

## 20. SWACSM Abstract

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### Angular Impulse of the Whole Body During American Football Long Snapping

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#### ABSTRACT

Long snapping is found in American football, and the goal is to have the ball reach the punter as quickly and accurately as possible so they can kick the ball downfield with minimal interference from the opposing team. Little research has been performed on the whole body kinetics of long snapping. **PURPOSE:** To describe the differences in angular impulse between high school and college athletes during the act of long snapping. **METHODS:** This study compared high school long snappers (n=5) and college long snappers (n=5). Whole group average age ( $18.9 \pm 1.3$  years), years of long snapping experience ( $5.1 \pm 1.65$  years), and body mass ( $99.6 \pm 7.5$  kg) were measured. One force plate was located under each foot (Kistler, 1200 Hz), and a left sagittal video (Apple, 30 Hz) was taken. Center of mass (CM) was calculated according to de Leva's body segment parameters (1996). The interval of interest began with a rise in posterior force and ended as posterior force decreased to zero. Sagittal plane resultant force and kinematic data were used to calculate whole body moments about the center of mass. The area under the moment-time curve defined the angular impulse and was normalized by mass. Independent t-tests were used to determine differences between college and high school athletes ( $\alpha = 0.05$ ). **RESULTS:** Angular impulse ( $p=0.98$ , college= $0.019 \pm 0.015$  Nms/kg, high school= $0.018 \pm 0.033$  Nms/kg) and average moment ( $p=0.61$ , college= $113.99 \pm 75.63$  Nm, high school= $133.46 \pm 191.27$  Nm) were similar between groups. Resultant force ( $p = 0.74$ ) as well as the angle between force and position vectors ( $p = 0.65$ ) displayed no difference. However, there were differences in the distance from CM to center of pressure ( $p=0.02$ , college= $0.79 \pm 0.015$  m, high school= $0.84 \pm 0.035$  m), as well as in time ( $p=0.045$ , college= $0.153 \text{ s} \pm 0.026$ , high school= $0.139 \text{ s} \pm 0.026$ ). **CONCLUSION:** The whole body angular impulse observed was positive – rotating the body counterclockwise to throw the ball posteriorly between the legs. There is a difference in how the two groups generated this counterclockwise motion as high school players had longer position vectors but took less time in the push phase compared to college players. Future research analyzing snap performance measures as it relates to long snap kinetics could provide insights into more effective strategies to produce this movement.