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Evaluation of Head Impact Exposure between One Season of Youth Versus High School Football

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CONTEXT

An estimated 1.2 million youth aged 6-14 play tackle football each year, however, there remains a paucity of evidence quantifying the magnitude and cumulative nature of head impact exposure as well as concussion incidence in this age group.

OBJECTIVE

The purpose of this study was to compare head exposure data and concussion incidence on a cohort of youth football players (YFB) relative to varsity high school football players (HS) over the course of one competitive season to determine differences in head impact exposure.

DESIGN

Prospective cohort.

SETTING

One season of YFB (grades 7 & 8) and one season of HS football (grades 10-12).

PARTICIPANTS

A total of 14 YFB (aged 13.02 +/- 0.66 years) and 28 HS (aged 17.46 +/- 0.83 years) athletes participated in this study.

INTERVENTION

Head impact was recorded using the GForce Tracker™ (GForce Tracker, Markham, Ontario) accelerometer device affixed to the inside of each football helmet. The accelerometers recorded linear acceleration and rotational velocity of the head by directly measuring three axes of linear and angular acceleration. During each practice and game, the athletic trainer activated the

accelerometers and monitored the real-time transmission of impact data displayed on a laptop via telemetry. The start and end times of each exposure were recorded, and only accelerations recorded within that time window were aggregated from each participant's accelerometer data.

MAIN OUTCOME MEASURE

Athlete exposures (AE), concussion incidence, average number of impacts per player during games and practices, and the average number of impacts over 100g per player during practice and games.

RESULTS

YFB participants amassed a total of 438 AE (105 game and 333 practice exposures) versus HS 1425 AE (272 game and 1153 practice). YFB had one reported concussion (incidence rate 2.28 per 1000AE). There were three reported concussions among the HS (incidence rate 2.02 per 1000AE). Independent samples *t* tests revealed that for practice, HS had significantly more total impacts per player per practice compared to YFB ($p = .04$). For games, HS had significantly more total impacts and impacts over 100g per player per game compared to YFB ($p = .007$, $p = .04$, respectively) (Figure 1).

CONCLUSION

We hypothesize that the increased mass and acceleration of HS, relative to YFB, contributed to the increased 100g impacts observed during games. The increased total impacts for HS, relative to YFB, during practice and games may be due to increased

confidence and willingness to be exposed to contact. Concussion incidence was similar for both groups. Future work is needed to determine if these age-level group differences

affect brain structure/function and or clinically diagnosed concussion incidence.

KEY WORDS: head impact, concussion, football, brain injury

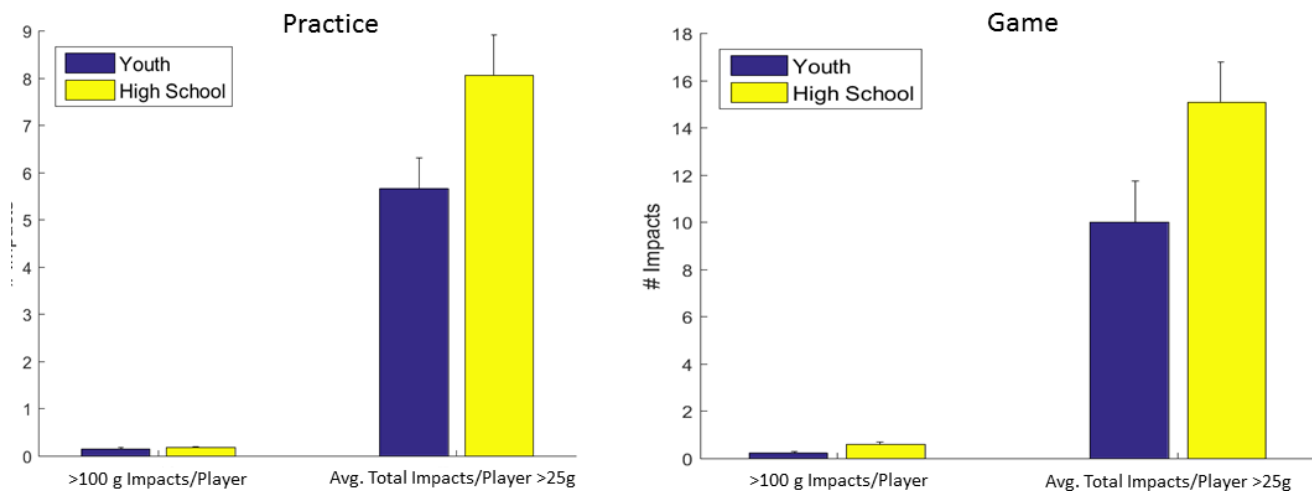


Figure 1: Represents the average number of impacts per player greater than 100g and the average total number of impacts per player greater than 25g for both practice and game situations