



## Original research

## Concussion history and reporting rates in elite Irish rugby union players

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## ABSTRACT

**Objectives:** To determine the self-reported, seasonal rates of concussion and the reporting practices among Irish rugby union players.**Design:** Descriptive epidemiology study.**Setting:** The study was conducted at the training grounds of four professional Irish rugby union clubs.**Participants:** One hundred seventy-two players ( $24.97 \pm 4.11$  years of age,  $13.49 \pm 5.79$  years playing experience) gave consent to participate.**Main outcome measures:** Number of concussions reported during the 2010–2011 season, reasons for not reporting, and positions of concussed players.**Results:** Forty-five percent of players reported at least one concussion during the 2010–2011 season, but only 46.6% of these presented to medical staff. The reasons for not reporting their concussions included, not thinking the injury was serious enough, and not wanting to be removed from the game. The relative proportion of concussions was higher for backs than forwards; however, the severity of injury was greater for forwards. Scrum-halves (12.0%) and flankers (10.9%) accounted for the majority of concussions reported.**Conclusions:** The self-reported rate of concussion in elite rugby union players in Ireland is higher than reported in other countries or other sports. Many concussions remain unreported and, therefore, unmanaged. However, recent changes in concussion management guidelines by the International Rugby Board may impact future reporting practices of players.

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## 1. Introduction

Rugby union is a dynamic contact sport requiring players to perform a variety of open and closed skill activities in a game environment. Worldwide, there are 3.5 million participants, with 118 Unions participating as members governed by the International Rugby Board (IRB) (IRB, 2010). The sport is particularly popular in Ireland, where there are over 150,000 registered participants across all levels of play (IRFU, 2011). Owing to the physical nature of the game, players are at risk for concussion.

The incidence of concussion in rugby union across various levels of play has been shown to range from 4.5% to 25% of all injuries

(Bathgate, Best, Craig, & Jamieson, 2002; Bird, Waller, Marshall, Alsop, Chalmers, & Gerrard, 1998; Marshall & Spencer, 2001; McIntosh, McCrory, Finch, & Wolfe, 2010). In a comparison study between collegiate American football players and club-level rugby union players from New Zealand, Marshall and colleagues reported that rugby union players sustained three times as many injuries (Marshall, Waller, Dick, Pugh, Loomis, & Chalmers, 2002). In addition, the most common injury in these players was to the head, accounting for 19% of all injuries.

Investigations of elite-level rugby union players in South Africa, Australia, and New Zealand have reported concussion rates of 5–23% per season (Holtzhausen, Schweltnus, Jakoet, & Pretorius, 2006; Seward, Orchard, Hazard, & Collinson, 1993; Shuttleworth-Edwards et al., 2008). In addition, concussion rates in male professional sports were reported highest among rugby union players at 9.05 concussions per 1000 player exposures (Tommasone & Valovich McLeod, 2006). A recent survey of U-20 rugby union

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players in Ireland observed that 48% reported a history of sustaining at least one concussion during the season investigated (Baker, Devitt, Green, & McCarthy, 2013).

The risk of sustaining a concussion in rugby union has been shown to vary by position. For instance, it has been reported that forwards, who partake in the more physical aspects of the game including set pieces, rucks, and mauls, are more prone to concussion injuries (Bathgate et al., 2002; Best, McIntosh, & Savage, 2005; Bird et al., 1998; Bottini, Poggi, Luzuriaga, & Secin, 2000; Fuller, Brooks, Cancea, Hall, & Kemp, 2007; Quarrie, Alsop, Waller, Bird, Marshall, & Chalmers, 2001). However, other investigations have found that backs, who are involved in high-speed tackles and collisions due to the nature of their role in play, demonstrate a greater rate of concussion compared to forwards (Brooks, Fuller, Kemp, & Reddin, 2005a; Kemp, Hudson, Brooks, & Fuller, 2008; Quarrie & Hopkins, 2008). The severity of injury, as measured by days out of play, and player position has also been examined with Brooks et al. reporting that backs had higher concussion incidence rates (4.9/1000) compared to forwards (4.0/1000); however, forwards had more severe concussions (14 days absent from play) compared to backs (10 days absent from play) (Brooks et al., 2005a).

Concern has been expressed regarding the underreporting of concussion among players, which has been documented to be as high as 53–62% in sports such as soccer and American football (Broglio, Vagnozzi, Sabin, Signoretti, Tavazzi, & Lazzarino, 2010; McCrea, Hammeke, Olsen, Leo, & Guskiewicz, 2004). A study examining concussion in high school rugby union players determined that of the 62% of athletes who sustained a concussion, 20% did not report their injury (Sye, Sullivan, & McCrory, 2006). Baker and colleagues found that 48% of U-20 Irish rugby union players believe they had sustained a previous concussion; however, 44% of them failed to report their injury (Baker et al., 2013). Previous investigations have found that the most common reasons for failing to report a concussion include: not thinking it was serious enough; not wanting to leave the game; believing that concussions are part of the game; not realizing it was a concussion; and not wanting to let down their teammates (Broglio et al., 2010; McCrea et al., 2004).

Although the rate of concussion in elite rugby union players has been examined in other countries, there are currently no reported concussion statistics for these players in Ireland. Therefore, the objectives of the current investigation were to examine the self-reported rates of concussion and reporting practices among elite-level players affiliated to the Irish Rugby Football Union (IRFU). In addition, we wanted to determine whether player position was related to concussion rates and severity.

## 2. Methods

This study was conducted following international ethical guidelines for biomedical research involving human subjects as outlined by the World Health Organization (CIOMS, 2002). Institutional Review Board approval was granted prior to the commencement of the study. Participants for this investigation included players from the four professional-level provincial teams representing each of the provinces of Ireland that comprise the IRFU (Connacht, Leinster, Munster and Ulster). The European rugby union season typically begins in late August and concludes at the end of May. Throughout the course of the season, each of the four Irish provincial teams plays intermittently against each other and other European provincial rugby teams in the Pro12 League and the European Rugby Cup. Players from these teams may also play in international tournaments including the 6 Nations and Rugby World Cup for the Irish National team.

Managers for each team were contacted to schedule times to meet with the players and distribute the surveys at the end of the

2010–2011 season (June, 2011). Surveys were administered to the players during a team meeting held at each team's respective training ground in an attempt to maximize response rates. The study was explained to the players, following which signed informed consent was obtained and the surveys were administered. Coaches and medical staff were asked to leave the meeting room while the players completed the surveys in an attempt to limit player-response bias (Guskiewicz et al., 2005). The surveys took approximately 10–15 min to complete. The completed surveys were collected and returned to the investigators.

The survey (Appendix A) was modeled on previously published investigations and designed to examine the players' concussion history (Broglio et al., 2010; McCrea et al., 2004). The survey provided the players with a representational definition of concussion and a list of common concussion signs and symptoms defined previously (Broglio et al., 2010; McCrea et al., 2004; McCrory et al., 2009). They were then asked to provide details of their concussion history and reporting practices during the 2010–2011 season.

Data analyses were conducted using SPSS software (SPSS, Chicago, IL) with an a priori significance level set at  $p < 0.05$ . Descriptive statistics are provided for demographic data. Due to reports in the literature suggesting that players are more susceptible to concussion based on position (Bathgate et al., 2002; Best et al., 2005; Bird et al., 1998; Bottini et al., 2000; Brooks et al., 2005a; Fuller, Molloy, et al., 2007; Kemp et al., 2008; Quarrie et al., 2001; Quarrie & Hopkins, 2008), descriptive statistics and mean comparisons were used to determine the positions most at risk. Descriptive analyses were also provided for number of concussions, severity (as a measure of days removed from play), whether the concussions were reported to coaching or medical staff, and if not, what reasons were provided for failing to do so.

## 3. Results

One hundred and seventy-two players from the four professional teams representing the four provinces that comprise the IRFU participated in this investigation. This represented 80.4% ( $N = 214$ ) of all professional-level players affiliated with the IRFU at the time of this investigation. Not all of these players answered every question of the survey. Therefore, the data presented are relative to the valid responses. Participants included 36 (20.9%) players from Team 1, 49 (28.5%) from Team 2, 50 (29.1%) from Team 3, and 37 (21.5%) from Team 4. Players had a mean age of  $24.28 \pm 3.67$  years, height of  $1.86 \pm 0.08$  m, weight of  $101.10 \pm 11.83$  kg, and playing experience of  $14.55 \pm 4.71$  years. ANOVA indicated that there were no statistical differences ( $p = 0.05$ ) in these variables between the provincial teams. All player positions were represented, with 102 (59.0%) forwards and 70 (41.0%) backs (Table 1).

The survey asked players to report their concussion history for the 2010–2011 season. Seventy ( $N = 156$ , 44.9%) players indicated sustaining at least one concussion. Overall, players reported a total of 92 concussions during the 2010–2011 season, with twenty-one ( $N = 65$ , 32.3%) sustaining more than one concussion. The players indicated that they sustained one ( $N = 44$ ), two ( $N = 16$ ), three ( $N = 4$ ), or four ( $N = 1$ ) concussions, whilst 5 players who reported a concussion did not indicate the number sustained. The mean number of concussions for those players who sustained a concussion was  $1.42 \pm 0.68$ . Players reported concussion symptoms lasting an average of  $3.15 \pm 5.10$  days and they were removed from play for an average of  $5.30 \pm 8.65$  days (Table 2).

Players were asked to indicate whether or not they disclosed to anyone (e.g. medical or coaching staff, etc.) the concussions they sustained during the 2010–2011 season. The responses indicated that 47 concussions were reported ( $N = 88$ , 53.4%). When asked to

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