Interventions (or Assessment of Risk Factors) In total 47 matches by basketball team A (9 players) and 41 matches by team B (7 players) were performed throughout the season. All training sessions and matches were executed as prescribed by the training and coaching staff without interference or manipulation.

Main Outcome Measurements The Oslo Sports Trauma Research Center (OSTRC) Questionnaire on Health Problems was used to collect data on injuries and illnesses on a weekly basis. Furthermore, players filled in s-RPE and duration for each training and match. Prevalence’s, severity scores, time-loss and total weekly load were compared for 1-match weeks and ≥2-match weeks. The data were analyzed using multilevel modeling.

Results Prevalence of injuries and illnesses were 18.1% and 4.6% for 1-match weeks and 17.2% and 3.3% for ≥2-match weeks. Severity scores and time-loss were not significantly different for 1-match weeks compared to ≥2-match weeks. Total weekly load was lower during ≥2-match weeks compared to 1-match weeks.

Conclusions No significant differences for injuries and illnesses were observed between 1-match weeks and ≥2-match weeks. Coaches appeared to reduce training load to compensate for multiple matches during short-term match congestion.

EVALUATION OF IN-EAR SENSOR SYSTEMS FOR QUANTIFYING HEAD IMPACTS IN YOUTH FOOTBALL

Background Wearable sensor systems have the potential to quantify head kinematic responses of head impacts in football. However, on-field use of sensors (e.g. accelerometers) remains challenging due to factors such as poor coupling to the head.

Objective To test the validity of a novel in-ear sensor for quantifying head-impact exposure in youth football.

Design Descriptive laboratory study/validation study.

Setting Youth football.

Participants Six male youth football players (15.3±0.3 years).

Evaluations In step 1, the sensor was mounted to a Hybrid III headform (HIII) and impacted with a linear impactor or foot-impact. Evaluations were obtained from both systems. In step 2, six youth soccer players wore sensors during a structured training protocol including heading and non-heading exercises; in step 3, they completed two regular football sessions. For each recorded accelerative event, PLA outputs were compared to video.

Main Outcome Measurements In step 1, random and systematic error were calculated using HIII as reference. In steps 2 and 3, mean values (±SD) were calculated for (1) all heading and (2) all non-heading events. Receiver operating characteristic curves were used to determine the sensor’s discriminatory capacity in both on-field settings, and cut-off values for predicting outcomes were identified.

Results In step 1, random and systematic error were both 11% for PLA. In step 2, heading events resulted in higher absolute values (PLA=15.6±11.8g) than non-heading events (PLA=4.6±1.2g); area under the curve (AUC) was 0.98. In step 3, AUC was >0.99. A 9g cut-off value yielded a positive predictive value of 100% in the structured training protocol vs. 65% in regular football sessions.

Conclusions The in-ear sensor displayed considerable random error and overestimated head impact exposures substantially. It showed excellent on-field accuracy for discriminating headings from other accelerative events, but secondary means of verifying events are still necessary.
introducing injury prevention measures. Males are more frequently exposed than females, heading rates increase with age, and there is substantial variation between players. Heading is a rare event in the youngest age groups, especially among females.

Background The relationship between head impact dose and observable functional deficits remains unclear. While studies have almost exclusively examined American football athletes, in Olympic athletes there are almost no data that explore this relationship.

Objective We aimed to use an impact monitoring mouthguard (IMM) to quantify head impact doses in Olympic and non-Olympic sports, identifying high-energy impacts on video as ‘no-go’ per the NFL protocol.

Design Retrospective meta-analysis from American football, basketball, boxing, ice hockey, karate, lacrosse, mixed martial arts, rugby, tae-kwon-do, soccer.

Setting Sporting field

Patients (or Participants) 4500 impacts over 800 player-games.

Interventions (or Assessment of Risk Factors) Impact doses where the athlete was observed as ‘no-go’.

Main Outcome Measurements Kinetic energy transfer (KE), risk-weighted exposure (RWE), peak scalar linear acceleration (PLA), peak scalar linear velocity (PLV), peak scalar angular acceleration (PAA), peak scalar angular velocity (PAV), impact location, impact direction, ‘No-go’ status.

Results The median KE, RWE, PLA, PAA, PLV and PAV was 5 J, 0.0002, 20 g, 1500 rad/s^2, 10 rad/s and 1.5 m/s, respectively. American football athletes sustained the highest energy impact doses, boxers and mixed-martial artists sustained the highest cumulative dose for a day of competition. Ice hockey had the highest rate of ‘no-go’ impacts versus total impacts collected. Karate had the highest rotational kinematics. Of the nine (9) highest energy impacts to the front of the head, all were ‘no-go’ impacts. Of the top eight (8) highest energy impacts to the sides of the head, none were ‘no-go’ impacts.

Conclusions ‘No-go’ observations occurred in high energy impact doses to the rear and the sides of the head, while similar impact doses to the forehead seemed tolerable. Prospective Olympic athlete impact monitoring could help identify risky exposures.