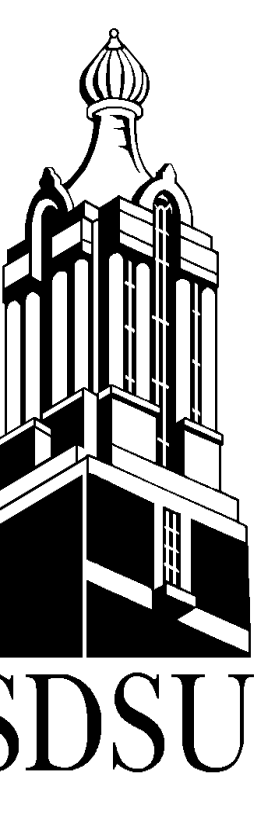# TEST-RETEST RELIABILITY OF THE KING-DEVICK TEST IN AN ADOLESCENT POPULATION

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CONTEXT

- King-Devick (KD) Test is a gross screening tool designed to assess for saccadic rhythm of oculomotor function.
- KD is recommended for use in sideline and continued assessment following sport concussion.
- Prior research has demonstrated significant learning effects/limited test-retest reliability in a pediatric population (<12yo) and in an adult population (>18yo).
- Test-retest reliability of the King-Devick test has not been established for use in an adolescent population (12-18yo).

OBJECTIVES

(1) Examine test-retest reliability of the King-Devick test over time in a healthy adolescent sample.
(2) Investigate effect of gender on the test-retest reliability of the King-Devick test over time.
(3) Investigate effect of age on the test-retest reliability of the King-Devick test over time.

WHY ESTABLISH TEST/RETEST RELIABILITY

- Establishing test-retest reliability over clinical timeframes will assure clinicians who use the KD to assess impairments post concussion that if impairments are identified, they are due to the condition, rather than poor reliability of the test itself.

SETTING/DESIGN

- A repeated measures design completed in the secondary school setting.
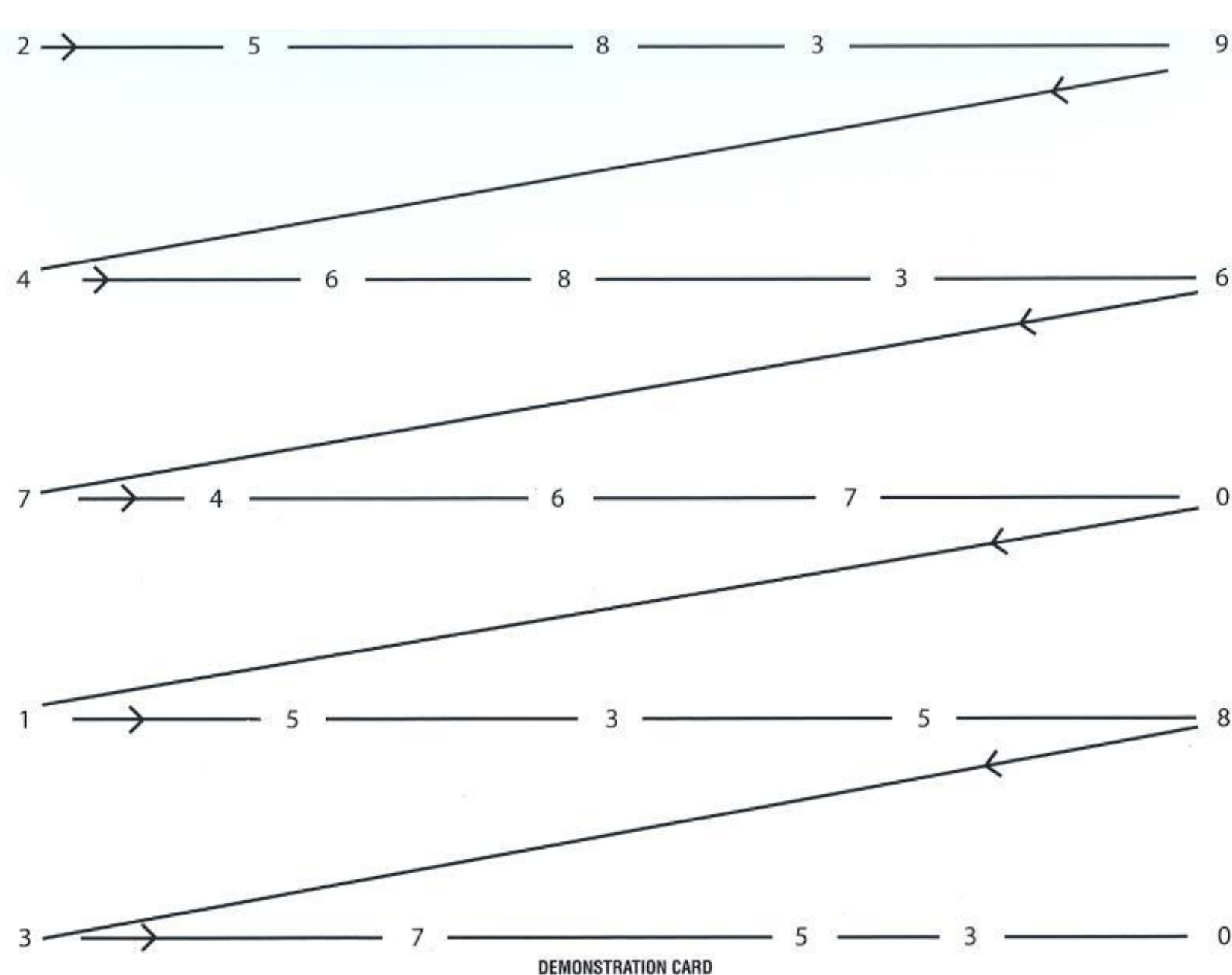
INTERVENTION

- 5 trained testers read directions from standardized note cards.
- Participants completed the KD/Version 1 at each of three testing sessions (Day 1, 30 days, and 45 days).

MAIN OUTCOME MEASURES

- Testers recorded the **TOTAL TIME** a child took to complete reading three cards as well as **ERRORS** committed while reading.
- Statistical Analysis: Intraclass correlation coefficients (ICC) and repeatability coefficients (CR) were calculated; linear mixed models were used to test for changes in testing times as well as age and gender differences over the 3 visits; $p < .05$ established apriori.

RESULTS

- Sixty-eight children completed all three testing sessions (Table 1)

Table 1: Characteristics of Participants

	Boys (n=41)	Girls (n=27)
Age (years)	15.4 ± 1.9	15.4 ± 1.9
Height (cm)	168.8 ± 39.8	154.4 ± 45.4*
Weight (kg)	71.2 ± 30.8	57.0 ± 28.8*

Data are given as means ± SD
*Value is different from males ($p < 0.05$)

- Table 2 illustrates means ± SD for times at each session. For entire cohort, significant improvements were observed between:
  - Visits 1 and 2: 4.3 ± 0.5 seconds, mean ± SE, $p < 0.001$)
  - Visits 2 and 3: 2.4 ± 0.5 seconds, $p < 0.001$
  - Total improvement of 6.7 seconds over 3 tests

Table 2: Means and Standard Deviations of Total Time to Complete King-Devick – Entire Sample

Initial Test Date	Test Day 2 (30d)	Test Day 3 (45d)
Time	Time	Time
51.8±9.9	47.5±9.8*	45.1±9.1*

*$p < .05$

- ICC = 0.81 (95% CI 0.73 – 0.87)
- Repeatability Coefficient = 8.76 seconds
- No significant gender by visit interactions were observed (Figure 1)
- No significant age by visit interactions were observed (Figure 2)
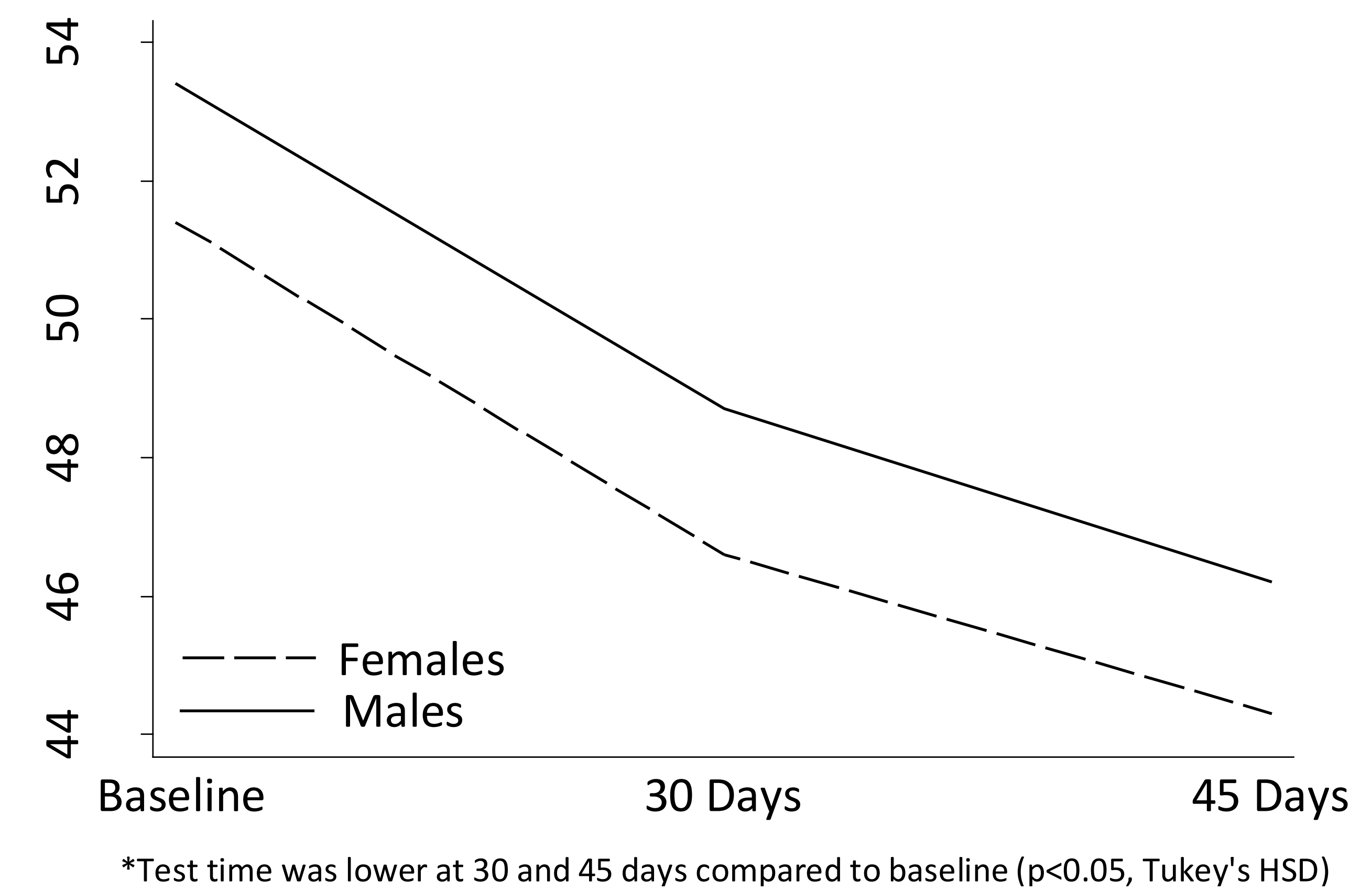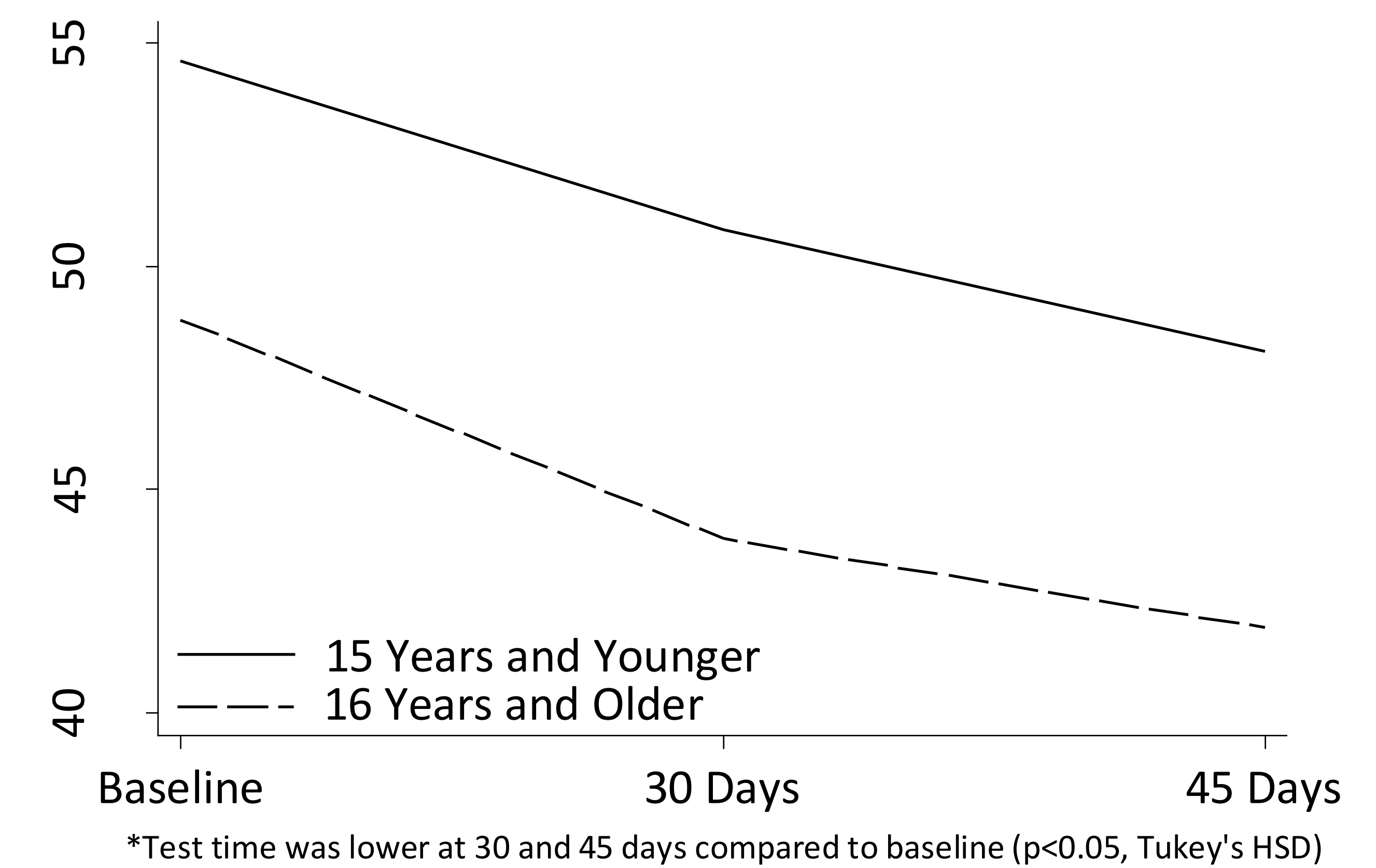
Figure 1: Time to Completion: Male&Female

*Test time was lower at 30 and 45 days compared to baseline ($p<0.05$, Tukey's HSD)

Figure 2: Time to Completion: Age Cohorts

*Test time was lower at 30 and 45 days compared to baseline ($p<0.05$, Tukey's HSD)

CONCLUSION

- Despite the high ICC, providers using the King-Devick test for initial detection and serial reassessment of concussion in youth (12-18yo) should use caution due large learning effect and large repeatability coefficient.
- Further reliability research should be completed before using the KD for clinical decisions.
- Clinicians should continue to incorporate multiple measures to ensure accurate detection of sport concussion.