



# **Time<sup>2</sup>Talk<sup>2</sup>Baby:** **A Study of the Effectiveness** of a **New Audio Coaching App** **for Parents**

**Peggy A. Sissel, Ed.D., M.A.**  
**Founder and CEO, Words To Grow On, LLC**  
**Little Rock, AR**  
**September, 2016**



Support and Funding for this project  
comes in part from

The Practice-Based Research Collaborative  
The Bridging the Word Gap Research Network

and

The Bridging the Word Gap Innovation  
Competition

sponsored by

The U.S. Department of Health and Human  
Services

Health Resources Services Administration, Bureau  
of Maternal-Child Health



# Introduction

- **BACKGROUND ~**
  - What is the "Word Gap?"
  - Why is it important?
- **THE INTERVENTION**
  - Rationale for Time<sup>2</sup>Talk<sup>2</sup>Baby
  - Study Details
  - Findings
  - Implications

# Background

## The Hart-Risley Study (late 90's)

- Groundbreaking study at **Univ. of Kansas**
- **42 families visited monthly for 3 years**
- **Parents & babies recorded 1 hour each visit**
- **30,000 pages of transcripts**
- **6 years of analysis**

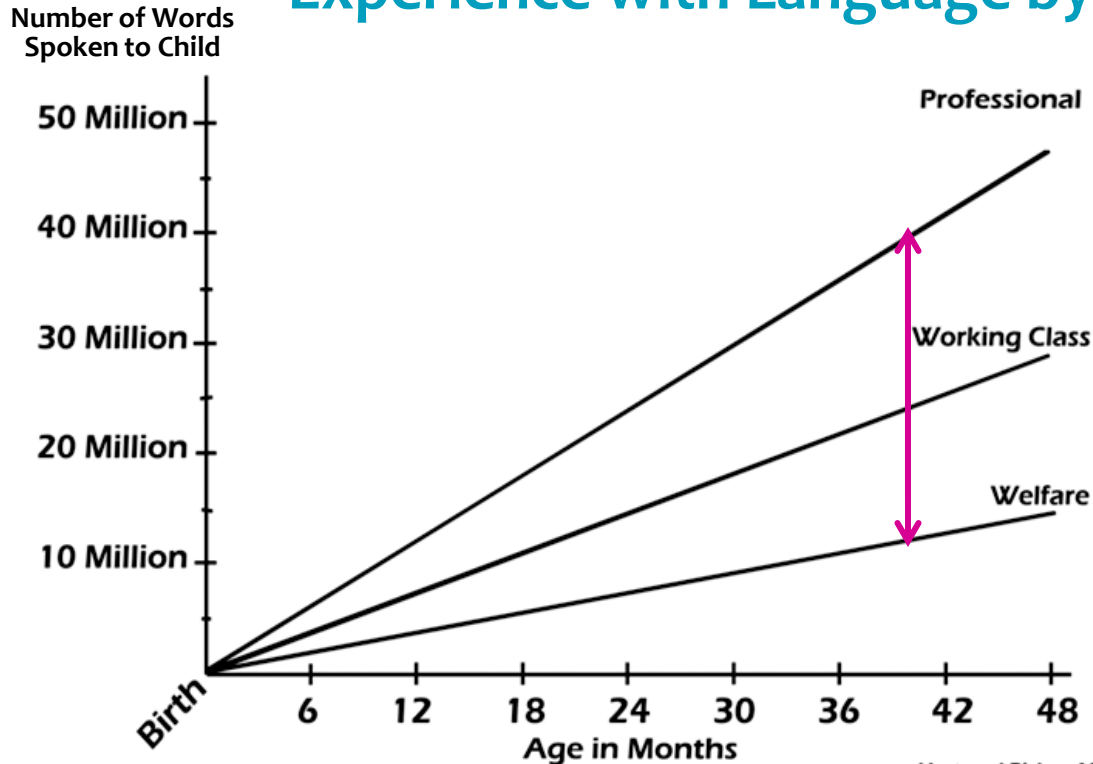
# The Hart-Risley Study

Drs. Betty Hart and Todd Risley discovered:

- Children's **language experience** differed by socio-economic status
- By the end of age **3** some children had heard nearly **40 million words** . . .
- . . . while others had heard as few as **10 million**

# The Hart-Risley Study

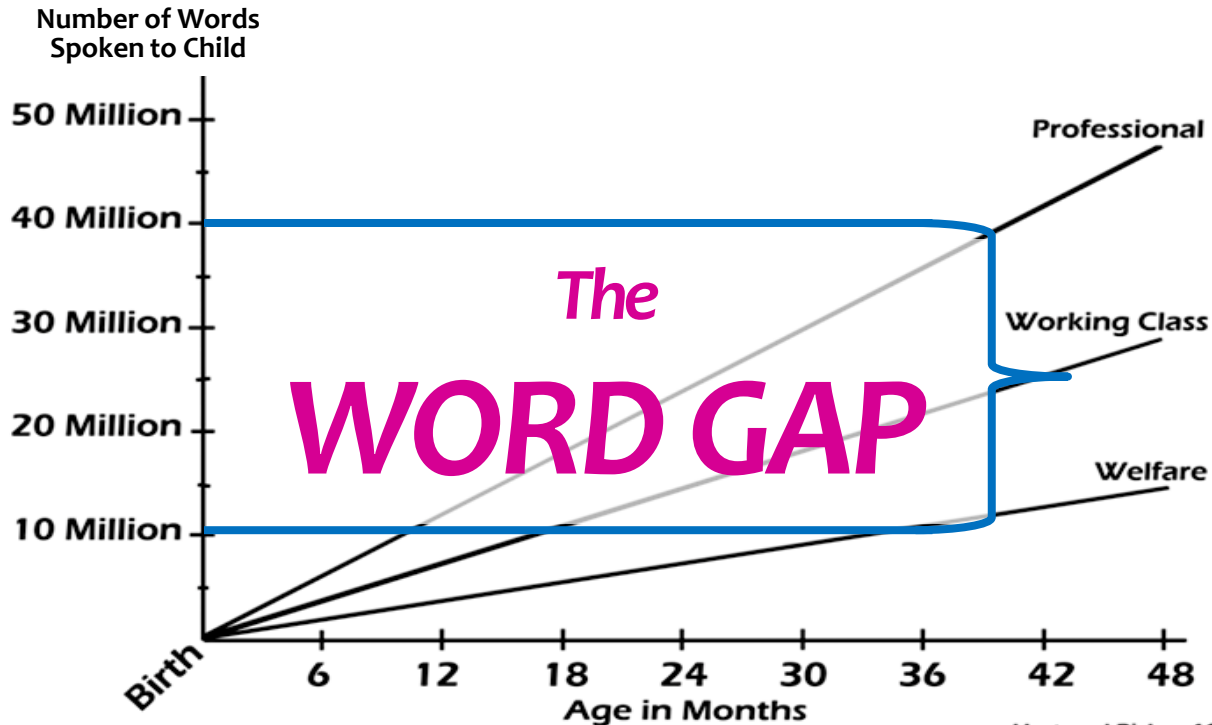
## Experience with Language by SES



By age 3 there was a **30 million** word difference between high SES families and low SES homes.

# The Hart-Risley Study

They called this difference "*The Word Gap*"



By age 3 there was a 30 million word difference between high SES families and low SES homes.

# The Hart-Risley Study

The differences among families were **HUGE**

Some parents were responsive to child **more than 250 times** an hour



Others gave child same type of attention **fewer than 50 times** an hour

These same parents had **40 + minutes** of interaction with child per hour



While other parents provided interaction **less than 15 minutes** per hour



# The Hart-Risley Study

## Professional level parents

Used **3,000 words** per hour with their child



While parents in low income homes used only **500 words**

**Approval and encouragement** rates also differed:

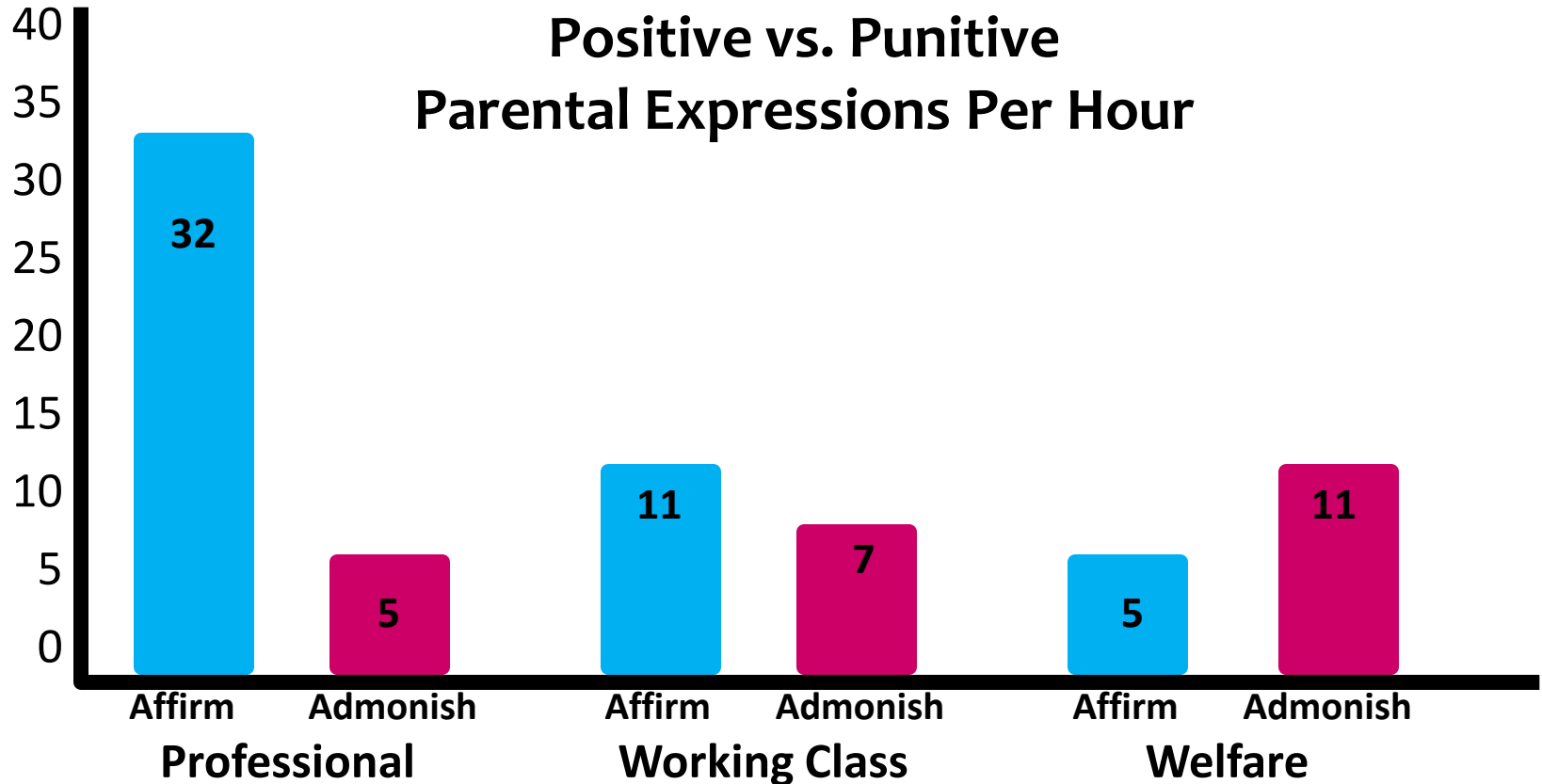


Disadvantaged children heard **10 times less!**

*For example . . .*

# The Hart-Risley Study

Positive vs. Punitive  
Parental Expressions Per Hour



# The Hart-Risley Study

- Moreover, they found that children's **intellect is actually developed by words**
- More words and interaction correlate with
  - ✓ Bigger vocabulary
  - ✓ Higher IQ
  - ✓ Greater achievement in future schooling

*For example . . .*

# Importance

## Average Counts for Parents and Children

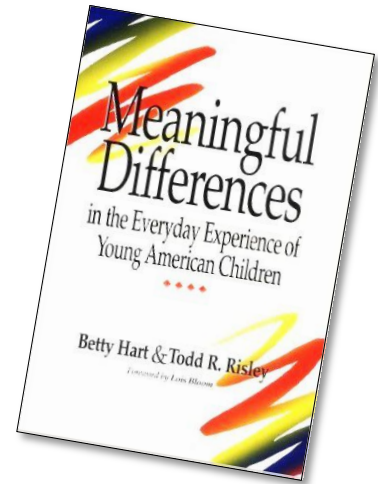
MEASURES	PARENT COUNTS			CHILD COUNTS		
	PROFESSIONAL (N=13)	WORKING CLASS (N=23)	WELFARE (N=6)	PROFESSIONAL (N=13)	WORKING CLASS (N=23)	WELFARE (N=6)
IQ at age 3				117	107	79
Recorded Vocabulary Size	2,176	1,498	974	1,116	749	525
Average Utterances per hour	487	301	176	310	223	168
Average Different Words per hour	382	251	167	297	216	149
Average Adult Words per hour	2,153	1,251	616			
Average Adult Words per 14-hour day	30,142	17,514	8,624			

(Hart and Risley, 1995)

# The Hart-Risley Study

Their discovery of the "**Word Gap**," also revealed the probable cause of:

- Poor early development
- Lack of kindergarten readiness
- and Low school achievement levels



**Parents need to talk and interact more  
with young children!**

**IF** parents need to talk and interact more  
with young children,

**HOW DO YOU HELP** parents do it?

# The Idea ~



## Create a Free Audio Coaching App



- For parents of 0 - 3 year olds
- 30-45 second audio message, sent daily
- Suggests activities
- Offers topics to talk about
- Songs & rhymes
- Provides rich vocabulary
- Age-appropriate techniques
- Easy and engaging

# The Idea ~

## Why an app?

- *The **Text4Baby*** service has shown effectiveness of phone messaging to promote maternal/baby care
- Smart phones are nearly universal
- Low income folks rely on them to access internet
- Apps are ubiquitous, accepted



# The Idea ~

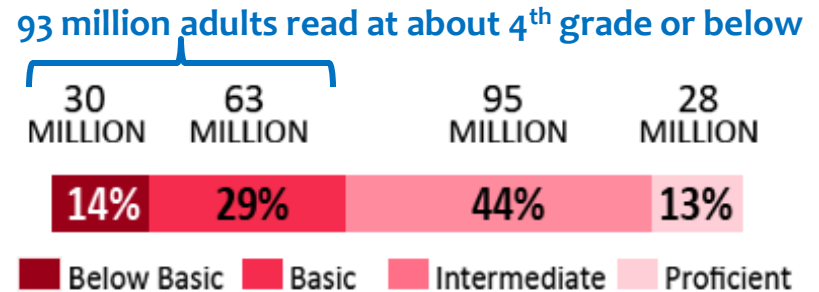
## Why an **AUDIO** app?

- Parents can hear suggested words to use
- Allows for modeling of interaction
- Can listen hands-free during care, in car
- Entertaining and educational
- No reading is required

# The Importance ~

## Need to reach low level readers

- **Adult Literacy Rates in the U.S. are very low**



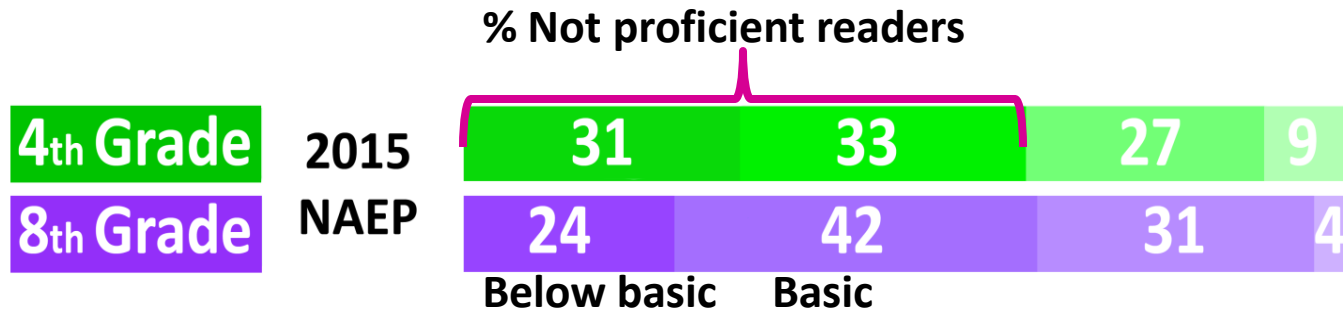
Source: NAAL, 2003, National Center for Education Statistics

- **Low literacy = low educational attainment = low vocabulary levels**

# The Importance ~

## Today's adults, and tomorrow's

- Within the next 10 years, the largest cohort since the Baby Boom will begin having children. Their literacy levels?



# Dual Aims ~



## Designed to Increase Parent-Child Interaction



- Encourage more talking, singing, reading
- Encourage "serve and return" exchanges
- Add ways of engaging baby
- Extend length of interactions
- Model use of second-tier vocabulary
- Expose baby to more, different words

# Dual Aims ~



## Improve Development of Young Children



- Stronger vocabulary
- Better receptive, expressive language skills
- Ready for school
- Ready to learn to read
- Ready to succeed

# The Need for Testing ~

In 2015, *Words To Grow On*<sup>™</sup> joined



to test

Time2Talk2Baby

\* A one month pilot took place in 2014-15 to develop the concept

# The Question ~

Can a **simple, click and listen**  
audio coaching app:

- Increase parents' perceived frequency of verbal interaction with their babies?
- Increase the types of engagement parents' report having with their babies?
- Measurably improve babies' language development?

# The Research Team

**Peggy A. Sissel, Ed.D.**

Creator, Founder & CEO, Words To Grow On, LLC

**Nicola Edge, Ph.D.**

Associate Professor, Department of Family and Preventative Medicine, University of Arkansas for Medical Sciences (UAMS)

**Laura McLean, M.D.**

Assistant Professor, Department of Pediatrics, General Peds Division, UAMS

**Alberto Allegre, M.D.**

Fellow, Department of Pediatrics, Behavioral Studies and Development Division, UAMS

**Anna Waddell, B.A.**

Research Assistant

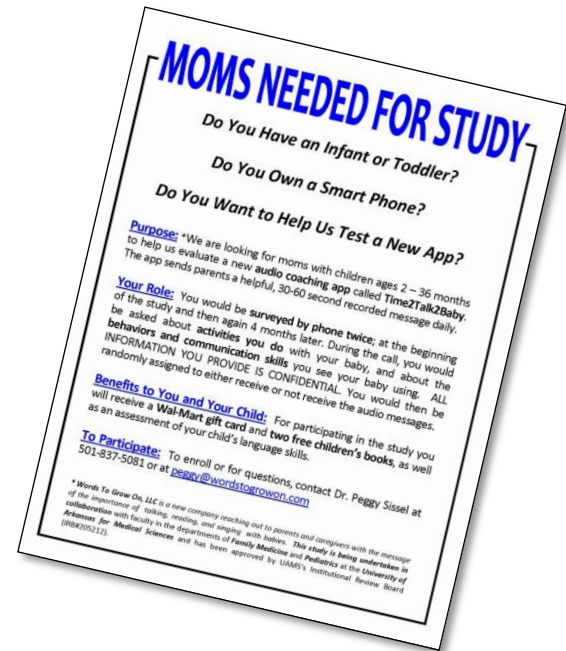


# Study Recruitment

Recruitment of subjects was assisted by ...

- Community agencies
- Advocacy groups
- Child care centers
- Pediatric clinics
- Home Visiting programs
- Word of mouth

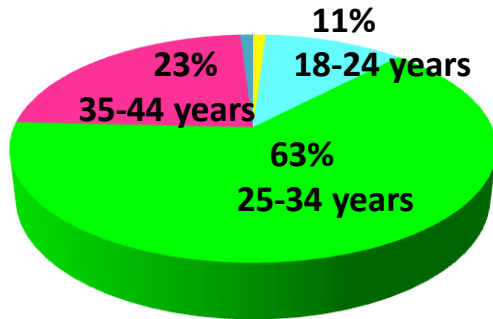
*For participating, all moms received gift cards, children's books and their child's language assessment results*



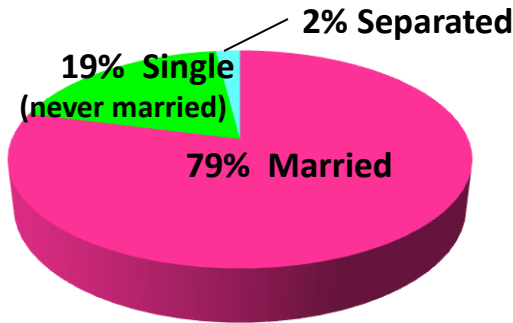
# Our Sample ~

90 Moms with babies ages 2- 34 months

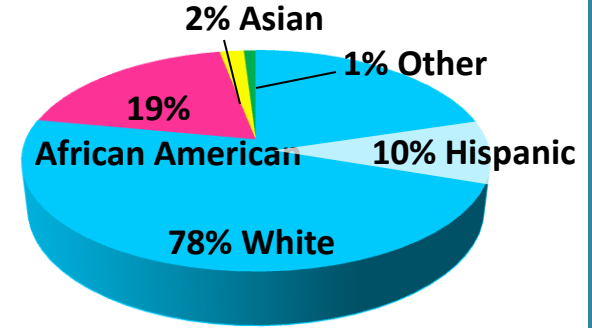
AGE



MARITAL STATUS



ETHNICITY



10% Reported not being able to meet family's basic needs

- Children were evenly represented by gender and age
- Children's entry language scores ranged from the 1<sup>st</sup> to the 99<sup>th</sup> percentile

# Methodology ~

## A Randomized Experimental Design

- **Intake same for all Moms** : 1. Consent form 2. Demographics  
3. Parents Engaging Babies with Language Survey\*  
4. LENA™ Developmental Snapshot Language Assessment
- **Random Assignment**: Treatment and Control Groups
- **Treatment Moms**: 9 weeks of daily audio messages sent to moms' smart phone
- **Control Moms**: No contact between intake and end of treatment period

\* *Asks about mom's literacy habits, leisure, and work life; activities she does with baby and how often; and her thoughts & feelings about her interactions with baby.*

# Procedural Details ~

**TIME FRAME** - May – July 2016

## TREATMENT GROUP

- Post treatment, moms were queried with a partial PEELS survey and the LENA Snapshot
- Given option to remain in study

## CONTROL GROUP

- Post treatment period, moms queried with partial PEELS and LENA Snapshot
- Moms then get messages and begin to be tracked like treatment group

# Procedural Details

## MESSAGE CONTENT & PRODUCTION

- **Scaffolded rubric** with 4 levels of age-appropriate content
  - ✓ 0 - 6 months
  - ✓ 6 - 12 months
  - ✓ 12- 24 months
  - ✓ 24 - 36 months
- **40 categories** offer variety - i.e. *Word of the Day, Nursery Rhymes, Talking Tips, Exploring Baby's World, Songs, Holidays, Word Games Opposites, StoryTime, Development, Smarty Pants (Q & A w baby)*
- **58 messages** sent to each mom over 9 weeks
- **232 total audio clips** produced; 58 for each age grouping

# Data Collection ~

## Children's Language Development

- Baseline language scores
- Individual change over time
- Treatment & Control group comparisons pre and post
- Demographic differences
- Maternal behaviors/attitudes

## Message Stats & Program Views

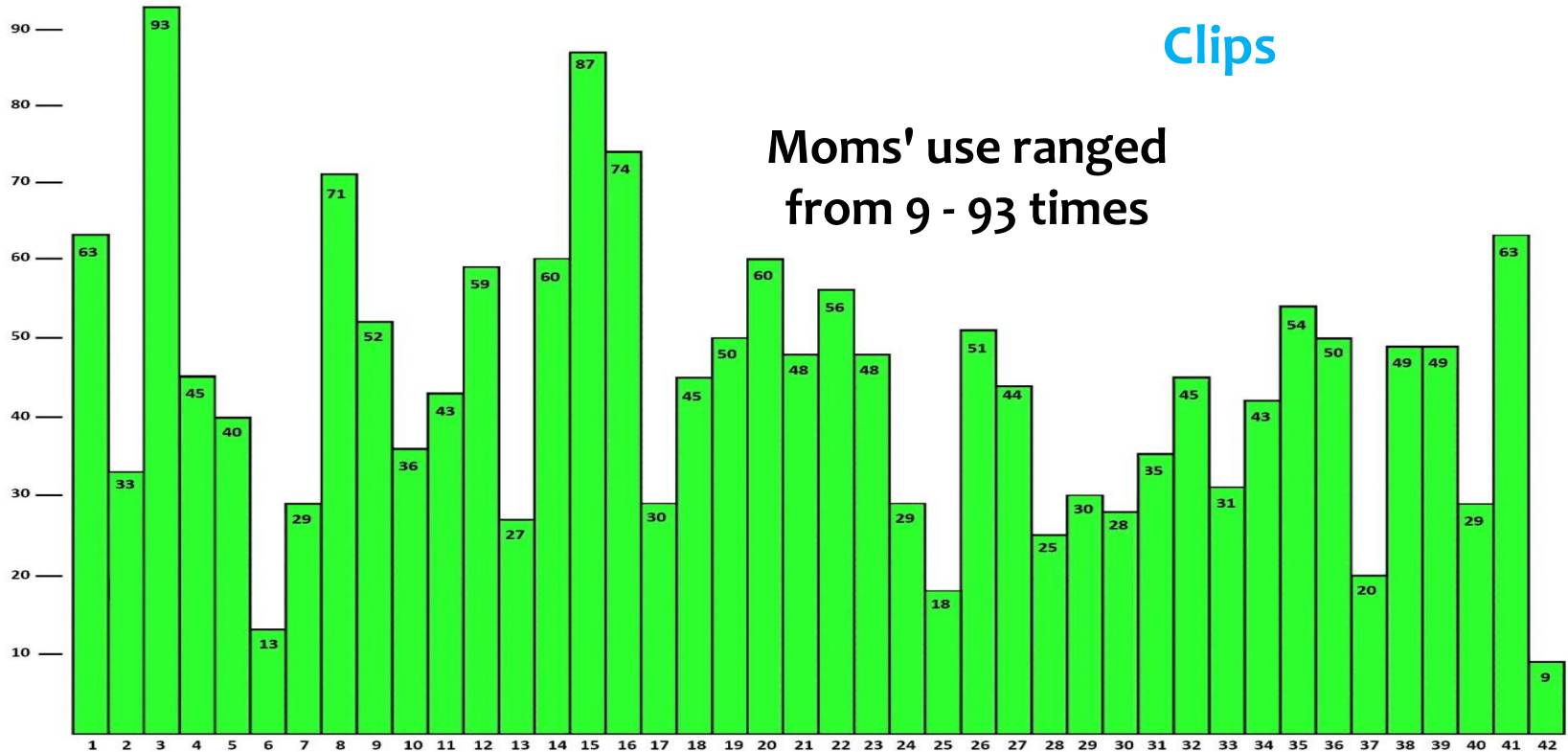
- Moms' Listening Rates
- Most frequently used clips
- Opinions of the program
- Perceived benefits
- Social transmission rates

# Results ~ Moms

9 Weeks  
42 Moms  
232 Audio Clips  
2,032 Downloads

Moms' use ranged from 9 - 93 times

# Times Listened to Audio Messages



Individual Moms by ID

# Results ~ Moms

## Mom's Feedback

- 88%** Learned new facts
- 81%** Found suggestions helpful
- 79%** Learned new ways to interact with baby
- 74%** Program was beneficial to self and baby
- 70%** Now understand baby's needs better
- 76%** Tried out all suggestions provided



# Results ~ Moms

## Moms Began New Behaviors

- Their new knowledge became actionable and embedded.

**65%** Now **regularly use activities** in messages

- They reported advocating for babies and educating others

**58%** Asked **family** to **talk more** to baby

**55%** Told **friends** about **need to talk**

**17%** Asked **care provider** to **interact more**

# Results ~ Moms

## Increase in Meta-Cognitive Processing about Parenting

Moms recognized self critique of thoughts/behaviors

**70% Recognize** what they did or didn't do with baby (or their other children) previously

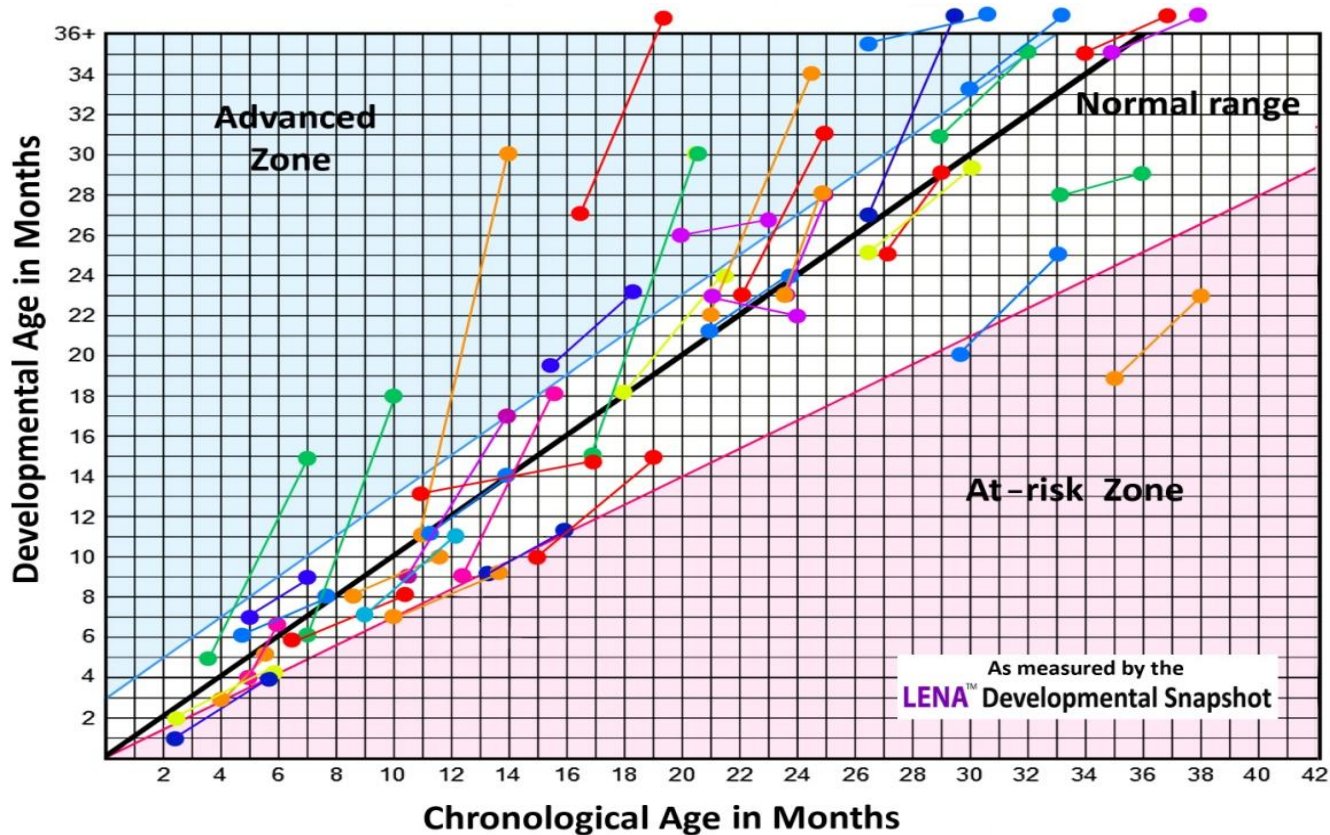
**47% Aware** that they are talking, interacting more with baby

**65% Notice** if and how other parents interact with their children

# Results ~ Babies

## TREATMENT GROUP CHILDREN

### Developmental Trajectories



**2** assessments  
Pre and Post  
(April - July)

**20** advanced  
significantly

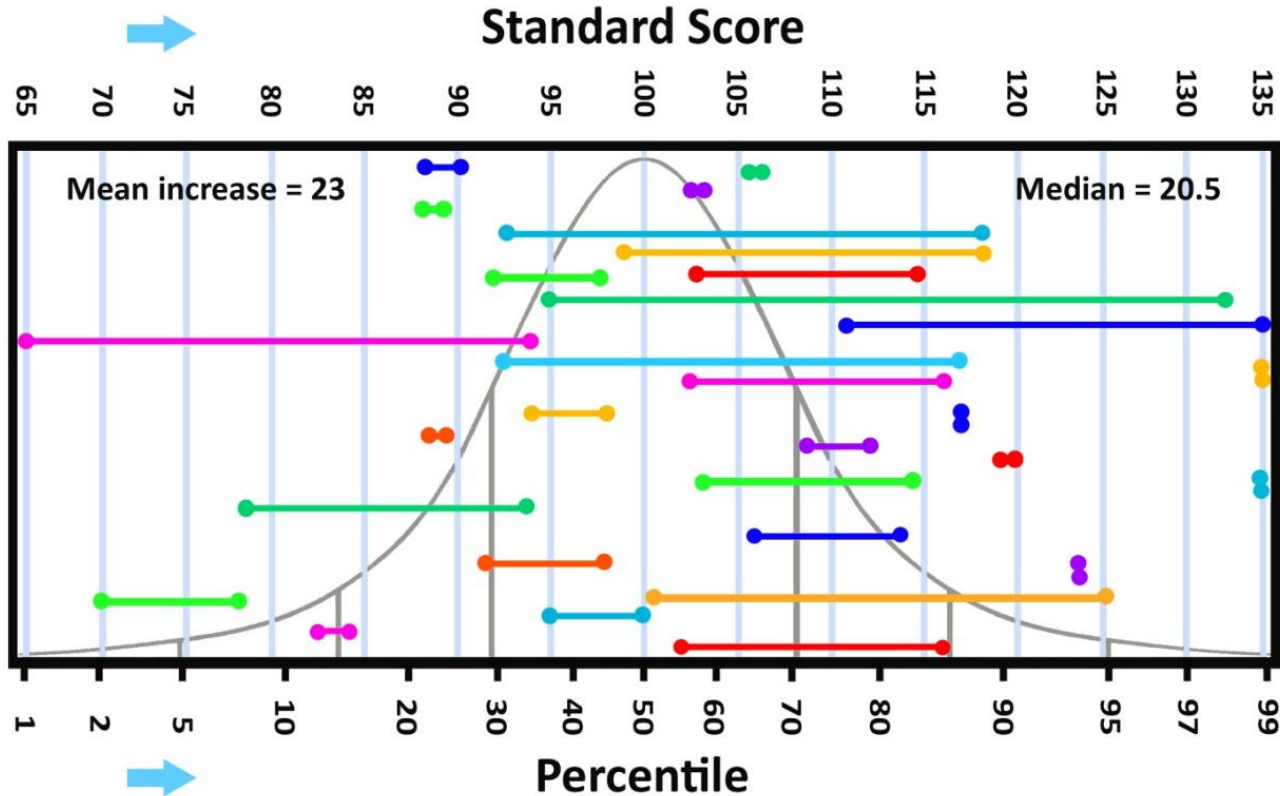
**11** moved from  
normal to  
advance range

**4** moved up  
from at-risk to  
normal range

# Results ~ Babies

TREATMENT GROUP CHILDREN  
Increases by Percentile

Results  
of only  
9 weeks  
of audio  
coaching

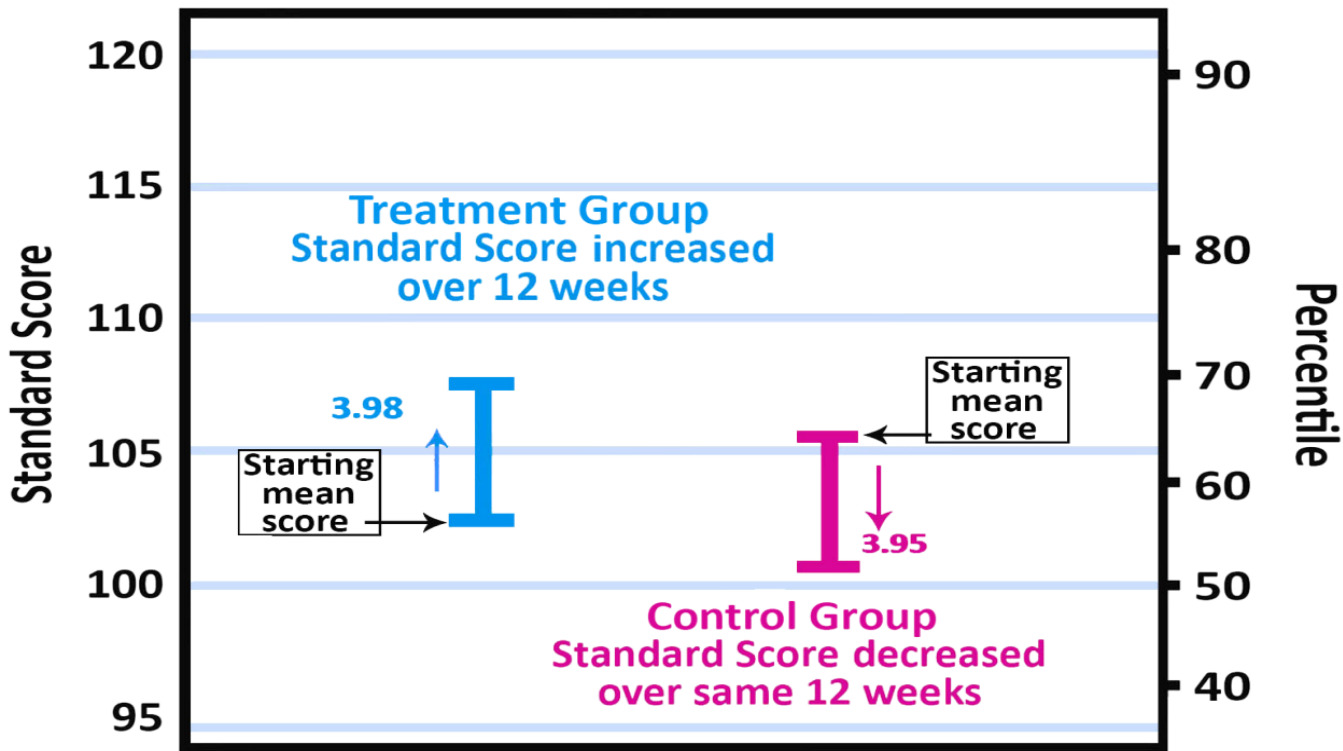


# Results ~ Babies

Differences in Pre and Post Scores  
Between Treatment & Control

9 weeks of  
30 - 60 sec.  
daily audio  
messages

no  
messages



LENA™ Developmental Snapshot

# Results ~ Babies

## Differences are Statistically Significant

Dependent Variable: Post Snapshot Score

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
control group	101.365 <sup>a</sup>	1.989	97.399	105.331
treatment group	107.303 <sup>a</sup>	2.016	103.282	111.324

a. Covariates appearing in the model are evaluated at the following values:  
Pre Snapshot Score = 104.1495

# Results ~ Babies

## Differences in Developmental Gains

**48.8%**

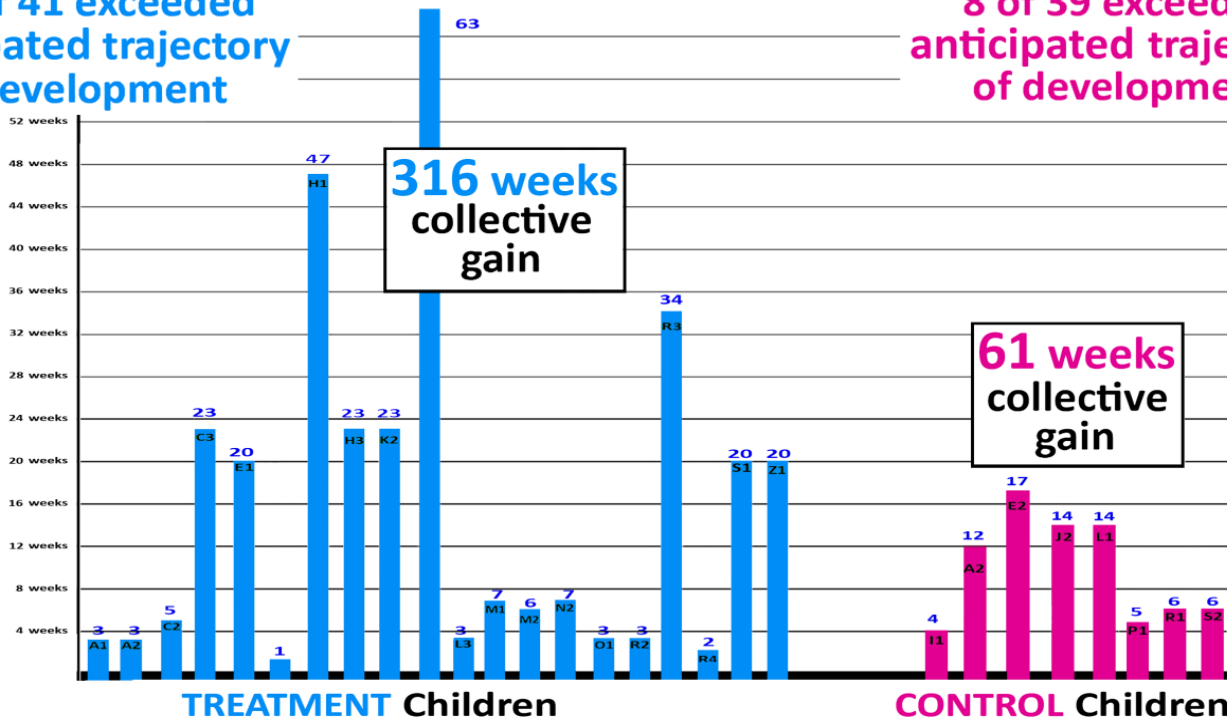
20 of 41 exceeded anticipated trajectory of development

TREATMENT vs CONTROL

**20.5%**

8 of 39 exceeded anticipated trajectory of development

9 weeks of 30 - 60 sec. daily audio messages

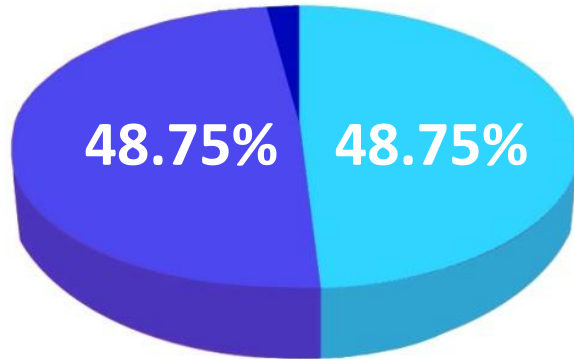


# Results ~ Babies

## Overall Differences Between Groups

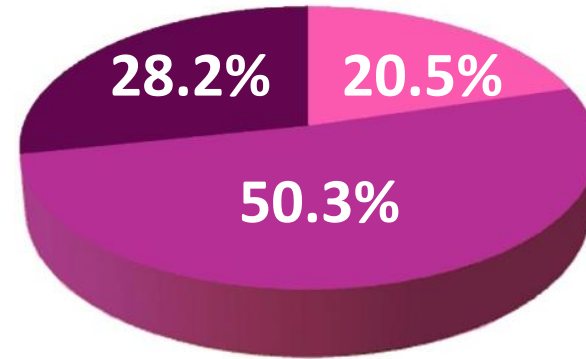
Treatment N = 41

2.4%



Advanced (20) significantly  
Normal (20)  
Lagged (1)

Control N = 39



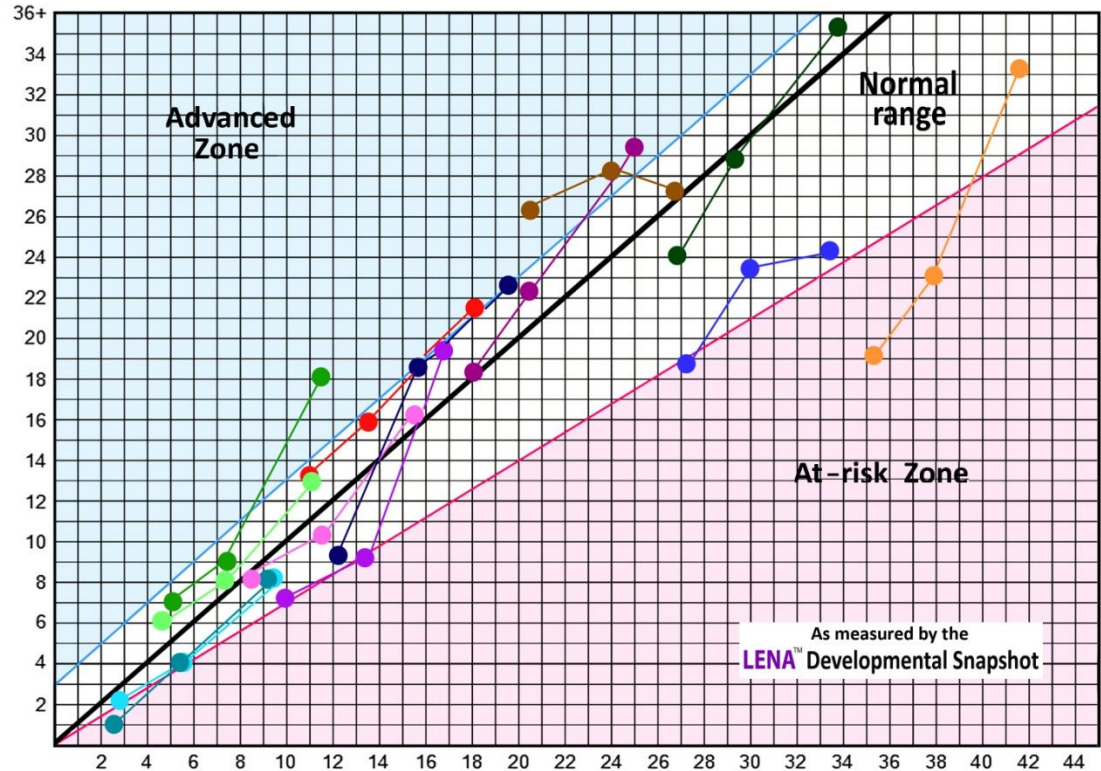
Advanced (8) significantly  
Normal (20)  
Lagged (11)



# Ongoing Results ~ Positive Developmental Trajectories at 7 Months

By November, 12 of 41 kids had aged-out of the study.

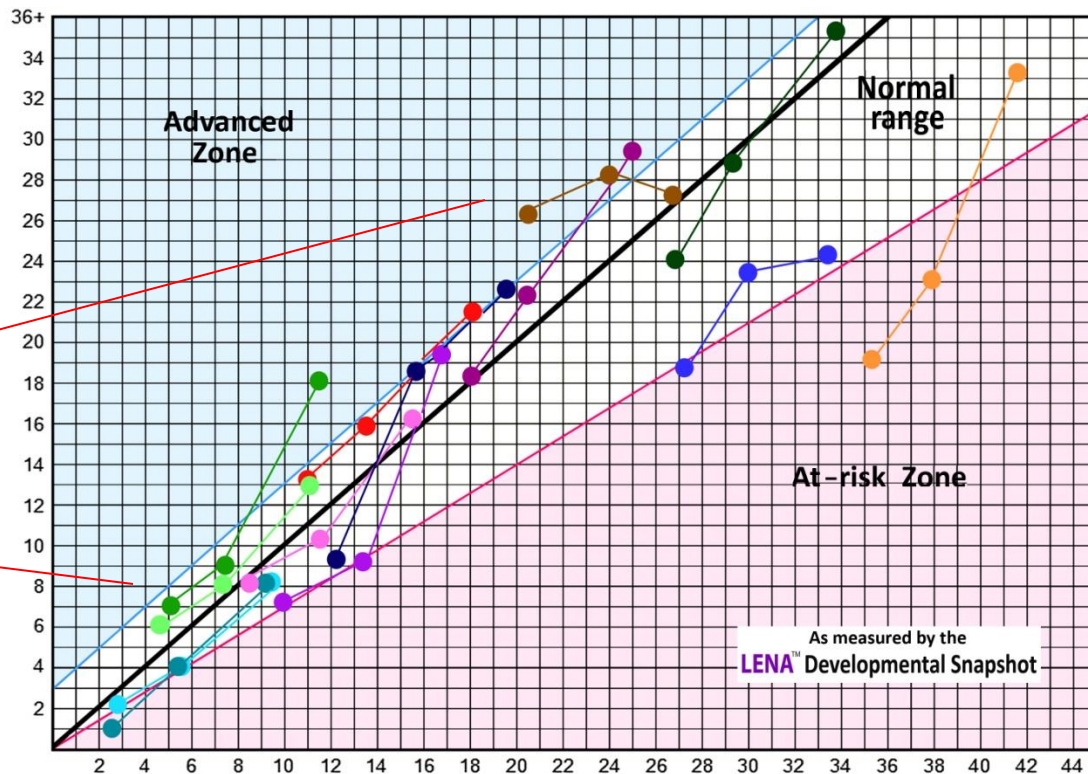
Of the 29 remaining Treatment Moms 13 did follow-up assessments



# Ongoing Results ~

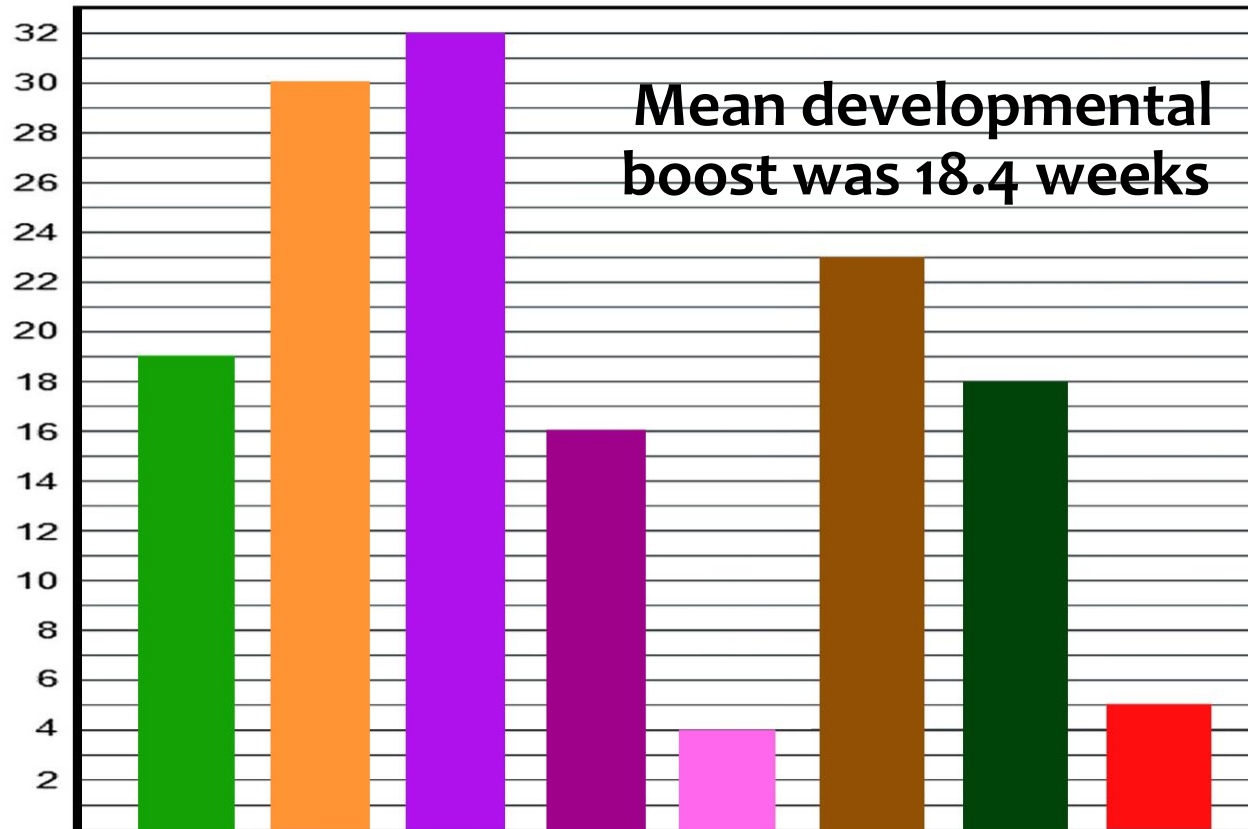
# Positive Developmental Trajectories at 7 Months

2 children continued normal language development



# Ongoing Results ~ Significant Development Over 7 Months

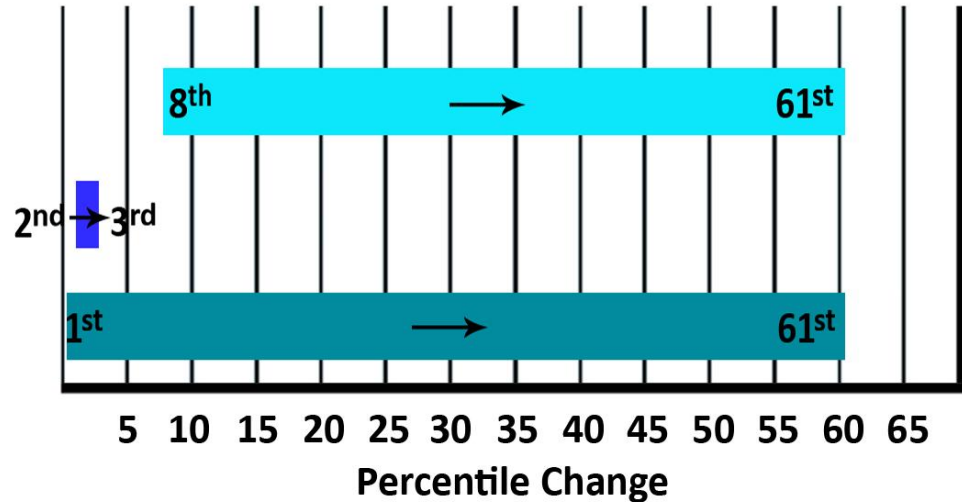
8 exceeded normal development by 1 or more months



# Ongoing Results ~ Positive Developmental Trajectories at 7 Months

3 additional children who began in the “at risk” zone made slower progress, but still advanced.

This growth is seen in their increased percentile scores.



# **Follow Up Results ~ Sustained Outcomes**

## **CONCLUSION**

**While no additional messages were provided to moms between July and November, the positive effects of the 9 weeks of audio coaching they received were sustained.**

# Implications ~

Can a simple, click and listen audio coaching app

- ✓ Increase parents' perceived frequency of verbal interaction with their babies? **YES**
- ✓ Increase the types of engagement parents' report having with their babies **YES**
- ✓ Measurably improve babies' language development **YES**

# Implications ~

These strong findings indicate that:

- Time**2**Talk**2**Baby is a viable intervention that should be financed and developed as a free smart phone app
- Continued testing should be done, especially with populations who are at-risk, delayed, low income, and families with youngsters with Autism Spectrum Disorder.

# Implications ~

**This intervention should be promoted by**

- **Public health systems**
- **Private and community-based medical clinics**
- **Human services that work with children and families**
- **Public housing**
- **Foster care programs**
- **and more**



# User Comments ~

*I enjoyed spending the time listening, learning, and the suggestions*

*My favorite messages were the ones with songs or rhymes and more interactive types of things to do with my baby.*

*Thank you! I loved the whole program!*

*Would love more statistics or facts about how talking to the baby will have an impact on its life?*

*LOVE LOVE LOVE!!!*

*Excellent job!*

# User Comments ~

*Maybe group like subjects together so one week is all nursery rhymes, then the next week has a theme.*

*Give us even more background to the ideas, like why they are important and how they can improve my child's well being.*

*Loved it!!*

*It was great!*

*Love where this is headed! I will miss this program!*

# User Comments ~

*Keep on developing the program. Excellent idea.*

*Thank you for letting me be a part of the program!*

*Great idea to give parents guidance and teach others ways to talk to their babies when things are so crazy a quick daily reminder can be very beneficial!*

*I loved the whole program!*

(The entire results of the feedback survey are available at [wordstogrowon.com/feedback.html](http://wordstogrowon.com/feedback.html))



For more information about

**Time2Talk2Baby**

or our study, please contact

Dr. Peggy Sissel

Founder and CEO

Words To Grow On, LLC

[peggy@wordstogrowon.com](mailto:peggy@wordstogrowon.com)