Improved Performance on the King-Devick Test When Re-Tested After Collegiate Sport Exposure

Zachary M Houck[1,2], BS; Breton M Asken[1,2], ATC, MS; Russell M Bauer, PhD[1,2]; William M Perlstein[1], PhD; Jon Boone[2,3] MS, ATC; Dewayne DuBose [2,3], PhD, ATC; James R Clugston[2,3,4], MD, MS

1 = UF Department of Clinical and Health Psychology
2 = UF Sports Concussion Center
3 = University Athletic Association
4 = UF Department of Community Health and Family Medicine

UF Sports Concussion Center
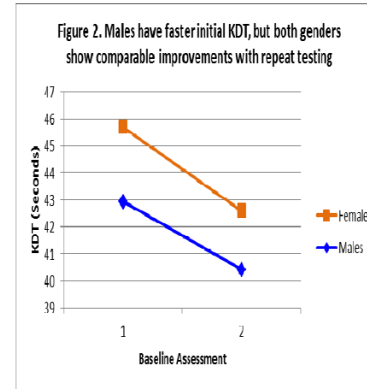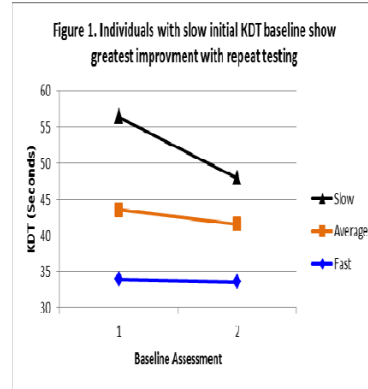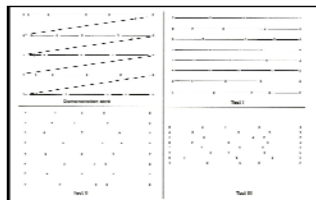**Student Health Care Center**
UNIVERSITY of FLORIDA

Purpose

The King-Devick Test (KDT) is a measure of saccadic eye movement and reading speed that is used as a brief sideline assessment of concussion. The current study evaluates :
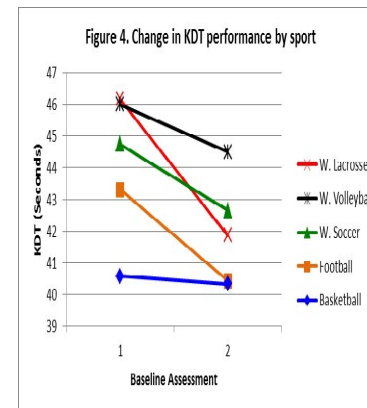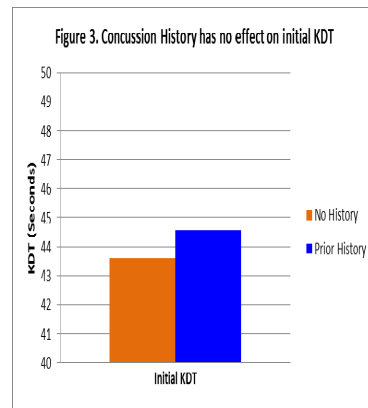
1. Changes in KDT performance with repeat testing in a collegiate athlete sample. We hypothesize that slow performers (longest times) will show significantly more improvement from BL #1 to BL #2 than the average and fast performers (shortest times).
2. Clinically relevant cut scores characterizing fast, average, and slow KDT times for each gender.
3. Evidence for annual KDT re-baselines.

Methods

1. A retrospective analysis of 131 collegiate athlete player records from the University of Florida Concussion Databank was performed.
2. Athletes in this study performed the KDT at two separate time points separated by at least one full athletic season.
3. All KDT assessments were performed on the KDT iPad application and administered by athletic trainers and team physicians at the University of Florida.
4. Athletes were grouped based on standardized score performances on initial KDT as Fast ($z \leq -1$), Average ($-1 < z > 1$), or Slow ($z \geq 1$).
5. Paired Samples T-test were conducted to determine if changes in group performance from KDT #1 to KDT #2 were significant.

Figure 1. Individuals with slow initial KDT baseline show greatest improvment with repeat testing

Figure 2. Males have faster initial KDT, but both genders show comparable improvements with repeat testing

Group	N	KDT#1 Mean(±SD)	KDT#2 Mean(±SD)	ΔKDT Mean(±SD)
Overall Sample	131	43.9 (7.6)	41.2 (7.0)	2.7 (5.4)
Gender				
Male	83	42.9 (7.4)	40.4 (7.2)	2.5 (4.9)
Female	48	45.7 (7.7)	42.6 (6.3)	3.1 (6.3)
Sport				
Football	72	43.3 (7.7)	40.4 (7.4)	2.9 (4.9)
Basketball	11	40.6 (4.8)	40.3 (6.4)	0.3 (3.7)
W. Lacrosse	24	46.2 (6.9)	41.9 (4.8)	4.3 (6)
W. Soccer	15	44.7 (8.5)	42.6 (7.4)	2.1 (4.3)
W. Volleyball	9	46 (9)	44.5 (7.9)	1.5 (9.3)

Figure 3. Concussion History has no effect on initial KDT

Figure 4. Change in KDT performance by sport

Clinical Cutoff Scores

Group	Male (seconds)	Female (seconds)
Fast	≤ 36	≤ 38
Average	36.01-49.99	38.01-52.99
Slow	≥ 50	≥ 53

Results

1. Overall, student-athletes completed the KDT significantly faster at BL#2 than at BL#1 (p<.001).
2. There were differential improvement rates based on initial baseline classification, such that slow performers (longest times) had significantly more improvement from BL#1 to BL#2 than the average (p<.005) and fast (p<.001) performers (shortest times).
3. Both male (p=.001) and female (p<.001) athletes improved from baseline #1 to baseline #2, and both genders showed differential improvement rates based on initial baseline classification.
4. There were no significant differences on initial baseline scores between athletes with a history of concussion and athletes with no history of concussion.

Conclusion

1. Athletes improve on the KDT with repeated testing, even with substantial time between assessments.
2. Athletes who perform poorly on initial KDT baseline improve significantly on retesting, while better performers do not show comparable improvements.
3. Athletes with extremely slow baseline scores should be re-tested in order to obtain a more representative performance.
4. These results were consistent across different sports, gender, and concussion histories.
5. Athletes in contact sports show comparable improvements to athletes in non-contact sports with repeated testing.

Significance

- It is recommended that athletes who perform relatively poorly (1 standard deviation slower than average performance, or greater than 50 seconds for males and 53 seconds for females based on our sample) on their baseline KDT assessment be targeted for a repeat administration .