Time2Talk2Baby: A Study of the Effectiveness of a New Audio Coaching App for Parents

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Introduction

- BACKGROUND ~
  - What is the "Word Gap?"
  - Why is it important?

- THE INTERVENTION
  - Rationale for Time2Talk2Baby
  - Study Details
  - Findings
  - Implications
Background

The Hart-Risley Study

• Groundbreaking study at Univ. of Kansas
• For 3 years during 1990's
• 42 families visited monthly
• 1 hour of parent-baby talk recorded
• 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

They called this "The Word Gap"

Number of Words Spoken to Child

The WORD GAP

Hart and Risley, 1995
The Hart-Risley Study

Differences among families were huge

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

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

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Affirm</th>
<th>Admonish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>32</td>
<td>5</td>
</tr>
<tr>
<td>Working Class</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Welfare</td>
<td>5</td>
<td>11</td>
</tr>
</tbody>
</table>
The Hart-Risley Study

• Moreover, children's intellect is actually developed by words

• More words and interaction children get =
  ✓ Bigger vocabulary
  ✓ Higher IQ
  ✓ Greater achievement in future schooling

For example . . .
# Importance

## Average Counts for Parents and Children

<table>
<thead>
<tr>
<th>MEASURES</th>
<th>PARENT COUNTS</th>
<th>CHILD COUNTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PROFESSIONAL (N=13)</td>
<td>WORKING CLASS (N=23)</td>
</tr>
<tr>
<td>IQ at age 3</td>
<td>2,176</td>
<td>1,498</td>
</tr>
<tr>
<td>Recorded Vocabulary Size</td>
<td>117</td>
<td>107</td>
</tr>
<tr>
<td>Average Utterances per hour</td>
<td>487</td>
<td>301</td>
</tr>
<tr>
<td>Average Different Words per hour</td>
<td>382</td>
<td>251</td>
</tr>
<tr>
<td>Average Adult Words per hour</td>
<td>2,153</td>
<td>1,251</td>
</tr>
<tr>
<td>Average Adult Words per 14-hour day</td>
<td>30,142</td>
<td>17,514</td>
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</tbody>
</table>

(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
- 30-60 seconds, sent daily
- Suggests activities
- Offers topics to talk about
- Songs & rhymes
- Provides rich vocabulary
- Age-appropriate techniques
- Easy and engaging
Why an app?

- Text4Baby service has shown effectiveness of phone messaging to promote maternal/baby care
- Smart phones nearly universal
- Low income folks rely on them for access to internet
Background ~

Why an audio app?

- Parents can hear suggested words to use
- Allows for modeling of interaction
- No reading is required
Why is no reading important?

- Adult Literacy Rates in the U.S. are very low
- Don't read well = low educational attainment = low vocabulary levels

93 million adults read at about 4th grade or below

Source: NAAL, 2003, National Center for Education Statistics.
Babies need lots of words, but also a RICH VARIETY of words

When the HOME ENVIRONMENT lacks higher level words for baby can Time2Talk2Baby help?
The Aim ~

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
The Overall Goal ~

Improve Development of Young Children

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>Peggy A. Sissel, Ed.D.</td>
<td>Creator, Founder &amp; CEO, Words To Grow On, LLC</td>
</tr>
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<td>Nicola Edge, Ph.D.</td>
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<td>Fellow, Department of Pediatrics, Behavioral Studies and Development Division, UAMS</td>
</tr>
<tr>
<td>Anna Waddell, B.A.</td>
<td>Research Assistant</td>
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Recruitment 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
Sample ~ Demographics

90 Moms with babies ages 2-36 months

- 23% 35-44 years
- 63% 25-34 years
- 11% 18-24 years

- 79% Married
- 19% Single (never married)
- 2% Separated
- 2% Asian
- 1% Other
- 10% Hispanic
- 78% White

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

- Children were evenly represented by gender and age
- Children’s beginning language scores ranged from 1% to 99%
Methodology

Randomized Experimental Design

• Common Intake: 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
First Test: 1 month pilot took place in 2014-15
This research period: May – July 2016

TREATMENT GROUP
• Post treatment, moms queried with partial PEBLS and LENA Snapshot
• Given option to remain in study

CONTROL GROUP
• Post treatment period, moms queried with partial PEBLS 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/interest - i.e. *Word of the Day*, *Nursery Rhymes*, *Talking Tips*, *Exploring Baby's World*, *Songs*, *Holidays*, *Opposites*, *StoryTime*, *Smarty Pants* (Q & A with baby)

• **58 messages** sent to each mom over 9 weeks

• **232 total audio clips** produced; 58 for each age grouping
Data Collection

Message Stats & Program Views
- Moms' Listening Rates
- Most frequently used audio clips
- Opinions of the program
- Perceived benefits
- Social transmission rates

Children's Language Development
- Baseline language scores
- Individual change over time
- Treatment & Control group comparisons pre and post
- Demographic differences
- Maternal behaviors/attitudes
Results ~ Moms

- 9 Weeks
- 42 Moms
- 232 Audio Clips
- 2,032 Downloads

Moms’ use ranged from 9 - 93 times

Mom’s Feedback

- 88% Learned new facts
- 81% Suggestions helpful
- 79% Learned new ways to interact with baby
- 74% Beneficial to self and baby
- 70% Understand baby's needs better
Results ~ Moms

**Behavior:** New knowledge became actionable and embedded.

- 58% Asked family to talk more to baby
- 55% Told friends about need to talk
- 17% Asked care provider to interact more
- 65% Now regularly use activities in messages

**Meta-Cognition:** 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

Differences in Pre and Post Scores

- **Treatment Group**: Standard Score increased over 12 weeks
  - Starting mean score 3.98
  - Control Group: Standard Score decreased over same 12 weeks
  - Starting mean score 3.95

- 9 weeks of 30 - 60 sec. daily audio messages
- **no messages**
Results ~ Babies

Differences are Statistically Significant

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Std. Error</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>control group</td>
<td>101.365(^a)</td>
<td>1.989</td>
<td>97.399</td>
</tr>
<tr>
<td>treatment group</td>
<td>107.303(^a)</td>
<td>2.016</td>
<td>103.282</td>
</tr>
</tbody>
</table>

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% TREATMENT vs CONTROL 20.5%
20 of 41 exceeded anticipated trajectory of development
8 of 39 exceeded anticipated trajectory of development

316 weeks collective gain
61 weeks collective gain
Outcomes ~ Babies

Overall Differences Between Groups

Treatment N = 41

- Advanced: 48.75%
- Normal: 48.75%
- Lagged: 2.4%

Control N = 39

- Advanced: 28.2%
- Normal: 20.5%
- Lagged: 50.3%
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**
These strong findings indicate that:

• Time2Talk2Baby 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

Continued:

• This intervention should be promoted and disseminated by
  • public health systems
  • private and community-based medical clinics
  • human services that work with children and families
  • and more
For more information about Time2Talk2Baby or our study, please contact

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