Supporting Information

**Additional Behavioral Measures of Cognitive, Language, and Academic Skills**

**Description of Additional Measures**

In addition to the measures reported in the main text, the participants were also administered the following tests to assess phonological awareness and reading comprehension. The awareness of and ability to access the sound structure of spoken language was assessed with the *phonological awareness* composite score derived from the Elision and Blending Words subtests of the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999). The CTOPP Elision subtest requires removing a phoneme from an aurally-presented real word (e.g., say ‘silk’ now say silk without the /l/). During the Blending Words subtest the child listens to real words that are presented with pauses between syllables or phonemes, and is then asked to repeat the word without pauses (e.g., What words do these sounds make? “can-dy”). Additionally, for the two participants who were younger than 7 years during the initial testing (one dyslexic and one typical reader) the phonological awareness composite score also incorporated performance on the CTOPP Sound Matching subtest where the child hears a word and picks which one of three pictures matches the sound that was heard, as indicated in the CTOPP administration guidelines for these younger children (Wagner, Torgesen, & Rashotte, 1999). The phonological awareness composite has a reported internal consistency of 0.90.

Additionally, *reading comprehension* was assessed with two instruments. The Passage Comprehension subtest of the WRMT required children to provide single word responses to silently read CLOZE-type probes (Woodcock, 1998). The Passage Comprehension subtest has reported median reliability of 0.92. The Gray Oral Reading Test comprehension subscale (GORT; Wiederholt & Bryant, 2001) required children to read a passage aloud and respond to orally-presented multiple-choice questions read by the examiner. An internal consistency of 0.97 was reported for the GORT comprehension scale.

**Experiment 1B Main Effects of Treatment for the additional measures described above**

Phonological awareness, passage comprehension from the WRMT, and reading comprehension from the GORT were assessed using separate 1 (Measure) x 2 (Time[ baseline, posttest]) within-participants repeated measures analysis of variance (ANOVA) models. The comprehension measures were analyzed separately because they are on different scales, and are differentially impacted by decoding and language comprehension abilities (Keenan, Betjemann, & Olson, 2008). A Bonferroni-corrected significance threshold of *p* < 0.008 was adopted to control the family-wise error rates for the univariate analyses.

Children with dyslexia exhibited improvements over the course of the intervention in their phonological awareness, *F*(1,14) = 11.79, *p* = 0.004, *MSE* = 76.03, η*p2* = 0.46 (see Table S1). The children with dyslexia’s passage comprehension, *F*(1,14) = 13.92, *p* = 0.002, *MSE* = 60.56, η*p2* = 0.50, and GORT comprehension skills, *F*(1,14) = 18.62, *p* = 0.001, *MSE* = 58.8, η*p2* = 0.57, improved also.

Supplemental References

Keenan, J. M., Betjemann, R. S., & Olson, R. K. (2008). Reading comprehension tests vary in the skills they assess: Differential dependence on decoding and oral comprehension. *Scientific Studies of Reading*, *12*(3), 281–300. http://doi.org/10.1080/1088843082132279

Wagner, R. K., Torgesen, J. K., & Rashotte, C. A. (1999). *The comprehensive test of phonological processing: Examiner’s manual*. Austin, TX: Pro-Ed.

Wiederholt, J. L., & Bryant, B. R. (2001). *GORT4: Gray Oral Reading Tests Examiner’s manual*. Austin, TX: Pro-Ed.

Table S1. *Participant characteristics on all measures*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | All Participants | | Dyslexic | | | | Typical Readers | | Group Comparisons | |
|  | Baseline | | Baseline | | Post-Intervention | | Baseline | | Typical Readersvs DyslexicBaseline | Dyslexic: Baseline vs Post-Intervention |
| Measures | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range | **η2** | **ηp2** |
| Age (Months) | 112.16 (23.62) | 78-169 | 111.20 (24.21) | 80-169 | 131.60 (24.54) |  | 113.06 (23.80) | 78-166 | 0 |  |
| Gender (% female) | 39 |  | 40 |  | 40 |  | 38 |  |  |  |
| Handednessa | 0.56 (0.23) | -0.07-0.91 | 0.52 (0.26) | -0.07-0.83 |  |  | 0.59 (0.20) | 0.27-0.91 | 0.02 |  |
| Full-scale IQb | 107.68 (15.89) | 81-146 | 96.33 (8.77) | 81-111 |  |  | 118.31 (13.56) | 88-146 | 0.49\*\*\* |  |
| Mother’s Educationc | 2.55 (0.85) | 1-5 | 2.53 (0.74) | 2-4 |  |  | 2.56 (0.96) | 1-5 | 0 |  |
| Attention Problems (SNAP-IV)d |  |  |  |  |  |  |  |  |  |  |
| Inattention | 0.77 (0.63)1 | 0-2.22 | 0.97 (0.66) | 0-2.22 |  |  | 0.57 (0.54)2 | 0-1.56 | 0.1 |  |
| Hyperactivity | 0.39 (0.38) 1 | 0-1.44 | 0.47 (0.36) | 0-1.33 |  |  | 0.32 (0.40) 2 | 0-1.44 | 0.04 |  |
| Oppositional Defiant | 0.35 (0.40) 1 | 0.1.5 | 0.37 (0.50) | 0-1.5 |  |  | 0.33 (0.29) 2 | 0-0.88 | 0.002 |  |
| Phonological Awarenesse | 99.87 (17.51) | 70-133 | 89.07 (11.67) | 70-109 | 100.00 (11.56) | 76-118 | 110.00 (16.12) | 76-133 | 0.37\*\*\* | 0.46\*\* |
| Untimed Word Readingf | 101.10 (21.14) | 70-159 | 84.13 (7.51) | 70-95 | 90.73 (7.19) | 80-102 | 117.00 (16.85) | 91-159 | 0.62\*\*\* | 0.41\*\* |
| Untimed Pseudoword Readingg | 101.55 (19.06) | 76-142 | 86.6 (7.69) | 76-99 | 99.13 (7.81) | 87-118 | 115.56 (15.44) | 87-142 | 0.60\*\*\* | 0.76\*\*\* |
| Timed Word Readingh | 92.55 (18.37) | 59-135 | 78.33 (9.20) | 59-94 | 85.07 (8.71) | 71-98 | 105.88 (14.30) | 84-135 | 0.58\*\*\* | 0.42\*\* |
| Timed Pseudoword Readingi | 95.48 (17.59) | 71-131 | 81.67 (6.03) | 71-89 | 87.13 (7.29) | 76-104 | 108.44 (14.67) | 80-131 | 0.60\*\*\* | 0.44\*\* |
| Passage Comprehensionj | 96.94 (16.94) | 66-125 | 82.53 (9.57) | 66-97 | 93.13 (6.72) | 83-109 | 110.44 (9.29) | 90-125 | 0.70\*\*\* | 0.50\*\* |
| GORT Comprehensionk | 10.39 (3.70) | 5-18 | 7.4 (2.26) | 5-11 | 10.20 (2.04) | 7-13 | 13.19 (2.32) | 10-18 | 0.63\*\*\* | 0.57\*\*\* |
| Object Rhyming Task |  |  |  |  |  |  |  |  |  |  |
| Accuracy (% correct) |  |  |  |  |  |  |  |  |  |  |
| Object-rhyme | 0.80 (0.22) | 0.33-1 | 0.68 (0.24) | 0.33-1 |  |  | 0.92 (0.11) | 0.58-1 | 0.30\*\*\* |  |
| Color-match | 0.95 (0.09) | 0.58-1 | 0.92 (0.12) | 0.58-1 |  |  | 0.99 (0.03) | 0.92-1 | 0.12 |  |
| Latency (ms) |  |  |  |  |  |  |  |  |  |  |
| Object-rhyme | 2653.91 (507.71) | 1304.25-3186.08 | 2648.48 (681.58) | 1304.25-3186.08 |  |  | 2658.99 (286.17) | 2041-3134.25 | 0 |  |
| Color-match | 1443.52 (402.15) | 873.42-2065.83 | 1533.42 (412.30) | 873.42-2065.83 |  |  | 1359.23 (386.18) | 1062.17-1664.08 | 0.05 |  |

*Notes*: All standardized test performance reported in standard scores. 1N = 30; 2n = 15; \*p < 0.05; \*\*p < 0.01; \*\*\*p <0.001. aEdinburghHandedness Score ranging from -1.0 to 1.0 with positive scores reflecting right-handedness; bWechsler Full-Scale IQ; cMother’s education level (1 = high school, 2 = some college, 3 = bachelor’s degree, 4 = master’s degree, 5 = PhD); dSNAP-IV (Bussing et al., 2008) based on a 0 to 3 parent-report rating scale (Not at All = 0, Just A Little = 1, Quite A Bit = 2, and Very Much = 3) that is scored by summing scores on items in each subscale and dividing by the number of items in that subscale; eComprehensive Test of Phonological Processing (CTOPP; Wagner et al., 1999); fWoodcock Reading Mastery Test (WRMT; Woodcock, 1998) Word Identification; gWRMT Word Attack; hTest of Word Reading Efficiency (TOWRE; Torgeson et al., 1999) Sight Words; iTOWRE Phonemic Decoding; jWRMT Passage Comprehension; kGORT Comprehension (Wiederholt & Bryant, 2001).