

The Incident of Concussion across Popular American Youth Sports: A Retrospective Review

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Abstract : Introduction: A leading cause of emergency room visits among youth (in the United States), is sports-related traumatic brain injuries. Mild traumatic brain injuries (mTBIs), also called concussions, are caused by linear and/or angular acceleration experienced at the head and represent an increasing societal burden. Due to the developing nature of the brain in youth, there is a great risk for long-term neuropsychological deficiencies following a concussion. Accordingly, the purpose of this paper is to investigate incidence rates of concussion across gender for the five most common youth sports in the United States. These include basketball, track and field, soccer, baseball (boys), softball (girls), football (boys), and volleyball (girls). Methods: A PubMed search was performed for four search themes combined. The first theme identified the outcomes (concussion, brain injuries, mild traumatic brain injury, etc.). The second theme identified the sport (American football, soccer, basketball, softball, volleyball, track, and field, etc.). The third theme identified the population (adolescence, children, youth, boys, girls). The last theme identified the study design (prevalence, frequency, incidence, prospective). Ultimately, 473 studies were surveyed, with 15 fulfilling the criteria: prospective study presenting original data and incidence of concussion in the relevant youth sport. The following data were extracted from the selected studies: population age, total study population, total athletic exposures (AE) and incidence rate per 1000 athletic exposures (IR/1000). Two One-Way ANOVA and a Tukey's post hoc test were conducted using SPSS. Results: From the 15 selected studies, statistical analysis revealed the incidence of concussion per 1000 AEs across the considered sports ranged from 0.014 (girl's track and field) to 0.780 (boy's football). Average IR/1000 across all sports was 0.483 and 0.268 for boys and girls, respectively; this difference in IR was found to be statistically significant ($p=0.013$). Tukey's post hoc test showed that football had significantly higher IR/1000 than boys' basketball ($p=0.022$), soccer ($p=0.033$) and track and field ($p=0.026$). No statistical difference was found for concussion incidence between girls' sports. Removal of football was found to lower the IR/1000 for boys without a statistical difference ($p=0.101$) compared to girls. Discussion: Football was the only sport showing a statistically significant difference in concussion incidence rate relative to other sports (within gender). Males were overall more likely to be concussed than females when football was included (1.8x), whereas concussion was more likely for females when football was excluded. While the significantly higher rate of concussion in football is not surprising because of the nature and rules of the sport, it is concerning that research has shown higher incidence of concussion in practices than games. Interestingly, findings indicate that girls' sports are more concussive overall when football is removed. This appears to counter the common notion that boys' sports are more physically taxing and dangerous. Future research should focus on understanding the concussive mechanisms of injury in each sport to enable effective rule changes.

Keywords : gender, football, soccer, traumatic brain injury

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