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Relationship of athletic and academic identity to concussion reporting intentions

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ABSTRACT

Background: Understanding concussed athletes' motivations for reporting concussion symptoms is important for health care professionals who are charged with the care, management, and prevention of future injury.
Objectives: To examine if athletic and academic identity predict concussion symptom reporting intentions above and beyond traditional socio-cognitive predictors.
Design: Cross-sectional study using self-report measures during the 2016 collegiate football season.
Method: In a sample of National Collegiate Athletic Association (NCAA) Division I American football athletes (N = 205) we examined the relationship of athletic and academic identity with three indices of symptom reporting behavior: reporting during a game, reporting 24 h after a game, and reporting on behalf of a teammate. We used descriptive statistical analyses, correlations, and linear regression to examine hypotheses.
Results: Controlling for traditional predictors, athletic identity was associated with a lower likelihood to report symptoms during a game ($\beta = -0.22, t = -3.28, p < .001$) or within 24 h ($\beta = -0.28, t = -4.12, p < .001$). Academic identity was positively associated with reporting intentions during a game ($\beta = 0.12, t = 1.68, p < .05$), 24 h later ($\beta = 0.13, t = 1.85, p < .05$), and on behalf of a teammate ($\beta = 0.22, t = -3.36, p < .001$).
Conclusions: Athletic and academic identities offer additional insight into athletes' motivation for concussion symptom reporting intentions, above and beyond traditional socio-cognitive predictors. Discussion focuses on the benefit of incorporating these important self-identities into educational health interventions to improve their impact.

1. Introduction

National health agencies, including those for the United States, Canada, and the United Kingdom have identified concussion as a serious public health problem, as research has shown that concussion can lead to serious health implications and even death (CDC, 2017; Canadian Government, 2017; Concussion, 2017; Taylor et al., 2017). It is estimated that at least half of concussions are not reported across all levels of sports (Asken et al., 2016; Kerr et al., 2016; Kerr et al., 2014; Llewellyn et al., 2014). Understandably, researchers have begun to identify predictors of concussion reporting behavior in order to design effective strategies to improve the rate at which athletes report suspected concussion symptoms to a coach or athletic trainer, both on their own behalf and on behalf of their teammates (Benson et al., 2013; Guay et al., 2016; Wiebe et al., 2011). American collegiate football not only has one of the highest concussion rates of all collegiate sports (Hootman et al., 2007; Zuckerman et al., 2015) but football players are often reluctant to report concussion symptoms. The most commonly cited reasons football players give for non- or under-reporting of symptoms is because they do not want to appear "weak or soft" to their coaches or to their teammates, they do not want to lose playing time, and they do not want to lose their starting position on the team (Asken et al., 2016; Kerr et al., 2016; Lininger et al., 2017). Furthermore, concussed players are not only eager to return to play (McCrory et al., 2017) after a concussion diagnosis, but they often return to play prematurely (Medina McKeon and Comstock, 2014).

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Nearly all research on predictors of concussion reporting behavior in American football players has focused on factors featured in the Integrated Behavioral Model (Montaño and Kasprzyk, 2015), such as attitudes about reporting, behavioral control, and perceived self-efficacy. In this paper, we argue that self-identity processes may help explain why athletes report, or do not report, suspected concussion symptoms. For example, the importance an athlete places on playing and athletic performance (e.g., athletic identity) appears to at least partially explain why athletes are reluctant to report concussion symptoms. Athletic and academic identities are perceptions an athlete has of him- or herself as an athlete and student. In the United States, most National Collegiate Athletic Association (NCAA) athletes strongly identify as both students and athletes (62% of women and 53% of men) (NCAA, 2013). Athletes that identify with either of these roles are making a social statement about who they are and seek acknowledgement by family, friends, and the larger social context for those roles (Brewer et al., 1993). According to Self-Identity Theory, identification with a particular role increases role-congruent behavior (Stryker and Burke, 2000). For example, athletes are more likely to endorse health behaviors and decisions that are congruent with their important self-identities (Jetten et al., 2017). Rise et al. (2010) conducted a meta-analysis on 33 studies and found that self-identity was a significant predictor of behavioral health intentions, second in strength to health-behavior-related attitudes, and distinct from past behavior. Thus, Self-Identity Theory provides the theoretical rationale as to why athletic and academic self-identities may impact concussion-reporting behavior––people are most influenced by those who support their basic psychological identity needs (Greenaway et al., 2016; Oyserman, 2015).

Understanding the role that self-identity may play in the symptom reporting process would enable health care professionals to better help these athletes prevent further injury. For example, an athlete with strong athletic identity may be less likely to report possible concussion symptoms if reporting those symptoms leads to outcomes that are at odds with his athletic goals. This idea has been supported in the few studies that have examined athletic identity and concussion reporting behavior. In a study of male ice hockey players, Kroshus et al. (2015) found that hockey players were less likely to report if they were high on athletic identity and they perceived their teammates as unsupportive of such behavior. Brewer et al. (1993) theorized that athletic identity would increase injury risk since an athlete's perception of self-worth depends on their ability to compete in athletic activity. O'Rourke et al. (2017) surveyed fifty-one youth athletes reporting to an outpatient concussion clinic. In this sample, athletes with high athletic identity reported fewer concussion symptoms over time. Relatedly, Hilliard et al. (2017) found that when injured, the need to recover quickly (and return to play) is associated with a strong athletic identity.

There are very few studies that have examined the influence of academic identity on athletic health outcomes. We reason that athletes' academic identities may be associated with less of an aversion to being immediately removed from play. The cognitive impairments associated with concussion have important implications for classroom performance and, not surprisingly, athletic programs are investing new resources to support "return-to-learn" protocols which are stepwise progressions designed to help concussed players reenter the classroom (Kerr et al., 2016). The only evidence we can find regarding the potential for a positive impact of academic identity on an athlete's decision-making process on the field comes from a recent investigation of academic and athletic identity in over 1100 athletes. Yukhymenko-Lescroart (2018a,b) reports that academic identity, and not athletic identity, is associated with more ethical playing behavior. In fact, athletes with higher levels of athletic identity showed higher levels of aggression and competitiveness, whereas higher levels of academic identity negatively predicted competitiveness and positively predicted ethic play.

American NCAA athletes receive mandated forms of education each season in order to increase the likelihood that they will report potential concussion symptoms, ideally when they first occur, but hopefully within 24 h. In general, researchers' intent on measuring concussion reporting behavior rely on self-report measures that ask players to estimate how often they have reported symptoms "in the past" or "during the last season" using self-report methodology. Research on how to improve our understanding of actual reporting behavior is in its infancy, but would benefit from more nuanced questions such as how often players report "during a game" or within a specific time frame, such as 24 h of injury (Wayment et al., 2019). In addition to reporting their own symptoms, collegiate athletes are increasingly encouraged to report teammates' possible concussive symptoms, yet this practice has been referred to as a "snitch rule" (Armstrong, 2016). In a sample of 328 male and female collegiate athletes (across 19 teams), Kroshus et al. (2016) found that players were more likely to report on behalf of a teammate or encourage him or her to seek concussion care if they believed playing with symptoms was dangerous and if they thought their teammates believed reporting was important. In their study of 193 college athletes, Davies and Bird (2015) reported that in one season (2013), 60% of their sample of 193 collegiate athletes suspected that a teammate had a concussion, but only half said that they reported their suspicion to an athletic trainer or coach. Although ours is the first study to investigate the impact of self-identity on reporting on behalf of a teammate, it is reasonable to expect that athletic identity would impede this behavior (i.e., reporting is snitching). Conversely, an athlete with a strong academic identity who believes that concussions need to be reported because of their adverse effect on brain health may be less likely to infer that a teammate's desire to play outweighs this risk or may be motivated to act altruistically on behalf of their teammate (Yukhymenko-Lescroart, 2018a).

1.1. Study objectives

In this study, we sought to examine the impact of athletic- and academic-identity on reporting behavior (during a game, 24 h later, on behalf of a teammate), controlling for well-known predictors of general reporting intentions (knowledge, attitudes, confidence in reporting and behavioral control). We postulate that the potential influence of athletic and academic identity is distinct from attitudinal and normative beliefs about concussion reporting (cf. Rise et al., 2010). Specifically, these identities may influence how athletes appraise the immediate and long-term costs and benefits of reporting symptoms that could lead to a concussion diagnosis and removal from play. We examined both the willingness to report their own suspected concussion (during a game and 24 h after a game) and their willingness to report on a teammate's behalf.

We proposed the following hypotheses:

H1. Athletic identity will be negatively associated with the intention to report concussion symptoms (a) during a game, (b) one day after game, and (c) on behalf of a teammate, controlling for the more established predictors of concussion reporting behavior (knowledge, attitudes, confidence in reporting and behavioral control).

H2. Academic identity will be positively associated with the intention to report concussion symptoms (a) during a game, (b) one day after game, and (c) on behalf of a teammate, controlling for the more established predictors of concussion reporting behavior (knowledge, attitudes, confidence in reporting and behavioral control).

H3. The interaction between athletic identity and academic identity will be positively associated with reporting intentions (a) during a game, (b) one day after game, and (c) on behalf of a teammate, controlling for the more established predictors of concussion reporting behavior (knowledge, attitudes, confidence in reporting and behavioral control). Specifically, athletes who are higher in athletic identity and lower in academic identity will be least likely to report their own and on behalf of their teammates.

2. Method

2.1. Design, participants, and setting

This correlational study utilized data collected from a sample of convenience from three NCAA Division I American football programs during and shortly after the 2016 football season (October, November, and January). Football players from three NCAA American football teams were invited to participate in our two-year study information about the longitudinal portion of the study can be found in (Craig et al., 2019). Athletes were notified about the opportunity to participate by the program coordinator in conjunction with the head athletic trainer at each institution. Email reminders were sent to each player prior to the data collection days. Prior to data collection, survey instruments were approved by institutional review boards from the primary institution (IRB #868162-1; March 1, 2016) with agreement from participating institutions. The survey consisted of standardized measures that have been used in previous research on concussion reporting behavior in samples of athletes in the United States. The survey was administered in a group setting at each participating university and took players around 30 min to complete. Players were compensated with a $10 gift card.

2.2. Measures

Demographic information: We collected information about athletes' age, race, year in college and the age at which they began playing football.

Athletic identity. We used the 10-item Athletic Identity Scale developed and validated by Brewer et al. (1993), including "Football is the most important part of my life," and "Being an athlete is an important part of who I am" (Cieslak, 2005). All items were rated on a five-point scale (1 = *strongly disagree;* 5 = *strongly agree*). A higher score on all items indicates stronger sense of athletic identity. Coefficient alpha was .89.

Academic identity. Academic identity (ACI) was measured with the Academic subscale of the Academic and Athletic Identity Scale developed and validated by Yukhymenko-Lescroart's (2014). Five items were used to rate the degree to which academic goals were central to a player's sense of self (e.g., "Being satisfied with my academic work," or "Getting good grades"). All items were rated on a five-point scale (1 = *not at all*, 3 = *somewhat important*, 5 = *extremely important*). Coefficient alpha was .96.

Concussion-related knowledge. An index of concussion-related knowledge was created with 14 items from Kroshus, Baugh, Daneshvar, and Viswanth's (2014) adaptation of Rosenbaum and Arnett's (2010) original Concussion Knowledge Index, including, "Concussions pose a risk to an athlete's well-being" and "Symptoms of a concussion can last for several weeks." All items were rated on a five-point scale (1 = *strongly disagree;* 5 = *strongly agree*) and were reverse coded as appropriate. A higher score reflected greater concussion-related knowledge. The items used for this index were previously validated by Rosenbaum and Arnett (2010).

Negative reporting attitudes. Our scale consisted of three items from the reporting attitudes scale (Kroshus et al., 2014a,b) and included "If I report what I suspect might be a concussion, my teammates will respect me" (reversed), "If I report what I suspect might be a concussion my teammates will think I made the right decision" (reversed), and "If I report what I suspect might be a concussion, my teammates will think less of me." Each item was rated on a five-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Coefficient alpha was .71.

Reporting confidence. We used a five-item scale developed and validated by Kroshus et al. (2014a,b) to assess an athlete's confidence to recognize symptoms and report those symptoms. Items included "I am confident in my ability to report symptoms of a concussion, even when I really want to keep playing," "I am confident in my ability to report symptoms of a concussion, even if I do not think the symptoms are all

that bad," and "I am confident in my ability to report symptoms of a concussion, even when I think my teammates want me to play." Each item is rated on a five-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Coefficient alpha was .92.

Perceived behavioral control. Two items from Register-Mihalik et al.'s (2013) validated measure of direct perceived behavioral control were used: "How much control do you have over reporting during the in-season," and "How much control do you have over reporting during the off-season?" Both items were rated on a five-point scale (1 = *no control*; 5 = *complete control*) and were strongly correlated, ($r = 0.79$, $p < .001$).

Intentions to report symptoms. Two items were used to measure players' tendencies to report symptoms (adapted from Torres et al., 2013). Following questions about experiences with concussion symptoms, players were asked whether they had "experienced any of these symptoms after an impact, but did not immediately tell a coach or athletic trainer (e.g., kept playing in a practice or game?)" and whether they "continued to experience any of these symptoms the day after a hit, but did not tell a coach or athletic trainer?" Respondents rated these two items using a five-point scale (1 - *not very often*; 5 = *very often*). We reversed the scores such that higher scores reflect responsible reporting behavior. Although these items ask about past behavior, we utilize this variable with the assumption these measures are likely to reflect future intentions (Albarracín and Wyer, 2000). Two items assessed willingness to report on behalf of a teammate ("If I think a teammate has sustained a concussion, I intend to encourage them to tell our coach and/or sports medicine staff," and "If I think a teammate has sustained a concussion, I intend to alert our coach and/or sports medicine staff"). These items were asked both for the in-season and off-season (an adaptation of original items; Kroshus et al., 2015). Each item was rated on a five-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Coefficient alpha was .82.

2.3. Statistical methods

All analyses were conducted using SPSS 24.0. Preliminary analyses evaluated the normality of the data using a Shapiro-Wilk test. Skewness and kurtosis estimates were in the range of normal (range: -1.13 to 1.05). The range of missing data was 2–9% and mean replacement (SPSS RMV) was used to replace missing data (Tabachnick and Fidell, 2007). General descriptive information (scale averages, SD for continuous variables and frequencies, percentages for categorical variables) were calculated among all of the study variables. We conducted separate hierarchical regression analyses to examine each type of reporting: *immediate reporting* of symptoms and reporting of symptoms *24 h later*. The four established predictors were entered at step one as controls, and both identity factors (and their interaction) were added at step two. The athletic and academic identities were centered prior to being entered into the regression analysis. We utilized a *p*-value of .05 to test hypotheses. Data are available through Open Science Framework (Wayment, 2018).

3. Results

3.1. Descriptive data

A total of 205 collegiate American football players completed surveys. The athletes were primarily either White (46%) or Black/African-American (41%), 35% of the sample were first-year students, 25% in their second year, 30% in their third year, and nearly 10% were in their final year (4th or 5th years). The average age of the sample was 19.81 (*SD* = 1.3). The average age participants began playing American football was 9.19 (*SD* = 2.82).

Table 1
Correlations among Study Variables (N = 205).

	X	SD	1	2	3	4	5	6	7	8	9
1 Knowledge	3.38	.283	–	-.157*	.089	.156*	.121	.146*	-.052	−078	.139*
2 Negative Reporting Attitudes	2.81	.388		–	-.387**	-.148*	.091	-.030	-.245*	-.167*	-.295**
3 Reporting Confidence	3.53	.799			–	.270**	.053	.133	.170*	.092	.319**
4 Behavioral Control	4.01	.975				–	.227**	.258**	.188**	.191**	.223**
5 Athletic Identity	3.80	.675					–	.096	-.201**	-.232**	.042
6 Academic Identity	4.42	.677						–	.143*	.160*	.280**
7 Report in Game	2.47	1.36							–	-.743**	-.190**
8 Report 24 h later	2.91	1.29								–	-.138*
9 Report for Teammates	3.65	.691									–

Note: All measures rated on a 5-point scale.
*p < .05. **p < .01.

3.2. Correlational data

Prior to conducting our regression analyses to test our hypotheses, we computed zero-order correlations (see Table 1). Athletic identity and academic identity were uncorrelated, $r^2(205) = 0.096$. Inspection of Table 1 reveals several significant correlations between predictor variables and our three outcomes of interest. Reporting during a game was significantly correlated with less negative reporting attitudes (-0.245, $p < .05$), reporting confidence (0.17, $p < .05$), behavioral control (0.19, $p < .01$), lower athletic identity (-0.20, $p < .01$), and greater academic identity (0.14, $p < . 05$). The pattern was nearly identical for reporting 24 h after a game. Reporting symptoms on behalf of a teammate was positively correlated to concussion knowledge (0.14, $p < .05$), less negative reporting attitudes (-0.30, $p < .01$), more reporting confidence (0.32, $p < .01$), greater behavioral control (0.22, $p < .01$), and academic identity (0.28, $p < .01$). Reporting on behalf of a teammate was negatively correlated with reporting intentions during a game or 24 h later (-0.19, $p < .01$, -0.14 $p < .05$, respectively). If players were willing to report on behalf of a teammate, they were somewhat lwess likely to report on their own behalf.

3.3. Hypothesis testing

We predicted that three types of concussion reporting intentions (during game, 24 h later, on behalf of teammates) would be negatively correlated with athletic identity and positively correlated with academic identity. We conducted three sets of regression analyses. To simplify the presentation of our results, and to allow for a comparison of the regression results across all three outcome measures, we present all statistical information regarding the regression results in Table 2.

For our model predicting *immediate reporting*, the model at step one was significant, $F(4,200) = 5.45***R^2_{adj} = 0.08$, and three of the four established predictors were significant. Concussion knowledge and negative attitudes were negatively correlated with immediate reporting and behavioral control was positively correlated with immediate reporting. Reporting confidence was not correlated with reporting. The fully nested model that included both identity variables was also significant, $F(7,197) = 5.31***R^2_{adj} = 0.13$. As predicted, athletic identity was negatively correlated with immediate reporting above and beyond the established predictors (H1a). Academic identity was also positively correlated with immediate reporting (H1b). The interaction term of athletic identity by academic identity was not significant (H1c).

For our model predicting *reporting symptoms 24 h after injury*, the model at step one was significant, $F(4,200) = 3.02*$ $R^2_{adj} = 0.04$, and two of the four established predictors were significant predictors of delayed reporting: negative attitudes were negatively correlated, and behavioral control was positively correlated, with reporting symptoms 24 h after injury. Concussion knowledge and reporting confidence were unrelated to delayed reporting. The fully nested model (including both identity variables) was significant, $F(7,197) = 4.80***R^2_{adj} = 0.12$. As

predicted, after controlling for established predictors, athletic identity was negatively correlated with reporting symptoms *24 h after* the injury (H1b) and academic identity was positively correlated with reporting of symptoms (H2b). The interaction term of athletic identity by academic identity was not significant (H2c).

Our final regression analysis tested our hypothesis that athletic identity would be negatively correlated, and academic identity positively correlated, with a *willingness to report on behalf of a teammate*, after controlling for established predictors of concussion reporting behavior. The model at step one was significant, $F(4,200) = 9.44***R^2_{adj} = 0.14$, and two of the four established predictors were correlated with willingness to report on behalf of a teammate. Willingness to report on behalf of a teammate was inversely correlated with negative reporting attitudes but positively correlated with reporting confidence and behavioral control. Concussion knowledge was unrelated to a *willingness to report on behalf of a teammate*. The fully nested model with both self-identity variables included was significant, $F(7,197) = 7.26***R^2_{adj} = 0.18$. Contrary to expectation, athletic identity was unrelated to the outcome variable (H3a). Yet, in line with our prediction, academic identity was positively correlated with *willingness to report on behalf of a teammate* (H3b). The interaction term of athletic identity by academic identity was not significant (H3c).

4. Discussion

The objective of this study was to examine if self-identity measures could assist our understanding of whether athletes are more or less willing to report potential concussion symptoms using three different measures of reporting intentions: during a game, 24 h after a game, and on behalf of a teammate. After controlling for well-known predictors of concussion reporting intentions (i.e., behavioral control, reporting confidence, attitudes toward the behavior), we found that players with stronger athletic identities were less likely to report symptoms during a game or 24 h later. Athletic identity was unrelated to reporting on behalf of a teammate. These results underscore what other researchers have found, namely, that athletes' desire to play is one of the most important reasons they are reluctant to report possible concussion symptoms during a game, 24 h later, or on behalf of a teammate. However, our results suggest that this pattern appears to be less true for athletes with stronger academic identities. Thus, interventions that appeal to an athlete's longer-term educational and health goals could be valuable additions to existing mandated concussion education programs. Finally, although not the main goal of our study, our results also add to the existing literature on predictors of concussion reporting intentions in that we found that behavioral control was the most consistent predictor of all three reporting outcomes, we found mixed results for self-efficacy and attitudes about reporting (Montaño and Kasprzyk, 2015), and we found that concussion-related knowledge was unrelated to concussion reporting behavioral intentions.

Table 2
Summary of regression results.

	Step One				Step Two			
	B	SE B	β	t	B	SE B	β	t
Report during Game[a]								
Concussion Knowledge	-.556	.329	-.12	− 1.69*	-.508	.325	-.11	− 1.56
Negative Attitudes about Reporting	-.768	.258	-.22	− 2.98**	-.661	.254	-.19	− 2.60**
Reporting Confidence	.089	.128	.05	.699	.094	.125	.05	.720
Behavioral Control	.222	.098	.16	2.26*	.258	.101	.18	2.57**
Athletic Identity					-.305	.093	-.22	− 3.28***
Academic Identity					.165	.093	.12	1.68*
Athletic * Academic Identity					.033	.077	-.03	.431
Report 24 h after Injury[b]								
Concussion Knowledge	.138	.318	.03	.433	.210	.309	-.05	.679
Negative Attitudes about Reporting	-.468	.249	-.14	1.88*	-.338	.242	-.10	1.40
Reporting Confidence	-.017	.123	-.01	-.137	-.010	.119	-.01	.087
Behavioral Control	.221	.095	.17	2.33*	.269	.096	.20	2.81**
Athletic Identity					-.365	.090	-.28	− 4.12***
Academic Identity					.163	.089	.13	1.85*
Athletic * Academic Identity					.022	.074	-.02	.30
Report on Behalf of Teammates[c]								
Concussion Knowledge	.173	.161	.07	1.07	.109	.160	.05	.682
Negative Attitudes about Reporting	-.323	.126	-.19	− 2.60**	-.349	.125	-.20	− 2.78**
Reporting Confidence	.178	.063	.21	2.85**	.164	.052	.19	2.67**
Behavioral Control	.092	.048	.129	1.90 +	.057	.050	.08	1.16
Athletic Identity					.006	.046	.01	.129
Academic Identity					.154	.046	.22	3.36***
Athletic * Academic Identity					.020	.038	.033	.512

Notes: + p < .10. *p < .05. **p < .01. ***p < .001.
[a] Step One Model: $F(4,200) = 5.45***R^2_{adj} = .08$; Step Two Model: $F(7,197) = 5.31***R^2_{adj} = .13$.
[b] Step One Model: $F(4,200) = 3.02* R^2_{adj} = .04$; Step Two Model: $F(7,197) = 4.80***R^2_{adj} = .12$.
[c] Step One Model: $F(4,200) = 9.44***R^2_{adj} = .14$; Step Two Model: $F(7,197) = 7.26***R^2_{adj} = .18$.

4.1. Limitations

There are several methodological limitations: 1) our sample represents only three American NCAA Division I football programs (all male athletes), 2) the data were cross-sectional and captured only a snapshot in time, and 3) we used self-report measures of behavioral intentions that are not necessarily related to behavior. Another limitation was our adaption of the outcome measures. These should be validated with athletes in future investigations. These limitations diminish the generalizability of our results to other American football leagues, other sports, and to female athletes. Although our findings show that athletic identity was related to being less likely to report during a game or 24 h later, it would be premature to believe, however, that athletic identity is only associated with risky behavior or unhealthy practices (e.g., tough athletes learn to play with pain). Finally, in our sample, athletic and academic identity were uncorrelated, contrasting those reported by Yukhymenko-Lescroart (2018a,b) among Division I athletes from twelve different sports. Future research is still needed on the measurement of important identities in athletes. The self-concept reflects multiple identities and includes a number of characteristics (Stryker, 1987). Future research that can better characterize the many elements of athletic identity would allow for the cultivation of those elements in athletic identity that could be harnessed for their influence on protective behavior (e.g., teammates looking out for one another) (Kroshus et al., 2016).

4.2. Interpretation

Our results suggest that important self-identities could aid our understanding of an athlete's motivation to report concussion symptoms for themselves and on behalf of a teammate. Athletic identity was related to less willingness to report concussion symptoms during a game or within 24 h. These results support previous research showing that one of the main reasons for not reporting potential concussion symptoms is due to the desire to play, a behavior we presume is associated with a strong athletic identity. Given that athletic trainers and other medical personnel are well-positioned to identify and treat concussions during competition (Savage and Covassin, 2018), and players may be more likely to self-report symptoms during practice (Baugh et al., 2014; Houck et al., 2016; Kerr et al., 2018; Wayment et al., 2019), we suggest a few practical implication of our research. First, information about how athletic identify may influence symptom reporting could be integrated into concussion education curriculum for athletic trainers, and other medical professionals who treat concussion. In line with the recent Berlin Concussion in Sport Group Consensus Statement, more financial support could be used to provide training for medical personnel, independent consultants, trainers and spotters to insure adequate capacity to observe high-risk impacts during competition (Patricios et al., 2018). Another idea would be to improve methods by which symptoms could be detected by health professionals post-game day. Our results also suggest that an important point of intervention may be to strengthen athletes' academic self-identity as a potential source of motivation to engage in a health protective behavior. Academic identity is likely to be facilitated by effective academic mentors and athletic programs that are supportive of academic progress (cf., Kerr et al.'s 2014 recommendation for athletic institutions to support academic goals). Finally, ours is perhaps the first study to examine predictors of reporting on behalf of a teammate, a relatively recent recommendation designed to help increase the number of diagnosed concussions. Reporting confidence, behavioral control, and academic identify were positively associated with this type of reporting. In interviews with athletic trainers (see Lininger et al., 2019), we learned that athletic trainers occasionally learn about potential concussions from players with whom they have a trusting relationship. The recommendation to report "a teammate" may be unlikely unless the reporting athlete has a trusted relationship with the athletic trainer. Reporting on behalf of a teammate may reflect an athlete's willingness to abide by institutional rules (to report) and the influence of future, non-

football goals associated with an academic identity. Increasing calls for athletes to report potential symptoms on behalf of their teammates would benefit from further investigation.

5. Conclusion

We argue that athletic identity may be associated with a reluctance to report potential concussion symptoms. To the extent that athletes want to play, then reporting a head injury or possible concussion symptoms during a game is at odds with athletic identity goals, especially if the athlete perceives that playing with pain is part of the game (Petrie et al., 2014) or that symptoms do not interfere with playing (Sanderson et al., 2017). Those working with concussed athletes seek to not only care and manage concussion injuries, but also help athletes minimize further injury. Our results suggest that prevention-related messages should consider self-identities and identity-related goals that may help an athlete minimize their future concussion risks. A clearer understanding of athletes' multiple identities, goals, and motivation could have important implications for preventing the occurrence of poor neurocognitive performance associated with multiple concussions.

Declarations of interest

None.

Data availability statement

Data are available in a text file, accompanied by meta data in a word document at https://osf.io/ux3a9/.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.msksp.2019.04.003.

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