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Concussion under-reporting and pressure from coaches, teammates, fans, and parents



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ABSTRACT

Concussions from sport present a substantial public health burden given the number of youth, adolescent and emerging adult athletes that participate in contact or collision sports. Athletes who fail to report symptoms of a suspected concussion and continue play are at risk of worsened symptomatology and potentially catastrophic neurologic consequences if another impact is sustained during this vulnerable period. Understanding why athletes do or do not report their symptoms is critical for developing efficacious strategies for risk reduction. Psychosocial theories and frameworks that explicitly incorporate context, as a source of expectations about the outcomes of reporting and as a source of behavioral reinforcement, are useful in framing this problem. The present study quantifies the pressure that athletes experience to continue playing after a head impact—from coaches, teammates, parents, and fans—and assesses how this pressure, both independently and as a system, is related to future concussion reporting intention. Participants in the study were 328 male and female athletes from 19 teams competing in one of seven sports (soccer, lacrosse, basketball, softball, baseball, volleyball, field hockey) at four colleges in the northeast region of the United States. Results found that more than one-quarter of the sample had experienced pressure from at least one source to continue playing after a head impact during the previous year. Results of a latent profile mixture model indicated that athletes who experienced pressure from all four of the measured sources were significantly more likely to intend to continue playing in the future than were athletes who had not experienced pressure from all sources, or only pressure from coaches and teammates. These findings underscore the importance of designing interventions that address the system in which athletes make decisions about concussion reporting, including athletes' parents, rather than focusing solely on modifying the individual's reporting cognitions.

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More than eight million adolescent and emerging adults participate in organized competitive sport at the high school or collegiate level in the USA on an annual basis (NCAA, 2013; NFHS,

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2014). Concussions, a mild traumatic brain injury that can result from contact with another athlete, equipment, or the playing surface are being increasingly recognized as a frequent injury in many sports (Daneshvar et al., 2011; Marar et al., 2012; Rosenthal et al., 2014). Although symptoms of most concussions resolve in less than two weeks (Eisenberg et al., 2014), during this period of time the somatic, cognitive and emotional symptoms sustained can interfere substantially with an athlete's activities of daily living and can pose a significant health burden (Kontos et al., 2012; Prichep

et al., 2013). In some cases, the neurologic consequences may extend across the life course (Kerr et al., 2012, 2014; McCrory et al., 2013a; Seichepine et al., 2013). Ongoing efforts to reduce the public health burden of concussions from sport span multiple levels, ranging from attempting to modify individual safety behaviors to changing the rules of sports to reduce exposure to potentially injurious head impacts (Benson et al., 2013; Graham et al., 2014; McCrory et al., 2013b).

One critical risk reduction strategy is ensuring that athletes who sustain a potentially concussive impact are immediately removed from play and receive medical evaluation (Benson et al., 2013; Kerr et al., 2014; Meier et al., 2014). Many symptoms of a concussion, such as confusion or dizziness, are not easily observable (Echlin et al., 2010; Moreau et al., 2014). Consequently, even if there is a trained medical professional on the sidelines of the game or practice, immediate removal from play is often to at least some extent contingent on athlete self-report. The concussed brain is in a metabolically vulnerable state during which additional impacts can have magnified neurologic consequences, including in some cases death or permanent deficits (Borden et al., 2007; Prins et al., 2013). Despite the importance of the safety behavior of timely symptom reporting, many athletes—at all ages and levels of competition—fail to report post head impact symptoms and continue playing their sport with a concussion (Baugh et al., 2014c; Delaney et al., 2002, 2015; Kaut et al., 2003; Kroshus et al., 2014c; Llewellyn et al., 2014; McCrea et al., 2004; Meehan et al., 2013; Register-Mihalik et al., 2012; Torres et al., 2013; Williamson and Goodman, 2006).

Prior research has found that constructs from the Theory of Planned Behavior (TPB; Ajzen et al., 2011) can help explain between-individual variability in concussion reporting (Chrisman et al., 2013; Kroshus et al., 2014a; Register-Mihalik et al., 2012; Register-Mihalik et al., 2013). Concussion reporting intention is associated with reporting behavior in prospective analyses (Kroshus et al., 2014b), and expectancy value cognitions such as perceived norms and attitudes have been found to be associated with reporting intentions (Kroshus et al., 2014a; Register-Mihalik et al., 2012, 2013). However, much of the variability in both intention and reporting behavior is still left unexplained by the TPB model (Kroshus et al., 2014a). A criticism of individually oriented theories such as TPB is that they ignore the important role of context. Chrisman et al. (2013) proposed using an expanded TPB model, in which environment interacts with reporting intentions to influence symptom reporting. Building on this model, perhaps a more inclusive framework for elucidating the individual's experience making concussion reporting decisions in consideration of contextual influences, is Bandura's Social Cognitive Theory (SCT; Bandura, 2004). SCT outlines a triadic reciprocal relationship between individual-level psychological determinants of behavior (such as cognitions, affect, and biological events), environmental factors, and behavior (Bandura, 2004).

The athlete's environment can thus be conceptualized as influencing their reporting behavior directly or by informing their cognitions about the expected outcomes of reporting and the extent to which important referent groups value these behaviors (outcome expectations). These expectations and perceived norms can be learned from the athlete's environment in a variety of ways (observational learning). When an athlete sustains a potentially concussive impact, their interactions with others in their athletic environment—such as teammates, coaches, parents and perhaps even fans—provide critical opportunities for behavioral reinforcement that can inform their future reporting-relevant cognitions and decisions (reciprocal determinism). Chrisman and colleagues found evidence of this feedback model, between coach response to concussion reporting and future concussion reporting behavior, in

the experiences of high school athletes with whom they conducted qualitative interviews (2013). However, cognitions about the expected outcomes of reporting a concussion need not necessarily be based on an individual's own experiences with injury. This learning process may also be based on observational learning over the course of an athletic career, with observation not limited to the athlete's teammates. Media representations of how high profile athletes behave or “should” behave when it comes to concussion can also provide information about what behaviors are likely valued in the athlete's sport context (Anderson and Kian, 2012; McGannon et al., 2013). Caron et al. (2013) have described how former professional ice hockey players often hid concussive symptoms from teammates and coaches. The authors suggest that the players may have been trying to act in ways that they perceived to be normative for their masculine sport culture. Thus, reporting behavior may also arise based on a desire to conform to perceived group norms and avoid social sanction for deviating from these norms, as opposed to any explicit communication based on actual deviant behavior.

Guided by SCT, the present study focuses on one particular dimension of environment–athlete interaction as it pertains to concussion reporting: the pressure that athletes experience from individuals in their sport environment to continue playing with symptoms after a possible concussion. Register-Mihalik et al. (2013) have called for the study of how pressure from teammates, coaches and parents is related to concussion reporting behavior. The construct of “pressure”—to not report symptoms of a concussion, to continue playing with symptoms of a concussion, or to return to play with symptoms of a concussion—has been invoked by a number of authors, without explicit definition (e.g., Chrisman et al., 2013; Doolan et al., 2012; Laker, 2011; Llewellyn et al., 2014; Meehan and Bachur, 2009; Register-Mihalik et al., 2013). Pressure to play through injury has been described more extensively for injuries other than concussion (e.g., Niven, 2007; Nixon, 1994, 1996; Roderick et al., 2000; Young et al., 1994; Young and White, 1995). The present study uses Niven's (2007) conceptualization of the pressure that athletes feel during injury recovery, which is described as a product of social and competitive pressures. A key concept here is that pressure is an internal experience, in response to external demands. Consistent with SCT's construct of reciprocal determinism and Cialdini and Goldstein's (2004) description of the individual differences in the impact of overt and covert social influence on behavior, individual appraisals of these environmental demands may vary based on individual characteristics and prior experiences.

The pressure that athletes experience from individuals or groups around them to continue playing while symptomatic after a concussion may be delivered directly or indirectly, and be explicit or implied. In some cases it may be related to the construct of perceived behavioral norms, from the Theory of Planned Behavior. When individuals experience a gap between their behaviors and how they believe a referent group would behave, they can experience an internal pressure to modify their beliefs or behaviors out of a desire for social approval (Cialdini and Goldstein, 2004). However, the extent to which an individual is motivated to make their behavior consonant with norms varies by their extent of identification with the referent group, or the extent to which the referent group represents an aspirational self-concept (Abrams and Hogg, 1990). For athletes, this likely means teammates or other athletes in their sport; prior research has found a significant association between perceived teammate or athlete norms about concussion reporting and concussion reporting intentions and behavior (Kroshus et al., 2014c; Register-Mihalik et al., 2013). However, social pressure from groups with whom an athlete does not identify or aspire to emulate can also influence behavior,

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