

# Relationships Between Demographics, Neurocognitive Measures and Near Point Convergence in Pediatric and Adolescent Concussion Patients

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**Purpose:** To describe relationships between near point convergence (NPC), patient characteristics and clinical findings among pediatric patients evaluated for concussion.

**Methods and Study Design:** Athletes 8 to 18 years, presenting within 3 days of a sport-related concussion (SRC) to one of 3 primary care sports medicine clinics in a large urban/suburban practice from December 2014 to October 2015 were enrolled in an IRB-approved, prospective cohort. A standardized visit included clinical interview and exam, symptom checklist, the Immediate Post-Concussion and Cognitive Test (ImPACTTM), and visual-vestibular screening. Univariable and multivariable statistics were used to assess the association between NPC and neurocognitive outcomes, controlling for age and gender. NPC was recorded as a continuous variable (3 trial average), and was dichotomized as “normal” ( $\leq 5$  cm) versus “abnormal” ( $> 5$  cm).

**Results:** One hundred thirty-one patients met study inclusion (mean age =  $14.3 \pm 2.0$  years; 57% male). Mean NPC was  $5.7 \pm 6.5$  cm (range = 1.3-40.0 cm), and 39 (31%) were considered abnormal ( $> 5$  cm). Younger patients had greater NPC scores ( $r = -0.21$ ;  $P = 0.02$ ) with patients aged 8 to 14 having higher average NPC scores compared to those 15+ ( $6.8 \pm 7.8$  cm vs  $4.5 \pm 4.3$  cm;  $P = 0.04$ ). There was no difference in NPC by gender ( $6.3 \pm 7.1$  cm vs  $4.9 \pm 5.5$  cm;  $P = 0.23$ ), history of head injury ( $5.4 \pm 4.1$  cm vs  $6.3 \pm 3.9$  cm;  $P = 0.53$ ), or total symptom score ( $r = 0.05$ ;  $P = 0.55$ ). There was no association between dichotomized NPC and any ImPACTTM composite score when controlling for patient age and gender ( $P > 0.05$ ).

**Conclusions:** There is a significant relationship between patient age and average NPC, with older patients having lower NPC. NPC is not closely associated with patient gender, history of head injury, total symptom score, or ImPACTTM composite scores.

**Significance of Findings:** Clinicians should consider age when assessing NPC during SRC evaluation. New age-specific cut points for “normal” and “abnormal” convergence may need to be considered.

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