King-Devick Reading Acceleration Program

The Effect of In-School Saccadic Training on Reading Fluency and Comprehension in First and Second Grade Students: A Randomized Controlled Trial

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Efficient eye movements provide a physical foundation for proficient reading skills. We investigated the effect of in-school saccadic training on reading performance. In this cross-over design, study participants (n=327, 165 males; mean age (SD): 7yrs-6mos (1yr-1mo)) were randomized into treatment and control groups then underwent eighteen, 20-minute training sessions over five weeks utilizing King-Devick Reading Acceleration Program Software. Pre- and post-treatment reading assessments included: fluency, comprehension, and rapid number naming performance. The treatment group had significantly greater improvement compared to the control group in fluency (6.2% vs. 3.6%, p=0.0277) and comprehension (7.5% vs. 1.5%, p=0.0002). The high-needs student group significantly improved in fluency (p<0.001) and comprehension (p<0.001). We hypothesize these improvements to be attributed to the repetitive practice of reading-related eye movements, shifting visuospatial attention, and visual processing. Consideration should be given to teaching the physical act of reading within the early education curriculum.

Summary Points:

✓ Students in 1st and 2nd grade were enrolled in 6 weeks of King-Devick Reading Acceleration training.
✓ The treatment group had significantly greater improvement compared to the control group in fluency and comprehension.
✓ A subgroup analysis was performed on high needs students, who were students with an active IEP or in reading recovery programs. Overall, high needs students went from 26th to 40th national percentile rank in reading fluency and from 40th to 56th in comprehension after RAP.
✓ The King-Devick Test, an eye movement test used for reading screening, may be used to predict below-average reading performance.


The Effect of Saccadic Training on Early Reading Fluency

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Background: Eye movements are necessary for the physical act of reading and have been shown to relate to underlying cognitive and visuoattentional processes during reading. The purpose of this study was to determine the effect of saccadic training using the King-Devick remediation software on reading fluency. Methods: In this prospective, single-blinded, randomized, crossover trial, a cohort of elementary students
received standardized reading fluency testing pre- and posttreatment. Treatment consisted of in-school training 20 minutes per day, 3 days per week for 6 weeks. **Results:** The treatment group had significantly higher reading fluency scores after treatment (P < .001), and posttreatment scores were significantly higher than the control group (P < .005). **Conclusions:** Saccadic training can significantly improve reading fluency. We hypothesize that this improvement in reading fluency is a result of rigorous practice of eye movements and shifting visuospatial attention, which are vital to the act of reading.

**Summary Points:**
- Students in grades 1st through 3rd enrolled in a 6-week long Reading Remediation program to train reading-related eye movements.
- King-Devick Reading Remediation significantly improved reading fluency.
- At the 1-year follow-up reading fluency scores remained significantly higher than before K-D Remediation.
- K-D Remediation shows promising results in improving early reading fluency.

Oculomotor training has been associated with improvements in reading fluency, but the physical act of reading is not typically taught in schools. The purpose of this retrospective study was to examine reading fluency outcomes in elementary students following oculomotor training. Methods: Pre- and post-training Scholastic Reading fluency benchmarks were reviewed for nine students (Grade1 through 4) who had undergone 6-week in-school training using King-Devick (K-D) Remediation software. Results: All students demonstrated improvement in reading fluency scores following training and this was statistically significant (p=0.008, Wilcoxon signed-rank). Conclusion: Findings support prior research that oculomotor training results in improved reading fluency.

**Summary Points:**
- Students, grade 1st through 4th participated in 6 weeks of King-Devick Reading Remediation, and underwent pre- and post- standardized reading fluency testing in this pilot study.
- All students significantly improved in reading fluency following K-D Remediation.
- The improvement in reading fluency may be attributed to the rigorous practice of eye movements (saccades) and shifts in visuospatial attention, which are necessary for proficient reading.

The purpose of this study was to determine if adding oculomotor training, using King-Devick (K-D) Remediation software, to an existing high school reading program would improve reading fluency outcomes. In this prospective, single-blinded, cross-over trial, of high school students (n=53) in grades 9 and 10 enrolled in the school’s 12-week supplemental reading course, all students received reading
intervention using Scholastic's Reading 180 system (New York, NY). Students were randomized by classroom into 3 groups based on their initial training condition (+K-D Remediation, +Placebo & Scholastic Only) and pre- and post-remediation measures were performed using the K-D Test and Reading Curriculum-Based Measurement (RCBM) reading fluency test. There was a significantly greater percentage improvement in reading fluency scores (WCPM) with combined +K-D Remediation compared to reading intervention with Scholastic Only (7.54% vs. 3.59%, p = 0.03). Over the entire training period there was an average increase of 9.88 WCPM during sessions with +K-D Remediation, 4.7 WCPM with Scholastic Only and 2.78 WCPM during +Placebo. Expected improvement of a successful reading program is an increase of 5 WCPM. In this study, reading intervention coupled with oculomotor training using K-D Remediation, resulted in nearly double the expected reading fluency improvement.

Summary Points:
- This investigation examined the effect of adding K-D Remediation to the Scholastic Reading 180 reading course for students (Grade 9 and 10) receiving supplemental reading instruction.
- Significant improvements in reading occurred with the addition of K-D Remediation to students’ existing reading intervention.
- The greatest improvement occurred in the placebo to K-D Remediation cross-over group.

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Reading Fluency Measures with Single Word Presentation Verses Left-to-Right Reading in Third Grade Students

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Objective. Accurate and efficient eye movements are an important aspect to a child’s reading performance. Poor readers demonstrate higher rates of eye movement disorders, which may negatively impact reading. Saccadic eye movements direct the eyes to the next word while reading. Single word presentation reading presents each word centered in the screen. The purpose of this study was to measure reading fluency for students using single word presentation reading and traditional left-to-right reading.

Methods. In this randomized study, participants (n=22) read 3rd Grade Scholastic Reading Fluency Passages using single word presentation and left-to-right reading. Left-to-right reading was measured by adding the total number of words read correctly in one minute (WCPM). Reading fluency was measured using single word presentation by adjusting the speed of presentation to the maximum speed the student stated words clearly without errors for one minute (WCPM). Students answered three reading comprehension questions following each reading passage.

Results. Students achieved significantly higher reading fluency scores when reading with single word presentation compared with left-to-right reading (mean (SD), 154 (47) WCPM vs 125 (46) WCPM, p<0.001, Wilcoxon signed-rank test). Reading comprehension scores were slightly higher when reading with single word presentation verses left-to-right reading (92% (18) vs 88% (17)), however this was not statistically significant (p=0.335). On average, students read 28.8 more words per minute while reading with single word presentation compared with left-to-right reading.

Conclusion. This study found that single word presentation reading may be a more efficient method of reading and maintain or improve reading comprehension. Single word presentation technology should be considered as an addition to current reading methods.

Summary Points:
- Single word presentation reading may be a more efficient method of reading and maintain or improve reading comprehension
Objective. The King-Devick Reading Acceleration Program (RAP) is an eye movement training program aimed at improving reading performance for grade school students. King-Devick RAP was implemented in the fall season in the first grade curriculum in order to evaluate its effectiveness on reading performance.

Methods. In this randomized, controlled, cross-over design, study participants (n=134, 76 males) were allocated into treatment and control groups in a two-to-one ratio and underwent eighteen, 20-minute training sessions over six weeks utilizing King-Devick Reading Acceleration Program Software. The treatment group read aloud single, randomized numerical targets zero through nine that were presented in a left to right direction. The control group read aloud single, randomized numeric targets, positioned in the center of the screen which did not change position. The speed of presentation was gradually increased over time as the subject progressed through training. Pre- and post-treatment reading assessments were performed, including the Wechsler Individual Achievement Test Third Edition (WIAT) Reading Fluency and Comprehension Tests and the King-Devick Test.

Results. The treatment group improved significantly compared with the control group in reading fluency (14% vs 11%, p=0.015) and reading comprehension (12% vs 5%, p<0.001). The high needs student subgroup was analyzed as a separate group and consisted of students with an Individualized Educational Plan, enrolled in reading assistance programs, or were English-Language Learners. The high-needs student group (n=25) significantly improved in pre- to post-treatment assessments in both reading fluency (14%, p<0.001) and comprehension (10%, p<0.001).

Conclusion. The K-D RAP program significantly improved reading fluency and comprehension over the course of six weeks of in-school training. This study further supports teaching the physical act of reading in the early education curriculum.

Summary Points:
- The King-Devick Reading Acceleration Program significantly improved reading fluency and comprehension over the course of 6 weeks (6 hours) of in-school training, which was flexibly incorporated into the daily classroom schedule.
- Efficient eye movements are one necessary component of proficient reading that integrate with visual processing, word decoding, and attention span; cognitive processing also contributes to successful reading.
- King-Devick Reading Acceleration Program improves aspects of reading that are not currently addressed in schools.
- Based on the positive reading outcomes found in this study and prior studies, there is increasing evidence to support the inclusion of teaching the physical act of reading in the early education curriculum.

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The King-Devick Test as a Reading Fluency Training Program For Students in Elementary Schools

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The King-Devick Test is an established eye movement test that has been used historically to detect
reading disorders related to poor visual-motor skills. Seventeen students in grades 2-4 from the St. Elizabeth School in Chicago Illinois, a predominantly African American K-8 school, were screened for reading inefficiency using the King-Devick Test (K-D Test) and assessed in reading fluency using the Scholastic Fluency Test pre- and post-treatment. The control group had a mean-word improvement of 13.11 words as compared to a 30.02 mean word improvement in the treatment group (p = 0.0413). Sub-group analysis of grades 2 and 3 showed a mean word improvement of 31.94 among the treatment group as compared to 13.11 for the placebo group (p = 0.0267). Reading fluency measures significantly improved following eye movement training.

Summary Points:

- Reading fluency significantly improved following 6 weeks of Rapid Number Naming training in 2nd and 3rd grade students.
- 4th grade student’s reading performance improved slightly, but not as much as 2nd and 3rd grade indicating there is likely an optimal time to implement eye movement training.
- Eye movement training programs should be considered as a part of the reading curriculum in schools.