Evaluating the Effects of *WordWorld* Viewing on Preschool Children's Acquisition of Pre-Literacy Skills

Michael Cohen, Martha Hadley, Craig Rosen, Gerad O'Shea, and Giancarlo Mariutto

The Michael Cohen Group, USA

EETC 2011
EARLY EDUCATION AND TECHNOLOGY FOR CHILDREN

Evaluating the Effects of *WordWorld*™ Viewing on Preschool Children's Acquisition of Pre-Literacy Skills

michael cohen group LLC

prepared by

Michael Cohen PhD and Martha Hadley PhD **Principal Investigators**
Craig Rosen **Senior Research Consultant**
Gerad O'Shea **Research Analyst**
Giancarlo Mariutto **Senior Research Associate**

presented to

The Early Education and Technology for Children Conference

March 3, 2011
Salt Lake City, UT

the michael cohen group research and consulting

Word World Introduction

PLAY ME

Word World Introduction (cont.)

The Curriculum of WordWorld

- The curriculum of WordWorld is designed to introduce, support and foster emergent literacy skills in children ages three to five.

- The curriculum draws from three skill sets critical for young children's emergent literacy:

  - *Print awareness*
    - Many words represent real-life objects.
    - Print moves from left to right.

  - *Phonological sensitivity and letter knowledge*
    - The visual and auditory segments in words.
    - The blending of word parts into words.

  - *Comprehension*
    - Developing new vocabulary
    - Cause and effect relationships.

Evaluation Objectives

Primary Hypothesis - Main Effects

- Pre-school children who view WW episodes over a six-week period will demonstrate significant gains in pre-literacy and emergent literacy skills compared to children who do not.
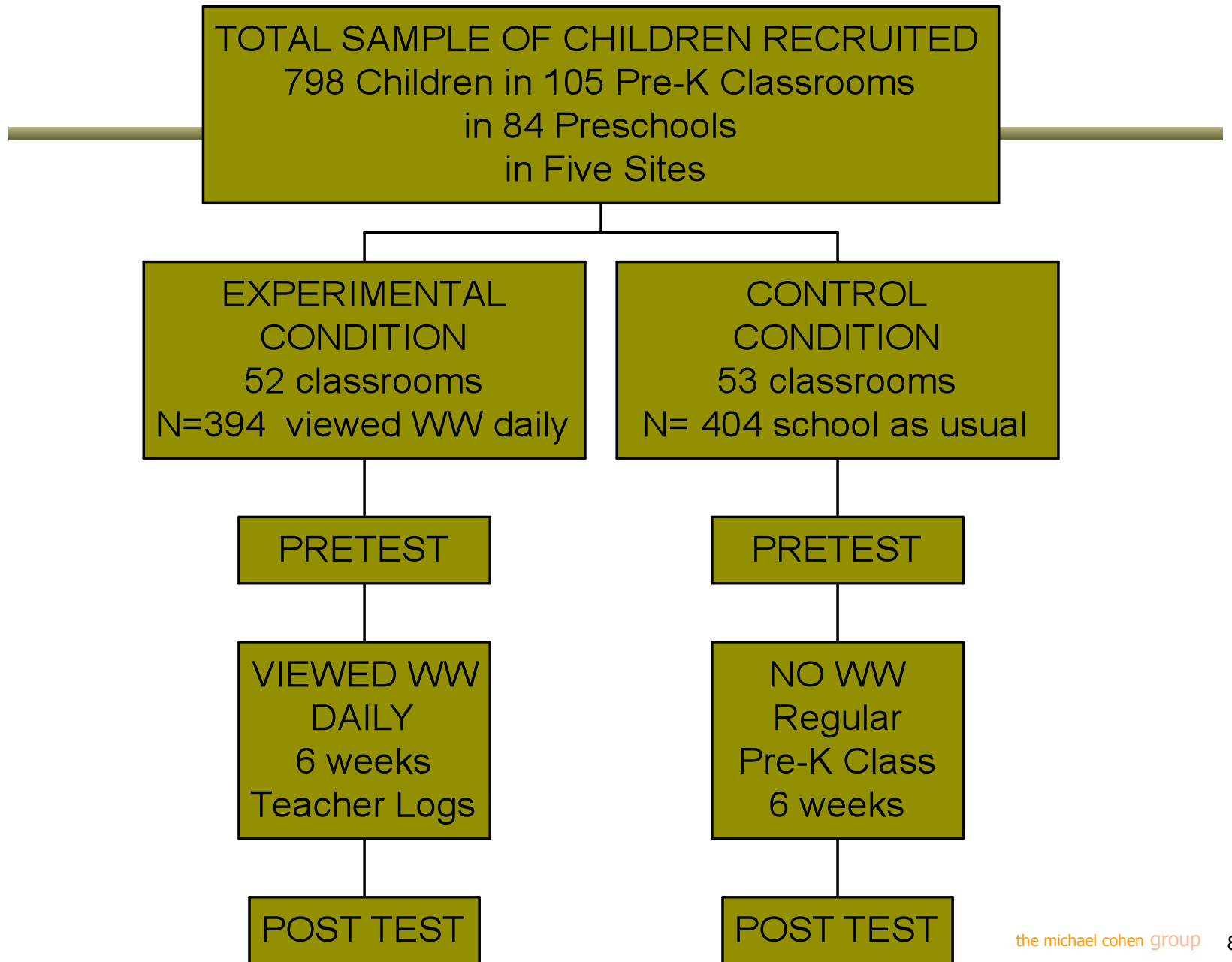
Evaluation Objectives (cont.)

Secondary Hypotheses - Moderators

- Potential moderators include:

    1. Child's baseline level of language development as assessed by standard measures
    2. Child and family's socio-cultural and demographic characteristics
        - Geographic location
        - Urban - Rural
        - Sex of child
        - Race and ethnicity
        - Primary or secondary language in the home
        - Household income
        - Level of parent education

Method: Study Design

Experimental Design

- A *randomized control trial* (RCT) was utilized to assess the hypotheses
- Preschools which serve low-income children (50% enrollment at or below the poverty line) were selected across five states (sites)
  - New York - Graduate Center City University of New York (CUNY)
  - Mississippi - Mississippi State University (MSU)
  - California - Stanford University (SU)
  - Texas - University of Texas at Austin (UTA)
  - North Carolina - University of North Carolina (UNC)
- Preschools at each site were randomly assigned to either experimental or control condition (classes in a given preschool were assigned to the same condition).

Confidential/Not for Distribution

TOTAL SAMPLE OF CHILDREN RECRUITED
798 Children in 105 Pre-K Classrooms
in 84 Preschools
in Five Sites

EXPERIMENTAL CONDITION
52 classrooms
N=394 viewed WW daily

CONTROL CONDITION
53 classrooms
N= 404 school as usual

PRETEST

PRETEST

VIEWED WW DAILY
6 weeks
Teacher Logs

NO WW
Regular
Pre-K Class
6 weeks

POST TEST

POST TEST

Method: Study Design (cont.)

Profile of Participating Children

Mean Age: 4 years 8 months (age range: 3 years 6 months to 5 years 6 months)

Racial and Ethnic Composition:

- 30% African-American
- 21% Hispanic/Latino
- 6% Asian American
- 32% Caucasian
- 1% Native American
- 10% Other and Unknown/No Response

Household Income:

- 33% under $30,000 per year
- 28% $30,00 - 75,000 per year
- 22% $75,000+ per year
- 17% Unknown/No Response

Confidential/Not for Distribution

Method: Study Design (cont.)

Pre- and Post-Test Assessment Instruments

Pre-Test
- Pre-LAS 2000
- PPVT IV

Distal Measures
- TOPEL 1 Concept of Print
- TOPEL 2 Phonemic Awareness
- Letter Recognition (NCDEL)

Proximal Measures
- WW Assessment
  - Picture Recognition of Images depicting WW Vocabulary
  - WW Word Recognition
  - WW Character Recognition & Associations
- Brief post-questionnaires for parents and children re: children's media preferences and habits

Post-Test

Distal Measures
- TOPEL 1 Concept of Print
- TOPEL 2 Phonological Awareness
- Letter Recognition (NCDEL)

Proximal Measures
- WW Assessment
  - Picture Recognition of images depicting WW Vocabulary
  - WW Word Recognition
  - WW Character Recognition & Associations
- Brief post-questionnaires for parents and children re: children's media preferences and habits

Method: Analysis

- All analyses were conducted using multi-level random effects regression with observations (pre-test and post-test) clustered within child, child clustered within school, and school clustered within condition

- Primary hypotheses analyses (main effects)

- Secondary hypotheses analyses (moderators)

- Differences between groups at baseline
    - No sig. differences for age, gender, PPVT, or any pretest output measure
    - Exp. condition – more Hispanic children (29% vs. 20%; chi-square (1)= 7.22, $p<.01$).
    - Exp. condition – fewer children from rural areas (24.9% vs. 31.7%, chi-square (1)= 4.5, $p<.05$)
    - Exp. condition – longer time between pre-test and follow-up (M=63 days vs. M=55.8 days; t(102) = 3.1, $p<.01$)

Results

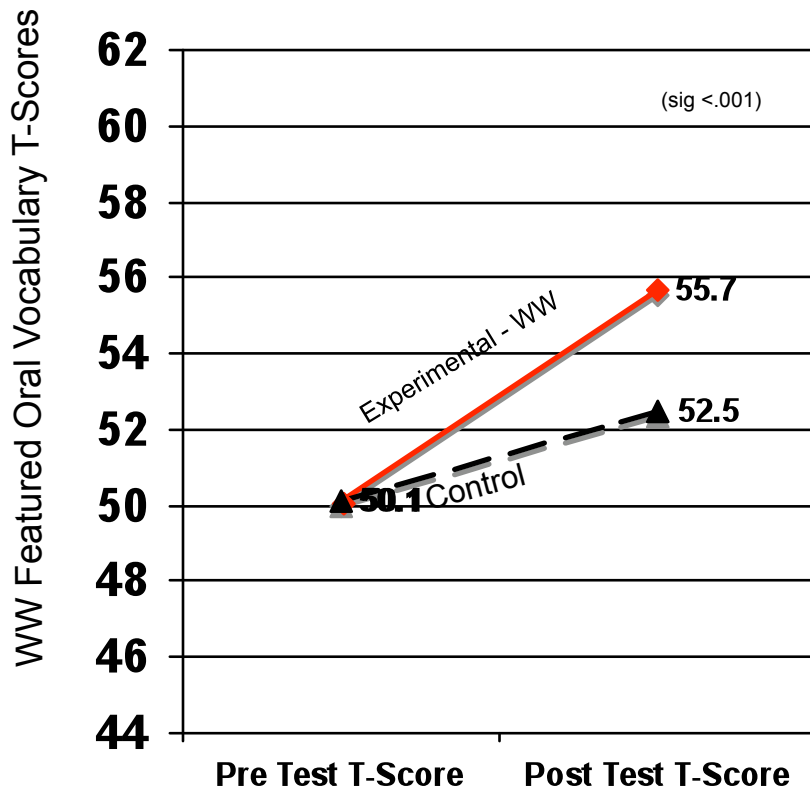### Significant Main Effects

Significant gains in proximal outcomes

- **Learning of oral vocabulary featured in WW** $t(98) = 4.58$, *p*<.01, d=.33)

- **Reading/recognition of written words featured in WW** $t(98) = 3.70$, *p*<.01, d=.20)

- Main effects for the overall sample were **not** found for distal outcomes

  - Letter recognition (about 1/2 the children knew their letters at pre-test, but results of post hoc analyses for ceiling effects were not significant);

  - Concept of Print (TOPEL 1); and

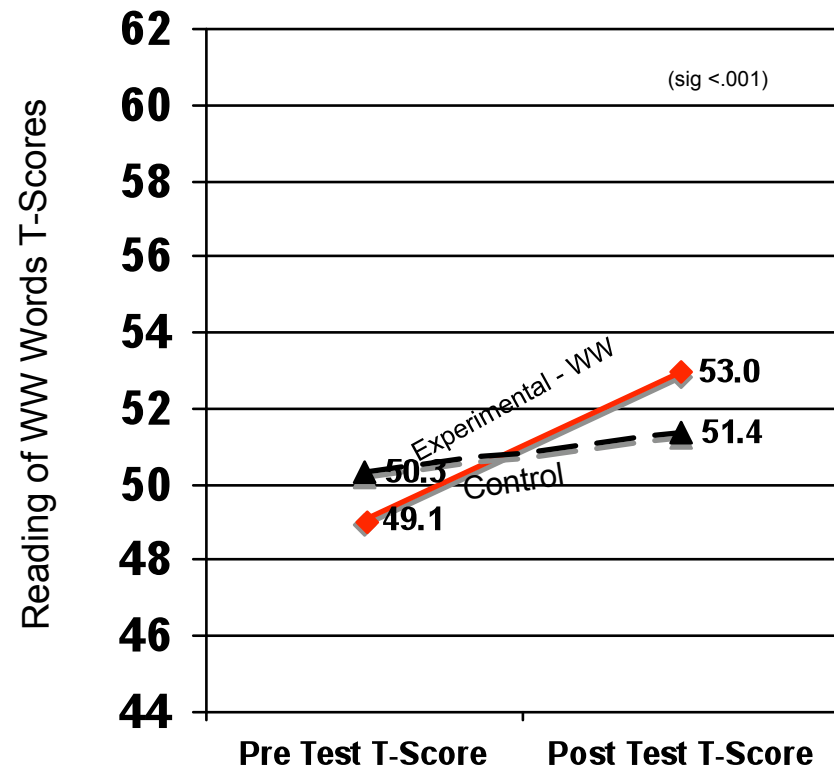 - Phonemic awareness (TOPEL 2).

Results (cont.)

Acquisition of WW Oral Featured Vocabulary Pre and Post Test T-Scores by Condition

(sig <.001)

Experimental - WW — 55.7

Control — 50.1 / 52.5

WW Featured Oral Vocabulary T-Scores

Pre Test T-Score — Post Test T-Score

Children's Overall Pre vs.... Post Test T-Scores

Confidential/Not for Distribution

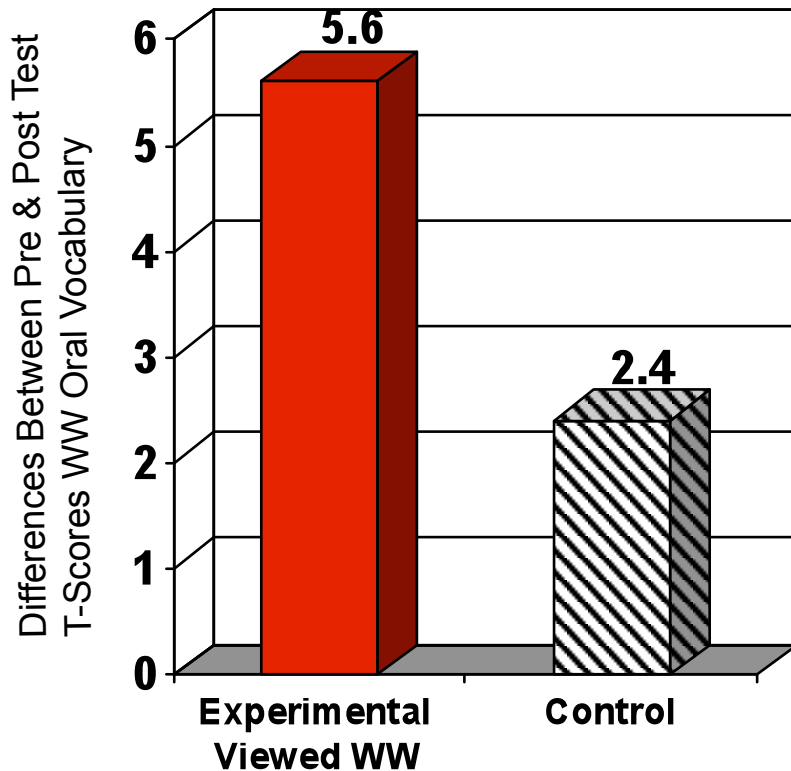## Reading of WW Words Pre and Post Test T-Scores by Condition

(sig <.001)

Experimental - WW — 53.0

Control — 50.5 / 51.4

49.1

Reading of WW Words T-Scores

Pre Test T-Score — Post Test T-Score

Children's Overall Pre vs.. Post Test T-Scores

Results (cont.)

Acquisition of WW Featured Oral Vocabulary

Differences Between Pre & Post Test
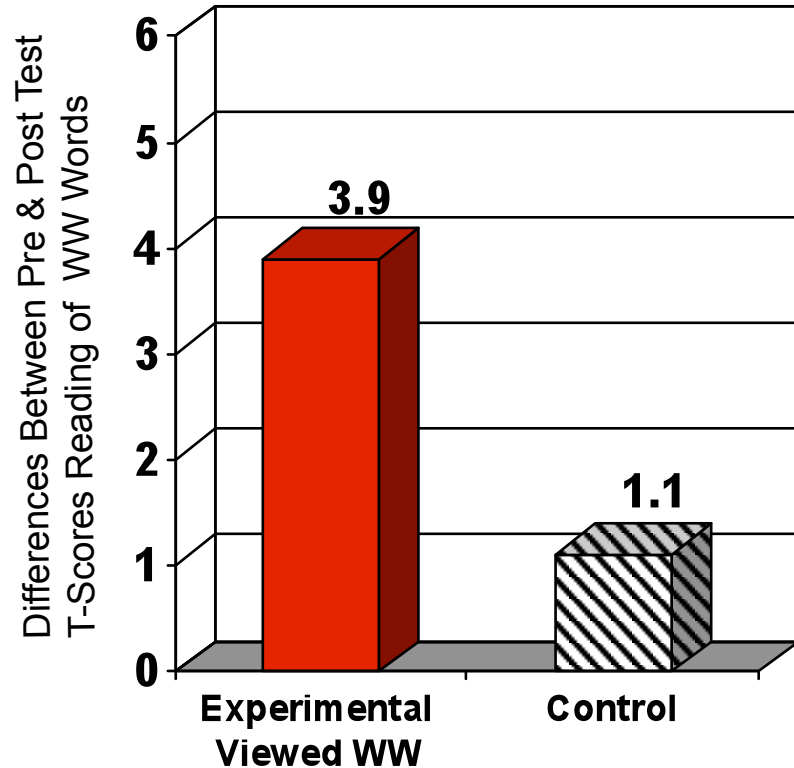T-Scores by Experimental Condition

Children in Experimental and Control Conditions

Confidential/Not for Distribution

Reading of WW Words

Differences Between Pre & Post Test
T-Scores by Experimental Condition

Children in Experimental and Control Conditions

Results (cont.)

Moderator Effects of *Proximal* Measures

Reading/Recognizing Words in WordWorld

- **Rural pre-K children** showed significant gains ($t(99) = 2.33$, $p<.05$)
- **Pre-K children** with who scored in the top 1/3 of PPVT scores showed significant gains ($t(75) = 2.55$ $p<.05$, d=46).

Confidential/Not for Distribution

Acquisition of WW Featured Vocabulary
of Children from Schools in Urban and Rural Areas
### Differences Between Pre & Post Test T-Scores
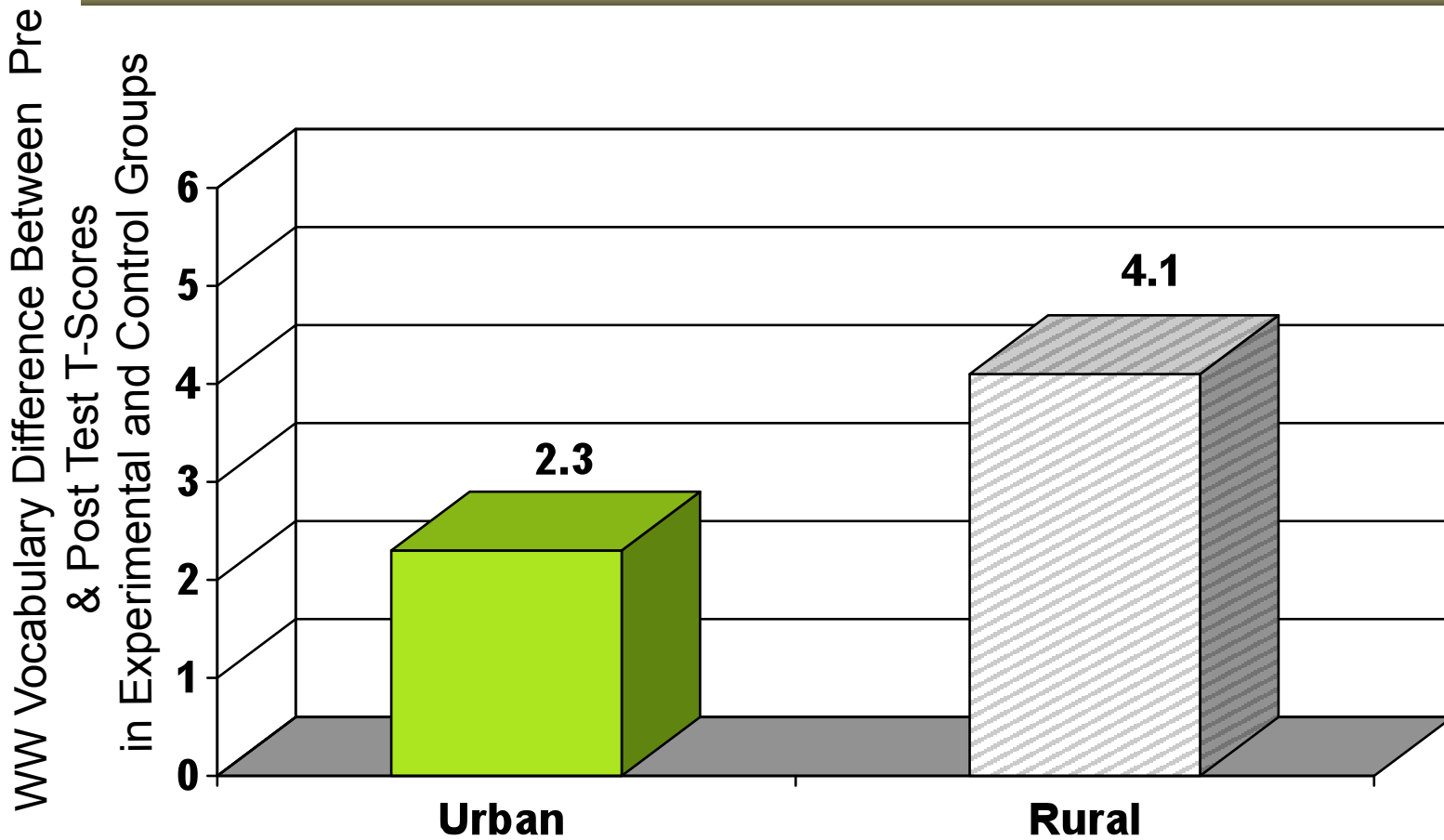
WW Vocabulary Difference Between Pre & Post Test T-Scores in Experimental and Control Groups

Urban: 2.3
Rural: 4.1

Children From Schools in Urban and Rural Areas

the michael cohen group research and consulting

Reading of WW Featured Words by PPVT Scores
Differences Between Pre & Post Test T-Scores in Experimental and Control Groups

Difference Between Pre & Post Test T-Scores on Reading of WW Words in Experimental vs Control Groups

Lower 1/3 PPVT Scores	1.6
Middle 1/3 PPVT Scores	1.4
Top 1/3 PPVT Scores	4.3
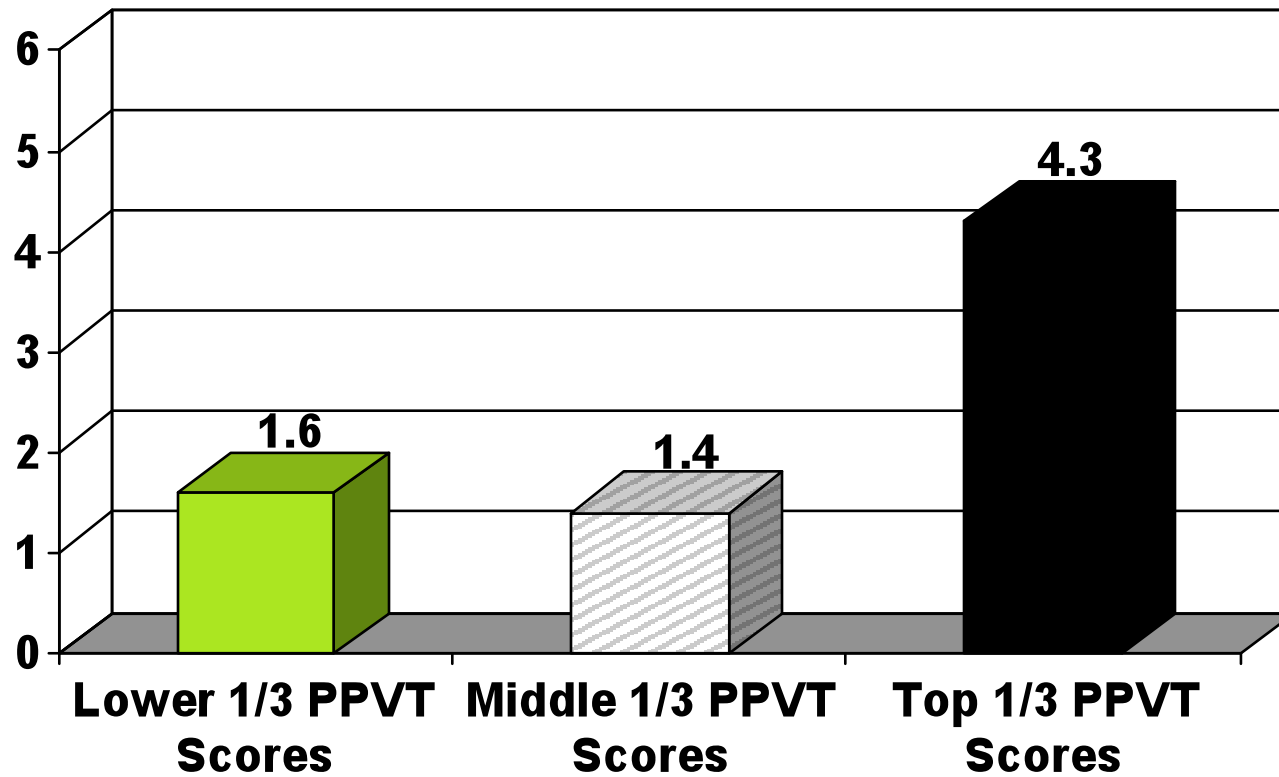
Children's Scores on PPVT at Baseline Grouped by Lower, Middle & Top Third

the michael cohen group research and consulting

the michael cohen group

Results (cont.)

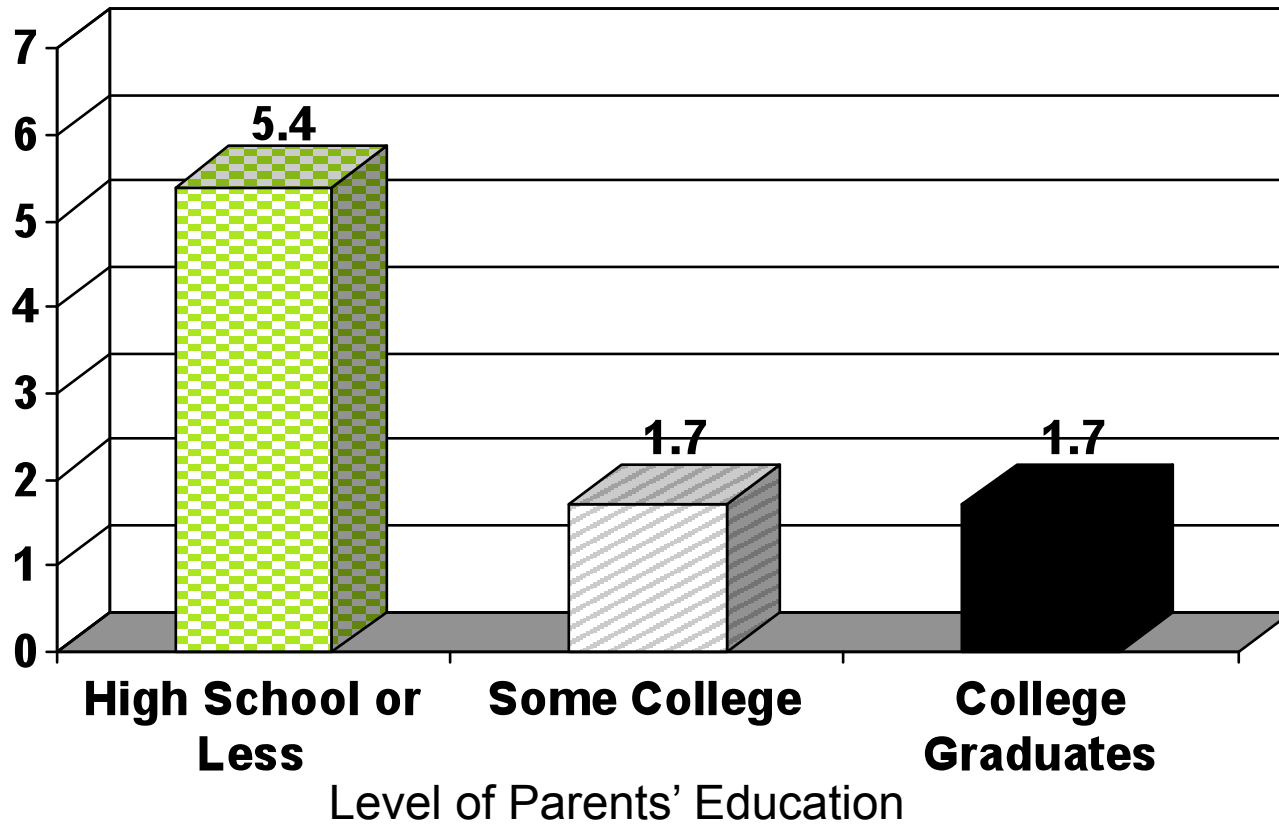## Moderator Effects for *Distal* Measures

Phonemic Awareness

- **Pre-K children,** assigned to the experimental condition, from **families whose parent/caregiver's level of education was "high school or less,"** had significant gains (p.< .05) in **phonemic awareness.**

- **Pre-K children**, assigned to the experimental condition **who scored lowest on the PPVT** (the bottom 1/3 of scores) showed significant gains (p. <.05) in **phonemic awareness.**

Phonemic Awareness (TOPEL 3) and Children's Parents' Level of Education

Differences Between Pre & Post Test T-Scores in Experimental and Control Groups

Y-axis: Difference Between Pre & Post Test T-Scores in Phonemic Awareness in Experimental and Control Groups

X-axis: Level of Parents' Education

Category	Value
High School or Less	5.4
Some College	1.7
College Graduates	1.7

Confidential/Not for Distribution

the michael cohen group research and consulting

Results (cont.)

Mediators -- Viewing WW at Home

- WordWorld was already broadcasting on PBS at the time the RCT took place
- At the end of this study, all children and all parents were asked tell us if they watched WW at home

  - **<u>69% of the children</u> reported watching WW at home**.
  - **<u>51% of the parents</u> reported that their child watched WW at home**.
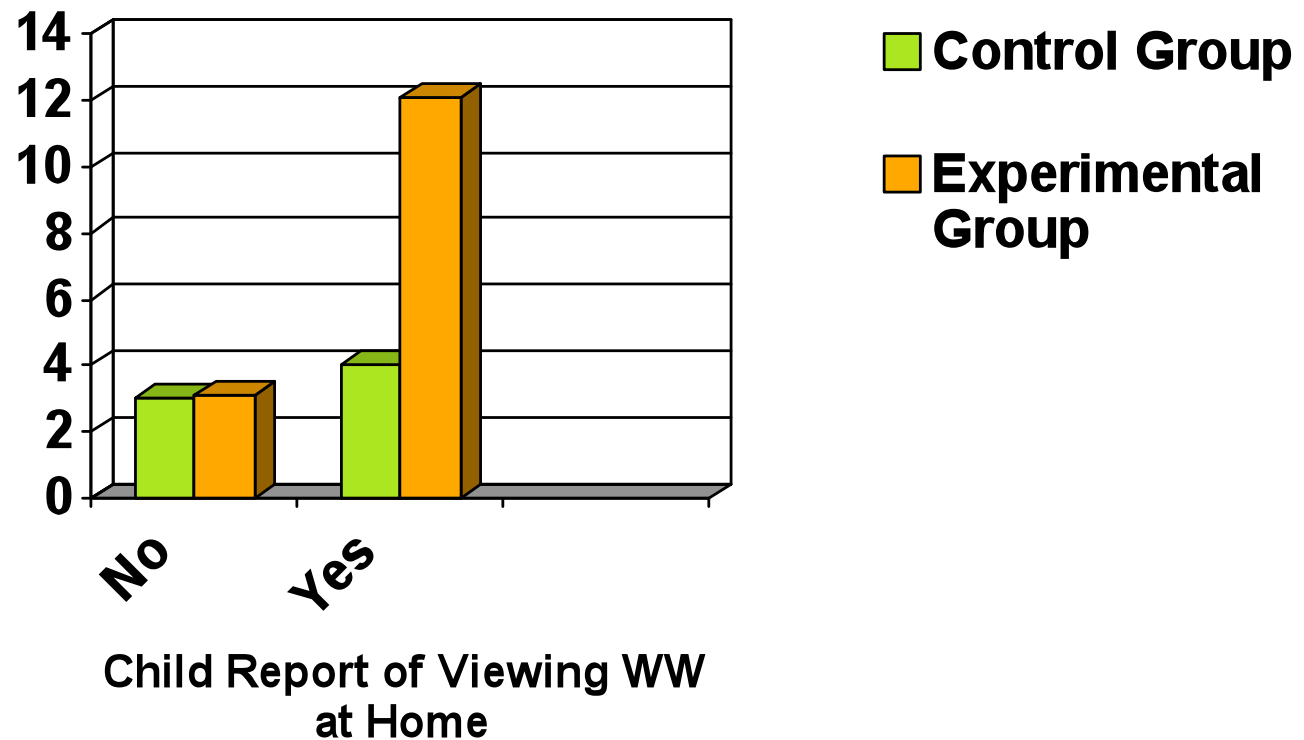
Results (cont.)

Mediators -- Viewing WW at Home (cont.)

- **Children in both conditions were, by their self-report, viewing WW at home.**
  - 79% of experimental condition
  - 60% of control children
- There were differences between experimental and control group regarding viewing WW at home and learning outcomes.
  - Children in the experimental group who reported viewing WW at home showed greater gains in oral vocabulary learning.
  - Children in the experimental group whose parents reported their viewing WW at home showed greater gains in oral vocabulary learning.

Results (cont.)

Learning of Oral Vocabulary featured in WW episodes by Child Self-Report of Viewing WW at Home

Child Report of Viewing WW at Home

- Control Group
- Experimental Group

Confidential/Not for Distribution

Results (cont.)

Learning of Oral Vocabulary Featured in WW Episodes by Parent Report of Child Viewing WW at Home

Parent Report of Child Viewing WW at Home
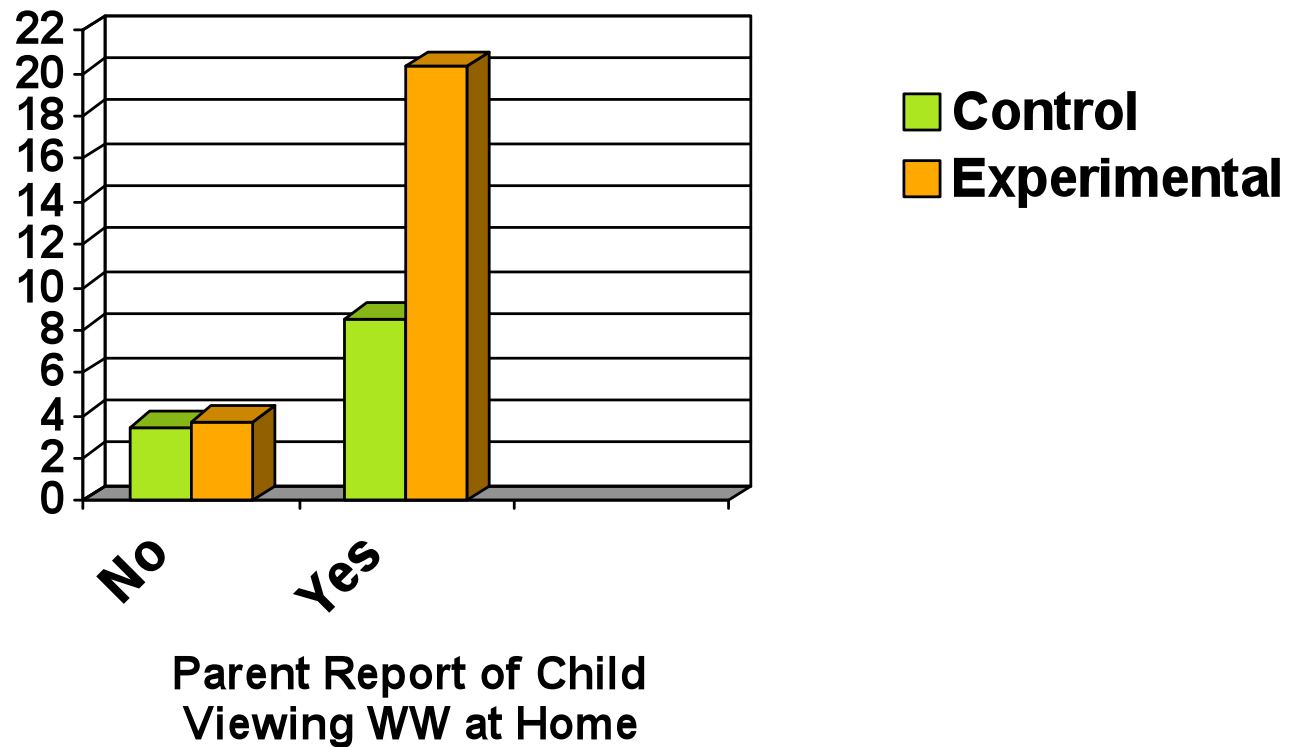
Discussion

1. There is some evidence that the vocabulary presented in Word World is internalized by viewers – both written and oral

2. Though no main effects were found for distal measures of literacy, there is evidence that *the most at-risk children* made gains in phonemic awareness

   - Children in lowest 1/3 of baseline vocabulary
   - Children with lowest report of parent education
   - *Trend* (p=.052) - English as 2nd language making less than $30K.

3. Viewing Word World at home and in school achieved the greatest gains in oral vocabulary

Appendix A – Detailed Measure Description

- **Pre-LAS 2000** (Duncan & DeAvilla, CTB/McGraw-Hill,1998) was used to assess level of verbal English language fluency and to screen for eligibility.

- **Peabody Picture Vocabulary Test or PPVT, 4th Edition** (PPVT-IV form A, NCS Pearson Inc., 2007), an established predictor of English literacy development, was used as a covariate and potential moderator of outcomes.

- **Test of Preschool Early Literacy (TOPEL)** (Lonigan, Wagner & Torgesen, Pro-Ed Inc, 2007) was the primary standardized measure of pre-literacy skills, particularly TOPEL 1 Concept of Print and TOPEL 2 Phonemic Awareness.

- **Letter Recognition** task (NCEDL, 2001) was used to determine how many letters each child was able to name. Overall score was based on all 26 letters in the alphabet. The WW letter recognition subscore was based on the 14 letters presented in the stimulus WW episodes, weighted by the frequency with which each letter was featured.

Appendix A – Detailed Measure Description (cont)

Detailed Description of Measures (cont.)

- **WW Customized Content Test:** <u>WW vocabulary</u>, a sixteen-item scale of pictures (photographs) that correspond to specific vocabulary words introduced in the six WW episodes (e.g., photograph of nest for NEST); and, <u>WW word recognition/reading</u>, a fourteen-item scale of printed words that were featured ("built") during WW episodes that children were asked to read.

- **Parent Questionnaire** -- a fifteen item questionnaire that asked parents about: their child's age and gender; the languages spoken at home and primary language spoken in the family; the presence of TV, VCR, DVR, DVD, cable in their home; their child's media habits; the frequency with which books are read to the child; as well as parents' education, employment status and household income.

- **Teacher Logs** -- a log in which teachers wrote the date and attendance of children participating in the study on each day WW episodes were shown as well rated the level of attention (four point scale), the frequency with which children said letter names and words out loud during viewing, and sang along, clapped, laughed, moved to the music. At the end of the week they were asked to report their observations regarding children's behavioral responses to WW during class time.

- **Post-test Questionnaire on Children's Viewing Habits**