DIFFERENCES IN PERFORMANCE ON THE ANTISACCADE TASK IN FOOTBALL ATHLETES DURING CHILDHOOD AND LATE ADOLESCENCE


Injury Biomechanics Laboratory, Department of Biomedical Engineering, Duke University

Introduction

- To date, few studies on saccadic eye movements in children and adolescents exist, especially those with mild traumatic brain injury (mTBI) suffered in a sports-related environment.
- Antisaccade (AS) task in particular may be able to objectively assess for mTBI or the effects of subconcussive loading by comparing baseline to follow-up performance.
- AS tasks engage areas including the prefrontal cortex (PFC).
- Quantifying performance with oculomotor assessments may help to understand which brain regions may be injured during a mTBI or affected due to subconcussive loading.
- Age-based differences in oculomotor system response resulting from differences in brain development are also of importance when considering the use of an assessment modality across ages.

Methods

- Participants: high school football team males (n=92; age 13-18 YRS) and Pop Warner football team males (n=34; age 5-10 YRS).
- Saccadic eye movement data collected using EyeLink 1000 system (SR Research, Canada) with binocular eye tracking at 1000 Hz (monocular: 2000 Hz).
- AS data taken at baseline (before the start of the football season).
- AS metrics: latency and number of wrong-way trials.
- ANOVA and post hoc statistical tests.
- This is one element of a larger study that includes other oculomotor modalities, biomechanics, athletic exposure, Standardized Assessments of Concussion, etc.

The Antisaccade and the Brain

- The percentage of correct AS showed statistical significance (p<0.05) between (1) the youngest age group and (2) the 16-18.9 year old age group and all younger age groups.
- Baseline data indicates there is a statistical difference between age groups in the average latency from the correct and WW trials.
- The latency data for correct AS trials shows that the oldest age group had the shortest latency.
- The oldest two age groups showed the shortest corrected latency.
- The youngest age group had the lowest percentage of correct AS trials and the highest percentage of WW trials.
- These results from the percentage of correct and WW trials may suggest that the younger group was less likely to inhibit the reflexive prosaccade in accordance with development of the higher-order cortices in the PFC.
- Alternatively, the trend could be due to a misunderstanding of the AS task by the younger cohort.
- Greater number of correct trials with older age matches previous studies.
- This is the first time working with this population for this study, which is scheduled to continue into a second year where additional baseline data will be acquired to increase this sample size.

Results

- There were no statistical differences (p>0.05) between the 8-10.9 year old age group and the 14-15.9 year old age group.
- The latency data for correct AS trials shows that the oldest age group had the shortest latency.
- The oldest two age groups showed the shortest corrected latency.
- The youngest age group had the lowest percentage of correct AS trials and the highest percentage of WW trials.
- These results from the percentage of correct and WW trials may suggest that the younger group was less likely to inhibit the reflexive prosaccade in accordance with development of the higher-order cortices in the PFC.
- Alternatively, the trend could be due to a misunderstanding of the AS task by the younger cohort.
- Greater number of correct trials with older age matches previous studies.
- This is the first time working with this population for this study, which is scheduled to continue into a second year where additional baseline data will be acquired to increase this sample size.

References

7. SR Research (Figure 3: http://www.sr-research.com/hardware.shtml)

Acknowledgements

- Duke Institute for Brain Sciences
- Duke Bass Connections Brain & Society
- Duke Injury Biomechanics Laboratory
- Cardinal Gibbons High School
- Durham Eagles Athletic Association