

# Results for concussion sideline vision tests may vary when English is a second language

February 24 2016

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Popular sideline vision tests used to help detect immediate signs of concussion may present challenges in the interpretation of results for athletes who speak English as a second language (ESL).

Researchers at NYU Langone Medical Center's Rusk Rehabilitation, in a new study, showed vision test times were significantly slower for healthy study participants who were non-native English speakers compared with native English speakers. In addition, the computerized eye tracker used in the study also showed that the number of rapid [eye movements](#), known as saccades, were significantly higher in the ESL group than the native English speakers.

These findings could have important implications, the researchers say, particularly amid growing evidence of vision testing's potential to positively detect concussions on sidelines and its increasing use at games and practices.

"These results highlight important disparities that language has on results of sideline vision testing, which are becoming more utilized in sports," says study co-author Joel Birkemeier, MD, a postdoctoral research fellow at NYU Langone's Rusk Rehabilitation. "When performing sideline vision tests, clinicians and trainers may need to first take into account how language may affect score results."

The research was recently presented at the February, 2016 annual meeting of the Association of Academic Physiatrists (AAP) Annual

Meeting in Sacramento, Calif. The study results are considered preliminary until publication in a peer-reviewed journal.

Approximately 4 million sports-related concussions occur each year in the United States, with long-term consequences on brain function a growing concern among those who play contact sports. From 2001 to 2009, the rate of emergency department visits for sports and recreation-related injuries with a diagnosis of concussion rose 57 percent among children under age 19, according to the Centers for Disease Control and Prevention.

## **How the Study Was Conducted**

For the study, 54 people - 27 native English speakers, and 27 ESL speakers - were evaluated with a computerized version of a vision test known as the King-Devick (K-D) Test. Patients ranged in age from 24 to 52 years old, with Spanish and Chinese being the most common native languages in the ESL group.

In the K-D test, participants are asked to rapidly read numbers presented in irregular patterns from left to right and top to bottom on three test cards, displayed in serial fashion. Times for all three readings are added together, and then that number is compared with a baseline score taken before the season: slower testing times and more errors when reading the numbers may indicate that a concussion has occurred.

Previous studies suggest approximately 50 percent of the brain's pathways are tied to vision, and K-D tests are used increasingly to provide coaches, trainers and parents a clue that an athlete should be removed from play and seen by a medical professional. Furthermore, previous research led by NYU Langone showed that the K-D test detects concussion 86 percent of the time among youth, collegiate and professional athletes tested.

In this particular study, researchers utilized a novel, infrared-based eye-tracking device called the EyeLink. The EyeLink tracks eye movements while the participants look at a computer interface that contains the number sequences used in the K-D test. NYU Langone researchers are using this device to develop biomarkers for concussion and other neurological conditions.

The study participants also completed a Bilingual Dominance Scale survey, which measured how dominant they were in their primary, non-English language as opposed to their secondary, English language.

In addition to slower test times among the ESL group, the results showed that the 'rest' time between saccadic eye movements was significantly longer for the ESL group compared to the native English speaking group. These results might be reflective of the time needed to process and say each number, according to the researchers. The total number of saccades for the ESL group was also significantly higher than the native English speaking group. Participants who were less dominant in their primary language, according to the survey, performed the vision tests quicker.

Future research will look closer at whether sideline vision testing in other languages influences results, as well as how other demographic characteristics affect the results of the test.

"Regardless of native language, if vision testing is performed properly where an athlete is tested before the season and after a suspected head injury, a drop in score should still suggest that he or she should be removed from play. In situations where baselines are not available, and scores are judged against average sideline test results, the comparisons become more precarious. We hope this initiates dialogue on multilingualism in sideline concussion screening," says lead study author John-Ross Rizzo, MD, assistant professor of rehabilitation medicine and

neurology at NYU Langone and director of the Visuomotor Integration Laboratory at NYU Langone's Rusk Rehabilitation. "Until the research answers these questions, the bottom line remains - when there's any doubt if an athlete sustained a concussion during play, take the athlete out."

Provided by New York University School of Medicine

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