

### 323 INCREASED CERVICAL STRENGTH IS ASSOCIATED WITH REDUCED HEAD IMPACT MAGNITUDE IN INTERNATIONAL BLIND FOOTBALL

<sup>1,2</sup>Daniel Fitzpatrick, <sup>3</sup>Peter Thompson, <sup>2</sup>Courtney Kipps, <sup>1</sup>Nick Webborn. <sup>1</sup>University of Brighton, Brighton, UK; <sup>2</sup>University College London, London, UK; <sup>3</sup>The Football Association, Burton Upon Trent, UK

10.1136/bjsports-2021-IOC.295

**Background** Blind Football has the highest rate of injury of any Paralympic sport. Head injuries, including concussion, represent a large proportion of these injuries. Blind athletes are less able to anticipate impacts. It has been shown in other sports that athletes with greater neck strength are better able to resist head impacts in a laboratory, and that they are less likely to sustain a concussion.

**Objective** To establish whether isometric neck strength influenced head impact forces in Blind Football.

**Design** Observational study.

**Setting** International Blind Football training and matches over six-months.

**Patients (or Participants)** England Blind Football squad (7 males, mean age 28.6y)

**Interventions (or Assessment of Risk Factors)** Isometric neck strength was measured once during preseason using a hand-held dynamometer. Head impact data was recorded using a head mounted accelerometer and gyroscope (GForce Tracker) attached to player's mandatory blindfolds.

**Main Outcome Measurements** Head impact location (front, back, left or right) was recorded. Linear regression was performed to compare mean linear acceleration and rotational velocity to isometric cervical strength (flexion, extension, left lateral flexion and right lateral flexion) with movements paired to the impact direction they oppose.

**Results** A total of 212.5 player hours were recorded (192.5 hours in training and 20 hours in matches). Increased cervical strength was associated with reduced mean linear acceleration ( $R^2 = 0.1912$ ,  $p = 0.020$ ) when comparing opposing movement to respective impact location. There was no association between cervical strength and rotational velocity ( $R^2 = 0.001$ ,  $p = 0.861$ ) or between number of impacts ( $R^2 = 0.4354$ ,  $p = 0.1068$ ).

**Conclusions** Elite Blind Football players with greater cervical strength were subject to head impacts with smaller linear acceleration. This is consistent with existing research in able-bodied athletes and provides an additional factor of the live game play setting in Blind Football. Further research is required to determine if cervical strength training can reduce the risk of concussion in Blind Footballers.

### 324 LIFETIME PREVALENCE AND ONE-YEAR INCIDENCE OF SPORT-RELATED CONCUSSION IN ADOLESCENTS

<sup>1,2,3</sup>Jocelyn McCallum, <sup>1,2,3,4,5,6,7</sup>Carolyn Emery, <sup>1,2,3</sup>Paul H Eliason, <sup>1,2,3,7,8</sup>Kathryn Schneider, <sup>1,2,3</sup>Amanda M Black. <sup>1</sup>Sport Injury Prevention Research Centre, Faculty of Kinesiology, University of Calgary, Calgary, Canada; <sup>2</sup>Hotchkiss Brain Institute, Cumming School of Medicine, University of Calgary, Calgary, Canada; <sup>3</sup>Alberta Children's Hospital Research Institute, Cumming School of Medicine, University of Calgary, Calgary, Canada; <sup>4</sup>Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Canada; <sup>5</sup>Department of Pediatrics, Cumming School of Medicine, University of Calgary, Calgary, Canada; <sup>6</sup>O'Brien Institute for Public Health, Cumming School of Medicine, University of Calgary, Calgary, Canada; <sup>7</sup>Sport Medicine Centre, University of Calgary, Calgary, Canada; <sup>8</sup>Evidence Sport and Spinal Therapy, Calgary, Canada

10.1136/bjsports-2021-IOC.296

**Background** Understanding the burden of concussion among youth is important to quantify the effectiveness of community-based concussion prevention strategies.

**Objective** To determine the lifetime prevalence and one-year incidence of sport-related concussion among male and female high school students (ages 14–19 years) in Alberta, Canada.

**Design** Cross-sectional survey.

**Setting** High schools (Alberta, Canada).

**Participants** High school students (n=2029; 958 male, 1048 female, 23 identified as 'other'; ages 14–19 years) from 24 schools.

**Assessment of Risk Factors** High school students completed a web-based survey during class (October 2018 – March 2019). Students identified the top three sports for participation in the past year.

**Main Outcome Measurements** Self-reported lifetime prevalence and one-year incidence of sport-related concussion were described by sex and sport with 95% confidence intervals (CI) adjusted for cluster by school.

**Results** Most high school students (1763/2029, 86.69%) reported participating in a sport/recreational activity in the past year. Of the 1,971 students (97.14%) answering the question about lifetime concussion history, 264/923 males [28.60% (95% CI, 21.97–36.31)], 227/1027 females [22.10% (95% CI, 17.96–26.89)], and 3/21 'other' students [14.29% (95% CI, 2.22–55.05)] reported one concussion or more. 131/923 males [14.19% (95% CI, 10.28–19.27)], 99/1027 females [9.64% (95% CI, 7.49–12.33)], and 1/21 'other' students [4.76% (95% CI, 0.46–35.28)] reported at least one concussion in the past year. For males, hockey [32/186, [Incidence Proportion(IP):17.20/100 students/year (95% CI, 12.48–23.23)], lacrosse [4/29, IP: 13.79/100 students/year (95% CI, 5.27–31.52)], and rugby [8/61, IP: 13.11/100 students/year (95% CI, 6.02–26.24)] had the highest rates of concussion. For females, ringette [4/21, IP: 19.05/100 students/year (95% CI, 9.92–33.46)], rugby [9/58, IP: 15.52/100 students/year (95% CI, 8.04–27.84)], and wrestling [3/25, IP: 12.00/100 students/year (95% CI, 3.68–32.76)] had the highest rates.

**Conclusions** 1 in 4 high school students report one or more sport-related concussions in their lifetime, and 1 in 9 students reported one or more concussions in the past year. Prevention strategies aimed at reducing concussion burden are crucial.

### 325 CONCUSSION KNOWLEDGE AND EXPERIENCE AMONGST FOOTBALL REFEREES IN ENGLAND

<sup>1,2</sup>Craig Rosenbloom, <sup>3</sup>Carmody Sean, <sup>4</sup>Irfan Ahmed, <sup>1</sup>Beasley Ian, <sup>2</sup>Cowie Charlotte. <sup>1</sup>Queen Mary University of London, London, UK; <sup>2</sup>The Football Association, Burton-on-Trent, UK; <sup>3</sup>Chelsea Football Club, London, UK; <sup>4</sup>Homerton University Hospital, London, UK

10.1136/bjsports-2021-IOC.297

**Objective** Football players are at risk of sustaining sport-related concussions (SRC). In 2015 The Football Association (The FA) in England released guidelines promoting recognition of SRC and immediate removal from the sporting environment as an important strategy in reducing SRC associated morbidity. The responsibility to safeguard players with a suspected concussion includes all stakeholders in the game, and this extends to referees. To date, referees' experience and knowledge of concussion with particular reference to The FA concussion guidelines is unknown.