Effects from a Randomized Control Trial Comparing Researcher and School Implemented Treatments with Fourth Graders with Significant Reading Difficulties

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This research was supported by grant P50 HD052117 from the Eunice Kennedy Shriver National Institute Of Child Health and Human Development. The content is solely the responsibility of the authors and does not necessarily represent the official views of the Eunice Kennedy Shriver National Institute Of Child Health and Human Development or the National Institutes of Health.

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About TCLD

The Texas Center for Learning Disabilities (TCLD) is a collaboration between The Meadows Center for Preventing Educational Risk at The University of Texas at Austin and researchers at the University of Houston. This project is funded by the Eunice Kennedy National Institute for Child Health and Human Development (NICHD).

http://www.texasldcenter.org/

Overview

Aim: To determine the efficacy of a reading intervention with upper elementary students with reading difficulties

Theoretical Framework

- **The Simple View of Reading (SVR)** (Gough & Tunmer, 1986; Hoover & Gough, 1990)
- Defines reading comprehension as the product of two complex, yet distinct skills: **word recognition** and **language comprehension**
- Research on the Simple View model indicates that word reading automaticity and language comprehension can account for 40%–85% of variance in reading comprehension at various grade levels (e.g., Catts et al., 2005; Cirino et al., 2012; Johnston & Kirby, 2006; Joshi & Aaron, 2000; Savage, 2006).

Theoretical Framework

Intervention components aligned to the Simple View of Reading:

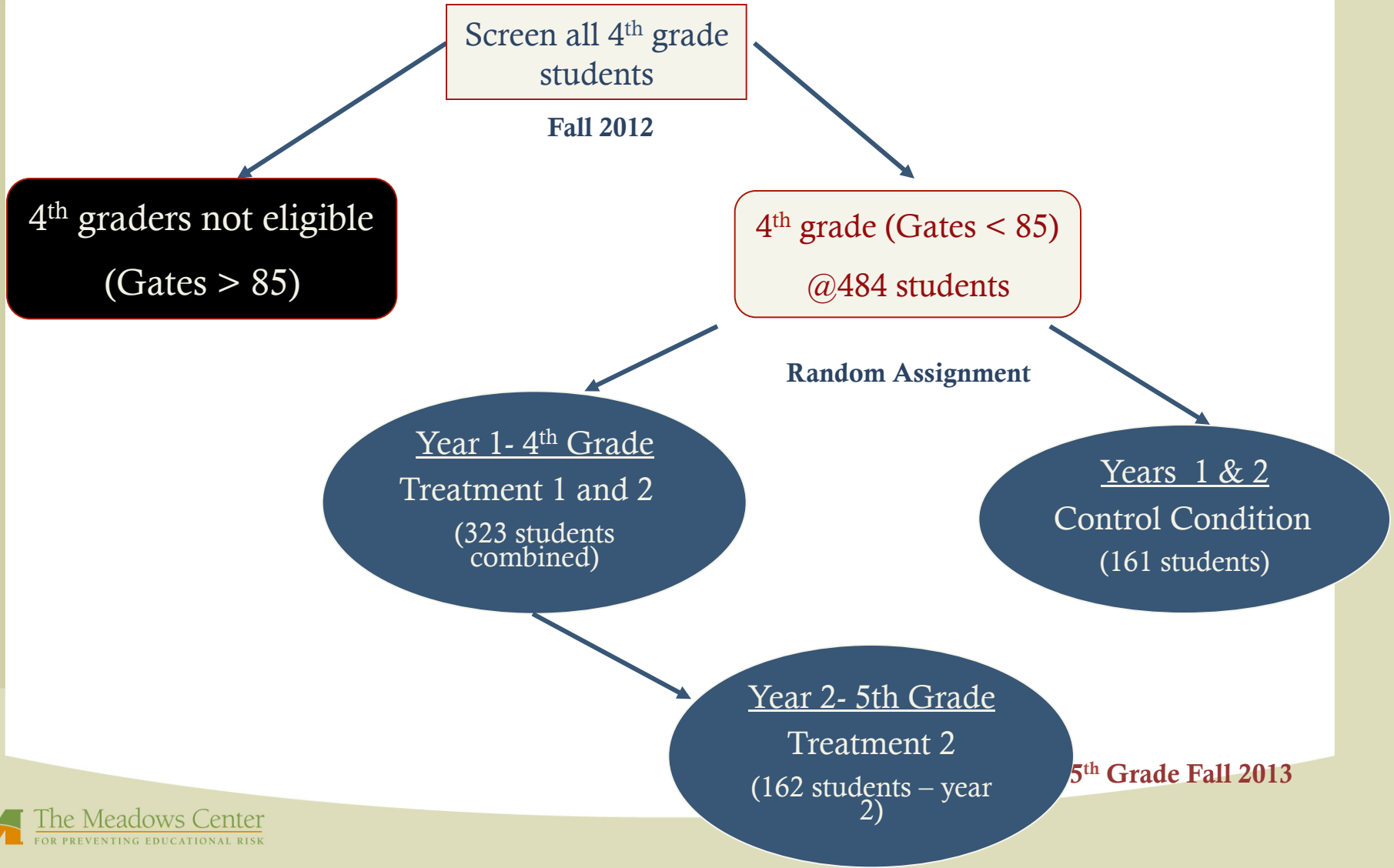
(1) ***word reading*** (automaticity in reading high-frequency and multi-syllable words),

(2) ***world knowledge*** (vocabulary and background knowledge)

(3) ***text-processing practices*** (including mental models and inference-making)

- The focus on (1) targets the decoding component of SVR
- The focus on (2) and (3) targets the language comprehension component within the overarching framework of SVR

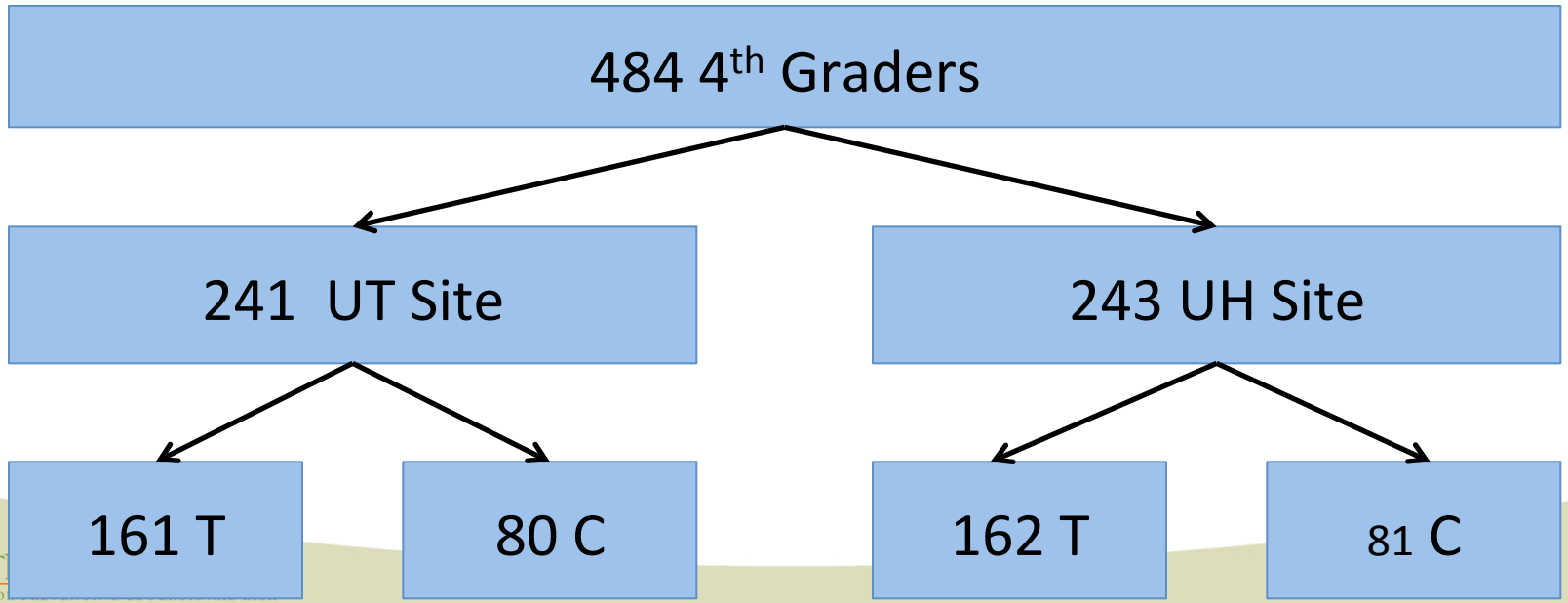
Two-year Research Overview



Sample

Students selected in fall of 4th grade

1. Earned a standard score of 85 or below on the GM-RT (screened 1,695 fourth graders)
2. Students in researcher implemented Treatment condition were randomized to one year (N=161) or two years of Treatment (N=162)



Measures

- Students were assessed at four time points
  - Fall 4th grade
  - Spring 4th grade
  - Fall 5th grade
  - Spring 5th grade
- Primary outcome measures included:
  - Decoding and Spelling
  - Fluency
  - Comprehension

Pretest Scores (Fall 4th Grade)

Measure	Construct	Group	N	Mean	SD
WJ-III Letter Word ID	Decoding	Treatment	296	89.16	11.25
		Control	149	90.40	11.01
WJ-III Spelling	Spelling	Treatment	292	86.40	10.27
		Control	148	88.11	10.56
WJ-III PC	RC	Treatment	296	**81.37**	8.89
		Control	149	**82.77**	8.87
Gates McGinitie RT	RC	Treatment	323	**77.25**	6.09
		Control	161	**77.14**	6.17
TOWRE Sight Word Efficiency	Fluency	Treatment	295	**79.88**	12.19
		Control	150	**80.95**	12.07
TOSREC	Fluency & RC	Treatment	321	10.80	5.38
		Control	157	11.16	5.35

Treatment Condition Comparability

The treatment and comparison conditions did not differ significantly on:

- Age: (t (479) = 1.15, p > .05)
- Free or reduced Lunch status: (x^2 (1) = 0.00, p > .05)
- Special education status: (x^2 (1) = 0.34, p > .05)
- Race/ethnicity (x^2 (1) = 3.20, p > .05)

Participants

- Age range: 8.7-12.0 (mean=9.8)
- Male: 56%
- Free and Reduced Lunch:87%
- Latino=68%, African American=22% Caucasian=8%, 2>races=2%

Year 1 Intervention – Researcher Implemented

- **Components:** Vocabulary, text-based reading, word study
- 80 sessions organized in 2-week units with readings associated with informational text
- 35-min sessions, 5 days/week provided in addition to core reading instruction
  - Average hours of intervention per student = 23.4 (SD = 17.6, range 0.0 - 42.0)
- Small groups of 4-5 students
- Tutors hired, trained, and supervised by researchers

Year 1 Intervention – Researcher Implemented

Word Study

- Daily
- Pattern and sight words
- Word study tests by unit

Academic Vocabulary

- New words 9 days per unit
- Review every 10th day
- CBM

Fluency Readings

- 3 days per unit beginning at unit 2

Stretch Text

- Social studies content 4 days per unit
- "Word check" activity for multi-syllable and academic words

Does it Make Sense?

- 5 days per unit beginning at unit 4

Word Study Goals

- Improve automaticity of reading (speed and accuracy)
- Teaching words *not* sounds
- Practice reading lists to mastery
  - Vocab words
  - Word patterns
  - Sight words
  - Phrases & sentences with word patterns

Example:

11. why
12. what
13. weren't
14. was
15. would
16. these
17. could
18. wanted
19. should
20. thought

Vocabulary Goals

- Teach nine words per 10 day unit
  - 1 day introduction with 2 days of extended review
  - Definition, related words, word in sentence, turn and talk activity
- Teach words and extended meaning
- Multiple opportunities to practice
- Integrate into multiple components of lesson (e.g., word study, passages)

Vocabulary

Settle

To move to and organize a new land

Related Words: establish, inhabit, organize, reside

Sample Sentence: In the 1600's large groups of people left England and **settled** in America.

Example: Moving from England to America in the 1600's

Day 3: Vocabulary Review Activities

Settle

To move to and organize a new land

Review Activity:

- **Turn and Talk**: The colonists left England and settled in America. Why do you think a group of people would want to leave their home and ***settle*** in another country?
- **Think-Pair-Share**: If you had to leave Texas what would be easy and what do you think would be hard about ***settling*** in another place?

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Text-based reading

- Fluency with text – Quick Reads
- Stretch text – longer Informational text with opportunities to answer summarization and inferential questions after sections of text
- Does it make sense?

Fluency With Text & Stretch Text Goals

Improve students fluency through multiple readings of text

- Accuracy, Speed, Expression

Improve student comprehension of text

- Student created summaries, literal and inferential questions (think and search)

Fluency with text

- Shorter text with focus on multiple readings and building automaticity

Stretch text

- Longer complex text with focus on practicing targeted vocabulary and think and inferential questions (think and search)

Text Based: Fluency with Text –

The Benefits of Volcanoes

Even though they cause harm, volcanoes have helped form our world. Billions of years ago, volcanoes were an important part of[25] how Earth's surface formed. Layers of rock from eruptions have made some volcanoes into tall mountains. Sometimes lakes formed in the spaces that were left[50] when rocks caved in or were blown away during volcanic eruptions.

People have found other benefits from volcanoes, too. One benefit is the beautiful gems[75] that sometimes form from minerals trapped in gas pockets of cooled lava. Also, volcanic ash is full of minerals that make soil better for growing[100] crops. Mount Vesuvius, a volcano in Italy, is famous for its grapes. The grapes of Mount Vesuvius grow on land that contains volcanic ash.[124]

Student Text Handout

Lesson Plan Handout

Quick Reads passage: "The Benefits of Volcanoes" (higher reading level)
Tell me what this is about?
Possible Answer: Even though volcanoes are dangerous, they are important part of how the earth is formed

What have volcanoes formed?
Possible Answer: They can form tall mountains and lakes.

How do volcanoes create beautiful gems?
Possible Answer: They create the gems when get minerals trapped in gas pockets of cooled lava from the volcanoes.

What are some ways volcanoes are beneficial to humans?
Possible Answer: Volcanic ash is full of minerals that makes the soil better for growing and they can create gems. Self Regulation

Stretch text

Jamestown: The First English Colony in America

Explorers had been landing in America for some time before English settlers arrived in what is now Jamestown, Virginia, in 1607. But it was in that spot on the James River that English colonization began and with it, the history of America. James the First was king of England at that time, and he had granted approval for a group of businesspeople to settle in this new land. They were part of the Virginia Company, and they got the go-ahead in 1606. By December of that year, the expedition was ready.

Questions:

- Tell me what this part of the story is about.
- There is one sentence in this paragraph that previews what happens at the end of this story. Can you find it? What do you think is going to happen?

Word Check:

Check in with students on vocabulary and multi-syllable words. Provide feedback on word meaning as necessary.

- settlers
- colonization
- settle
- expedition

Does It Make Sense? Goals

- Self-monitoring of text by identifying if sentence(s) make sense
- Demonstrate understanding of sentence by identifying context clues to support answers

Day 3 - Does It Make Sense?

1. When Columbus sailed west from Spain, maps of the world included hotels for explorers.	YES	NO
2. Columbus landed on the moon between North and South America.	YES	NO
3. Many Spanish explorers followed Columbus from behind the Atlantic Ocean.	YES	NO
4. The speed that players throw, kick, and bite the ball makes soccer an exciting game.	YES	NO
5. Today, with millions of players and spectators, soccer is the world's most popular sport.	YES	NO

Progress Monitoring

- AIMSweb ORF (2nd grade) administered 4 times
- Result reports used to modify instruction
  - Green = 1.5 or more wpm growth/wk
  - Yellow = less than 1.5 wpm growth/wk, but some growth
  - Red = little to no increase in wpm
- Adjustments to instruction for students showing little to no growth included modified word lists, fluency passages and additional scaffolds during stretch text and vocabulary instruction.

Treatment Fidelity

- Subset of audio recordings randomly selected by blocking on reading group and school within each tutor to identify 8 lessons per tutor
- Lessons coded for instructional implementation and global observation of quality (4-pt scale)
- Implementation: M = 3.71, SD = 0.24
- Quality: M = 3.71, SD = 0.46

Year 1 comparison group – school implemented interventions

- **School personnel elected to provide treatment in the comparison condition**
- Educators were interviewed and completed an alternate reading inventory form to determine school-based interventions:
  - Test preparation
  - Word reading (i.e., Basic Language Skills; Vickery, Reynolds, & Cochran, 1987)
  - Fluency (i.e., Fast ForWord; Scientific Learning Corporation, 1997)
  - Inclusion support

Year 1 comparison group – School implemented intervention

- School implemented intervention typically delivered by certified teachers
- Group sizes ranging from 1 to 15 students
- Delivered for 2 to 5 days per week
- 10 to 60 minutes per session
- Proportion of students receiving intervention was similar across sites ($p > 0.05$)

Year 1 Data Analysis

One-way analysis of covariance (ANCOVA)

- Conducted for each outcome measure
- Standardize effect sizes and p-values are calculated using model predicted means and observed standard deviations

Standardized Effect Sizes examined

- Effect size for all measures examined regardless of statistical significance (WWC Recommended Practice)
- Calculated using model predicted pretest standard scores means and observed posttest standard deviations (Bloom, Hill, Black, & Lipsey, 2008)

Year 1 Results

				Pretest		Posttest		
Measure	**Construct**	**Group**	**N**	**Mean**	**SD**	**Mean**	**SD**	***d***
WJ-III Letter Word ID	Decoding	Treatment	296	90.89	9.45	92.34	10.40	0.15
		Control	149	91.93	9.24	92.46	10.78	0.05
WJ-III Spelling	Spelling	Treatment	292	88.57	8.62	86.79	13.77	-0.16
		Control	148	90.02	8.87	88.85	12.69	-0.11
WJ-III PC	RC	Treatment	296	84.91	7.20	83.37	9.09	-0.19
		Control	149	86.04	7.19	84.81	8.67	-0.16
GM-RT	RC	Treatment	323	80.89	5.11	84.07	8.00	**0.48**
		Control	161	80.80	5.18	84.53	8.92	**0.52**
TOWRE Sight Word Efficiency	Fluency	Treatment	295	81.90	10.97	85.13	12.36	0.28
		Control	150	82.86	10.86	84.46	12.09	0.14
TOSREC	Fluency & RC	Treatment	321	11.04	4.52	15.03	7.21	**0.67**
		Control	157	11.34	4.50	15.99	6.38	**0.85**

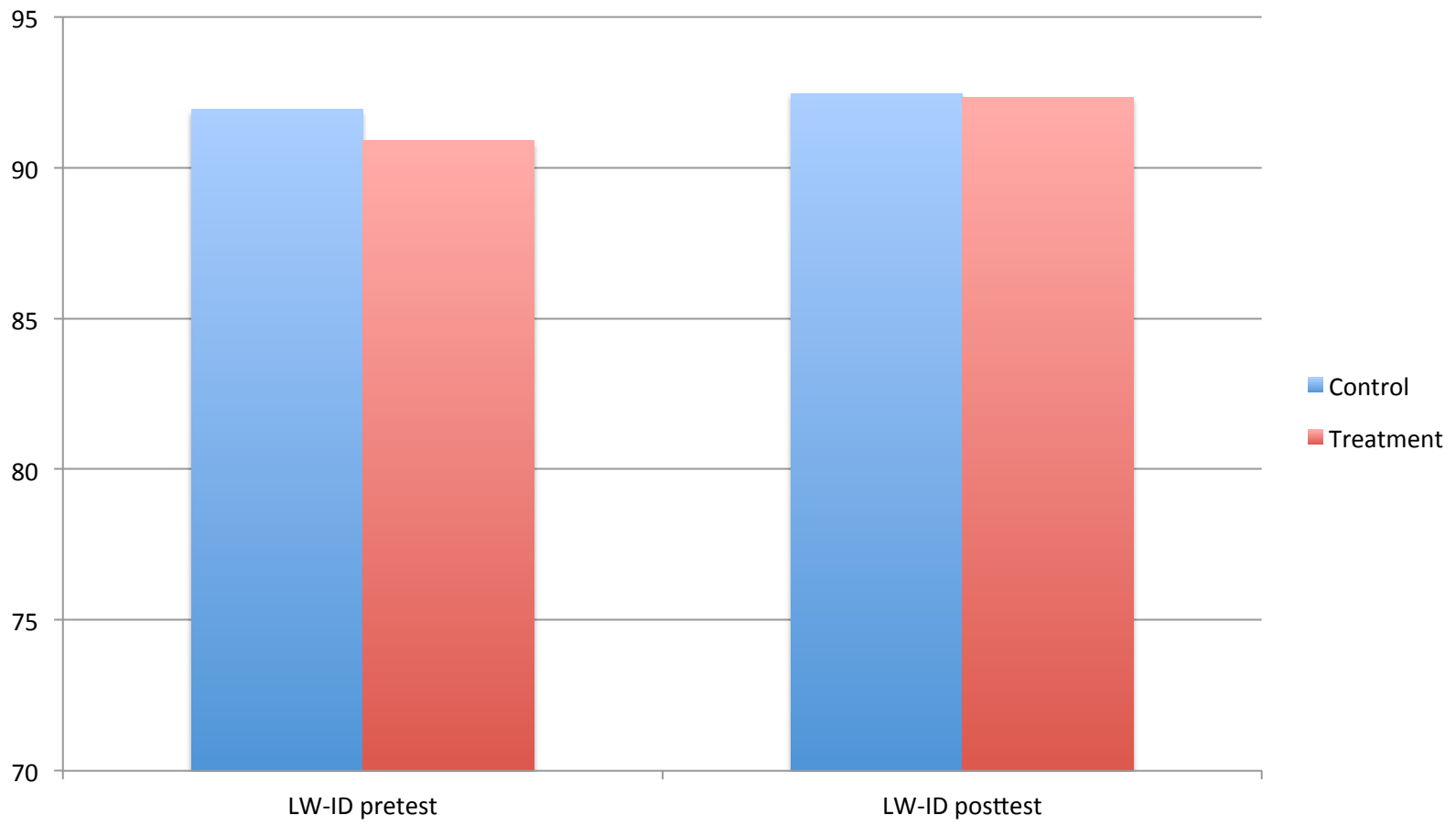
Note: Standardize effect are calculated using model predicted means and observed standard deviations

Year 1 Results

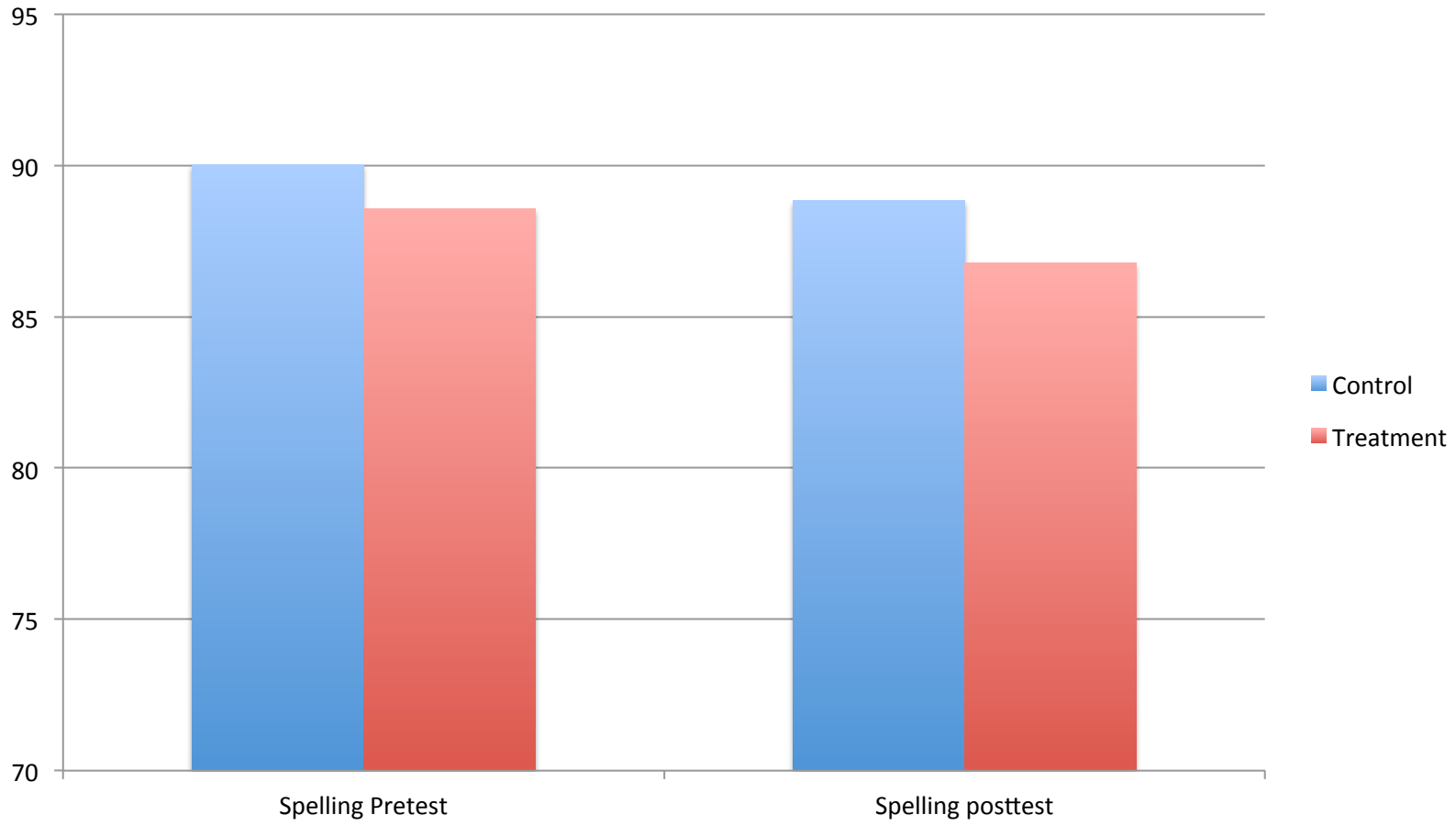
Measure	Construct	Group	*F*	*p*-value
WJ-III Letter Word ID	Decoding	Treatment-Control	3.31	0.07
WJ-III Spelling	Spelling	Treatment-Control	2.24	0.14
WJ-III PC	RC	Treatment-Control	0.03	0.86
GM-RT	RC	Treatment-Control	0.69	0.41
TOWRE Sight Word Efficiency	Fluency	Treatment-Control	0.92	0.86
TOSREC	Fluency & RC	Treatment-Control	0.32	0.57

Note: Standardize effect sizes and p-values are calculated using model predicted means and observed standard deviations

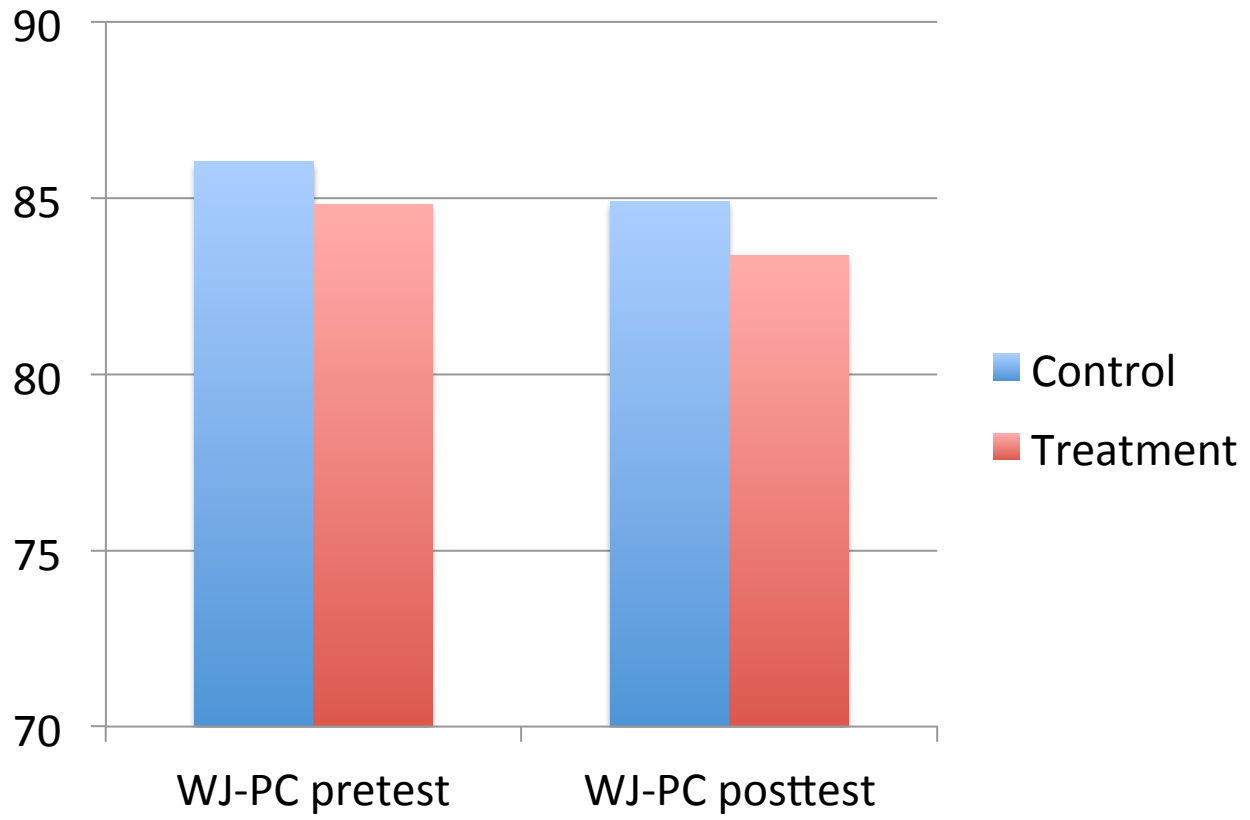
Year 1 Results – pre and posttest group comparisons – WJIII-Letter



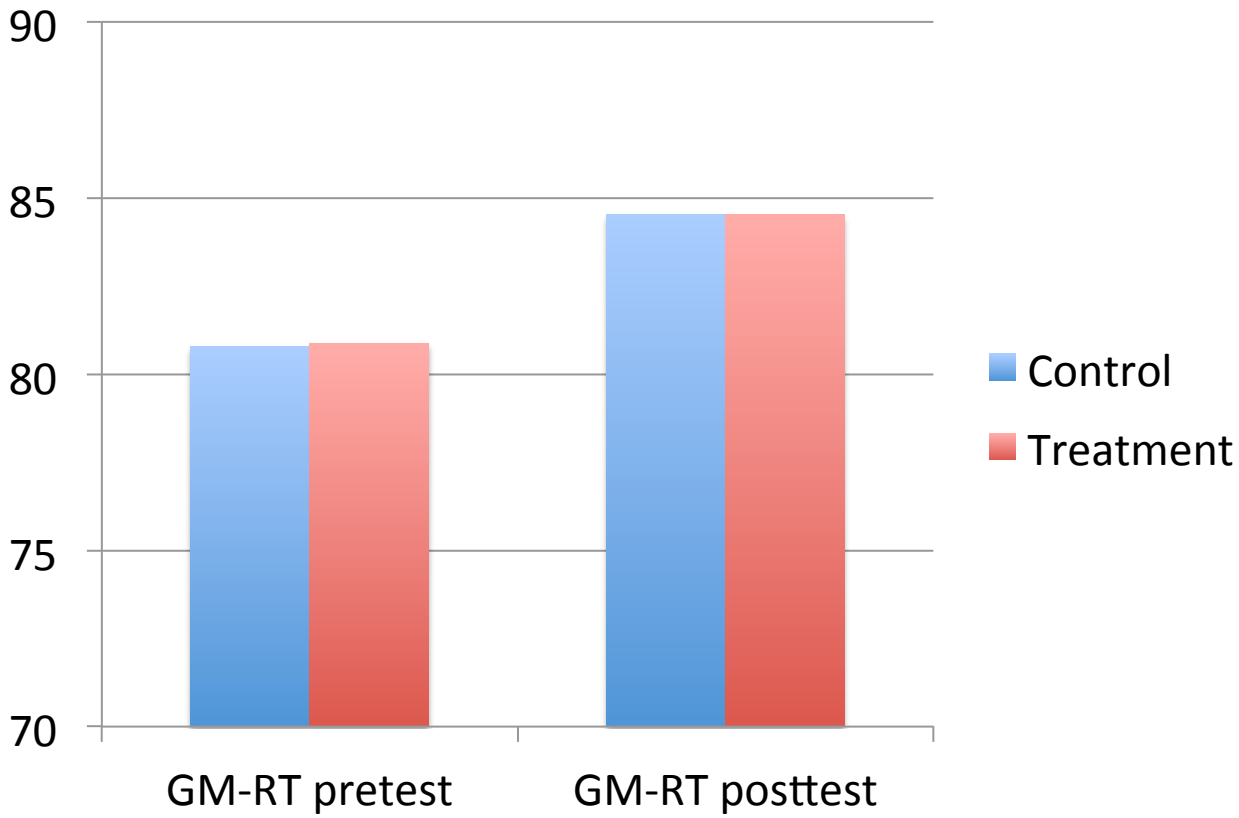
Year 1 Results – pre and posttest group comparisons – WJIII – Spelling



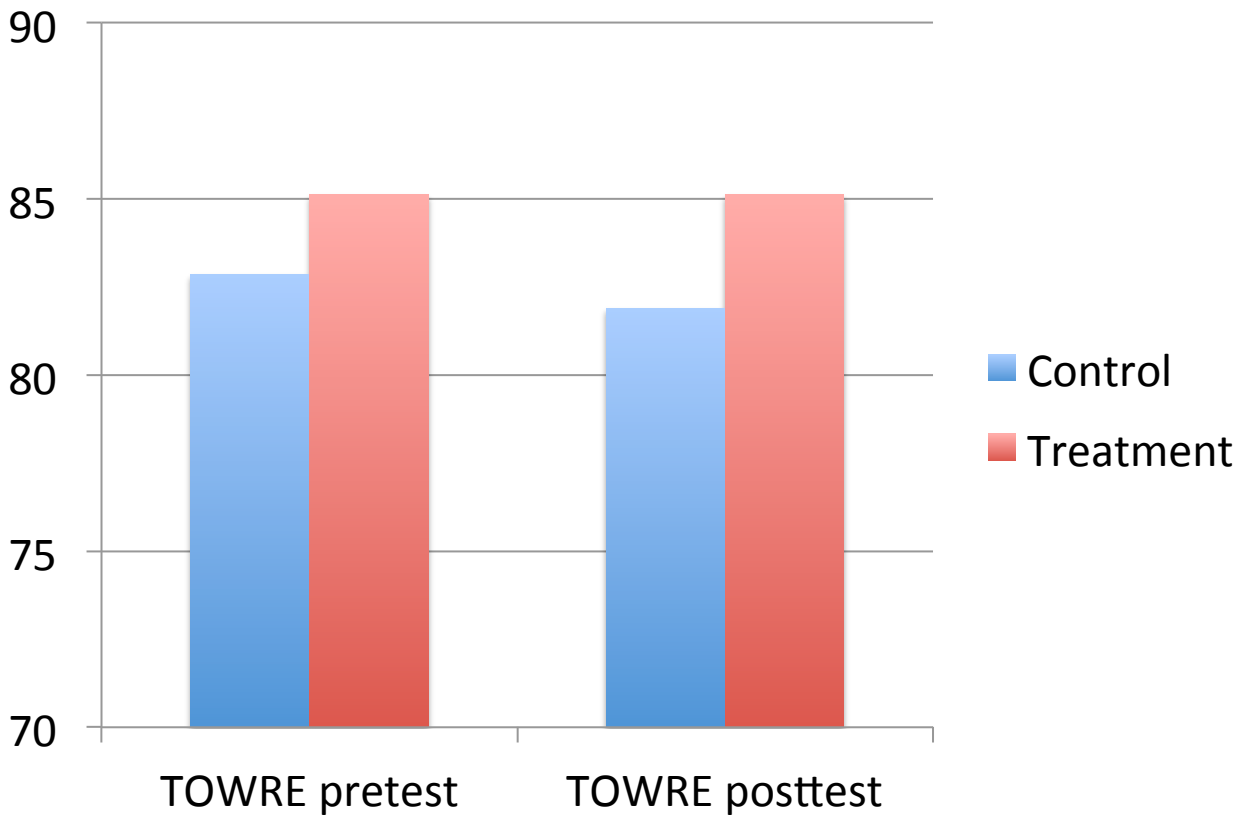
Year 1 Results – pre and posttest group comparisons – WJIII-PC



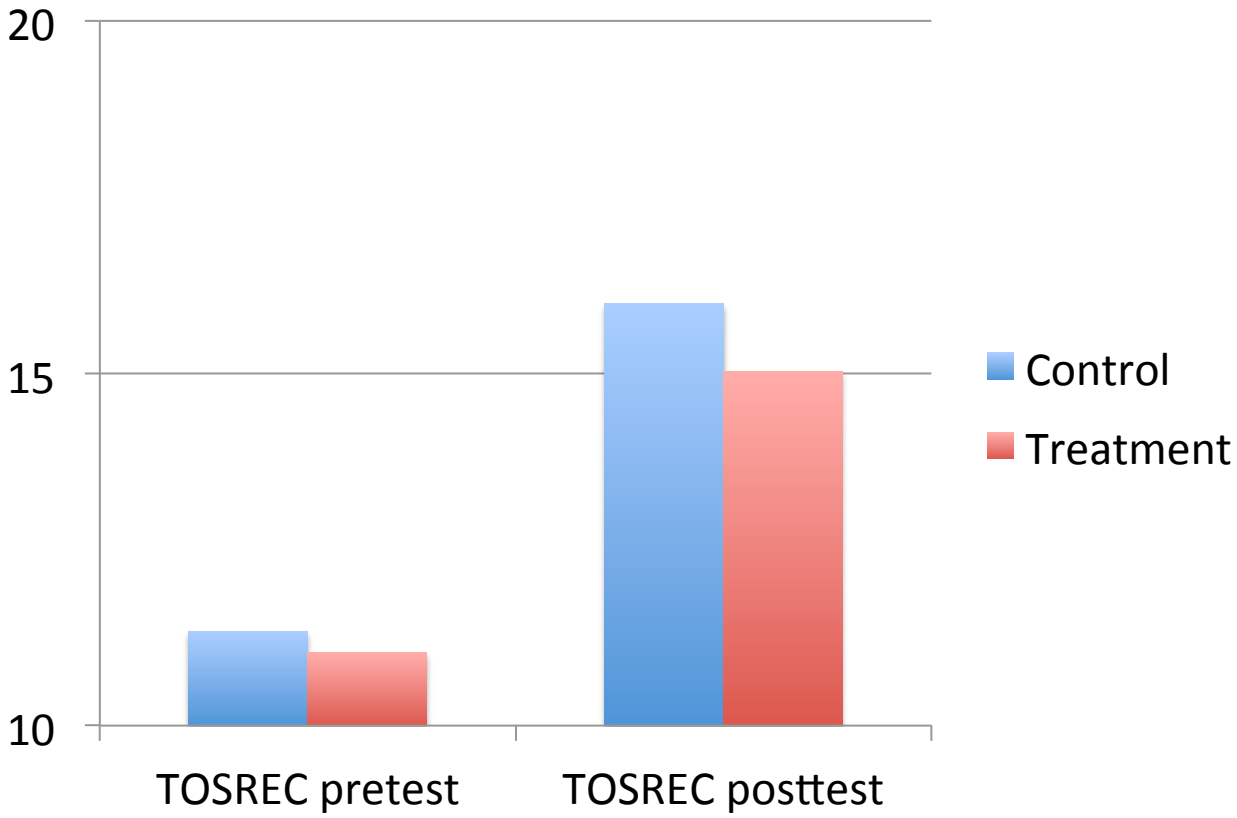
Year 1 Results – pre and posttest group comparisons – Gates MacGinitie Reading Test



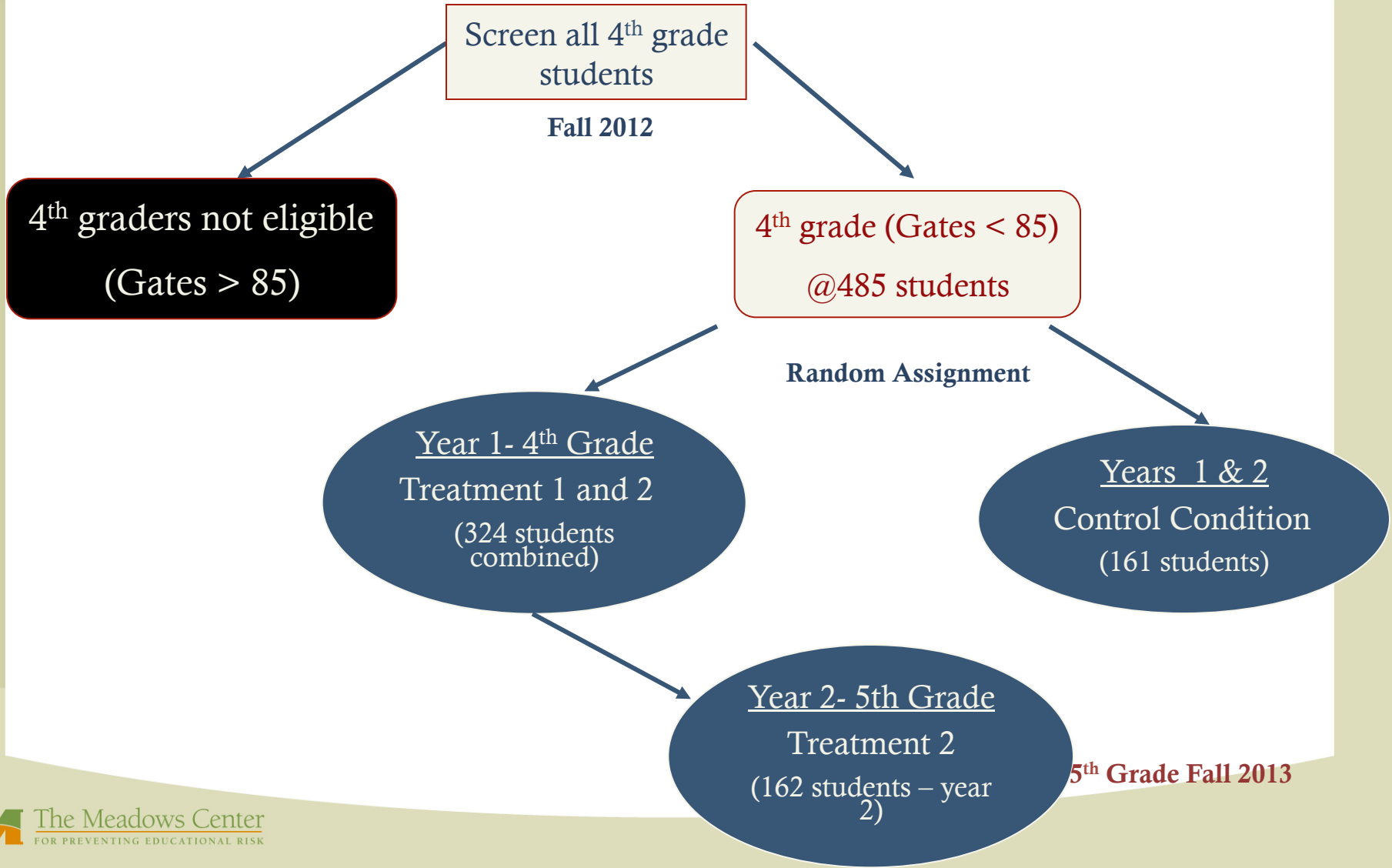
Year 1 Results – pre and posttest group comparisons – TOWRE



Year 1 Results – pre and posttest group comparisons – TOSREC



Two-year Research Overview



Year 2 Intervention – Researcher Implemented

- Half of the students in the researcher implemented intervention received a second year of treatment- initially randomized to two years of Treatment (N=162)

- **Components:** Vocabulary, text-based reading, word study with the addition of self-regulation component

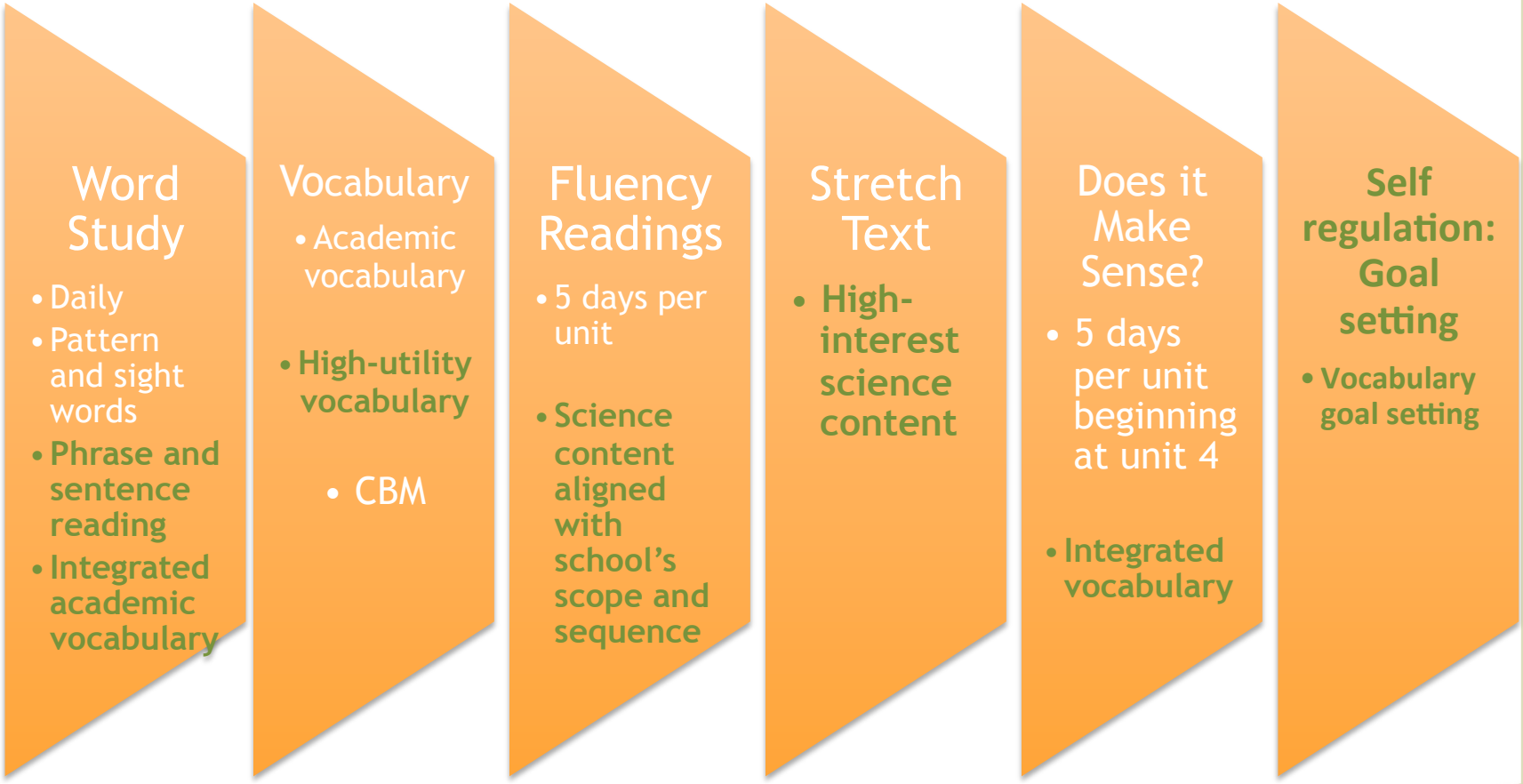
Background on Intervention Changes

Promising research suggests integrating strategies that ***support cognitive processing through academic instruction*** may accelerate academic progress. Attention is a high priority focus.

Year 2 Intervention – Researcher Implemented

- 80 sessions organized in 2-week units with readings associated with **Science** content
- 35-min sessions, 5 days/week provided in addition to core reading instruction
- Small groups of 4-5 students
- Tutors hired, trained, and supervised by researchers

Treatment Components – Year 2



Self Regulation Goals

- Teach and provide opportunities for students to:
  - Set goals
  - Evaluate their progress towards meeting their goals
  - Reflect on their goals
- Provide opportunities for students to set and reflect on goals
- GOAL: Improve vocabulary knowledge

Self Regulation Goals

- Students create their own vocabulary goals
- Students fill in “I Can!” statements prior to lesson and “I Did” statements at conclusion of lesson
- Students create and use strategies from “What works for me?”
- Students reflect on 1-2-3 and vocabulary goals
- Students assessed on if met the goal at end of lesson

Day 2 Goals	Name:_____ **Unit 6** **Goal:** **Use ___ new words.**		
	1-2-3 Goals…	**I Can!**	**I Did!**
	1 Believe	Yes/ No	Yes/ No
	2 What works for me?	Yes/ No	Yes/ No
	3 Stay with it	Yes/ No	Yes/ No
	Did I achieve my goal: Yes/ No		

Further analysis

- Extensive battery executive function, cognitive processes, and academic measures administered to sample
- Constructs will be evaluated for their role in reading comprehension and other academic skills

Further analysis

Construct	Measures
Listening Comprehension	KBIT-2 Verbal Knowledge, WJ-III Oral Comprehension
Mathematics	WJ-III Calculations, WJIII- math fluency
Written Expression	WJ-III Writing Fluency, Test of Written Language Story Comprehension, WJ-III Spelling
Vocabulary	WASI Vocabulary (expressive)
Phonological Processing	CTOPP RAN-Letters, CTOPP Blending Words, CTOPP Elison
Nonverbal Reasoning	KBIT-2 Matrices
Shift	CTOPP RAN-Letters, CTOPP Blending Words, CTOPP Elison
Inhibit	KBIT-2 Matrices

Further analysis

Construct	Measures
Attentional Control	WMTB-C Listening Span, Inquisit Letter Tracking, n-Back, Corsi Backwards
Fluency	D-KEFS Verbal Fluency and Design Fluency
Planning	WJ-III Planning, Inquisit Tower
Regulatory Control	BRIEF Rating Scale, SWAN Rating Scale
Contextual Learning	Experimental Measure – Contextual Learning
Short Term Memory	WMTB-C Word Recall, Inquisit Corsi Blocks Forward
Processing Speed	Inquist n-Back, Letter Tracking, WJ-III Visual Matching
Motor	D-KEFS Trails, Purdue Pegboard, NEPSY-II VisuoMotor Precsion

Conclusions

- Regardless of researcher or school provided treatment, students made substantial progress in closing the gap from the beginning and end of 4th grade
- Gains are substantial when compared to standard scores gains from previous interventions of upper elementary grade students (Wanzek et al., 2013)
- Previous reviews have indicated interventions of short duration, few RCTs (N=9) with limited use of standardized measures of reading comprehension (N=2) (Solis et al., 2012)
- Findings support the hypothesis that it may be necessary to provide even more intensive interventions (longer duration, smaller groups, focused instruction) for some students to remediate reading difficulties

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