

2011 International Conference on Child Development and Learning

**Multiple Deficits of Chinese Developmental
Dyslexia in Learning English as a 2nd Language:
A Neuroscience Remediation Program**

**Using Fast ForWord®
and Reading Assistant™**

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Project Aims

1. To investigate whether Chinese children with developmental dyslexia can benefit from training using a neuroscience based remediation program which is used among English speaking children.
2. To report whether training on phonological strategies by using Fast ForWord[®] and Reading Assistant[™] helps Hong Kong children to have better phonological strategies in learning English as a 2nd language.

Behavioral Evidence of Dyslexia

- **Phonological processing and naming speed deficits** are the major causes of dyslexia in alphabetic languages
- Chinese dyslexic children can be impaired in one or more of the domains of rapid naming, orthographic, visual, morphological awareness and phonological processing. The connections among orthographic, phonological, morphological and semantic representations in the lexicons of poor readers are weak, and the interactive activation and processing among the representations are slow and inefficient¹ (Shu, Meng & Lai, 2008) .

Phonological Awareness is Important to English Reading

- **Phonological processing is a very significant component of reading and probably the core deficit of reading disability (Siegel, 1993).**
- **It has been suggested that “phonological processing plays a critical role in reading acquisition for both native and non-native speakers” (Chiappe & Siegel, 1999).**
- **Phonological awareness, or the ability to identify and manipulate phonemes, is a necessary precursor to successful reading acquisition (Chiappe, Siegel, & Wade-Woolley, 2002).**
- **It has been found in a study for kindergarten children that alphabetic knowledge and phonological awareness were important predictors of literacy performance for all children (Chiappe, Siegel, & Gottardo, 2002).**

Phonological Awareness Is also Important to Chinese Reading

- Ho and Bryant (1997b) found in their study of Chinese Children in Hong Kong that there is a pattern of phonological and cognitive development common to both English-speaking and Chinese-speaking children. Phonological awareness correlates significantly with the use of phonetics in reading Chinese characters (Ho & Bryant 1997a).
- Reading fluency in Chinese was predicted by rapid automatized naming (RAN) but not by phonological sensitivity, whereas Chinese dictation was uniquely predicted by phonological sensitivity but not by RAN. (Wang X. 2011)
- Performance on phonological tasks such as phoneme deletions was significantly related to Chinese reading ability even after controlling for syllable- onset/rime-level awareness, vocabulary, and Pinyin knowledge among monolingual Mandarin-speaking 6- to 8-year-old first graders. (Newman, Shu etc. 2011)

Chinese dyslexic children with English reading impairment

- Our studies suggested that similar neural deficits are involved for impaired phonological processing in English as both the first and the second language acquired (Meng & Lai A. 2011)
- The data support a language-universal theory of the neural basis of developmental dyslexia on the basis of rhythmic perception and syllable segmentation. They also suggest that novel remediation strategies on the basis of rhythm and music may offer benefits for phonological and linguistic development (Goswami, Usha et al, 2011)
- Substantial body of behavioral studies showing commonalities in the cognitive manifestation of dyslexia in Chinese and English populations. They also demonstrated the influence of cognitive ability and learning environment on a common neural system for reading. (Hu, Wei, Lee, H. 2011)

Terminology

- **Phonological Awareness**
 - the ability to break down speech into smaller segments
- **Phonological Strategies**
 - the ways and skills that are employed in breaking down speech into smaller segments
- **Phonological awareness training**
 - teaching the sound and phonetic structure of words (an computerized auditory & optical training)
- **Reading comprehension & efficiency training**
 - teaching the ability to listen and read out loud passages, as well as understanding the content (an computerized auditory & optical training)

Research Period

From **May 2011** to **November 2011**

- May – June 2011: **Pre-test**
- July – October 2011: **Intervention** (22 hours)
 - 12 July- 11 August 2011: 1 hour per session, 2 sessions per week (10 hours)
 - 3 September – 15 October 2011: 2 hours per session, 1 session per week (12 hours)
- October – November 2011: **Post-test**
- November 2011: Data Analysis

Research Subjects

- 91 School-aged children
 - Dyslexic Intervention Group (26 children)
 - Dyslexic Control Group (21 children)
 - Normal Intervention Group (22 children)
 - Normal Control Group (22 children)

Definition of Chinese Developmental Dyslexia

Children with dyslexia were defined as being at or below the 0.16 percentile (around or higher -1 SD) in the standardized Chinese Character Naming Test and also diagnosed by local Educational Psychologists as SpLD in reading and writing. Age mean is 9.23 yrs.

Non-dyslexic children were defined as being at or above the 0.3 percentile (at or below S.D -0.53) in the standardized Chinese Character Naming Test. Age mean is 8.95 Yrs.

Demographic data of subjects

	Dyslexics (44 children)	Non-Dyslexics (47 children)
Primary 1	4	6
Primary 2	10	14
Primary 3	12	12
Primary 4	9	9
Primary 5	7	2
Primary 6	5	1

Pre and Post Tests

1. The Standardized Graded Character Naming Test for School-age Children in Hong Kong (2004) (Leung & Lai-Cheng, 2003)
2. Hong Kong Screening Test for Chinese-speaking Children Learning English as a Second Language (Developed by Prof Linda Siegel, UBC. Manulife Centre for Children with SpLD, 2009)
3. Test of Language Development—2 Primary (Newcomer & Hammill, 1988)
4. Graded Reading (Materials chosen from *Classroom Primary TSA English Mock Papers*. One article each grade from Primary 2 to primary 6)

Intervention Programs

1. **The Fast ForWord** :is a learning acceleration program based on over 30 years of neuroscience research, designed for education institutions, English language learning centers, and clinical specialists worldwide.
2. **Reading Assistant** : Using research-validated speech verification technology, "listens" to a student as he or she reads aloud. Monitoring for signs of difficulty, **the program intervenes with assistance when the student is challenged by a word. Students re-read passages several times to build automaticity. Students are assessed to determine their level of comprehension by skill.**

Research Evidences of FFW & RA

Nevada Department of Education Finds Fast ForWord a "High-Gain Program", July 2010.

- The Report concludes that Fast ForWord products increased student reading achievement by an average of 22.2 percentage points, which was the largest average impact of all programs reviewed in the Report.

Suggested Protocols

□ Fast ForWord

- Students can achieve, on average, a 1 to 2 year gain in reading skills in 8 to 12 weeks using one of our prescribed protocols:
 - 30 minutes each day, five days a week, for 12 to 16 weeks.
 - 40 minutes each day, five days a week, for 9 to 13 weeks.
 - 50 minutes each day, five days a week, for 6 to 10 weeks.
 - 90 minutes each day, five days a week, for 4 to 7 weeks.

Suggested Protocols

□ Reading Assistant

- K-3 – a minimum of 20 minutes 3 days per week
- 4-5 – a minimum of 30 minutes 3 days per week
- 6-8 - a minimum of 40 minutes 3 days per week
- 9-12 – a minimum of 40 minutes 3 days per week

Fast ForWord®

◆ Demo

◆ *Fast ForWord® Reading Level 1*

◆ *Fast ForWord® Reading Level 5*



Reading Assistant™

◆ Demo

◆ Reading Assistant™ Grades 6-12

Louise K-3

Options

Read To Me


Hide Glossary

Questions Answered
0 of 1


Library

A Butterfly Is Born

3 The caterpillar is hungry. It eats the plant. The caterpillar grows.



4



The caterpillar changes. It hangs from a plant. It makes a chrysalis.

Manuel Rodriguez

Options

Read To Me


Hide Glossary

Questions Answered
0 of 2

Library

The Wise Woman

3 The cruel king found two horses that were exactly the same in color and size. He sent them to the kind king and asked him to decide which horse was the mother and which horse was the daughter.



4 The kind king called his judges. The judges looked at both horses, but they could not tell which horse was the mother and which horse was the daughter.

Procedures

Pre Test

- All participants were given the Pre test appropriate to their grade and age at the beginning of the study, May – June 2011

A neuroscience based remediation training

- A neuroscience based remediation training using Fast ForWord and Reading Assistant to the Intervention
- **Non-dyslexics and Dyslexics:**

	Fast ForWord	Reading Assistant
Non-dyslexics	16 Hours	6 Hours
Dyslexics	16 Hours	6 Hours

	Fast ForWord (16 Hours)	Reading Assistant (6 Hours)
12 July	1 Hour	N/A
14 July	1 Hour	N/A
19 July	1 Hour	N/A
21 July	1 Hour	N/A
26 July	1 Hour	N/A
28 July	1 Hour	N/A
2 August	1 Hour	N/A
4 August	1 Hour	N/A
9 August	1 Hour	N/A
11 August	1 Hour	N/A
3 September	1 Hour	1 Hour
10 September	1 Hour	1 Hour
17 September	1 Hour	1 Hour
24 September	1 Hour	1 Hour
8 October	1 Hour	1 Hour
15 October	1 Hour	1 Hour

Reading in Class

Student A



Student B



Phonological Strategies in English (Fast ForWord)



Phonological Strategies in English (Reading Assistant)



Procedures

Post Test

- All participants were given the post test appropriate to their grade and age at the end of the study, October – November 2011

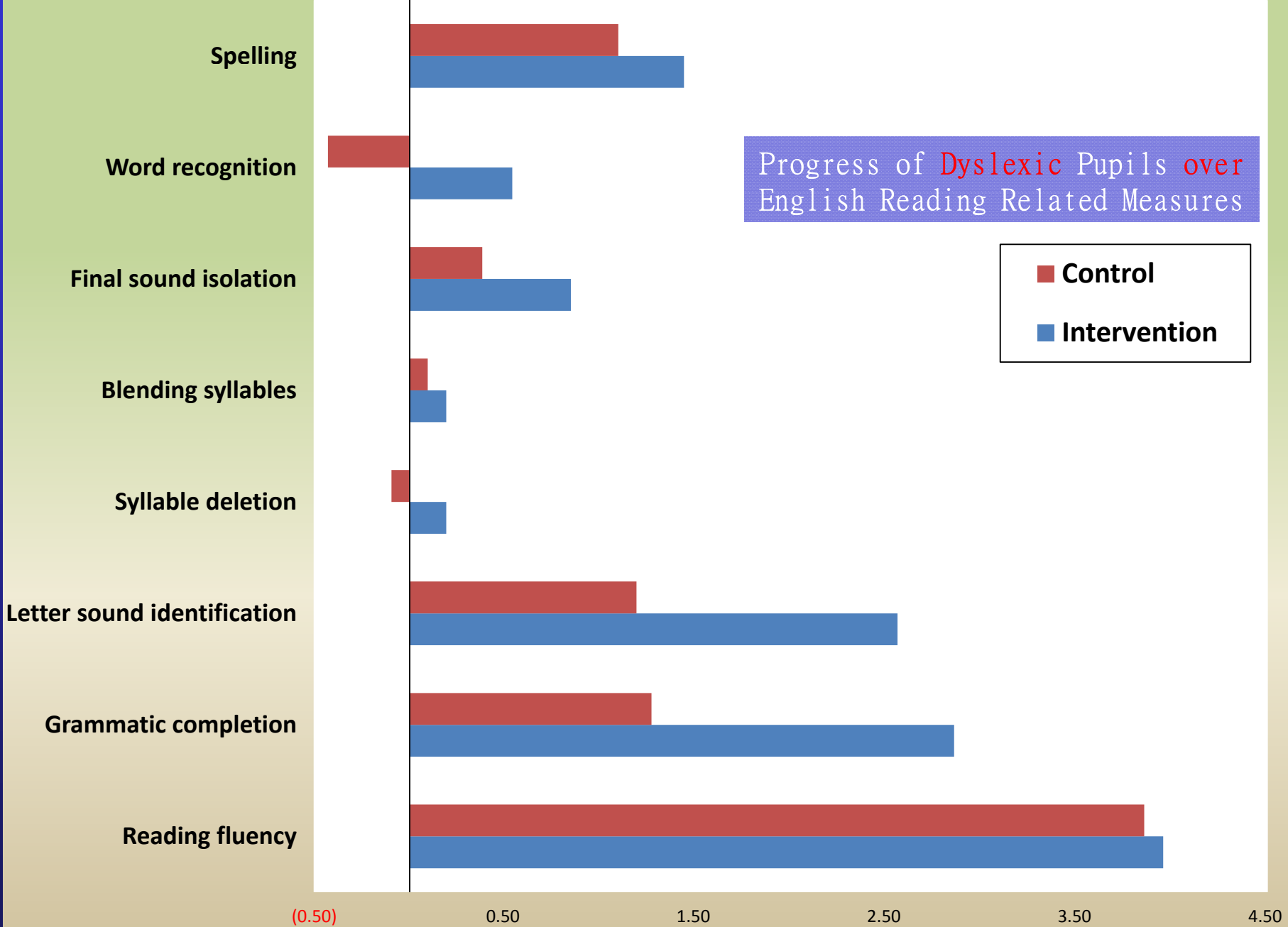
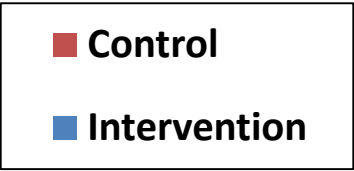
Research Findings

Areas of Improvements (between-groups)

Intervention VS Control

Progress of **Dyslexic** Pupils **over** English
Reading Related Measures

Progress of **Dyslexic** Pupils over English Reading Related Measures



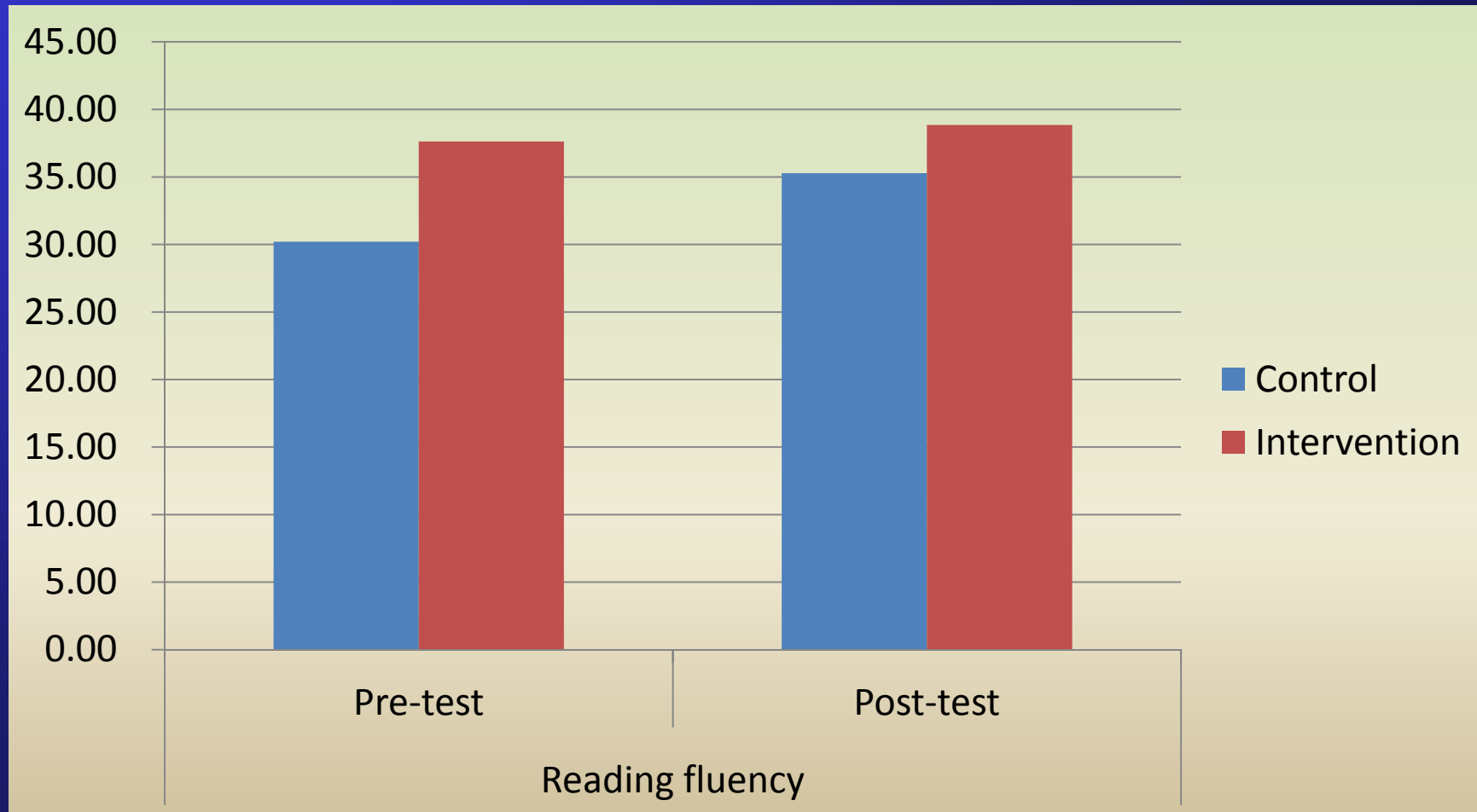
In the **Dyslexic sample**, the **intervention group** performed better in the following areas:

Spelling	Word Recognition
Final Sound Isolation	Blending Syllables
Syllable Detection	Letter Sound Identification
Grammatical Completion	Reading Fluency

Graded Reading – Reading Fluency

- Reading fluency is the ability to read phrases and sentences smoothly and quickly, while understanding them as expressions of complete ideas.
- Students were required to read a passage according to their school-age. The reading was timed (No. of correct words per minute)

Progress of Dyslexic Pupils over English Reading Related Measures



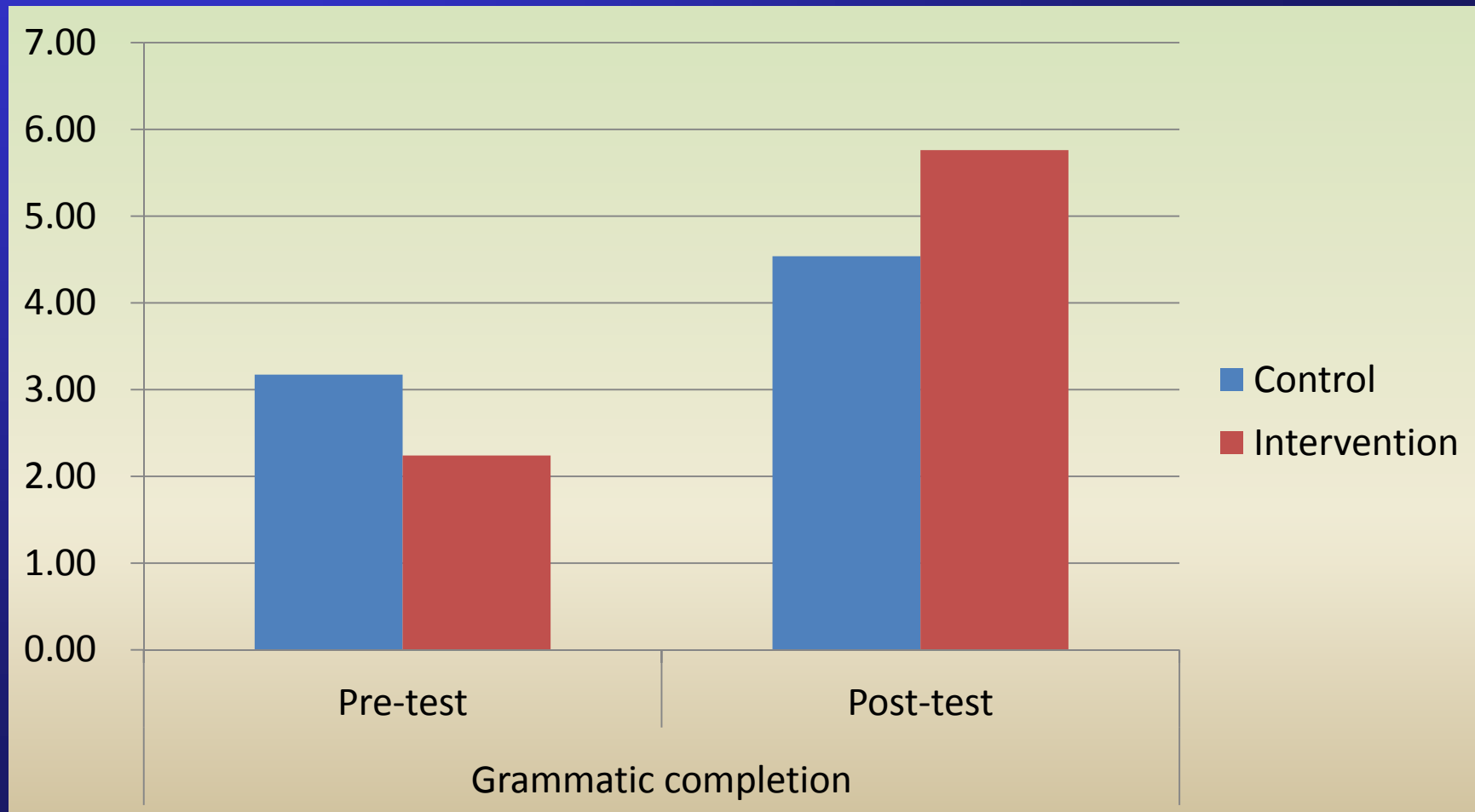
TOLD-2 Primary – Grammatical Completion

- It is a 30-item subtest primarily involves listening ability.
- This syntactic task that measures the student's ability to recognize grammar points in spoken sentences.

i.e.: It is his horse. The horse belongs to ___. (him)

Jane likes to jump. Now she is ___. (jumping)

Progress of Dyslexic Pupils over English Reading Related Measures



PA – Letter Sound Identification

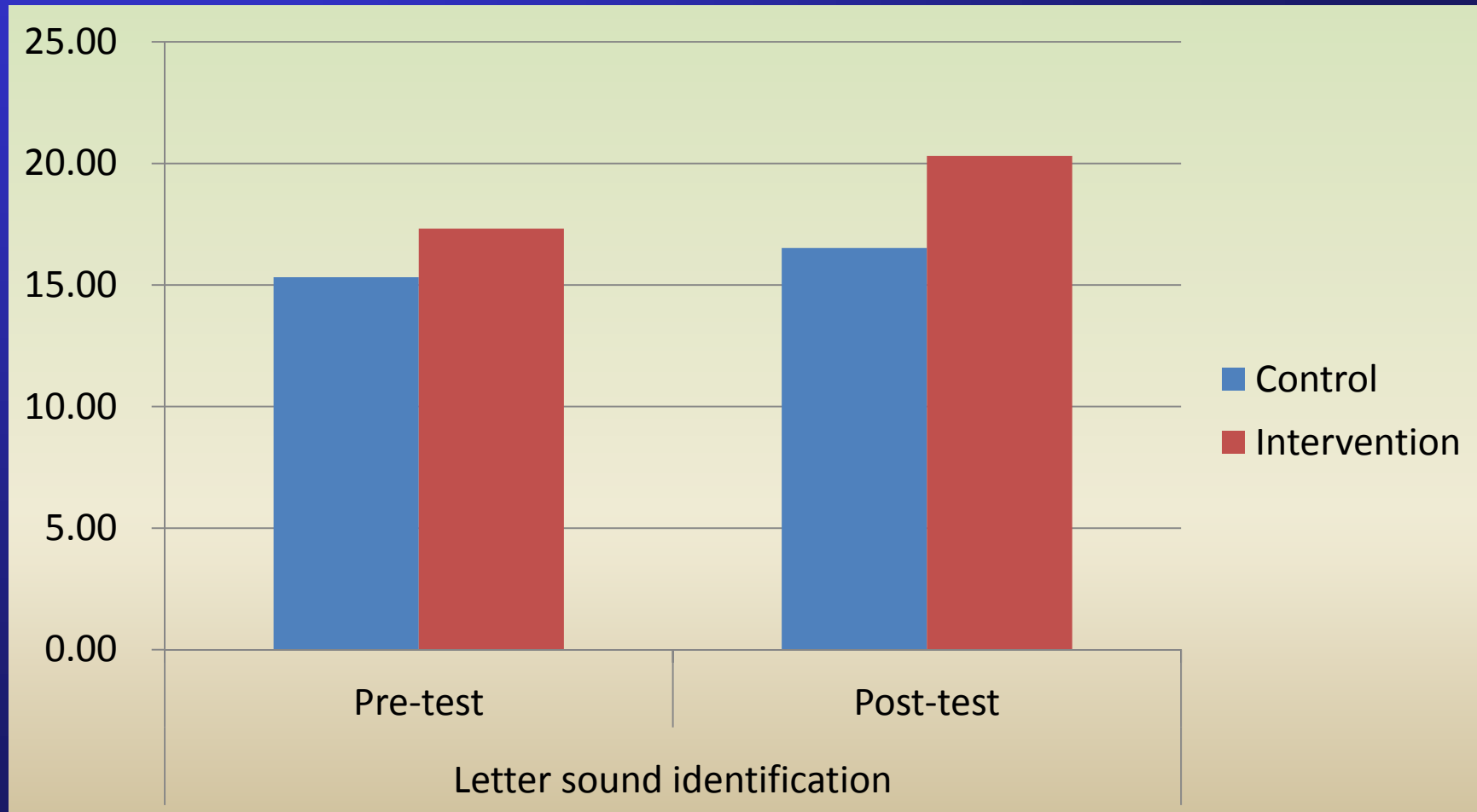
- It assesses student's knowledge of letter/sound correspondence.
- Students were required to read out loud the correspondent letter sounds based on randomly placed letters.

i.e.: “ a ” → / æ /

“ y ” → / j /

“ j ” → / dʒ /

Progress of Dyslexic Pupils over English Reading Related Measures



PA - Syllables

- Syllables are often considered the phonological "building blocks" of words. It assesses student's knowledge on the unit of speech sounds.
- Students were required to **detect** the number of syllables in a word, or **blend** separate syllables into a word.

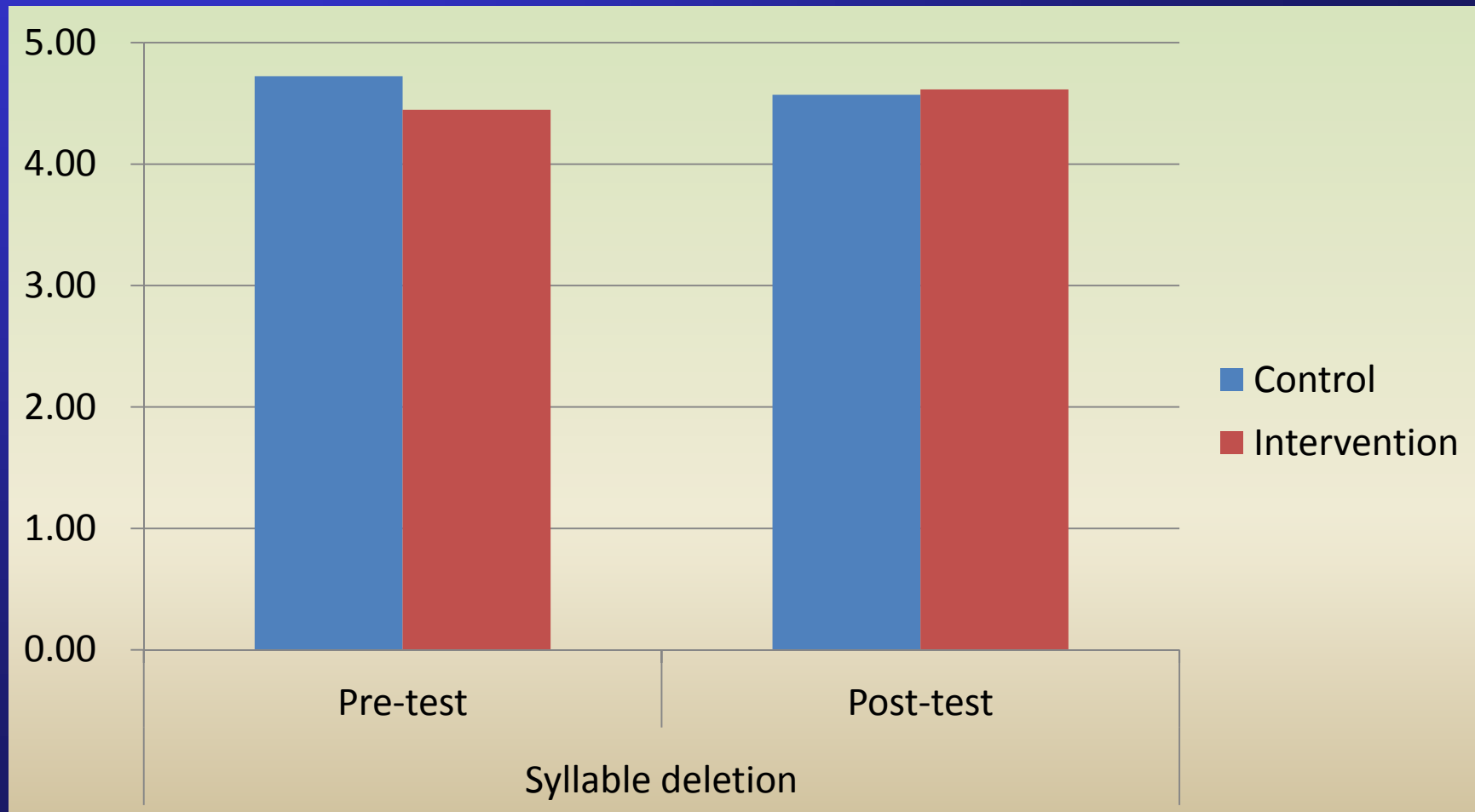
i.e.: December → de ... cem ... ber (3 syllables)

Playstation → play ...sta ...tion (3 syllables)

Or: book ... let → booklet

tel ...e ...phone → telephone

Progress of Dyslexic Pupils over English Reading Related Measures



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i.e.: Syllable Detection

December → de ... cem ... ber (3 syllables)

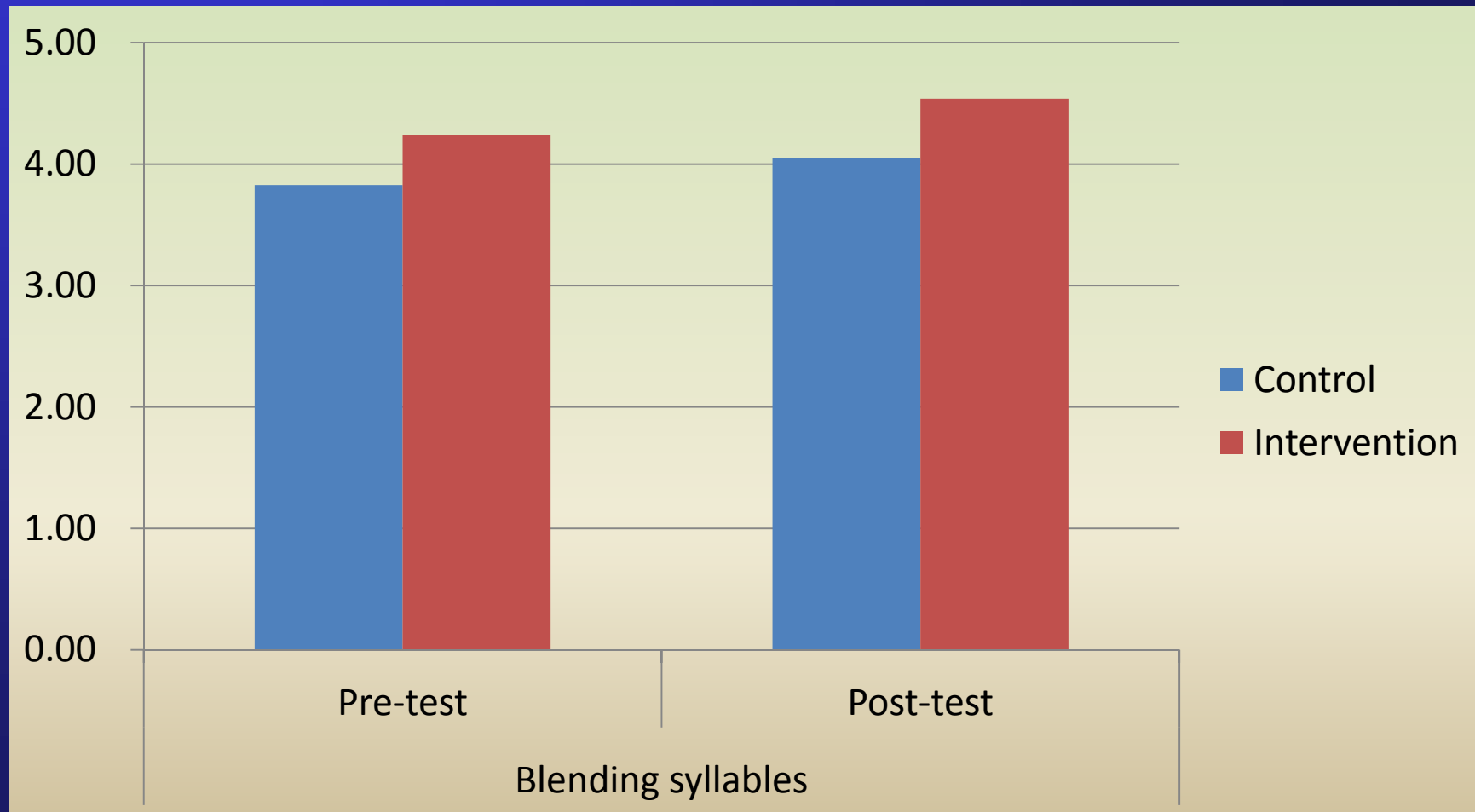
Playstation → play ...sta ...tion (3 syllables)

Blending Syllables

book ... let (2 syllables) → booklet

tel ...e ...phone (3 syllables) → telephone

Progress of Dyslexic Pupils over English Reading Related Measures



PA – Sound Isolation

- Isolation assesses student's ability to identify one phoneme by its position within a word

- Initial

e.g. “Cat” → / k /

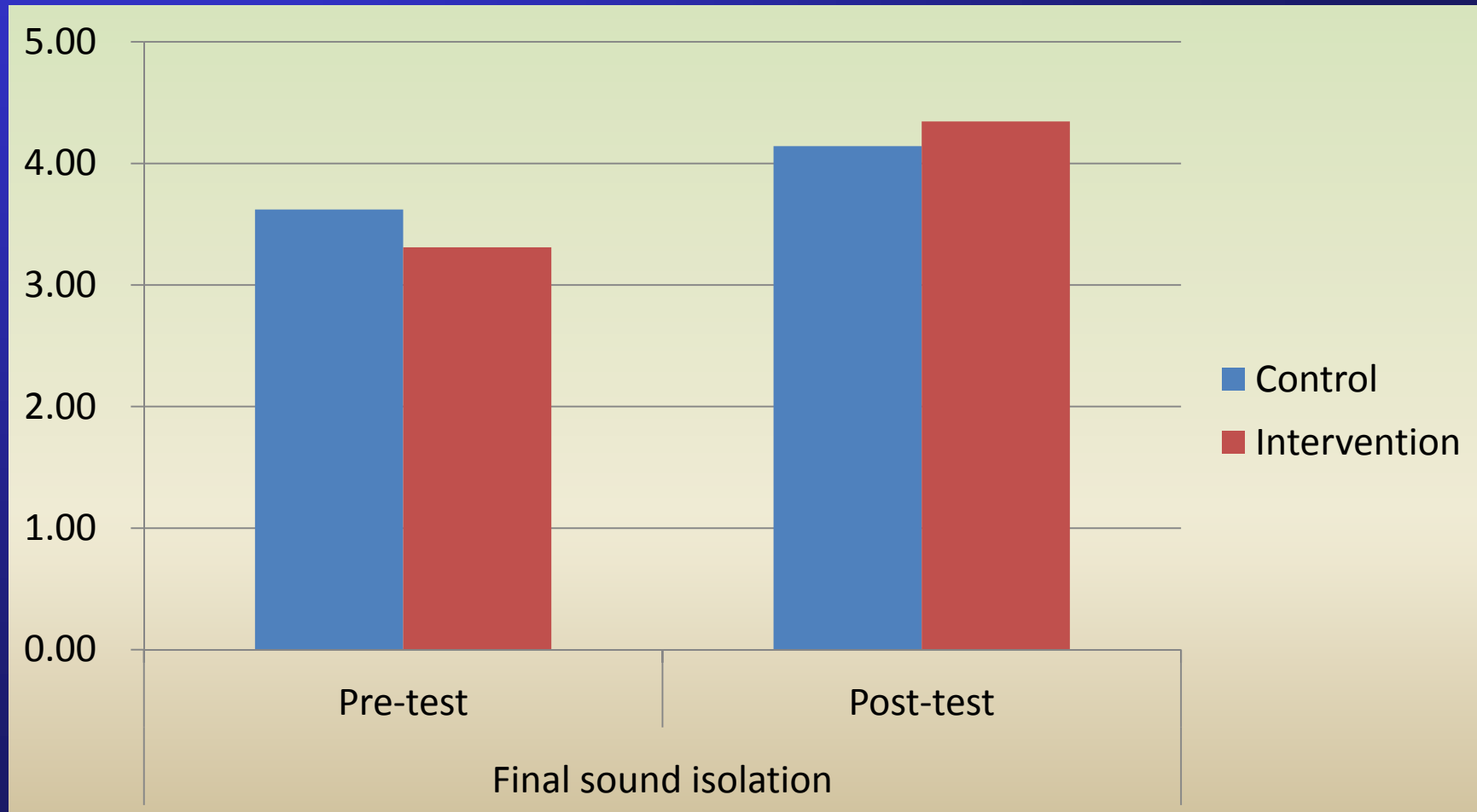
- Final

e.g. “Cat” → / t /

- Medial

e.g. “Cat” → / æ /

Progress of Dyslexic Pupils over English Reading Related Measures

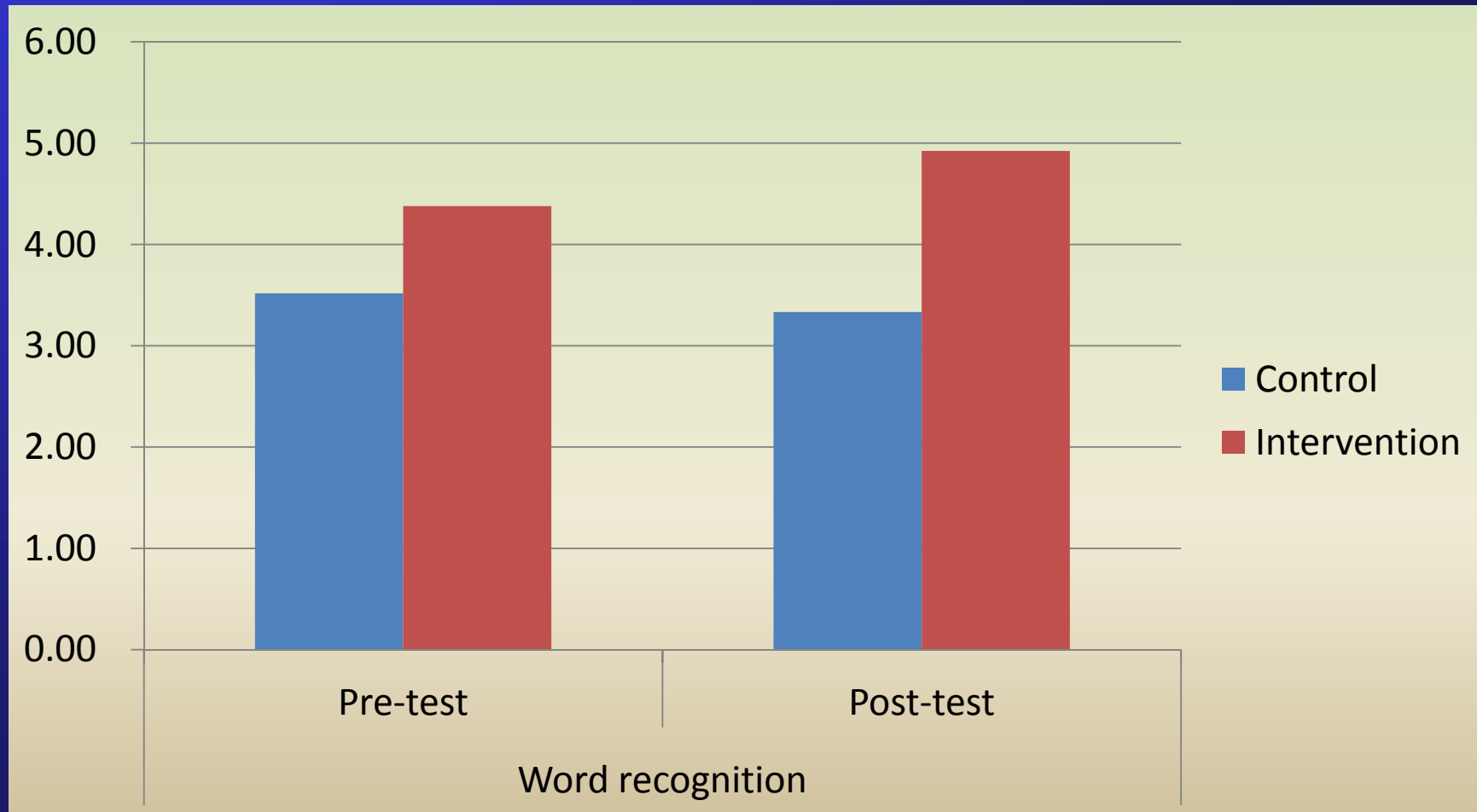


PA – Word Recognition

- To assess student's ability to recognize words at their grade level
- Student were required to speak out the word listed on a piece of paper instantly

i.e.: Primary 2 level → banana, pencil, flower...etc

Progress of Dyslexic Pupils over English Reading Related Measures



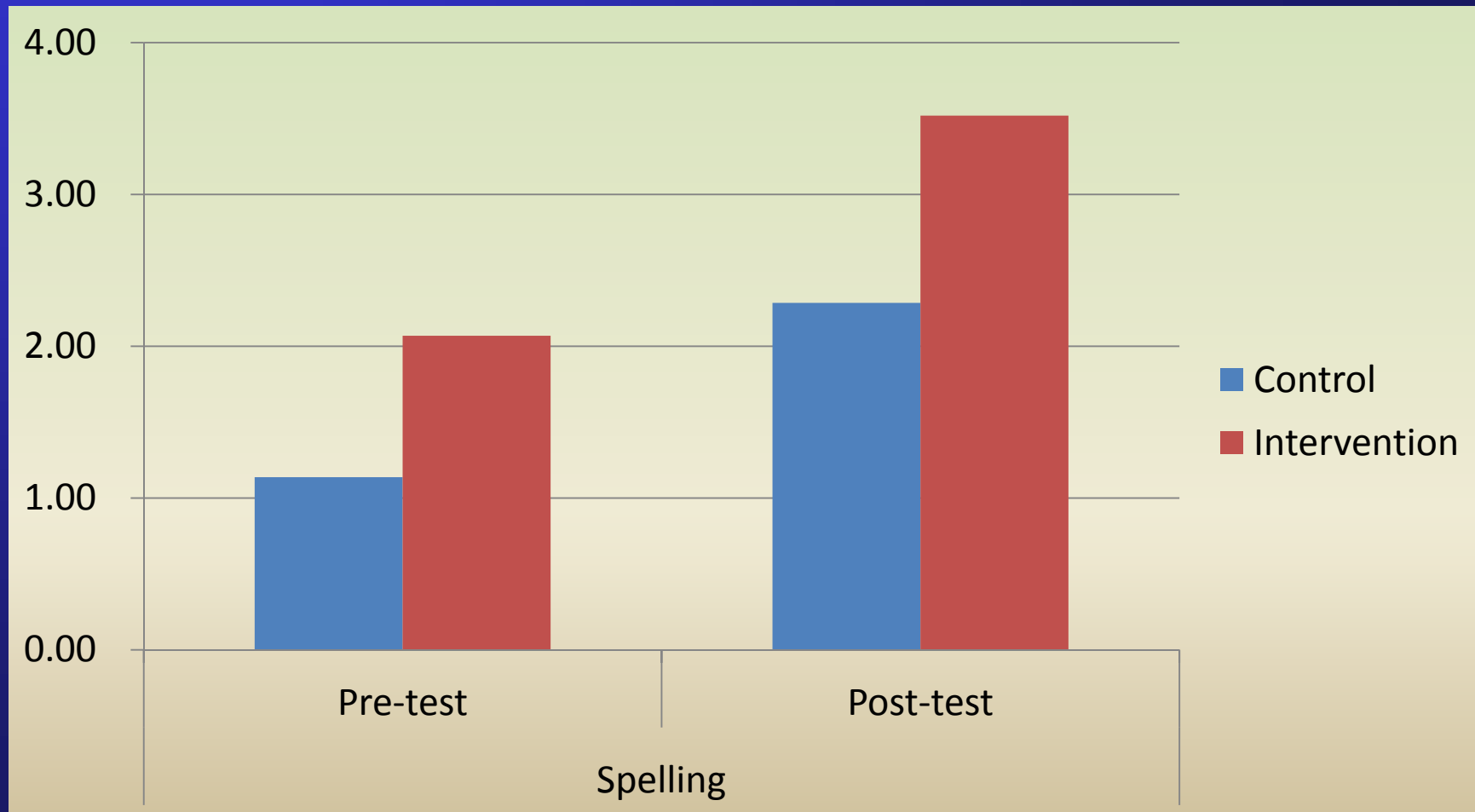
PA - Spelling

- Spellings attempt to transcribe the sounds of English into alphabetic letters. It assesses student's ability to generalize the knowledge of letter/sound correspondences and to associate with words
- Students were required to write down words being read by the examiner

i.e.: “fan” → The **fan** makes the room cool.

“pin” → **P**in the flower on my coat.

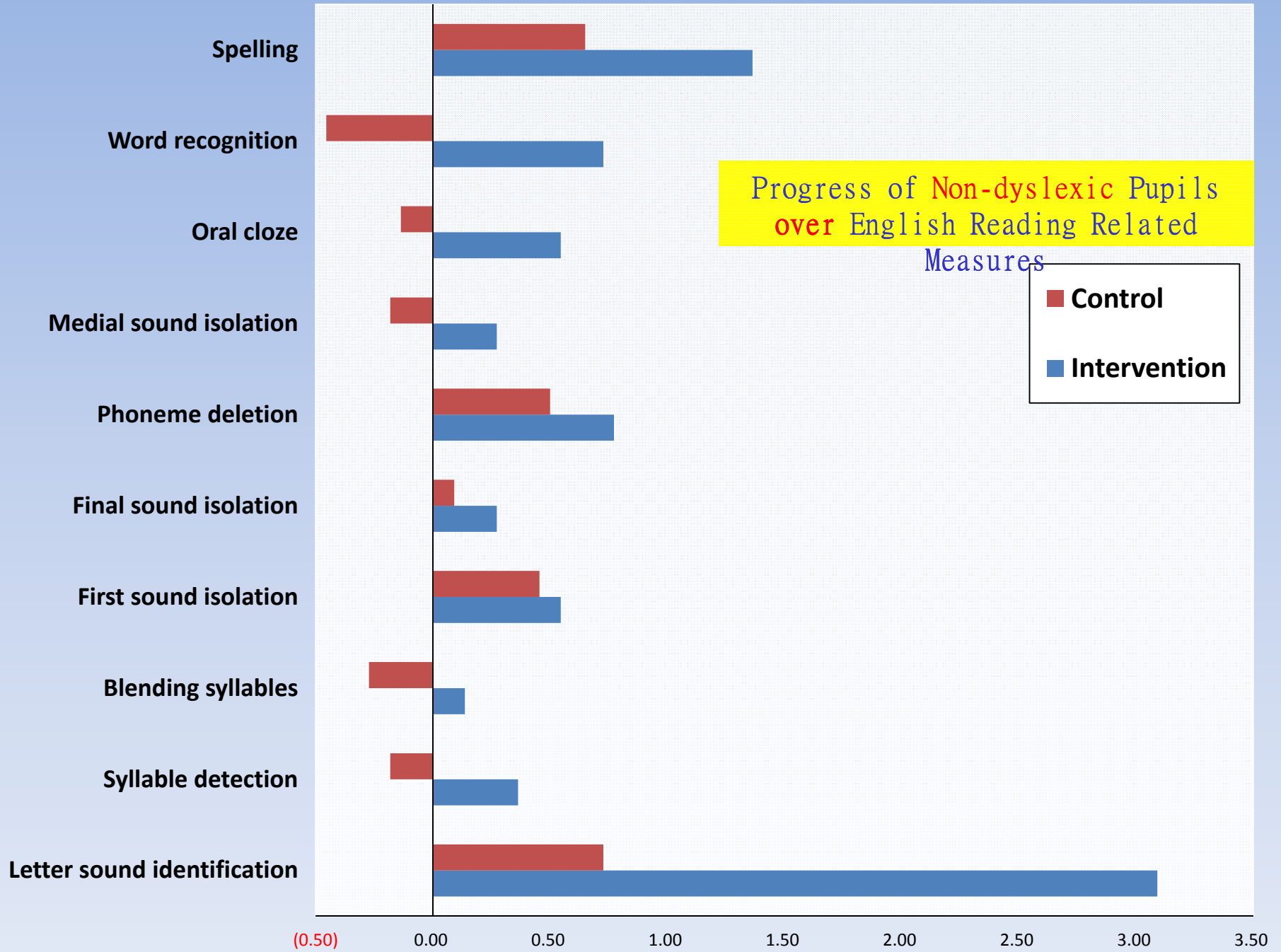
Progress of Dyslexic Pupils over English Reading Related Measures



Intervention VS Control

Progress of **Non-Dyslexic** Pupils **over**
English Reading Related Measures

Progress of Non-dyslexic Pupils
over English Reading Related
Measures



In the **Non-dyslexic** sample, **the intervention group** **performed better** in the following areas:

Spelling	Word Recognition
Oral Cloze	Medial Sound Isolation
Final Sound Isolation	First Sound Isolation
Phoneme Deletion	Blending Syllables
Syllable Detection	Letter Sound Identification

PA – Letter Sound Identification

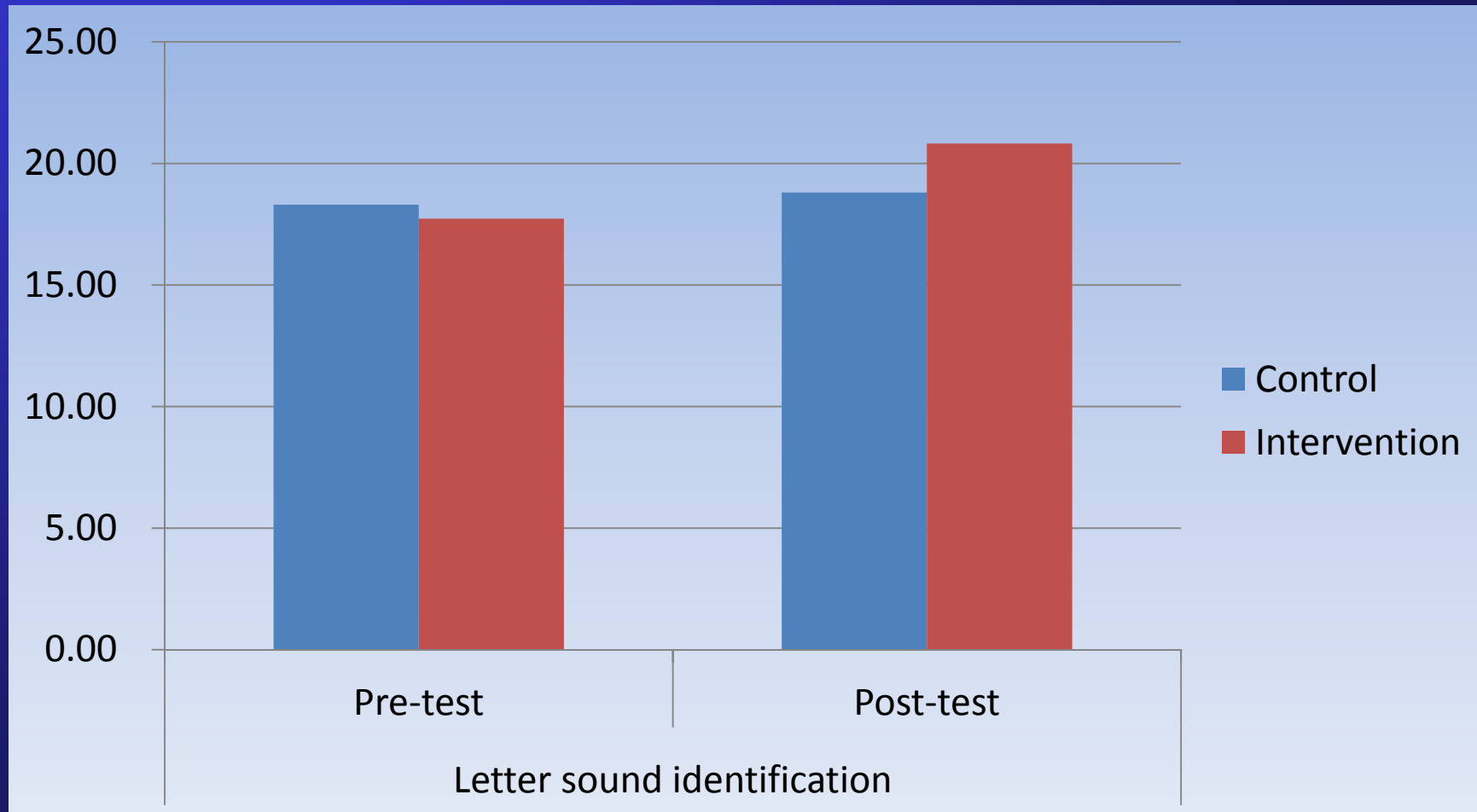
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Progress of Non-dyslexic Pupils over English Reading Related Measures



PA – Syllable detection

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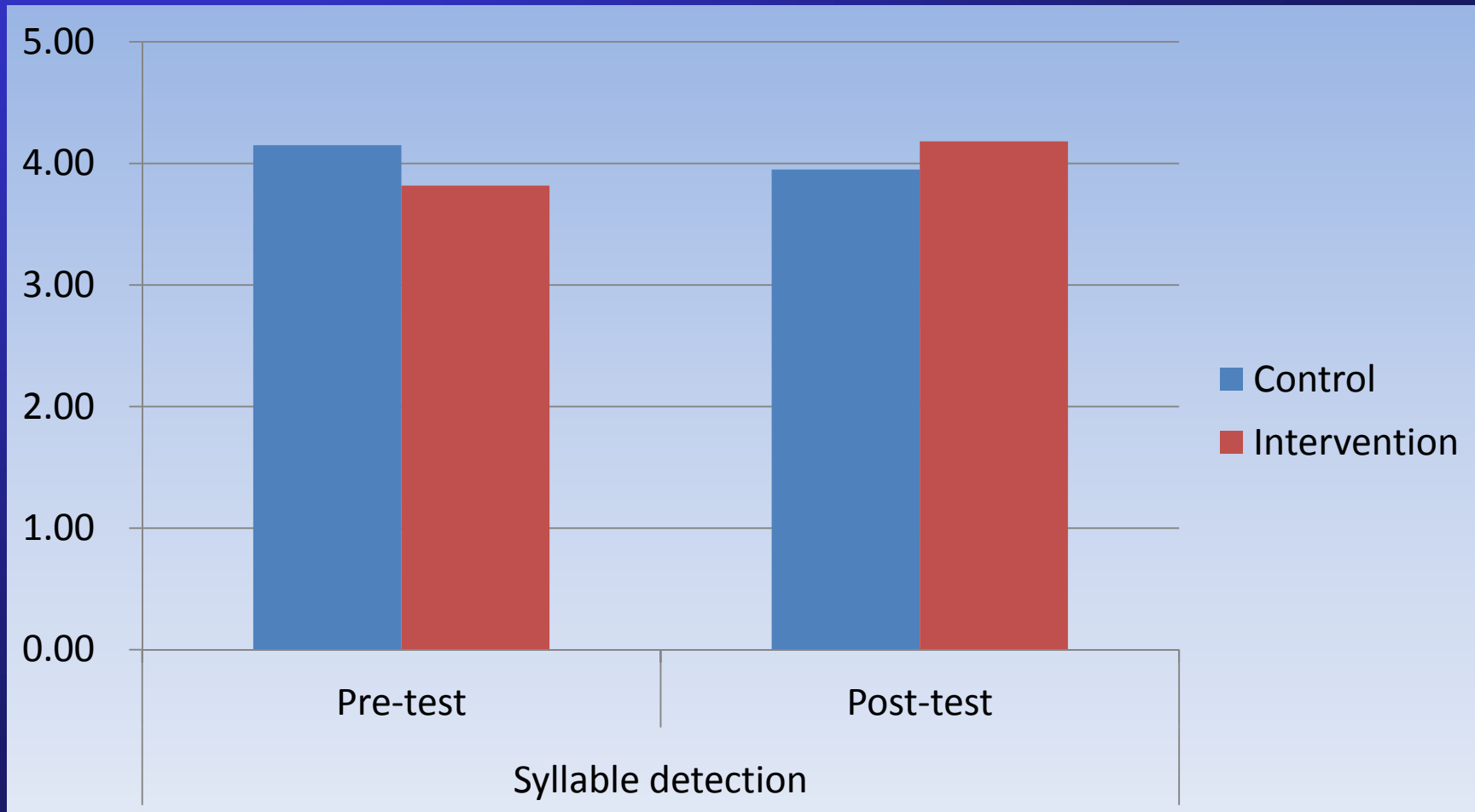
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Progress of Non-dyslexic Pupils over English Reading Related Measures



PA – Blending Syllables

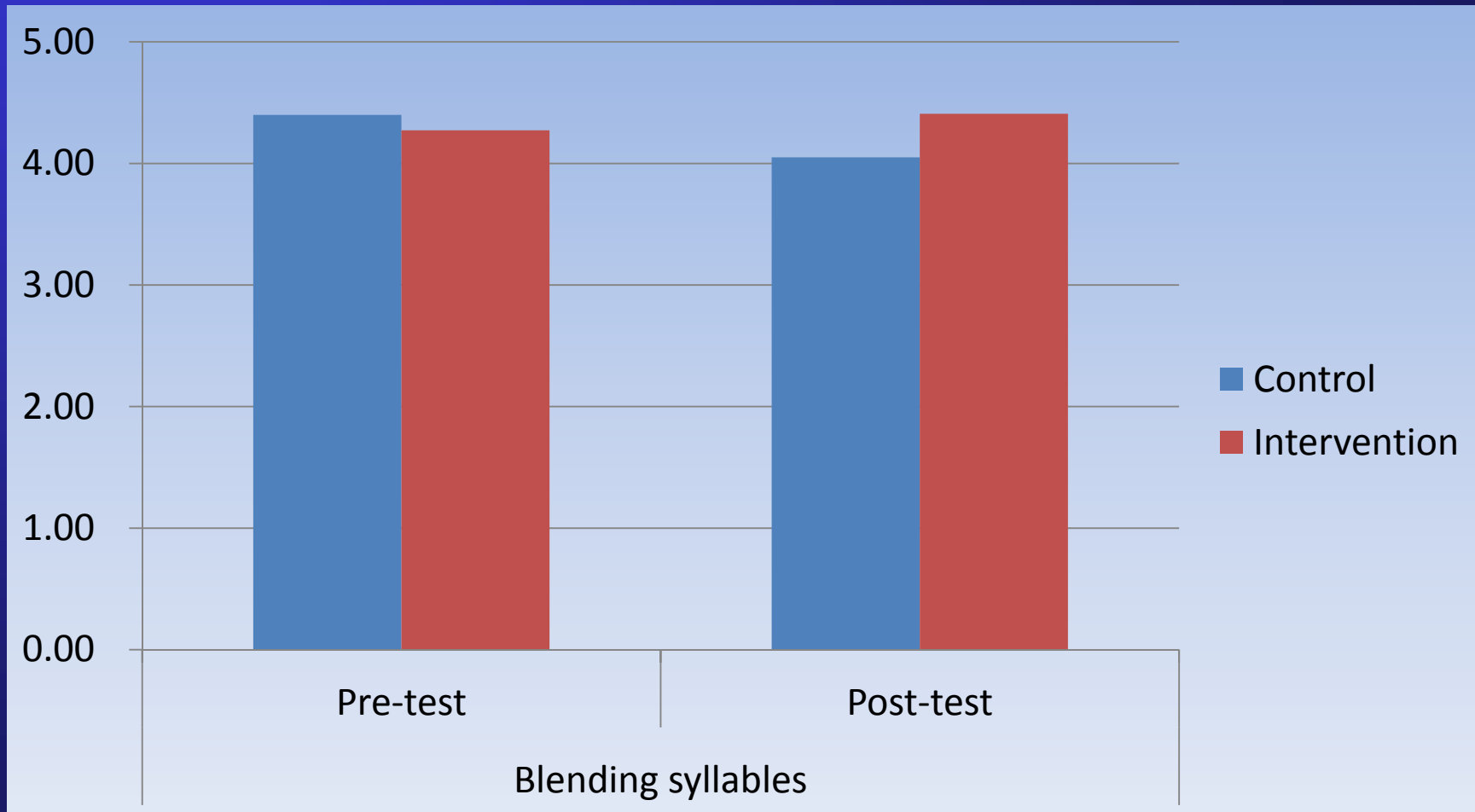
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Blending Syllables

book ... let (2 syllables) → booklet

tel ...e ...phone (3 syllables) → telephone

Progress of Non-dyslexic Pupils over English Reading Related Measures



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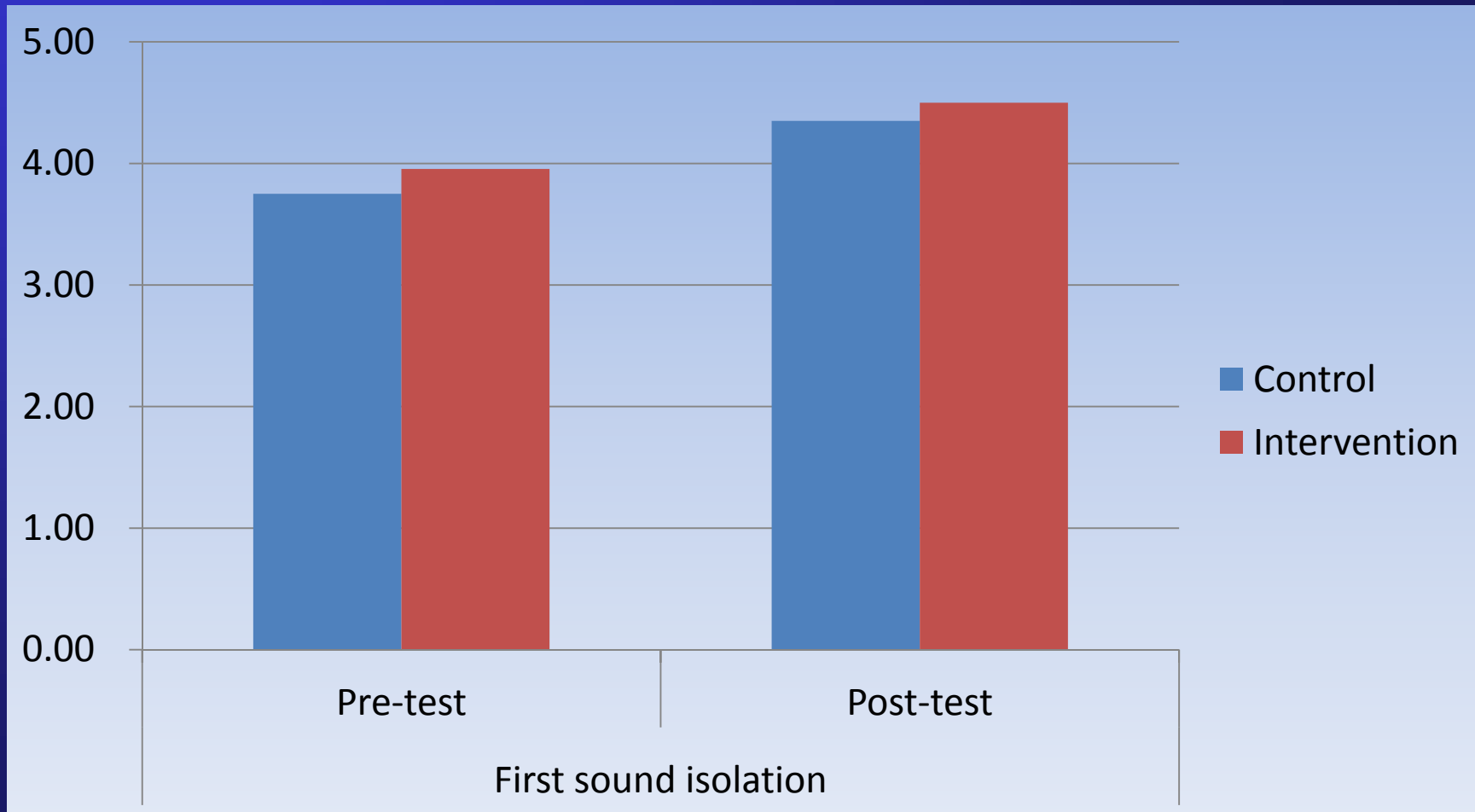
- Final

e.g. “Cat” → / t /

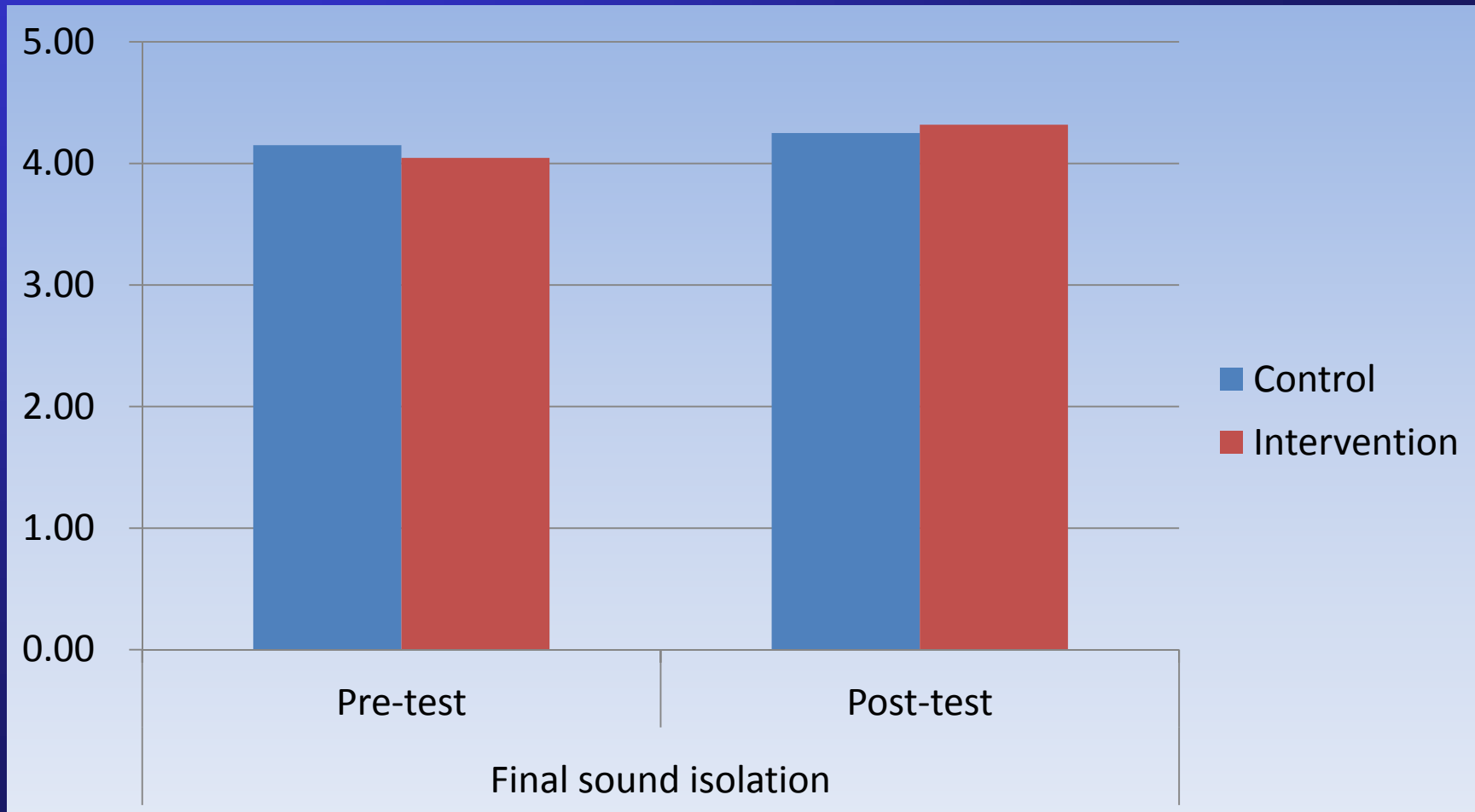
- Medial

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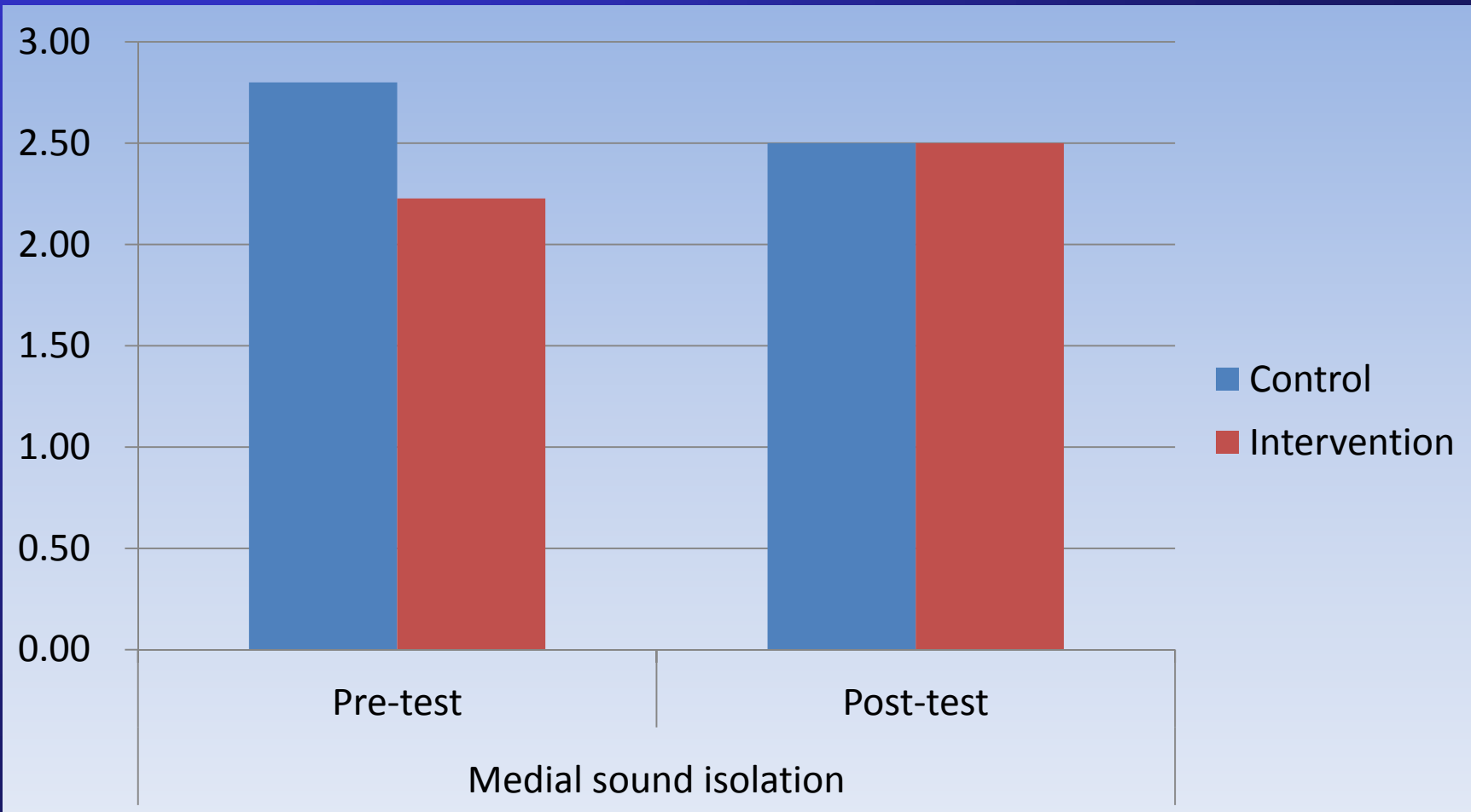
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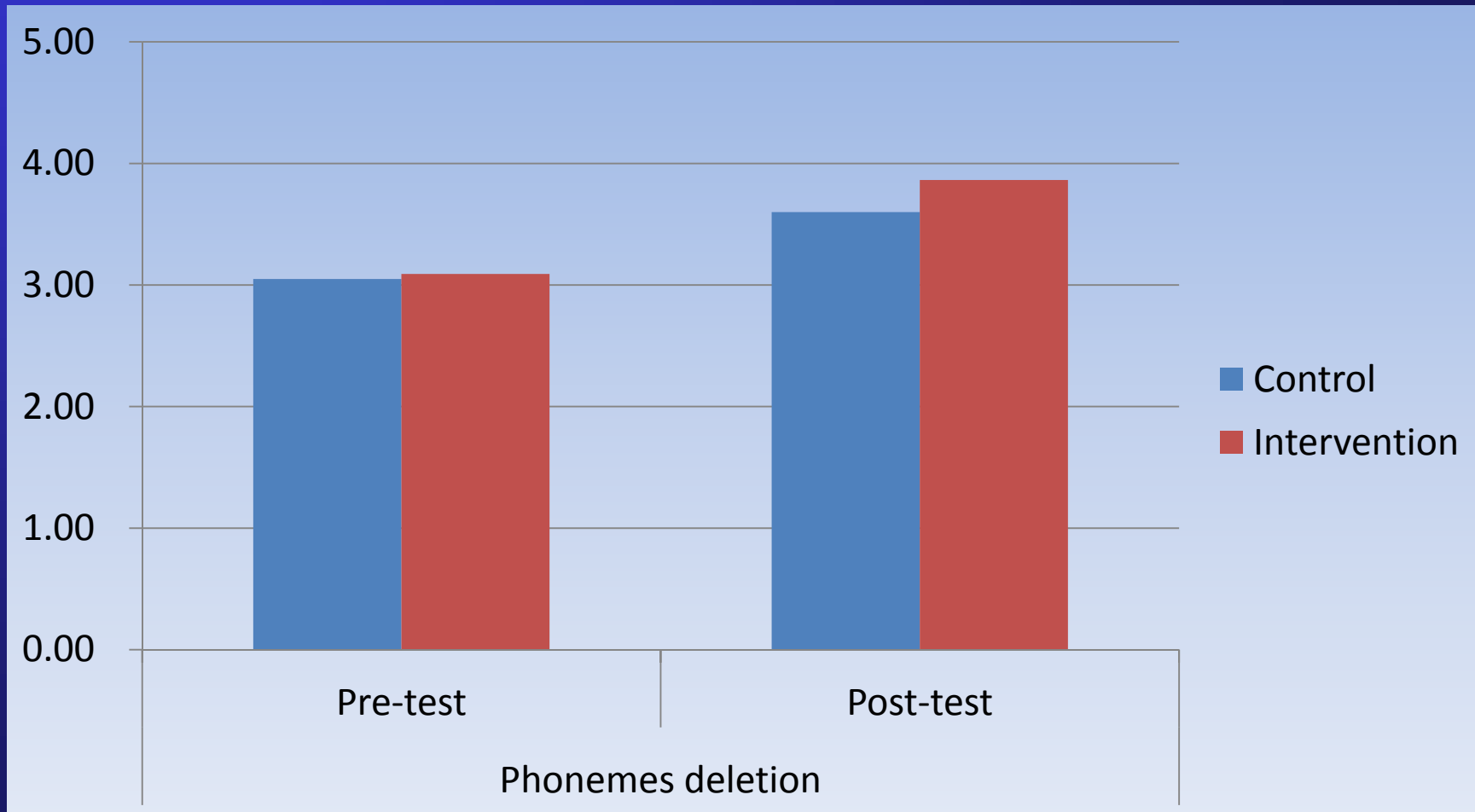


PA - Phoneme

- A phoneme is the smallest segmental unit of sound
- Students were required to pronounce a word without one of its phonemes.

i.e.: say “dog” / d ə g / without / d / sound → / ə g /

Progress of Non-dyslexic Pupils over English Reading Related Measures



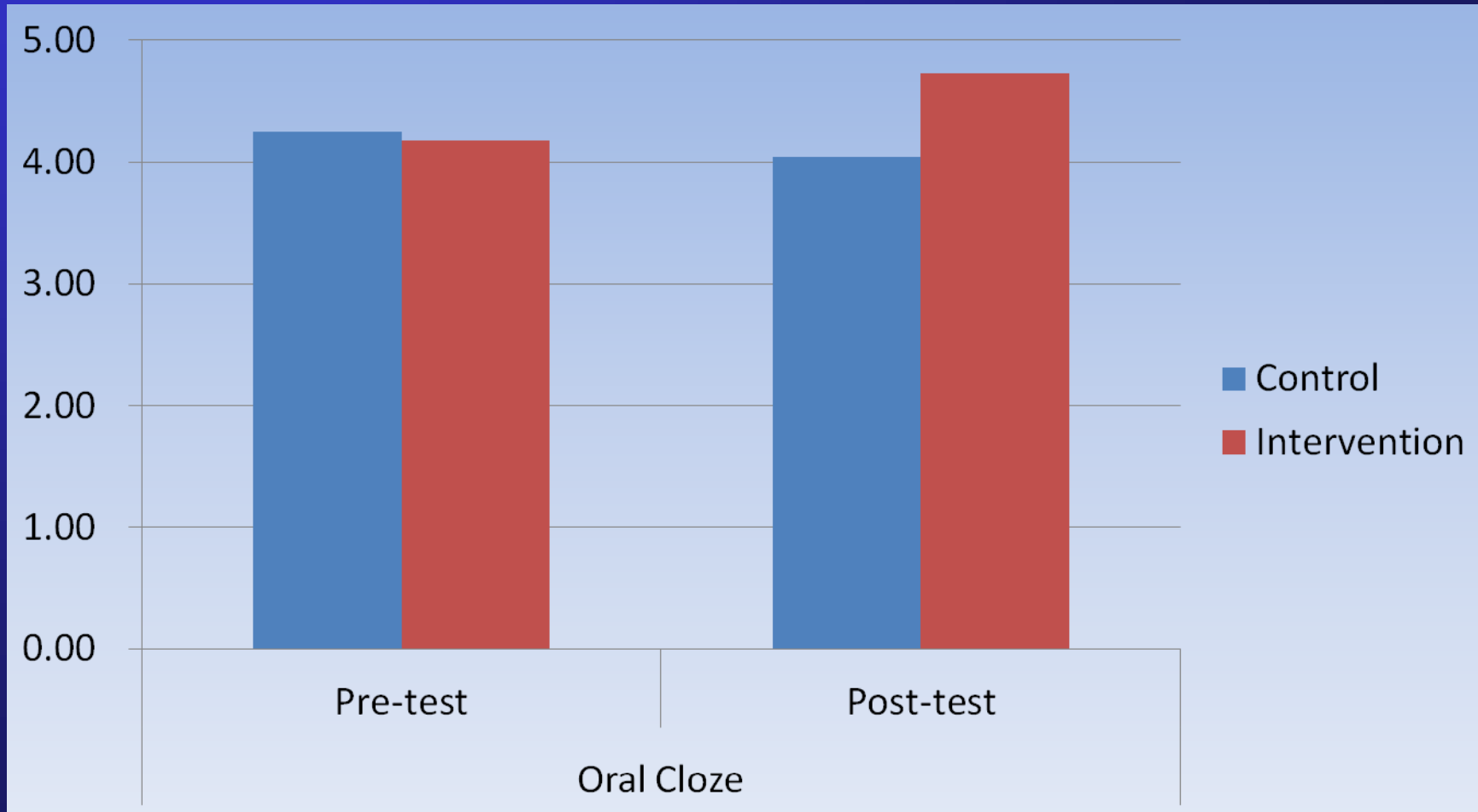
PA – Oral Cloze

- Grammatical Practice
- Students were required to give the missing word in a sentence, to make it grammatically correct and semantically meaningful.

i.e.: Many children like to ___ ice-cream. (eat)

There is a bird ___ the sky. (in)

Progress of Non-dyslexic Pupils over English Reading Related Measures

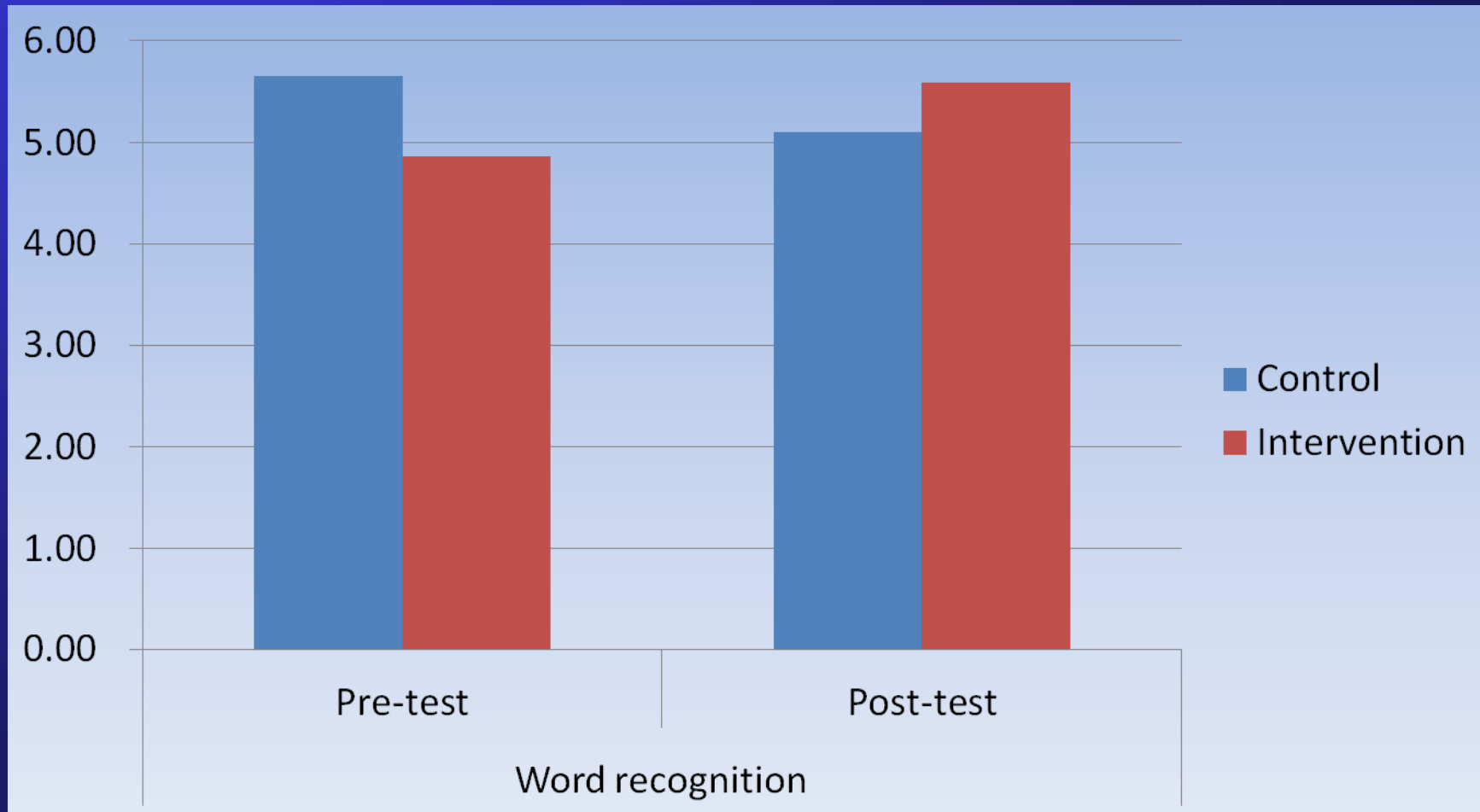


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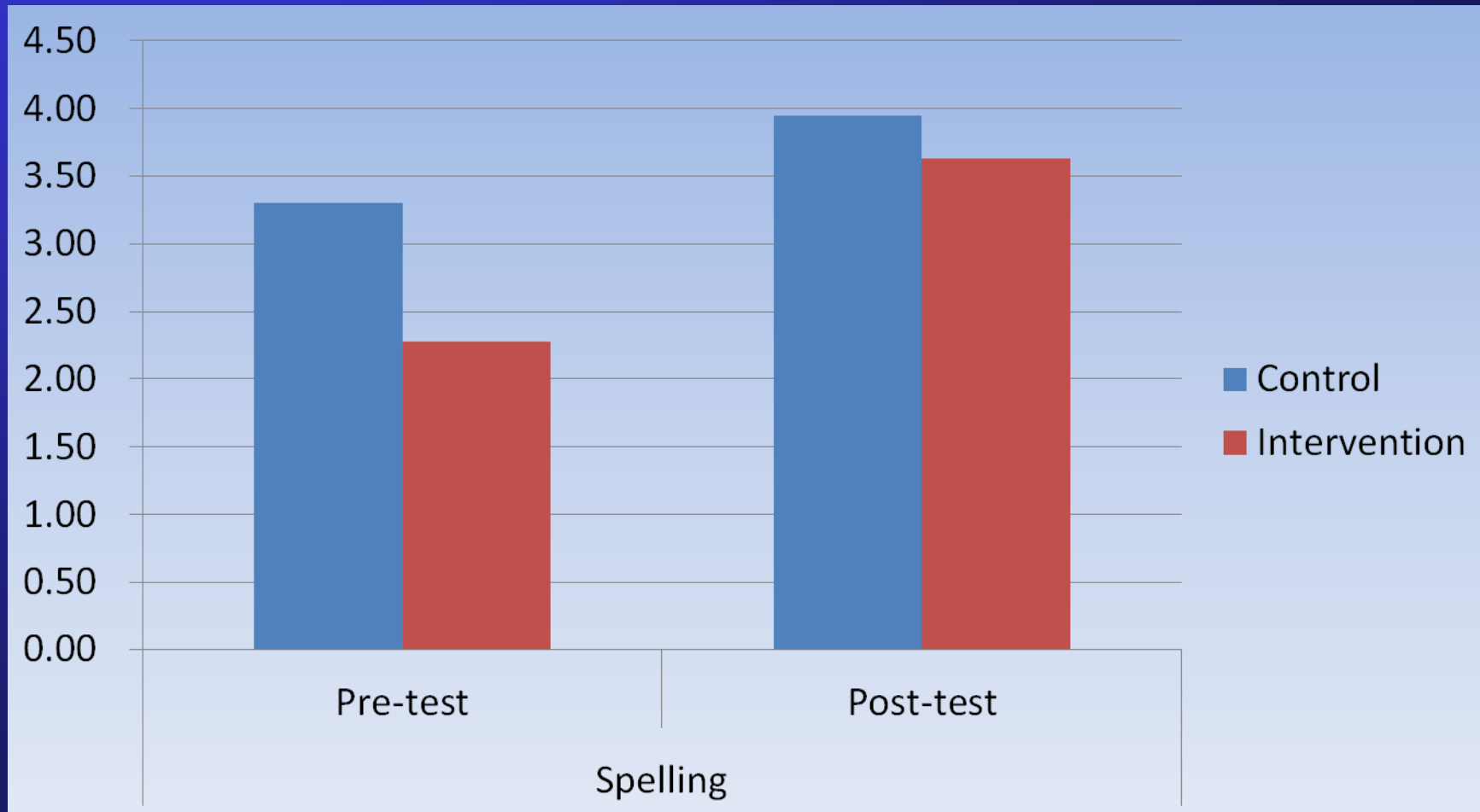
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Progress of Non-dyslexic Pupils over English Reading Related Measures



Influence on the result of intervention

1. Duration of intervention
2. Insufficient exposure
3. Expressive and picture vocabulary not emphasized
4. Passage reading materials were not from the training program

Influence on the result of intervention

- Due to limited access to the student computer room, intervention group participants did not follow exactly the prescribed protocols in using Fast ForWord and Reading Assistant program. This may lead to some unexpected results.

Influence on the result of intervention

- As suggested in the program manual, students of all ages may need a few sessions time to use the guided reading software independently, whereas all intervention group participants spent 6 hours in total in using Reading Assistant Program. Thus the result in reading fluency may not be satisfactory.

Suggestions & Conclusions

1. Picture expressive vocabulary, rhyme, blending phonemes and non-word reading should be taught explicitly in the remediation program for both Chinese dyslexics and non-dyslexic children in learning English as a second language.
2. Reading Assistant helps Chinese dyslexic children to improve their reading fluency and grammatical completion but not non-dyslexics.
3. After the program, it may give some indications on the best way to follow up the training, such as expressive vocabulary, oral cloze, sentence building and enhancing verbal and non-verbal communication.

Conclusion

Direct teaching basic language skills and phonological strategies by using Fast ForWord & Reading Assistant improved both dyslexic and non-dyslexic children's phonological skills and reading ability.



Thank You!

Dr Alice Cheng Lai

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