Psychometric Properties of the King-Devick Test

I read with interest the recently published article by Heick et al.\(^1\) Under King-Devick test procedures, it is unclear whether the timing during the King-Devick test administration followed standardized King-Devick test instructions, which instructs that timing should start at the beginning of a test card and stop at the end of each test card. This should then be repeated across all three test cards and the total cumulative time of the three test cards constitutes the King-Devick test time. However, the authors state that “the study examiner started the stopwatch timer for the King-Devick score when the participant read the first number on card 1, and stopped the timer when the participant completed the last number on card 3.” This description appears to include the time between test cards and therefore the King-Devick test time score includes the time taken to change to the next test card multiple times throughout the course of the test. This would undoubtedly influence the participant’s performance compared to all other published studies of the King-Devick test that followed the standard protocol.

Furthermore, in the discussion, authors state that “the King-Devick test is usually performed twice, and the average of the two trials is recorded as the athletes’ baseline King-Devick composite score.” King-Devick test administration instructions, which have been guided by the evidence of published studies of the King-Devick test and its utility in concussion detection, incorporate a minimum of two error-free trials for baseline testing and the faster of the two is recorded as the participant’s baseline score. Heick et al. recommend eliminating the first trial to improve reliability, but in many cases the second trial of baseline testing is faster in performance and therefore the first trial is in effect already eliminated according to the King-Devick baseline testing procedure.

Additionally, the King-Devick test was previously offered on two platforms, physical test and electronic tablet. Given that investigators used a stopwatch, readers are left to assume that the physical test was used. However, it is not clear what testing platform was used in their study. Given recent published literature\(^2\) showing incompatibility across testing platforms and high test-retest reliability on the electronic platform, the electronic tablet testing is now the sole testing platform offered. This additionally allows for standardized testing and automatic timing of the King-Devick test to minimize administration errors and misinterpretation of the evidence-based testing protocol.

Regarding the discussion on minimal detectable change, as the authors have noted, previous studies have published various average changes from baseline. However, in a meta-analysis and systematic review published in 2015\(^3\) that pooled and meta-analyzed data from 15 studies, any worsening of King-Devick test time at the time of an injury indicated a five times greater risk of concussion.

The authors cite a study of King-Devick test normative data\(^4\) and recommend obtaining additional normative data to be used by health care professionals if individual baseline scores are not available. However, even the cited study states that “without a reliable baseline measurement, it is not possible to know if that score indicates a decline for that particular individual or not.” The authors further discuss the influence of age and sex on test performance, which have also been described by others\(^5,6\) and underscore the need for individual baseline test performance to be used for comparison.

Given the missing information highlighted above and absence of complete reference to the latest published literature on the King-Devick test to date, it is recommended that these points be added to the limitations of this study and noted in this publication.

REFERENCES

3. Galetta KM, Liu M, Leong DF, Ventura R, Galetta S, Balcer L. The King-Devick test of rapid naming for concussion detection: meta-analysis and systematic re-
Reply

We thank Dr. Leong for her work in this area and her interest in our manuscript.

We did, in fact, follow the standardized protocol for instructions and administration for each King–Devick card in our study. The researcher started the stopwatch when the participant started King–Devick card 1 and stopped the timer when the participant stopped King–Devick card 1. This protocol was used for each King–Devick card and each participant.

In our study, we were specifically interested in determining whether a practice effect is present for the King–Devick test and during which trial participants reached a plateau in performance. We used only the error-free trials, but we recorded the average of the three trials and not the fastest or best trial of the three. In a separate study, we are investigating how many trials are required to reach the plateau that Weir has suggested.

Although we appreciate Dr. Leong’s reference to some newly published studies, these were not published or available to our research team at the time that data collection was completed. We did use the physical test for the current study because it was the standard used among youth and adolescent populations during the time of data collection. In light of Raynowska et al.’s 2015 article, we agree that it would have been interesting to investigate the use of the electronic version of the King–Devick test. Further, we hope that our work complements the work of others in this area regarding normative data and other influencing factors.

We concur that the King–Devick test is a good component of a multifactorial concussion assessment battery when administered by health care providers and as such should be investigated further.

REFERENCES