



## Concussion reporting, sex, and conformity to traditional gender norms in young adults

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### ABSTRACT

This study assessed whether between-sex differences in concussion reporting intention and behavior among young adults are explained by the extent to which the individual conforms to traditional masculine norms that often characterize contemporary sport culture. A survey of college athletes in the United States ( $n = 328$ ) found greater symptom reporting intention among females as compared to males, but no difference in their likelihood continued play while experiencing symptoms of a possible concussion. Greater conformity to the norms of risk-taking was associated with greater likelihood of continued play while symptomatic among female athletes but not among male athletes. These findings suggest that gendered behavior, rather than biologically determined sex, is an important consideration for concussion safety in this age group. Addressing elements of the contemporary sport ethos that reinforce risk taking in service of athletic achievement may be a relevant direction for interventions aimed at improving injury reporting among all athletes.

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## 1. Introduction

Concussions are an important concern among the many male and female athletes who participate in contact and collision sports (Graham, Rivara, Ford, & Spicer, 2014; Marar, McIlvain, Fields, & Comstock, 2012; Rosenthal, Foraker, Collins, & Comstock, 2014). In the short-term, a concussion may cause cognitive, somatic and emotional symptoms that limit the injured athlete's ability to successfully engage in activities of daily life such as attending school (Moser, Schatz, & Jordan, 2005). While most patients with concussion recover fully, individuals who have sustained multiple concussions are at elevated risk of lasting memory deficits, mental health challenges, and potentially neurodegenerative disease (Gardner,

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Iverson, & McCrory, 2014; Iverson, Echemendia, LaMarre, Brooks, & Gaetz, 2012; Kerr, Marshall, Harding, & Guskiewicz, 2012; Kerr et al., 2014). Continued sport participation while symptomatic after a concussion can prolong neurologic recovery (Majerske et al., 2008). The consequences of concussion may be further magnified, and in some cases result in catastrophic injury, when an individual sustains additional brain trauma before full recovery from the initial injury (Boden, Tacchetti, Cantu, Knowles, & Mueller, 2007; Prins, Alexander, Giza, & Hovda, 2013). Because many symptoms of a concussion are difficult to detect by observation alone (McCrory et al., 2013), the critical secondary prevention behavior of post-injury removal from play often relies on honest disclosure of symptoms to a coach or medical personnel. Unfortunately, among athletes at all ages many concussions go unreported and undiagnosed (Meehan, Mannix, O'Brien, & Collins, 2013). For college athletes, concussion-related care seeking occurs in an environment in which there is often a heightened level of independence as compared to high school. Whereas parents are encouraged to help identify if their adolescent child is experiencing symptoms of a concussion (Lin et al., 2015), this is less relevant among young adult children who are attending college and often living independently for the first time. Being able to care for one's body, one aspect of which may include seeking care for a suspected concussion, can be viewed part of the successful transition to adulthood and adult-centered healthcare (Lugasi, Achille, & Stevenson, 2011; Pai & Ostendorf, 2011; Schwartz, Tuchman, Hobbie, & Ginsberg, 2011).

In general, female athletes are more likely to be diagnosed with a concussion than are male athletes in sports played under same rules (Covassin & Elbin, 2011; Dick, 2009; Gessel, Fields, Collins, Dick, & Comstock, 2007; Marar et al., 2012; Rosenthal et al., 2014). For example, in soccer the rate of diagnosed concussions among high school athletes is seven per 10,000 exposures to a game or practice among females and four per 10,000 exposures among males (Rosenthal et al., 2014). Possible explanations include physiologic sex differences, and differences in behavior that may be patterned by sex. Relevant physiologic sex differences may include head size, neck muscle strength, and head-neck stabilization (Covassin, Elbin, Harris, Parker, & Kontos, 2012; Covassin, Elbin, Larson, & Kontos, 2012). In support of a physiologic explanation are findings that concussed females experience greater neuropsychological deficits relative to baseline testing than do males, with different symptom profiles and more severe and longer lasting symptoms (Covassin, Elbin, Harris et al., 2012; Covassin, Elbin, Larson et al., 2012; Frommer et al., 2011). Alternatively or in addition, the difference could be a function of sex-patterned behavior, with female athletes possibly more likely to disclose their symptoms and seek medical care for a suspected concussion than male athletes (Harmon et al., 2013). In support of this hypothesis, one study of 262 college athletes found that more male athletes than female athletes indicated that they would be unlikely to report symptoms of a future concussion to a coach, athletic trainer, or teammate (Torres et al., 2013).

Understanding why some athletes fail to report suspected concussions is not as simple as determining whether or not they have adequate concussion knowledge, operationalized as the ability to identify symptoms of a concussion (Chrisman, Quitiquit, & Rivara, 2013; Kroshus, Baugh, Daneshvar, & Viswanath, 2014; Register-Mihalik et al., 2012). Knowledge can be viewed as a necessary but not sufficient precondition for reporting these symptoms. Beyond knowledge, expectancy value theories that presume rational decision-making, such as the Theory of Planned Behavior (Ajzen, 2011) have been used to frame much of the existing research related to concussion reporting (e.g., Chrisman et al., 2013; Kroshus et al., 2014; Register-Mihalik et al., 2013). Within this framework, intentions about reporting are viewed as a proximal predictor of reporting behavior. Significant correlates of concussion reporting intentions include expectancies about reporting, concussion reporting norms, and perceived pressure related to reporting (Chrisman et al., 2013; Kroshus et al., 2014; Kroshus, Kubzansky, Goldman, & Austin, 2015; Kroshus, Garnett, Hawrilenko, Baugh, & Calzo, 2015; Register-Mihalik et al., 2013). However, one of the few prospective studies on this topic finds that concussion reporting intention explains only a very small fraction of variability in whether or not an athlete continues to play their sport while experiencing symptoms of a suspected concussion (Kroshus, Baugh, Daneshvar, Nowinski, & Cantu, 2015). This may be because intentions influence behavior through a deliberative decisional process. When in conditions of high arousal or emotion, such as in the middle of a competition, decisions are more likely to be reactive and associative, and future-oriented and deliberative cognitions such as intentions tend to have relatively minimal influence on behavior (Figner, Mackinlay, Wilkening, & Weber, 2009; Reyna & Farley, 2006; Tracey, 2003; Vast, Young, & Thomas, 2010). Consequently, an athlete's decision about whether or not to continue play while experiencing symptoms immediately post-injury may be made using a different cognitive schema than their decision about whether to seek care once outside of the physiologically arousing and emotional game setting. Studying reporting behavior in the immediate post-injury period is particularly important in an adolescent and young adult population given ongoing maturational processes related to response inhibition and emotion regulation (Steinberg, 2005).

Concussion reporting may best be conceptualized as a product of the triadic reciprocal relationship between the individual athlete, their environment, and their behavior, as outlined in Bandura's Social Cognitive Theory (Bandura, 2004). The athlete's environment can be conceptualized at levels ranging from their interpersonal interactions with teammates, to the broader culture in which they live. In general, in many sports environments, and particularly those at more competitive levels, there is substantial positive reinforcement for winning. Traditionally masculine role norms that help achieve that goal, such as taking risks and playing through pain and injury, are thus highly valued and positively reinforced (Atkinson, 2010; Fenton & Pitter, 2010; Fogel, 2011; Roderick, 2006; Waldron & Krane, 2005). However, the sport environment may look and feel systematically different for different athletes, depending in part on their sex and gender expression (Calzo et al., 2014), in ways that may be related to their concussion reporting intentions and potentially to their behaviors. Interpersonal interactions between athletes and coaches and between teammates can provide information about what behaviors are valued, and what the social or competitive penalty will be for non-conformity with specific behaviors. Thus, conformity to traditionally masculine norms such as risk-taking, self-reliance, and winning may be conceptualized as distal predictors of previously identified predictors of

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