IOWA STATE UNIVERSITY
School of Education

Craig K. Van Pay, MS & Constance Beecher, PhD

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Closing the Achievement Gap Through Parent Education and Quantitative Linguistic Feedback: The Use of LENA Start™ to Improve the Home Linguistic Environment and Parental Knowledge of Child Development

Introduction

- Young children acquire language and literacy from their caregivers
  - Shared-book reading and other literacy activities (Payne, Whitehurst, & Angell, 1994)
  - Quality and quantity of child-directed speech (Hart & Risley, 1995; Cartmill, et al., 2013)
  - Maternal knowledge of child development (Rowe, 2008; Suskind, et al., 2015)
- Socioeconomic status influences these in many ways
  - Lack of education or resources/access to resources (Hoff, 2013)
  - Different stressors/responses to stress (Bradley & Corwyn, 2002)
- Achievement and Word Gaps
  - Gap between children of low and high SES families when entering school (Duncan & Magnuson, 2013; Carter et al., 2009)
  - Differences in vocabulary, reading ability, etc. (Bleses, et al., 2016; Fernald, Marchman, & Weisleder, 2013; Rodriguez, et al., 2009)
- Interventions to close the achievement gap
  - Shared-book reading or conversational foci (Leffel & Suskind, 2013; Reese, Sparks, & Leyva, 2010)
  - Quantitative linguistic feedback (Suskind, et al., 2015)

Research Questions

1. Can completion of the LENA Start™ program result in increases in the quantity of words used and conversational turns participants have with their child?

2. How is parents' knowledge of child development related to the number of words and conversational turns with their child, and can the LENA Start™ program increase their overall knowledge of child development?

3. Does the LENA Start™ program have a differential impact on higher risk families versus lower risk families, as determined by receiving public assistance?

4. Does the LENA Start™ program result in greater growth of a child's language ability than is expected over the course of the program as measured by the LENA Snapshot?

Materials and Methods

Participants

- 46 parents of children aged 1 to 30 months of age (child *M* = 13.82 months; *SD* = 8.28 months; 28 F, 18 M)
- Parents from 21 years to 44 years of age (*N* = 41; *M* = 33.27 years; *SD* = 5.17 years; 35 F, 5 M)
- 38 married, 1 living with partner unmarried, 2 single parents
- 18 received WIC Supplement, 21 did not

Language Spoken	N
English	18
Spanish	1
Chinese	14
Polish	1
Other	7

Race/Ethnicity	N
White/Caucasian	18
Asian/Pacific Islander	21
Hispanic	4
Prefer Not To Answer	2

Highest Level of Education	Frequency	Percent	Cumulative Percent
Some college, but no degree	4	9.8	9.8
Associates Degree - AA, AS	3	7.3	17.1
Bachelors Degree - BA, BS	16	39.0	56.1
Graduate or professional degree - MA, MS, MD, JD, PhD	18	43.9	100.0

Procedure

- LENA Start™ – Eight-week parent education program
- Presentation, guidebook, practice, Talking Tips
- Weekly recordings with LENA DLP
- Reports providing quantitative feedback
- LENA Snapshot – 3x, monthly
- SPEAK – Pre-test and Post-test

Orientation	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
SPEAK	Snapshot				Snapshot			Snapshot
Demog.	Record	Record	Record	Record	Record	Record	Record	SPEAK

Location

- Public library in a midsized, Midwestern city
- Provided in a public space with adjoining room for child-care

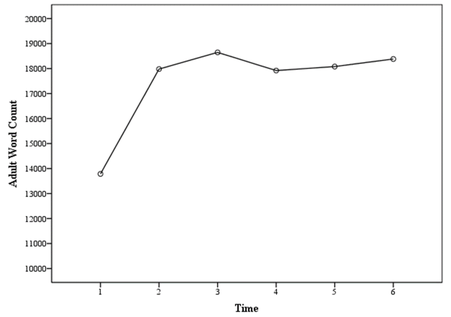
Materials & Measures

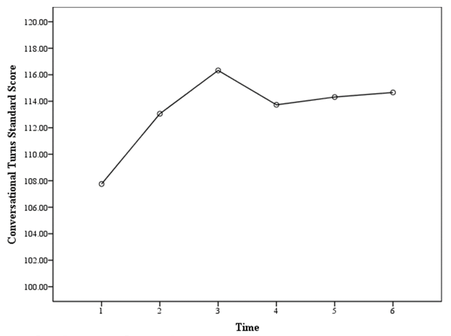
- LENA Start™ – turn-key parent-curriculum including online support and all teaching materials
  - 8 week program with quantitative linguistic feedback
  - 14 Talking Tips and themed sessions
- Survey of Parental Expectations And Knowledge About Language Learning (Suskind, et al., 2017)
  - 30 item test of parenting knowledge of child development
  - 24 Likert scale questions, 6 exposure questions
- LENA Snapshot
  - 52 yes or no questions about child language development
  - Parent-report, complete after 5 consecutive no answers
- LENA Environment Analysis
  - 16 hour recordings of parent-child talk
  - Provides with 95% accuracy the amount of electronic time, the amount of child-directed speech, and the amount of conversational turns

Results

Research Question 1

- Repeated-measures ANOVA of time for adult word count, $F(5, 225) = 6.93$, $p < .001$, $h_p^2 = .133$.
  - Quadratic - $F(1, 45) = 15.94$, $p < .001$, $h_p^2 = .262$
- Repeated-measures ANOVA of time for conversational turns standard score, $F(5, 225) = 4.67$, $p < .001$, $h_p^2 = .094$
  - Quadratic - $F(1, 45) = 9.90$, $p < .01$, $h_p^2 = .180$





Research Question 2

- Dependent-samples t-test of pre-test (*M* = 73.38, *SD* = 15.38) and post-test (*M* = 83.55, *SD* = 12.41) SPEAK score, $t(40) = -6.00$, $p < .001$
- Corrected Cohen's *d* of -.99 (Morris & Deshon, 2002)

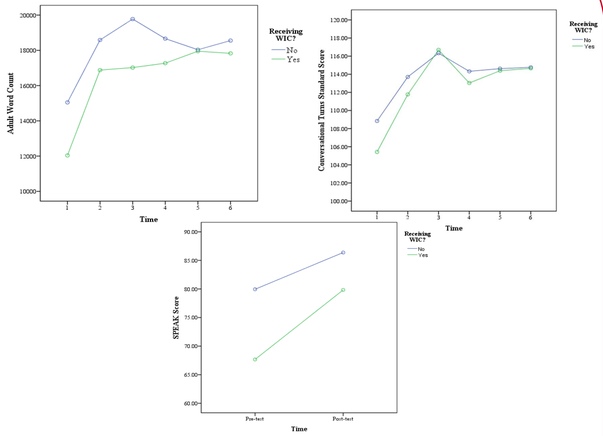
Bivariate Pearson Correlation Matrix of Adult Word Count Time 1, Adult Word Count Time 6, CT Standard Score Time 1, CT Standard Score Time 6, SPEAK Pre, and SPEAK Post.

Measure	1	2	3	4	5	6
1. Adult Word Count Time 1	-	-	-	-	-	-
2. Adult Word Count Time 6	.446 .002	-	-	-	-	-
3. CT Standard Score Time 1	.723* .000	.368 .012	-	-	-	-
4. CT Standard Score Time 6	.341 .021	.706* .000	.556* .000	-	-	-
5. SPEAK Pre-test	.496* .001	.120 .450	.387 .011	-.011 .945	-	-
6. SPEAK Post-test	.310 .043	.262 .089	.235 .129	.133 .394	.778* .000	-

Note. * = Correlation is significant at the Bonferroni corrected $p < 0.0014$ level (2-tailed).

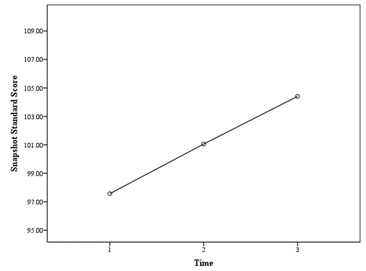
Results (Cont.)

Research Question 3



Research Question 4

- Repeated-measures ANOVA of Snapshot standard score x time
  - Within-subjects, $F(1.44, 41.73) = 4.15$, $p < .05$, $h_p^2 = .125$
  - Within-subjects polynomial contrasts:
  - Linear - $F(1, 40) = F(1, 29) = 5.36$, $p < .05$, $h_p^2 = .156$



Discussion

- RQ1 – Results indicate growth of participants in adult word count and conversational turns over the course of the program. These results offer evidence of the efficacy of the program for improving the linguistic environment of participants.
- RQ2 – There was large growth from pre-test to post-test in parent knowledge of child development. Pre-test score was related to adult word count but not conversational turns.
- RQ3 – There were no differences in adult word count and conversational turns for families receiving WIC across the program. Despite these findings, evidence for the efficacy of the program for at-risk families is still provided.
- RQ4 –Results provide evidence of the program resulting in growth in child language development that is greater than expected over that time frame. This has large implications for helping to close the achievement gap for enrolled participant's children.

Limitations

- Design – no comparison group, no random assignment
- Analysis – removal of data due to design, splitting of analyses due to missing data resulting in increased type-one error rate
  - Measures – knowledge of child development and child language development are self-report, no convergent evidence
    - Sample – sample may not be representative of general population in several ways

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Contact: cvanpay@iastate.edu & cbeecher@iastate.edu