McAvoy, Devore, Carl, Lee, & Logan, 2013; Master, Gioia, Leddy, & Grady, 2012; Sady, Vaughan, & Gioia, 2011).

Symptoms of concussion last longer when care seeking is delayed (Asken, McCrea, Clugston, Snyder, & Houck, 2016). At present time, it is estimated that between 12% and 60% of athletes delay seeking care after sustaining a concussion. Differences in sport-related concussion (SRC) care seeking have been attributed to a number of different immutable factors, including gender, sport, level of competition, as well as between-study differences in the definition used for under-reporting (Baugh, Kroshus, Daneshvar, & Stern, 2014; Kerr et al., 2014; Kroshus, Daneshvar, Garnett, Nowinski, & Cantu, 2013; Llewellyn, Burdette, Joyner, & Buckley, 2014; Register-Mihalik, et al., 2013; Torres, et al., 2013). There are also potentially modifiable differences in concussion reporting behavior. For some athletes, a lack of knowledge about the injury may be driving their delayed reporting (Register-Mihalik, et al., 2013); however, a growing body of evidence suggests that behavior is perhaps most strongly influenced by an inter-related constellation of individual expectancies and environmental pressures and incentives (Chrisman, Quitiquit, Rivara, 2013; Kerr et al., 2014; Kerr, Register-Mihalik, Kroshus, Baugh, & Marshall, 2015; Kroshus, Baugh, Daneshvar, & Viswanath, 2014; Kroshus, Garnett, Baugh, & Calzo, 2015; Kroshus, Kubzansky, Goldman, & Austin, 2015; Register-Mihalik, et al., 2013; Llewellyn et al., 2014; Register-Mihalik, et al., 2013).

Whereas prior research related to contextual influences on reporting behavior have focused on normative and competitive pressures to continue play, less attention has been paid to the interpersonal context in which reporting takes place. Meier (2015) and colleagues discovered that National Collegiate Athletic Association (NCAA) Division I student-athletes who experienced a SRC self-reported significantly fewer symptoms to athletic trainers than they did in confidential psychiatric interviews. One lens through which to view the coach-athlete relationships and relational dimensions of concussion reporting is attachment theory. Bowlby (1969/1982, 1973) and Ainsworth's (1989) (Ainsworth & Bell, 1970) attachment theory, a developmental paradigm constructed to organize human behavior, cognition, and emotion from infancy to adulthood, explains the influence of interpersonal dynamics in close relationships on how individuals respond during periods of marked distress. These early experiences have a significant influence on one's neurological development (Fox & Calkins, 2003), ability to effectively regulate emotions (Cassidy, 1995; Diamond & Aspinwall, 2003), and ways of interacting with others in close relationships (Mikulincer & Shaver, 2003). Though first developed to explain patterns of infant behavior as a result of the quality of interactions between mother and child, researchers have determined that the basic tenets of attachment can be applied to other close relationships including romantic relationships and to those dyads in which one figure can be described as stronger and wiser (Hazan & Shaver, 1987). This adult attachment dynamic may be particularly relevant in the college sport setting, where athletes are often living away from home for the first time and coaches function as surrogate parents (Berry & Howe, 2000).

Attachment was first cited as a potential factor in the coach-athlete relationship in Jowett's (2003) case study of an Olympic-level coach-athlete dyad in which the athlete described isolation, intimacy, trust, disconnection, and emotional support as relationship-specific

phenomena that caused significant distress. Building on these findings, Davis and Jowett (2010) conclude that the coach fulfills the functions of an attachment figure; that is, when the coach-athlete relationship is healthy and appropriate, a coach represents a unique beacon of comfort and safety when an athlete experiences distress. In other words, an athlete's dependence on their coach for support, direction, and encouragement through physical and emotional distress parallels that of the parent-child dyad (Jowett, 2005) and subjects the athlete to the same dynamics of other close attachment relationships. Though research that focuses on the influence of athlete attachment has been limited to studies on sport and relationship satisfaction (Davis & Jowett, 2010) and well-being (Felton & Jowett, 2015), this conceptualization of the coach-athlete relationship warrants attention in that it could explain unique differences in each athlete's willingness to report SRC symptoms accurately and honestly.

Modern conceptualization of attachment includes spectrums of attachment anxiety and avoidance. High anxiety and avoidance are typically referred to as "insecure" forms of attachment, whereas low anxiety and avoidance are representative of "secure" attachment (Brennan, Clark, & Shaver, 1998). Individuals exhibiting high attachment anxiety may up-regulate their emotional experiences, thus exaggerating their pain, distress, or injury in an attempt to experience felt security from an attachment figure (Mikulincer & Shaver, 2003). Athletes who demonstrate behaviors and feel emotions attributable to an anxious attachment style may feel somewhat conflicted when considering SRC reporting. While one might hypothesize that the anxiously attached athlete would exaggerate their symptoms to gain proximity to coach, the athlete may also be aware of consequences to communicating their distress (e.g. reduced playing time, receiving negative attention or less attention). Researchers have found that individuals high in attachment anxiety are more likely to view themselves pessimistically and have catastrophic beliefs about transactions with other people (Mikulincer & Florian, 1998). The case of the highly avoidant individual may be more clear. High avoidance is typical of individuals who down-regulate their emotions in response to attachment figures who disapprove of or respond angrily to an individual's distress (Mikulincer & Shaver, 2003). These individuals often deny worries, needs, and vulnerabilities and are often described as compulsively self-reliant; however, still experience internal distress (Mikulincer & Shaver, 2008). Avoidant athletes may distrust their coach, attempt to disconnect from their coach, do not discuss their problems with their coach and have discomfort with closeness to their coach (Davis & Jowett, 2010; 2014). In experiences of pain or distress, it is likely that athletes who have developed an avoidant attachment pattern will not seek reassurance or help from a coach. Secure attachment is evident in individuals who have positive expectations about support when they experience distress. In the case of a secure athlete, Davis and Jowett (2014) report that the athlete "knows [they] can rely on their coach" in times of distress. The authors suspect that the athletes who securely attached to their coaches are more willing to report their symptoms because they have anticipated an effective interaction with coach when in need of support.

Grounded in attachment theory, the present study is, to our knowledge, the first to investigate how the relationship between coach and athlete attachment may be associated with help-seeking behavior. We test the hypothesis that Coach-athlete Attachment Avoidance and Coach-athlete Attachment Anxiety are positively associated with and predict SRC symptom underreporting and Coach-athlete Secure Attachment is negatively associated with and predicts SRC underreporting.

Methods

Sample and Procedure

During the 2014–15 academic year, 1,333 student-athletes completed an online educational intervention unrelated to concussions, and as part of this intervention they were invited to complete a pretest and immediate posttest survey. Of the 1,333 student-athletes who were invited to participate in data collection procedures a total of 1,027 completed the pretest survey and 834 completed the posttest survey. Most participants completed the posttest survey in late fall or into the spring semester. Two hundred and eighty-four (34.1%) of the 834 student-athletes indicated that they have at some point in their life experienced symptoms of a SRC and these individuals comprised the sample for the present study. This study protocol was approved by the Institutional Review Board (IRB) of the University of North Carolina Greensboro.

Measures

Demographic and sport-related risk factors. Participant indicated their sex, age, and the organized sport in which they participate. A sport-type variable (high collision vs. low collision) was computed by using the self-identified sport participation and the NCAA's impact expectation by sport list (NCAA, 2014). For this study field hockey, football, ice hockey, lacrosse, pole vault, rugby, skiing, soccer, and wrestling were coded to be a high collision sport whereas all other sports were marked as low collision sport.

SRC experience and reporting. Participants were first asked if they had ever experienced symptoms (e.g., dizziness, brief loss of consciousness, confusion, drowsiness or feeling sluggish, blurred vision, headache, nausea or vomiting after a blow to the head) of a concussion in their lifetime. Student-athletes who reported that they had ever experienced symptoms of a concussion were then asked indicate whether they have "...ever experienced symptoms of a SRC and reported it to your coach or athletic trainer?" This dichotomous variable was then used as the dependent variable for correlational and regression analyses.

Coach Athlete Attachment Scale (CAAS). An athlete's quality of attachment within the coach-athlete relationship was primarily measured across attachment anxiety, avoidance, and secureness using the Coach-Athlete Attachment Scale (CAAS; Davis & Jowett, 2014). Davis and Jowett applied the modern theoretical understanding of attachment utilized in the widely accepted Experiences in Close Relationships Scale (ECR; Brennan et al., 1998) in their design of the CAAS. The three-factor CAAS is a 19-item measure that requires athletes to respond to statements about the quality of the coach-athlete relationship on a 7-point Likert-type scale, from strongly disagree to strongly agree. Lower scores on the anxiety and avoidance scales are indicative of a greater degree of attachment security, while higher scores indicate a greater degree of distress experienced within the coach-athlete relationship. High scores on the secure scale indicate a high degree of security. Construct validity of the three-factor CAAS and internal consistency for the Anxiety, Avoidance, and Secure subscales has been previously determined by Davis and Jowett (2014). Adequate levels of internal consistency reliability have been established for Anxiety, Avoidance, and Secure ($\alpha = .938; .966; .967$ respectively) for this sample. Example items on the CAAS include: "*I do not seek my coach out when things go*

wrong,” on the avoidance scale, “I am concerned that my coach will find another athlete that he/she prefers,” on the anxiety scale, and “I know that I can rely on my coach,” on the secure scale. Scoring of the CAAS is accomplished by calculating the mean score for items 1–7 (Avoidance), items 8–14 (Anxiety), and items 15–19 (Secureness).

Analysis

Descriptive univariate statistics for sample characteristics and SRC reporting behaviors were computed. To assess potential relationships between coach-athlete attachment (Avoidance, Anxiety, Secureness) and SRC reporting, a Spearman Rank correlation was conducted. Correlation coefficients less than $-.50$ were deemed to be an adequate negative relationship and correlation coefficients above $.50$ were deemed to be an adequate positive relationship. Due to the complications of potential collinearity between the CAAS subscales, variance inflation factors (VIFs) were examined. The threshold for identifying collinearity between CAAS constructs was a VIF greater than 10 (Belsley, Kuh, & Welsch, 1980). Next, binomial logistic regression was used to assess if coach-athlete attachment subscales significantly contribute to SRC reporting behaviors. Block entry was used to yield the most appropriate regression equation; i.e., to help determine the level of importance of each predictor variable. Assessment of each logistic regression model, as well as between model differences was accomplished by examining the percentage of correct predictions, an assessment of the percent in variance of SRC reporting (Nagelkerke R²), and an assessment of the predicted probabilities of SRC reporting (Exp [β]) of each CAAS subscale. For all analyses, p -values were considered statistically significant at $p < .05$ and were computed using SPSS version 24 (Armonk, NY: IBM Corp).

Results

Sample Characteristics

More than half of the participants were male, represented all years of athletic eligibility, and their ages ranged from 18 to 22 years ($M = 19.16$, $SD = 0.49$). Table 1 provides additional details related to sample characteristic.

Table 1. Sample Characteristics ($n = 284$)

Demographic	<i>n</i>	%
Gender		
Male	153	57.1
Female	115	42.9
Age		
18	36	13.4
19	61	22.8
20	64	23.9
21	59	22.0
22+	48	18.0
Sport type (collision)		
Collision	170	65.6
Non-collision	89	34.4
Concussion reporting		

Demographic	<i>n</i>	%
Non-report	74	26.2
Report	208	73.8

Sport-Related Concussion Incidence and Care Seeking Behavior

Table 2 presents Mean scores and Standard Deviations for SRC reporting behavior reported across each CAAS subscale.

Table 2. Mean scores for SRC reporting behavior

Variable	Non-report of SRC Symptoms M (SD)	Reporting of SRC Symptoms M (SD)
CAAS Avoidance	4.08 (1.98)	3.60 (1.78)
CAAS Anxiety	3.07 (1.71)	2.60 (1.58)
CAAS Secure	3.63 (1.82)	4.30 (1.86)

Prior to conducting correlational and regression analyses, collinearity between CAAS constructs was first assessed. Upon review of VIFs (<10), collinearity between CAAS constructs was low. Table 3 presents a correlation matrix for all variables being considered within this analysis. Significant relationships exist between the CAAS Anxious subscale and SRC symptoms reporting ($p = .034$) and between the CAAS Secure subscale and SRC symptom reporting ($p = .015$). The directionality of the correlation coefficients indicates as coach-athlete Anxiousness increases, *not* reporting SRC symptoms increase. Conversely, as coach-athlete Secureness, *not* reporting SRC symptoms decrease.

Table 3. Correlation Table: SRC Symptoms Reporting and Coach Attachment

	SRC Reporting	Avoid	Anxious	Secure
Spearman's rho				
SRC Reporting				
Correlation Coefficient	1.000			
Sig. (2-tailed)				
N	282			
Avoid				
Correlation Coefficient	.109	1.000		
Sig. (2-tailed)	.072	.		
N	271	271		
Anxious				
Correlation Coefficient	.129*	.551**	1.000	
Sig. (2-tailed)	.034	.000	.	
N	272	264	272	
Secure				
Correlation Coefficient	-.147*	-.158**	-.324**	1.000
Sig. (2-tailed)	.015	.010	.000	.
N	274	266	267	274

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Detailed results of each the regression models for SRC reporting behaviors are provided in Table 4. Model 1 presents the main effects of CAAS Secureness on SRC reporting. In this

model, 3.6% (Nagelkerke R^2) of variance is accounted for by the CAAS Secureness and based on the classification table correctly classified 73.7% of the cases. CAAS Secure significantly ($p = .008$) predicts SRC reporting ($b = -.205$, 95% CI = [.700, .948], $p = .008$). In other words, as endorsement of coach-athlete secureness increases, likelihood of *not* reporting symptoms of a possible concussion goes down.

Table 4. Logistic regression analysis of SRC Reporting ($n = 284$)^a

	<i>B</i>	Beta	95% CI for <i>b</i>	<i>p</i> -value
Model 1				
CAAS Secure	-.205	.815	(.700, .948)	.008
Constant	-.219	.803		.504
Model 2				
CAAS Secure	-.177	.838	(.715, .981)	.028
CAAS Anxious	.130	1.139	(.959, 1.353)	.139
Constant	-.694	.500		.135
Model 3				
CAAS Secure	-.178	.837	(.714, .981)	.028
CAAS Anxious	.087	1.091	(.887, 1.343)	.410
CAAS Avoidance	.068	1.071	(.889, 1.290)	.472
Constant	-.828	.437		.100

^aModel 1 Nagelkerke $R^2 = 0.036$, Model 2 Nagelkerke $R^2 = 0.048$, Model 3 Nagelkerke $R^2 = 0.055$. *b* = Unstandardized regression coefficient.

Model 2 includes both CAAS Secureness and CAAS Anxiousness. This model explained 5.2% (Nagelkerke R^2) of variance in SRC reporting and correctly classified 74.1% of the cases. In this model, CAAS Secure remained a significant predictor ($b = -.177$, 95% CI = [.715, .981], $p = .028$) of concussion reporting while controlling for CAAS Anxious. CAAS Anxious was not a significant predictor of concussion reporting. As coach-athlete attachment increases, likelihood of *not* reporting symptoms of a possible concussion went down regardless of the relationship between coach-athlete anxiety.

In the third and final model, 5.5% (Nagelkerke R^2) of variance in SRC reporting is accounted for by the CAAS Secureness, Anxiousness, and Avoidance subscales and 74.1% of the cases were correctly classified. Like the previous two models, CAAS Secure continues to be a significant predictor of SRC reporting ($b = -.178$, 95% CI = [.714, .981], $p = .028$) even while controlling for CAAS Anxious and CAAS Avoidance. CAAS Anxious and CAAS Avoidance did not significantly predict SRC reporting while controlling for the other two CAAS subscales.

Discussion

Consistent with our hypotheses, findings from logistic regression analyses suggest that athletes with secure coach attachment are significantly more likely to report symptoms of a suspected concussion. It may be helpful to interpret these findings, in part, within the context of other studies that assessed correlates of coach-athlete attachment. Davis and Jowett (2014) found that secure attachment to coach was positively associated with perceptions of social support supplied within the social environment (e.g., the extent an athlete would turn to their coach for advice about problems), relational depth, and negatively related to the degree to which athletes indicated

interpersonal conflict. It is possible that the athletes in the present study would report greater coach-athlete attachment had relationships with their coach inclusive of these interpersonal correlates reported by Davis and Jowett (2014). It may be these characteristics of the relationship, rather than the attachment itself, that is related to the reporting decision. As the athlete-coach relationship develops in a positive way, the athlete may worry less about certain possible negative outcomes of reporting symptoms of a possible concussion to their coach. For example, whereas some athlete may believe that the coach would be upset about reporting a concussion if it hurt the team's athletic performance, athletes who are more securely attached, or who have a closer interpersonal relationship, may instead believe that the coach cares more about their wellbeing as a person. This is consistent with Felton and Jowett's (2015) finding that secure athletes are less likely to think their coach will undermine their efforts to have their basic needs met. In this case, "basic needs" could be interpreted as health and safety. Additional research is needed to explore a broader range of characteristics of the coach athlete relationship, including social support and relational depth, and how it relates to care seeking behavior. Such work could also explore athlete expectancies and perceived coach expectancies related to concussion reporting.

Results suggesting that coach-athlete anxiousness and avoidance are not predictive of SRC reporting are inconsistent with our hypotheses. This was surprising as high attachment anxiousness and avoidance are negatively associated with relationship satisfaction (Davis & Jowett, 2010) and therefore we expected that it would be negatively associated with reporting behavior. Even though collinearity of the attachment constructs appears to be low (see VIFs), it is still possible that in the case of SRC symptoms reporting, high secureness rather than low secureness (as measured by CAAS Secure) is accounting for the differences in the behavior. This may be an important factor when developing future programming aimed at promoting SRC reporting behaviors. For example, interventions ought to consider the potentially important difference between promoting secure relationships versus preventing insecure relationships. Additionally, how attachment interacts with coach-mediated expectancies about SRC reporting should be explored.

Implications for Practice

Increasing concussion care seeking is an important task that can involve a multidisciplinary group of stakeholders, including members of the mental health and performance team, includes sport psychologists, counselors, psychologists, and consultants trained in serving athletes. One way that these professionals may seek to intervene to create sport cultures that are more supportive of concussion reporting is to understand and help to address coach-athlete attachment. Davis and Jowett (2014) suggest that professionals should consider the CAAS an appropriate clinical assessment to gauge athlete perceptions of their relationship with coach. In cases where coach-athlete attachment reflects a potential red flag for concussion reporting, the mental health professional may consider a range of strategies. When working one-on-one with the athlete, the professional may seek to use a knowledge of how internal working models of attachment can be reconstructed across the lifespan (e.g. Hamilton, 2000), and aim to challenge cognitions, affect, and behavior representative of insecurities in close relationships. However, in some cases the attachment may reflect dynamics of the interpersonal relationship that cannot be modified

through a change in athlete cognitions alone. In such cases, it may be useful to explore with the athlete other sources of support and attachment.

Educational materials for coaches could be developed that help support secure attachment. Given our knowledge that coach-athlete relationships characterized by negativity are predictive of athlete distress and attrition and positive relationships induce self-efficacy and healthy coping (e.g. Cote, 2002; Smith & Smoll, 2002) coaches could be provided comprehensive training that prioritizes a coach's reflection on their coaching style and educates them about how their behaviors affect their relationship with their athletes. Punitive coaching behaviors have been linked to negative athlete attitudes, whereas coaches who communicate moderate levels of encouragement are more likely to roster athletes with positive attitudes toward the coach (Smoll, Smith, & Cumming, 2007). Therefore, coaches should also be provided with training that uses Smith and Smoll's (2002) coaching guidelines for reacting to an athlete's mistakes in order to more effectively communicate with an athlete so that coach-athlete secureness is improved. Lastly, coaches may benefit from consultation with professionals (e.g., sport psychology professionals, counselors, and psychologists) working with their athletes to understand the unique attachment profile of each of their athletes in an effort to understand how performance feedback may affect an athlete's willingness to report problems.

Limitations and Future Directions

A limitation of this study is that we measured student-athlete lifetime SRC experiences, SRC reporting behaviors, and their relationship with current coaches. Student-athletes may have experienced symptoms of a SRC, and reported it or not, while playing for a different coach. That is, their current level of coach athlete attachment may not be associated to their previous reporting behaviors (i.e., when they were playing for a different coach). However, most athletes who participated in this study were not first year athletes and thus this limitation may be mitigated. We recommend that future studies investigating coach athlete attachment and SRC reporting more narrowly define the time-period of injury.

Another limitation of this study was that coach-athlete attachment data was collected in isolation from other potentially important factors related to SRC reporting. This may have contributed to the small variance in SRC reporting explained by the models in this study. Therefore, although this study highlights the important association between coach athlete secureness on SRC symptoms reporting behaviors, other potentially important factors should be included in future studies. For example, while collecting coach-athlete attachment data from student-athletes, future studies should simultaneously collect other psychological cognition data (e.g., norms, expectancies, motives, etc.) related to SRC reporting. This would allow for the testing of more comprehensive model could potentially explain greater variance in SRC reporting behaviors of student-athletes.

Conclusion

Results presented in this report provide preliminary evidence suggesting the important role coach-athlete relationships may have on SRC reporting behaviors of collegiate student-athletes. Although additional research is needed, these findings raise the potential utility for sport

psychology professionals, as well as other professionals serving student-athletes and coaches of considering the importance of the nature of the coach-athlete relationship with regards to SRC reporting. Learning more about this important relationship can help inform individual and group interventions to better support help seeking for SRC, and potentially other health challenges, among college athletes.

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