GIBSON INSTITUTE
OF COGNITIVE RESEARCH

Achievement Outcomes for LearningRx Students

Math and Reading Achievement Before and After Cognitive Training

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Math and Reading Achievement following Supplementary Cognitive Training Interventions

Executive Summary

LearningRx is a supplemental educational services provider of cognitive-focused reading and

math interventions for students. The services are based on a cognitive training approach to

reducing deficits in reading and math skills. The services are currently provided at 80

LearningRx Centers across the United States. Each center is an independently-owned franchise

that implements the LearningRx proprietary curricula, including ReadRx and MathRx programs.

To assess the outcomes of the ReadRx and MathRx programs for students in 2008 to 2014, pre-

intervention reading and math achievement scores were compared to post-intervention scores.

Findings

- From 2008 to 2014, there were 6,340 students who completed a 120-hour reading or math

  intervention program at a LearningRx center in the United States. There were 5,352

  students in the ReadRx program and 988 students in the MathRx program.

- Students completed content-related achievement testing prior to and following

  completion of their intervention. All students were administered subtests of the

  Woodcock Johnson III – Tests of Achievement appropriate for their program.

- As a group, ReadRx students made statistically significant gains on tests of Word Attack,

  Spelling Sounds, Sound Awareness, and Passage Comprehension. The mean gain across

  reading achievement tests was 3.6 years.

- As a group, MathRx students made statistically significant gains on tests of Math

  Fluency, Applied Problems, and Quantitative Concepts. The mean gain across math

  achievement tests was 3.3 years.

- We collected a subset of state achievement test results for 108 students prior to and after completing a LearningRx intervention. 91% of the students who completed the ReadRx program (59 of 65) showed improvement on state reading achievement tests after the intervention.

- A differential effects analysis of each program showed that MathRx students made nearly twice the gains in math than the ReadRx students; and ReadRx students made nearly twice the gains in reading than the MathRx students.

Background of the LearningRx Programs

LearningRx was created in 2002 by a team of learning experts led by pediatric optometrist and vision therapist Dr. Ken Gibson. The proprietary curriculum includes a 60-hour foundational training program, called ThinkRx, which targets seven primary cognitive skills and multiple sub-skills through repeated engagement in game-like mental tasks delivered one-on-one by a cognitive trainer. The tasks emphasize visual or auditory processes that require attention and reasoning while incorporating the components of intensity, sequencing, loading, and feedback. The ThinkRx curriculum is most often used in combination with an additional 60 hours of an intensive sound-to-code reading intervention, called ReadRx, or a 60-hour intensive math intervention called MathRx.

The ReadRx intervention focuses on auditory processing, basic code, and complex coding skills necessary to improve reading rate, accuracy, fluency, comprehension, spelling, and writing. MathRx develops comprehension, numerical fluency, and higher level thinking skills, the core underlying cognitive skills required to learn mathematical concepts, solve problems, and perform

mathematical calculations. The interventions are delivered over the course of twelve to twenty-four weeks. Students are trained with each procedure to mastery, and a detailed progression through the program is maintained in workbooks to ensure consistency in implementation across students. Between January 2008 and September 2014, a total of 14,589 students ages 3-95 completed at least one training program in a LearningRx center in the United States.

Characteristics of ReadRx and MathRx Students

Achievement data were available for 5,352 students in the ReadRx program and 988 students in the MathRx program who attended `one of 80 LearningRx centers across 24 states. Nearly 40% of students were female and 60% were male. The distribution of ages is shown in the box plots in Figure 1 and detailed in Table 1. The racial breakdown is shown in Table 2.
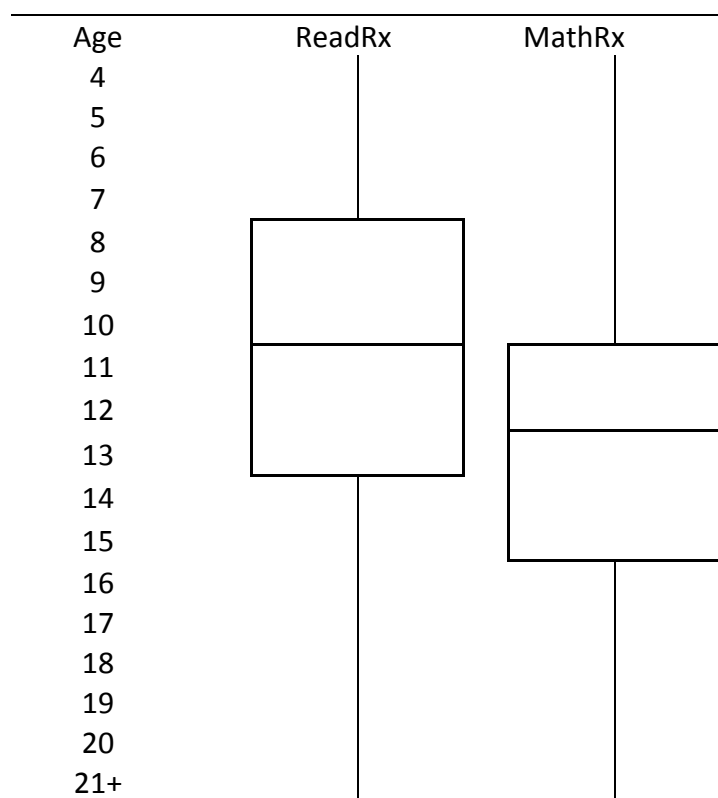
Figure 1. Distribution of Ages by Program

Table 1. Number and Percentage of Students by Program

Age	# of ReadRx Students	%	# of MathRx Students	%
4	2	<1%		
5	13	<1%		
6	112	2.1%	1	<1%
7	490	9.1%	21	2.1%
8	813	15.1%	51	5.1%
9	793	14.8%	101	10.2%
10	730	13.6%	100	10.1%
11	492	9.1%	98	9.9%
12	430	8.0%	122	12.3%
13	349	6.5%	112	11.3%
14	254	4.7%	112	11.3%
15	274	5.1%	77	7.7%
16	166	3.1%	69	6.9%
17	118	2.2%	44	4.4%
18	42	<1%	18	1.8%
19-29	176	3.2%	44	4.4%
30-49	71	1.3%	15	1.5%
50-69	22	<1%	3	<1%
70+	5	<1%		
Total	5,352		988	

Table 2. Race of ReadRx and MathRx Students from 2008-2014

Ethnicity	Number		Percentage	
	ReadRx	MathRx	ReadRx	MathRx
White/Caucasian	3,456	536	65%	54%
Not Reported	1,249	326	23%	33%
Black	213	37	4%	4%
Hispanic	193	40	4%	4%
Asian	135	24	3%	2%
Other	96	21	2%	2%
Native American	10	4	0%	0%
Total	**5,352**	**988**	**100%**	**100%**

Results by Program

ReadRx Reading Achievement Results using Woodcock Johnson III

Paired samples *t* tests were conducted on pretest and post-test Woodcock Johnson III - Tests of

Achievement (WJ III) scores for students who completed the 120-hour ReadRx program. After

Bonferroni correction, post-test scores were significantly greater than pretest scores across all

four measures (Appendix A). Figure 2 illustrates the pretest and post-test percentiles for four

Woodcock Johnson III - Tests of Achievement reading tests: Word Attack, Spelling Sounds,

Sound Awareness, and Passage Comprehension. Figure 3 illustrates the pretest and post-test age

equivalents for the same four WJ III reading achievement tests.   On the Word Attack test, the

mean standard score gain was 7.9 points and mean age equivalent gain was 3.2 years. The mean

percentile at pretest was 34 and improved to 51 at post-test. On the Sound Awareness test, the

mean standard score gain was 16.2 points and mean age equivalent gain was 6.1 years.

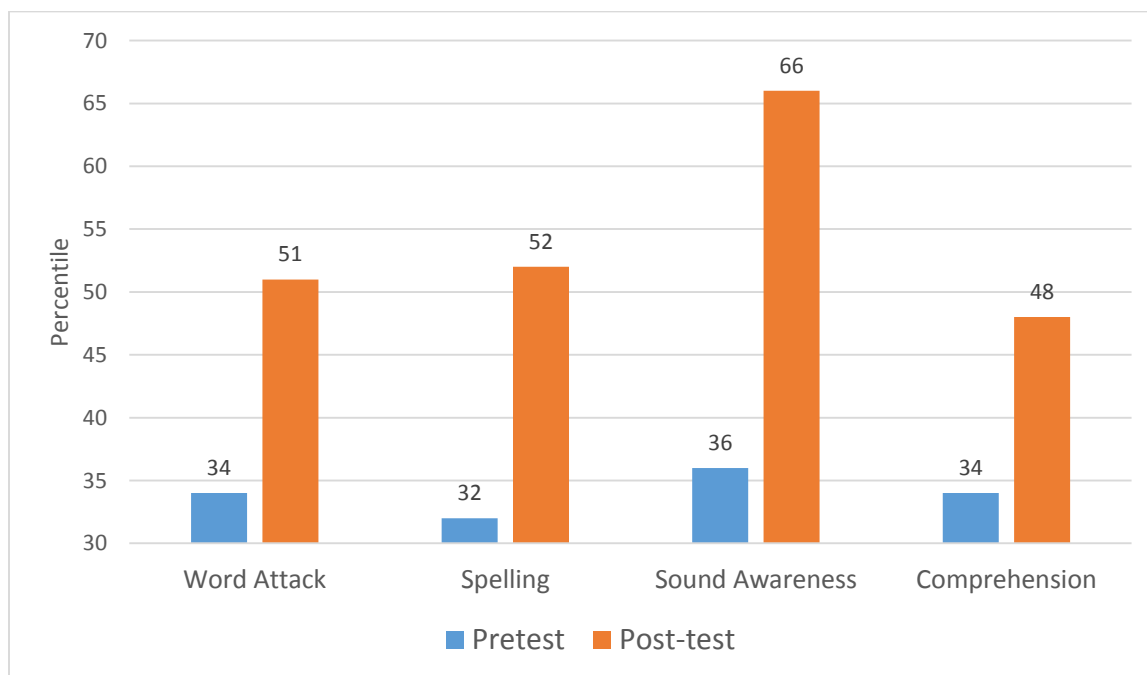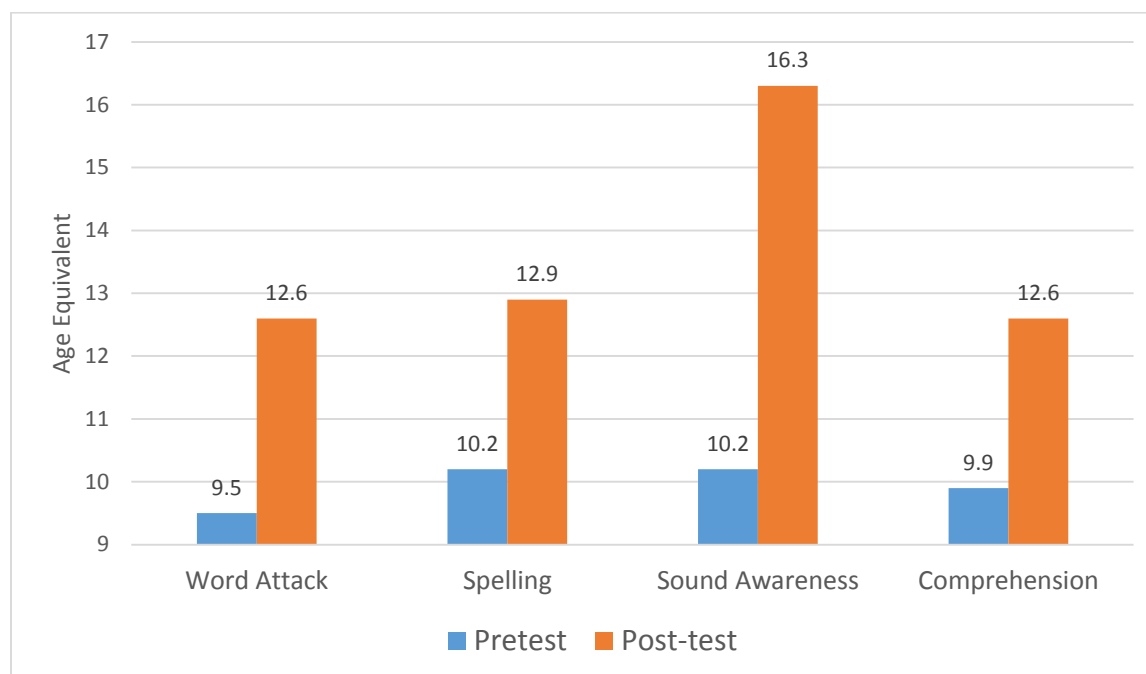*Figure 2. Reading Achievement Test Percentiles Pre and Post ReadRx Training*

Figure 3. Reading Achievement Test Age Equivalent Pre and Post ReadRx Training

The mean percentile at pretest was 36 and improved to 66 at post-test. On the Spelling Sounds test, the mean standard score gain was 7.1 points and mean age equivalent gain was 2.6 years. The mean percentile at pretest was 32 and improved to 52 at post-test. On the Passage Comprehension test, the mean standard score gain was 6.9 points and mean age equivalent gain was 2.6 years. The mean percentile at pretest was 34 and improved to 48 at post-test. The mean gain across all four reading achievement tests was 3.6 years following 120 hours of ReadRx reading intervention.

ReadRx Reading Achievement Results using State Standardized Achievement Tests

LearningRx requested two consecutive years of state achievement test results from students in 2010. To be eligible for analysis, the first test scores were to be from a test taken prior to beginning LearningRx; and the second set of scores were to be from a testing date after finishing

the LearningRx program. They received 128 sets of tests and 108 met the criteria for the time interval required for analysis. Of the 108, there were 65 scores from students who had completed the ReadRx program. (The remaining students completed unrelated programs.) The scores were across 24 states with different assessment tools. As a group, the mean percentile across the state standardized reading achievement tests prior to LearningRx was 33, and the mean percentile after LearningRx improved to 47. The mean standard score across the state standardized reading achievement tests prior to LearningRx was 509 and the mean standard score following completion of LearningRx was 551. Ninety-one percent of ReadRx students in this sample saw an increase in their state standardized achievement test scores following the completion of the ReadRx program.

MathRx Math Achievement Results using Woodcock Johnson III

Paired samples *t* tests were conducted on pretest and post-test Woodcock Johnson III - Tests of Achievement scores for students who completed the 120-hour MathRx program. After Bonferroni correction, post-test scores were significantly greater than pretest scores across all four measures (Appendix B). Figure 4 illustrates the pretest and post-test percentiles for three Woodcock Johnson III - Tests of Achievement math tests: Math Fluency, Applied Problems, and Quantitative Concepts. Figure 5 illustrates the pretest and post-test age equivalents for the same four WJ III math achievement tests. On the Math Fluency test, the mean standard score gain was 12 points and mean age equivalent gain was 3.8 years. The mean percentile at pretest was 38 and improved to 60 at post-test. On the Applied Problems test, the mean standard score gain was 4.9 points and mean age equivalent gain was 2.4 years. The mean percentile at pretest was 41 and improved to 52 at post-test.

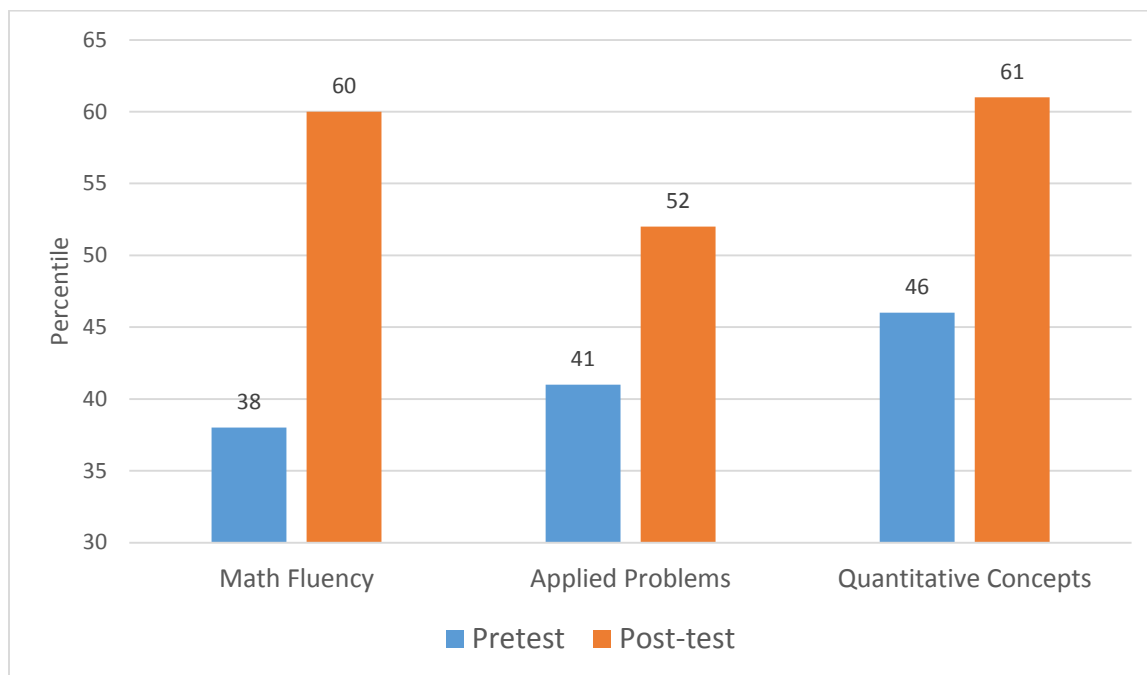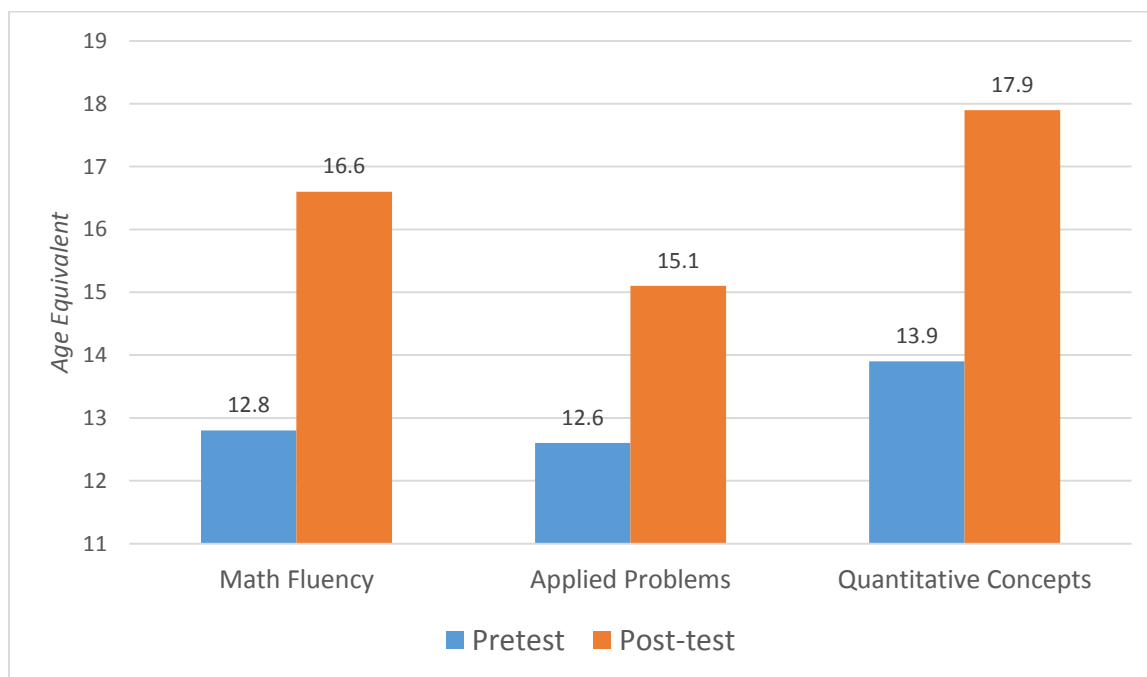*Figure 4. Math Achievement Test Percentiles Pre and Post MathRx Training*

Figure 5. Math Achievement Test Age Equivalent Pre and Post MathRx Training

On the Quantitative Concepts test, the mean standard score gain was 6.9 points and mean age equivalent gain was 3.9 years. The mean percentile at pretest was 46 and improved to 61 at post-test. The mean gain across all three math achievement tests was 3.4 years following 120 hours of MathRx math intervention.

Differential Effects Analysis

In addition, 2096 students ages 5-18 who completed reading or math intervention programs took achievement tests unrelated to their program. There were 1374 students in the ReadRx program who also took at least one of the math achievement tests, and 722 students in the MathRx program who also took at least one of the reading achievement tests. This allowed for a differential effects analysis of each program. As a group, MathRx students made nearly twice the gains in math achievement than the ReadRx students (Figure 6).

Figure 6. Comparison of Student Gains in Math Achievement by Program
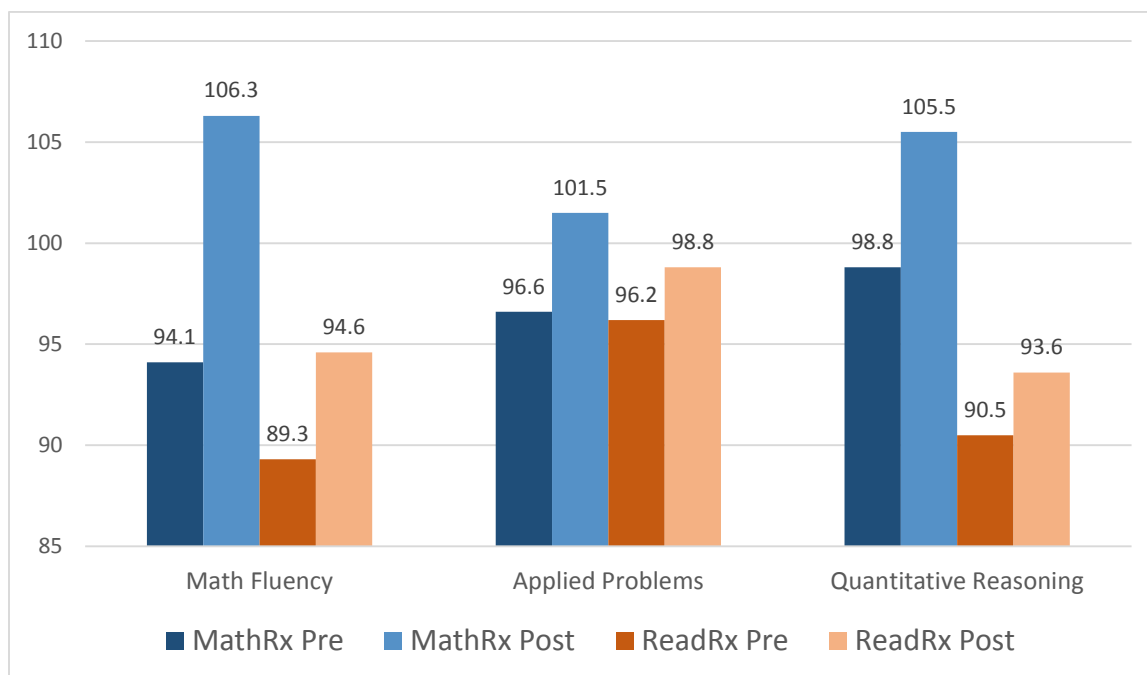
On the test of Math Fluency, the MathRx group ($n = 703$) gained a mean of 12.3 points while the

ReadRx group ($n = 1369$) gained a mean of only 5.3 points. On the test of Applied Problems,

the MathRx group ($n = 137$) gained a mean of 4.9 points versus the ReadRx group ($n = 48$) gain

of 2.6 points. On the test of Quantitative Concepts, the MathRx group ($n = 576$) gained 6.8

points compared to the lesser gain for the ReadRx group ($n = 222$) of 3 points. Appendix C

shows the statistical differences between ReadRx and MathRx student outcomes on math

achievement.

As a group, the ReadRx students made nearly twice the gains in reading achievement as the

MathRx students (Figure 7).

Figure 7. Comparison of Student Gains in Reading Achievement by Program
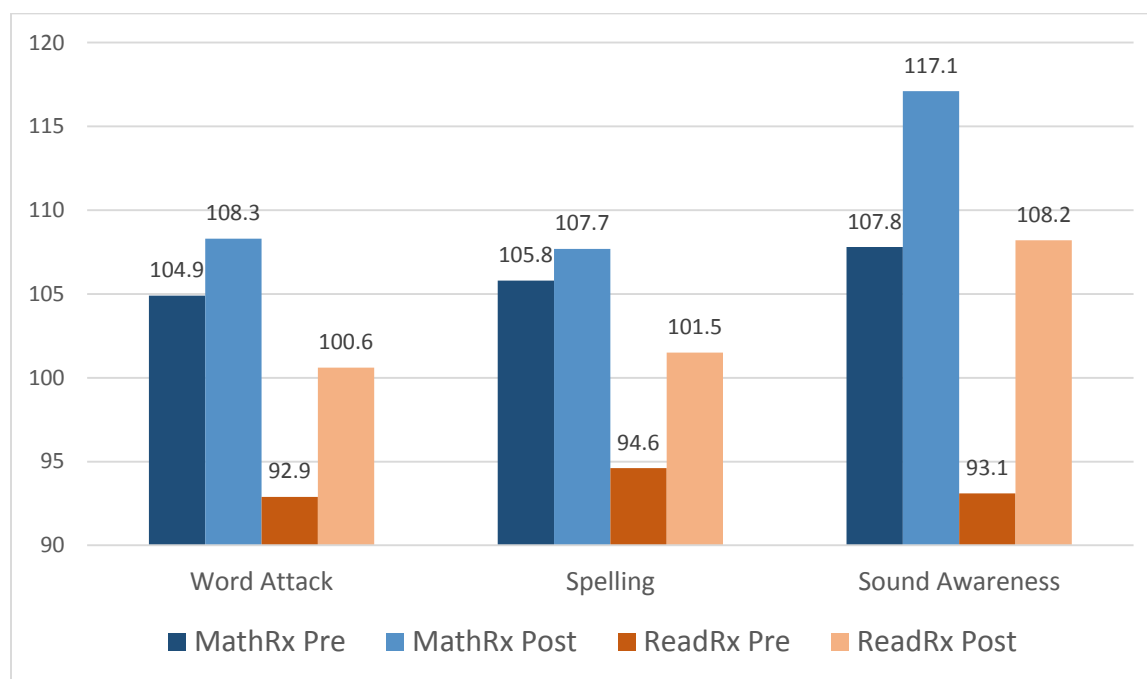
On the test of Word Attack, the ReadRx group ($n = 1355$) gained a mean of 7.7 points while the

MathRx group ($n = 713$) gained a mean of only 3.4 points. On the test of Spelling Sounds, the

ReadRx group (n = 1213) gained a mean of 6.8 points versus the MathRx group (n = 202) gain

of 3.3 points. On the test of Sound Awareness, the ReadRx group (n = 1359) gained 15.1 points

compared to the much lesser gain for the MathRx group (n = 703) of 9.3 points. Appendix D

illustrates the statistical differences between ReadRx and MathRx student outcomes on reading

achievement.

Parent Satisfaction with the ReadRx and MathRx Programs

At the conclusion of any LearningRx training program, parents complete a satisfaction survey at

the request of the center staff. We collected all parent survey data from students in the ReadRx

and MathRx programs for the past 8 years (n = 9861). Surveys are written on a scale from 1 to

10, with 10 as the highest rating. Seventy-one percent of parents rated the program a 10 and

24% rated it an 8 or 9 (Table 3). Just 5% of parents rated the ReadRx/MathRx programs a 7 or

less. The mean parent rating for the ReadRx and MathRx programs is 9.5 out of 10. Benefits

identified by parents on the surveys include increased confidence (n = 3050), better grades (n =

931), improved standardized test scores (n = 151), and better performance in sports (n = 78).

Table 3. Parent Ratings of the MathRx and ReadRx Programs

Parent's Score (from 1 to 10)	Percentage
10	71%
9	15%
8	9%
7	3%
6 or less	2%

Summary and Conclusions

Students who completed ReadRx or MathRx interventions showed significant improvement on achievement tests in the content area related to their program. Achievement data were collected from two sources: pretest and post-test records of scores on the Woodcock Johnson III – Tests of Achievement ($n = 6{,}340$) and from a subset of students who volunteered their state standardized test reports from before and after LearningRx training ($n = 108$). The large quantity of data enabled the identification of positive achievement trends for students who completed a LearningRx math or reading intervention. Statistical analysis of standard scores on the WJIII indicated significant changes from pretest to post-test for ReadRx students on all four measures of reading achievement and for MathRx students on all three measures of math achievement. Notable pretest to post-test growth was also observed for percentiles and age-equivalent scores. This trend was also noted among the state standardized achievement test results in which 91% of post-test scores were higher than pretest scores. The differential analysis also revealed a targeted influence on content-specific growth. That is, the ReadRx students improved more on reading achievement than the MathRx students as well as the inverse.

Prior research on the results of supplemental educational services revealed small changes in achievement (REA, 2007) for students who completed a tutoring program. Specifically, the report on 24 supplemental education services providers revealed reading achievement gains ranging from 4.43 years to losses of -3.44 years; and math achievement gains ranging from 2.91 years to losses of -6.1 years. The results of the current analysis revealed that reading achievement gains for ReadRx students ranged from 2.6 years to 6.1 years with a mean gain of 3.6 years. Math achievement gains for MathRx students ranged from 2.4 years to 3.9 years with

a mean gain of 3.4 years. Indeed, these results position the LearningRx interventions at the higher end of an age-equivalent gains comparison across programs and affirm that, as a group, students who have completed the ReadRx or MathRx programs realized notable improvements in reading or math achievement.

APPENDIX A

Results of Paired Samples *t* Tests on ReadRx Student WJ III Achievement Scores

	Mean	SD	SEM	95% Confidence Interval		*t*	df	*p*	*d*
				Lower	Upper				
Word Attack	-7.9	7.9	.11	-8.1	-7.7	-72.8	5286	.00	1.0
Spelling of Sounds	-7.1	11.9	.19	-7.5	-6.8	-37.9	3990	.00	.60
Sound Awareness	-16.2	12.5	.17	-16.6	-15.9	-94.2	5294	.00	1.3
Passage Comprehension	-6.9	7.2	.56	-8.0	-5.8	-12.3	161	.00	.97

APPENDIX B

Results of Paired Samples *t* Tests on MathRx Students WJ III Achievement Scores

	Mean	SD	SEM	95% Confidence Interval		*t*	df	*p*	*d*
				Lower	Upper				
Math Fluency	-3.8	3.6	.13	-4.0	-3.5	-29.2	783	.00	1.0
Applied Problems	-5.0	7.5	.59	-6.1	-3.8	-8.5	163	.00	.66
Quantitative Concepts	-6.9	9.6	.38	-7.6	-6.1	-18.1	644	.00	.71

APPENDIX C

Comparison of Math Achievement Differences between MathRx and ReadRx Students

		Sum of Squares	df	Mean Square	F	p	η^2
Math Fluency	Between Groups	22,609	1	22,609	253	.000	.11
	Within Groups	184,587	2070	89			
	Total	207,196	2071				
Applied Problems	Between Groups	195	1	195	3	.067	.02
	Within Groups	10,495	183	57			
	Total	10,690	184				
Quantitative Reasoning	Between Groups	2,288	1	2,288	25	.000	.03
	Within Groups	72,186	796	91			
	Total	74,474	797				

APPENDIX D

Comparison of Reading Achievement Differences between MathRx and ReadRx Students

		Sum of Squares	df	Mean Square	F	p	η^2
Word Attack	Between Groups	8,639	1	8,639	114	.000	.05
	Within Groups	156,075	2066	75			
	Total	164,714	2067				
Spelling Sounds	Between Groups	2,203	1	2,203	14	.000	.01
	Within Groups	212,838	1413	151			
	Total	215,041	1414				
Sound Awareness	Between Groups	15,498	1	15,498	100	.000	.05
	Within Groups	318,467	2060	154			
	Total	333,965	2061				

REFERENCES

Office of Research, Evaluation, and Accountability, Office of Extended Learning Opportunities. (2007). *SES tutoring programs: An evaluation of year 3 in the Chicago public schools.* Retrieved from http://sesiq2.wceruw.org/documents/chicago_ses.pdf