

## Head Impacts in youth soccer are comparable to American Football

**Background:** Research has unequivocally demonstrated that females and youth soccer players are at a significant high risk of concussion. Recently, concerns for “heading” have been raised due to possible adverse neurological effects. While head impact accelerations and rotations have been investigated in American football, head impacts in youth soccer have not been rigorously studied. The purpose is to measure impact accelerations that result from different heading scenarios during youth soccer games.

**Methods:** 16 players on an U-14 female youth soccer team were fitted with headbands instrumented with wireless sensors (GForceTracker, Artaflex Inc., Markham, Ontario, Canada) during eight soccer games. All games were video recorded to characterize heading scenario. Peak linear acceleration, and peak rotational velocity were recorded for each header.

**Results:** A total of 126 header impacts were recorded, and long-range kicks accounted for 40% of all headers. Average header peak linear acceleration was 16.78 g and ranged from 7.96 g (ball deflection) to 38.62 g (drop kick). Average header peak rotational velocity was 1063 °/s and ranged from 37 °/s (long-range kick) to 2791 °/s (long-range kick).

**Discussions and conclusions:** Header accelerations experienced by youth players depend on game scenario with largest impact accelerations from drop kicks and long-range kicks. Although the number of head impacts is smaller in soccer compared to American football, the impact magnitudes are comparable.

**Interdisciplinary Reflection:** While the measured head accelerations are below injury thresholds, these data provide insight into the magnitude of head impacts in soccer and possible contribution to long-term cognitive deficits.