Empirical Evidence of the Value Added by Parents’ Participation in Early Language Intervention

Ann P. Kaiser, PhD
Vanderbilt University
Department of Special Education
Vanderbilt Kennedy Center

ann.kaiser@vanderbilt.edu
Today’s Talk

• The role of parents in language development
• Parents as important partners in language intervention
  • Evidence from Vanderbilt Kidtalk Projects
  • Evidence from meta analyses
• Implications for advancing parent-implemented language interventions in research and practice
Communication Requires Partners

sending

receiving

receiving

sending

receiving

sending

receiving
Parents are children’s first and most enduring communication partners

- Parents are the first language teachers
  - Responsive to the whole child as a communicator, as well as his language
  - Invested in the immediate function and meanings of child communication
- Primary, caring relationship is a foundation for communication and teaching
- Quantity and quality of linguistic input provided by parents impacts child language development (Hart & Risley, 1995; Smith, Landry, & Swank, 2000; Tamis-LeMonda, Bornstein, & Baumwell, 2001; )
Dancing in the Dark

**Typical children**
- Easy to read social cues
- Follow a dependable developmental trajectory
- Interested in partners and objects
- Use multiple strategies to learn language
- Quickly move through developmental stages

**Children with communication delays**
- May be difficult to determine child intentions
- Slower, possibly disrupted developmental trajectory
- Vary in social and object interest, play, daily living skills
- Fewer strategies, less well developed
- May move slowly through developmental stages
We can make the process of communication easier for parents and the outcomes for their children better with effective parent training.
ENHANCED MILIEU TEACHING
Parent-Implemented Enhanced Milieu Teaching

• **Based on two assumptions:**
  • Communication is learned in interactions with partners
  • Changing partner support for communication can change child outcomes

• **Goals:**
  • Improving generalized communication outcomes for children
  • Understanding the conditions in which communication and language are learned
<table>
<thead>
<tr>
<th>Population</th>
<th>Intervention</th>
<th>Dosage, mode</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children with ID (DS, ASD, DD)</td>
<td>Parent only Parent + therapist</td>
<td>2X week, 36 sessions</td>
<td>Kaiser &amp; Roberts, 2013</td>
</tr>
<tr>
<td>Toddlers with receptive/ expressive delays</td>
<td>Parent + therapist</td>
<td>2x week 28 sessions</td>
<td>Roberts &amp; Kaiser, 2015</td>
</tr>
<tr>
<td>Minimally verbal preschoolers with ASD</td>
<td>Parent + therapist+ Direct teaching+EMT/ JASPER</td>
<td>3x week 48 sessions, iPad, Direct teaching</td>
<td>HRSA Ongoing</td>
</tr>
<tr>
<td>2 Yr olds with ASD</td>
<td>Parent+ therapist + EMT/JASPER+ Behavior support</td>
<td>2x week 48 sessions home only</td>
<td>IES Ongoing</td>
</tr>
<tr>
<td>3-4 Yr olds with DS</td>
<td>Parent+ therapist + EMT/JASPER +iPad</td>
<td>2x parent +therapist; 2x therapist only, 48 sessions</td>
<td>Merck Ongoing</td>
</tr>
<tr>
<td>2-3 Yr olds Spanish Language delayed</td>
<td>Parent+ therapist</td>
<td>2x week home In Spanish, 24 sessions</td>
<td>NIDCD Ongoing</td>
</tr>
</tbody>
</table>
A Cascading Intervention Model

1. How to Teach Parents?
2. What to Teach Parents?
3. Child Language
4. Parent Use of Strategies
5. Parent Training
Enhanced Milieu Teaching (EMT)

- EMT is a widely studied intervention with consistently positive effects on various language forms and structures (Kaiser & Hampton, 2016).
- Gains in language have been observed in children with intellectual disabilities:
  - Classes of language structures (Goldstein & Mousetis, 1989; Warren, Gazdag, Bambara, & Jones, 1994)
EMT Strategies

• Setting the Foundation for Communication
  • Play and Engage
  • Notice and Respond
  • Take Turns
  • Mirror and Map

• Modeling and Expanding Play and Communication
  • Modeling and Expanding Play
  • Modeling Language
  • Expanding Communication

• Using Environmental Arrangement (EA) Strategies to Promote Communication

• Using Prompting Strategies to Promote Practice
Maximizing Intervention Effects

Teach-Model-Coach-Review Parent Training (Parent Intervention Roberts et al, 2014; )

- Based on 6 adult learning strategies (Dunst & Trivette, 2009).
- Simultaneous use of different methods has the largest effect (d=1.25).

<table>
<thead>
<tr>
<th>Coach</th>
<th>• Coached the caregiver while she practiced the strategy with the child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review</td>
<td>Last 10 minutes of each session</td>
</tr>
<tr>
<td></td>
<td>• Discussed the session</td>
</tr>
<tr>
<td></td>
<td>• Linked parent and child behaviors</td>
</tr>
<tr>
<td></td>
<td>• Made a plan for home use of strategies</td>
</tr>
</tbody>
</table>

Value Added Limerick 2017

13
Benchmarks for Enhanced Milieu Teaching taught using Teach-Model-Coach-Review (Roberts & Kaiser, 2015; Roberts et al., 2014)

<table>
<thead>
<tr>
<th></th>
<th>Primary Intervention by therapist</th>
<th>Parent Training</th>
<th>Parent implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td>6 key EMT strategies at specified fidelity</td>
<td>Key TCMR behaviors in workshops and session at fidelity</td>
<td>6 key EMT strategies at specified fidelity</td>
</tr>
<tr>
<td><strong>Dosage</strong></td>
<td>15 minutes</td>
<td>15-25 minutes</td>
<td>15 minutes in session</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>24 sessions, 1 clinic and 1 home/week,</td>
<td>4 workshops, 24 sessions</td>
<td>3 activities per session</td>
</tr>
</tbody>
</table>
Benchmarks for Enhanced Milieu Teaching Implementation

- **Matched Turns 80%**
  Percentage of adult turns that are in response to the child’s previous utterance

- **Responsiveness 90%**
  Percentage of child turns to which the adult responds

- **Target Level Talk 50%**
  Percentage of adult utterances that contain a child target

- **Expansions >40%**
  Percentage of child utterances to which the adult adds a content word.

- **Time Delays 3-5 @ 80%**
  Number and percentage of episodes that include correctly executed steps of the nonverbal prompting hierarchy

- **Prompting 1-5 @ 80%**
  Number and percentage of episodes that include correctly executed steps of the verbal prompting hierarchy
Why Parent **Plus** Therapist?

- **Therapists**
  - Provide intensive intervention using all components
  - High level of fidelity
  - Can fine tune intervention to include other strategies (direct teaching, more complex forms, peers)
  - Can “prime” children so that parents are likely to be more successful

- **Parents**
  - Teach in the context of relationship and emotional connection
  - Have more opportunities to teach in functional contexts and routines
  - Immediately benefit from the improved communication with their child
  - Can tailor strategies and communication to the child’s changing communication skills and needs
Maximizing child outcomes by teaching across settings and routines

**Teach in Play**
- Extended engagement
- Teach join attention skills
- Multiple teaching opportunities
- Teach symbolic play to support cognition, language

**Teach Across Activities within Home**
- Teach functional language skills
- Improve daily interactions
- Improve behavior
EMT Parent Outcomes

- **Parents learn** a range of strategies to criterion levels.
  - Environmental arrangement (Alpert & Kaiser, 1992; Hemmeter & Kaiser 1990)
  - Modeling language targets (Hancock & Kaiser, 2002)
  - Prompting target production using MT techniques (Kaiser, Hancock & Nietfeld, 2001; Roberts et al, 2014)

- **Parents generalize** these strategies to home interactions with their children (Hancock & Kaiser, 2002; Kaiser & Roberts, 2013).

Child Outcomes from Parent-Implemented EMT

- Increases **child use of language targets**
  - Early syntactic forms *(Kaiser & Hester, 1994; Roberts et al, 2014)*
- Increases child **frequency of communication** *(Kaiser et al, 1993; Kaiser & Roberts, 2012; Wright et al, 2013; Curtis et al., in review)*

- Results in **generalization** across settings and people, *(Kaiser & Roberts, 2012; Wright et al., 2013)*

- Results in **maintenance** of newly learned targets *(Roberts et al., 2014; Kaiser & Roberts, 2012)*
Longer MLU when parents are trained

Kaiser & Roberts, 2013  Children with ID
Greater effects of parent training for children with ASD

Kaiser & Roberts, 2013

Value Added Limerick 2017
## Effects Over Time

- RCT 28 sessions of parent-implemented EMT
- Toddlers with Expressive only or expressive/receptive delays
- Assessed Pre, Post, 6mos, 12 mos follow up
- Parents trained to fidelity, strong maintenance of fidelity

<table>
<thead>
<tr>
<th></th>
<th>Standard Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
</tr>
<tr>
<td><strong>Expressive language (PLS-4)</strong></td>
<td>75</td>
</tr>
<tr>
<td><strong>Receptive language (PLS-4)</strong></td>
<td>77</td>
</tr>
<tr>
<td><strong>Expressive vocabulary (EOWPVT-3)</strong></td>
<td>61</td>
</tr>
</tbody>
</table>

Value Added Limerick 2017

Roberts & Kaiser, 2015
Hampton, Kaiser & Roberts, under review
PLS Auditory Scores at 6, 12 mo followup

Expressive only
Receptive/Expressive
Positive Effects on Behavior at 12 mo follow up

- The intervention group had significantly fewer:
  - total problem behaviors $-6.589$, 95% CI [-11.804, -1.385])
  - externalizing behaviors $-2.231$, 95% CI [-4.355, -0.108])
  - internalizing behaviors $-2.091$, 95% CI [-3.791, -0.391])

- Effects sizes for treatment vs control differences
  - total problem behavior, $d = -0.434$
  - externalizing behavior, $d = -0.346$
  - Internalizing behavior, $d = -0.440$

Curtis, et al, under review
Effects on Early Grammatical Performance
IPSyn Z Scores for Treatment and Control Groups at Pre, Post, 6 months & 12 months
Parents Appreciate KidTalk

• “It’s been a really good support system for me and really encouraging and supportive. You need that with a child with special needs.”
• “Being able to learn through play is so effective!”
• “My child looked forward to her therapy. You taught me so much about my child!”

• Mn Ratings for positive effects on child communication: 4.8/5
Summary

- **Parents can learn EMT strategies to criterion levels**
  - When training is systematic: TMCR; multi modal, criterion based
  - Training occurs across settings and routines at home
  - Relatively brief training

- **Parents generalize to home settings**
  - Changes in observational data; minimal changes in LENA data
  - Estimating relationship between parent behavior and child outcomes is complex due to sampling, difference in child

- **Parents maintain to some extent over time**
  - Responsiveness, modeling, expansions
  - Less correct prompting

- **Child effects are moderate**
  - .2-.4 depending on population, measure
  - Best effects for observational measures (NDW, rate, SCU)

- **There may be benefits beyond targeted language**
  - Behavior
  - Parent/child relationship
Challenges and Limitations

- Requires a skilled interventionist
  - Teaching parents vs child
  - Adapting to specific child needs
  - Behavior support skills
  - Mode
- Effects depend on parent learning and use of strategies at home
- Child effects are moderate, vary by measure
- Need for cultural and linguistic adaptations
- Need to specify phenotypic adaptations for children to maximize outcomes
Meta Analyses of Parent-Implemented Interventions for Communication

• **Group Design**
  - Roberts & Kaiser, 2011
  - Hampton & Kaiser, 2016
  - Kaiser, Cunningham, Heidlage, Trivette, Roberts, et al., 2017 (Bridging the Word Gap Work Group I; ongoing)

• **Single Case** (syntheses, SC meta approach)
  - Moyle et al., 2014
  - Meadan et al., 2016
  - Frey, Barton, et al., 2017 (Bridging the Word Gap Work Group I, ongoing)
Meta-analysis: Rationale

- Structured research technique with documentation at each step of search, coding, and analysis
- Replication of the process is possible.
- The magnitude and direction of all results are coded for each study
- Quantitative examination of the relationship between study characteristics and study results.
- The results of the small studies are pooled, increasing the statistical power to detect differences.
Why Meta Analyses

• Looking for effects beyond a single intervention or approach
• Applying a common standard for outcomes (standardized effect sizes: similar measure measurement constructs)
• Potential for examining moderators of treatment outcomes
Limitations

Only as good as the data that can be accessed from the studies
- Measures of relevant constructs
- Design of the study: Sample size, randomization, threats to validity
- Description of population, intervention, fidelity

Effect Sizes reflect both the treatment and comparison group

Standardized mean difference between two groups:
\[ \text{Cohen's } d = \frac{M_1 - M_2}{SD_{pooled}} \]
\[ \text{Glass's } \Delta = \frac{M_1 - M_2}{SD_{control}} \]
\[ \text{Hedges' } g = \frac{M_1 - M_2}{SD_{pooled}} \]
Roberts & Kaiser, 2011
Meta-analysis Questions

• Does training impact parent use of language support strategies?

• Do parent-implemented interventions positively affect language outcomes of young children with language impairments compared to control?

• Do parent-implement interventions positively affect language outcomes compared to treatment by therapists?
Meta-analysis: Kaiser & Roberts, 2011

• **Study Type:** 13 randomized group experiments 1 matched control
• **Average Sample Size:** 25 participants (range 12-47)
• **Diagnosis:** 6 DD; 8 Language Delay
• **Age:** Majority of studies included children between 24 and 36 months of age.
• **Intervention:**
  • 6 studies were Hanen Parent Program
  • 8 were between 10-13 weeks and had less than 26 hours of parent training.
• **Control Group:** 3 community services, 11 non-treatment control
## Meta-analysis: Roberts & Kaiser, 2011

Does parent training change parent behavior?

<table>
<thead>
<tr>
<th></th>
<th>g</th>
<th>CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent responsiveness</td>
<td>.73</td>
<td>(.26, 1.2)</td>
<td>.00</td>
</tr>
<tr>
<td>Rate</td>
<td>.26</td>
<td>(-.13, .64)</td>
<td>.19</td>
</tr>
<tr>
<td>Use of language models</td>
<td>.38</td>
<td>(-.03, .80)</td>
<td>.07</td>
</tr>
</tbody>
</table>
Meta-analysis: Roberts & Kaiser, 2011

- Do parent-implemented interventions positively affect child language outcomes? (*compared to control*)
- Which child language outcomes have the largest effects?

<table>
<thead>
<tr>
<th></th>
<th>$g$</th>
<th>CI</th>
<th>$p$</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall language</td>
<td>.45</td>
<td>(-.02, .92)</td>
<td>.06</td>
<td>7</td>
</tr>
<tr>
<td>Expressive language</td>
<td>.61</td>
<td>(.00, 1.21)</td>
<td>.05</td>
<td>7</td>
</tr>
<tr>
<td>Receptive language</td>
<td>.35</td>
<td>(.05, .65)</td>
<td>.02</td>
<td>7</td>
</tr>
<tr>
<td>Expressive vocabulary</td>
<td>.43</td>
<td>(.24, .73)</td>
<td>.00</td>
<td>14</td>
</tr>
<tr>
<td>Receptive vocabulary</td>
<td>.38</td>
<td>(.10, .66)</td>
<td>.01</td>
<td>5</td>
</tr>
<tr>
<td>Expressive morpho-syntax</td>
<td>.82</td>
<td>(.37, 1.38)</td>
<td>.00</td>
<td>7</td>
</tr>
<tr>
<td>Rate</td>
<td>.51</td>
<td>(.18, .84)</td>
<td>.00</td>
<td>9</td>
</tr>
</tbody>
</table>
**Meta-analysis: Roberts & Kaiser, 2011**

- Do parent-implemented interventions positively affect child language outcomes? *(compared to therapist implemented intervention)*

<table>
<thead>
<tr>
<th></th>
<th>$g$</th>
<th>CI</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall language</td>
<td>.24</td>
<td>(-.26, .73)</td>
<td>.35</td>
</tr>
<tr>
<td>Expressive language</td>
<td>.25</td>
<td>(-.43, .93)</td>
<td>.47</td>
</tr>
<tr>
<td>Receptive language</td>
<td>.41</td>
<td>(.08, .76)</td>
<td>.02</td>
</tr>
<tr>
<td>Expressive vocabulary</td>
<td>.14</td>
<td>(-.25, .54)</td>
<td>.69</td>
</tr>
<tr>
<td>Receptive vocabulary</td>
<td>.19</td>
<td>(-.26, .64)</td>
<td>.41</td>
</tr>
<tr>
<td>Expressive morpho-syntax</td>
<td>.42</td>
<td>(.06, .79)</td>
<td>.02</td>
</tr>
<tr>
<td>Rate</td>
<td>-.15</td>
<td>(-.56, .27)</td>
<td>.48</td>
</tr>
</tbody>
</table>
Roberts and Kaiser, 2011
Vocabulary outcomes for parent training studies
Hampton & Kaiser, 2016

Meta Analysis Questions

• What are the effects of intervention on the spoken language outcomes for children with ASD?

• What features of intervention account for differences in outcomes?
Meta-analysis: Hampton & Kaiser, 2016

- **Study Type:** 16/26 were randomized group experiments
- **Sample Size:** 11-294
- **Diagnosis:** All children with ASD; 81% male;
- **Age:** Mn 3.33 yrs; range; 1.75 – 4.18 months
- **Intervention:**
  - 92% included some naturalistic teaching
  - 50% included some direct teaching components
  - Both targeted language and comprehensive interventions

- **Control Group:** treatments as usual, highly variable
Meta Analysis Hampton & Kaiser, 2016

- What are the effects of intervention on the spoken language outcomes for children with ASD?

<table>
<thead>
<tr>
<th></th>
<th>g</th>
<th>CI</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>.26</td>
<td>(-0.11, .42)</td>
<td>26</td>
</tr>
<tr>
<td>Clinician</td>
<td>.08</td>
<td>(-.47,0.62)</td>
<td>5</td>
</tr>
<tr>
<td>Parent only</td>
<td>.11</td>
<td>(-0.06,.28)</td>
<td>9</td>
</tr>
<tr>
<td>Parent + Clinician</td>
<td>.42</td>
<td>(0.24-0.68)</td>
<td>12</td>
</tr>
</tbody>
</table>
### Clinician Only

<table>
<thead>
<tr>
<th>Study</th>
<th>Effect Size</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boyd et al., 2014</td>
<td>-0.56</td>
<td>[-0.88; -0.24]</td>
<td>6.0%</td>
</tr>
<tr>
<td>Kasari et al., 2008</td>
<td>0.27</td>
<td>[-0.29; 0.83]</td>
<td>4.0%</td>
</tr>
<tr>
<td>Whalen et al., 2010</td>
<td>0.35</td>
<td>[-0.23; 0.92]</td>
<td>3.9%</td>
</tr>
<tr>
<td>Goods et al., 2013</td>
<td>0.65</td>
<td>[-0.46; 1.77]</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

**Random effects model**

Heterogeneity: I-squared=77.1%, tau-squared=0.2135, p=0.0044

### Parent Only

<table>
<thead>
<tr>
<th>Study</th>
<th>Effect Size</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venker et al., 2012</td>
<td>-0.50</td>
<td>[-1.50; 0.50]</td>
<td>1.9%</td>
</tr>
<tr>
<td>Carter et al., 2011</td>
<td>-0.06</td>
<td>[-0.58; 0.46]</td>
<td>4.3%</td>
</tr>
<tr>
<td>Tonge et al., 2014</td>
<td>-0.06</td>
<td>[-0.52; 0.41]</td>
<td>4.7%</td>
</tr>
<tr>
<td>Green et al., 2010</td>
<td>0.00</td>
<td>[-0.32; 0.32]</td>
<td>6.0%</td>
</tr>
<tr>
<td>Rogers et al., 2012</td>
<td>0.10</td>
<td>[-0.29; 0.49]</td>
<td>5.3%</td>
</tr>
<tr>
<td>Hardan et al. 2014</td>
<td>0.41</td>
<td>[-0.16; 0.98]</td>
<td>3.9%</td>
</tr>
<tr>
<td>Wetherby &amp; Woods, 2006</td>
<td>0.43</td>
<td>[-0.23; 1.09]</td>
<td>3.4%</td>
</tr>
<tr>
<td>Schertz et al., 2013</td>
<td>0.43</td>
<td>[-0.37; 1.23]</td>
<td>2.6%</td>
</tr>
<tr>
<td>Drew et al., 2002</td>
<td>0.56</td>
<td>[-0.23; 1.35]</td>
<td>2.7%</td>
</tr>
<tr>
<td>Aldred, Green, &amp; Adams, 2004</td>
<td></td>
<td>[-0.85; 3.99]</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

**Random effects model**

Heterogeneity: I-squared=0%, tau-squared<0.0001, p=0.5264

### Parent + Clinician

<table>
<thead>
<tr>
<th>Study</th>
<th>Effect Size</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt et al., 2002</td>
<td>-0.34</td>
<td>[-1.34; 0.65]</td>
<td>1.9%</td>
</tr>
<tr>
<td>Roberts et al., 2011</td>
<td>0.05</td>
<td>[-0.40; 0.49]</td>
<td>4.9%</td>
</tr>
<tr>
<td>Solomon et al., 2014</td>
<td>0.16</td>
<td>[-0.24; 0.55]</td>
<td>5.3%</td>
</tr>
<tr>
<td>Siller, Hutman, &amp; Sigman, 2013</td>
<td></td>
<td>[-0.25; 0.73]</td>
<td>4.5%</td>
</tr>
<tr>
<td>Bloch et al., 1980</td>
<td>0.25</td>
<td>[-0.53; 1.02]</td>
<td>2.7%</td>
</tr>
<tr>
<td>Casenhiser, Shanker, &amp; Stieben, 2013</td>
<td></td>
<td>[-0.27; 0.81]</td>
<td>4.1%</td>
</tr>
<tr>
<td>Strain &amp; Bovey, 2011</td>
<td>0.49</td>
<td>[ 0.25; 0.73]</td>
<td>6.7%</td>
</tr>
<tr>
<td>Dawson et al., 2010</td>
<td>0.55</td>
<td>[-0.04; 1.14]</td>
<td>3.8%</td>
</tr>
<tr>
<td>Cohen et al., 2006</td>
<td>0.58</td>
<td>[-0.06; 1.22]</td>
<td>3.5%</td>
</tr>
<tr>
<td>Vivanti et al., 2014</td>
<td>0.59</td>
<td>[ 0.07; 1.12]</td>
<td>4.2%</td>
</tr>
<tr>
<td>Remington et al., 2007</td>
<td>0.95</td>
<td>[ 0.33; 1.56]</td>
<td>3.6%</td>
</tr>
<tr>
<td>Howard et al., 2005</td>
<td>1.09</td>
<td>[ 0.53; 1.65]</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

**Random effects model**

Heterogeneity: I-squared=36.4%, tau-squared=0.0324, p=0.0593

**Random effects model**

Heterogeneity: I-squared=57.7%, tau-squared=0.0825, p=0.0001
For children with ASD, there appears to be value added by including parents in comprehensive or language specific early intervention.

Few studies compared parent-implemented directly to clinician implemented.

No significant effects for other intervention features—age, comprehensive/targeted intervention, dosage.

Wide range of measures for spoken language; most include vocabulary.

Although ES are positive, actual gains were modest.

Findings similar to those in Kaiser & Roberts, 2013.

- Children with ASD may benefit relatively more from clinician plus parent-implemented.
Meta-analysis: Kaiser et al-BWG, 2017

1. Conducted as one part of major literature review related to Bridging the Word Gap (HRSA Research Network)

2. What is the impact of parent-implemented intervention on child expressive and receptive language outcomes?

3. What is the impact of parent-implemented intervention on child vocabulary outcomes?

3. Do child vocabulary outcomes vary by type of intervention?
Meta-analysis: Kaiser et al.-BWG, 2017

- **Study Type:** 25 randomized group experiments with BAU
- **Average Sample Size:** 68% had less than N= 50
- **Diagnosis:** 44% Language delay; 36% ASD; 20% other
- **Age:** 0-8 years; 36% 0-3 yrs; 56% 4-5 Yrs
- **Intervention:**
  - 7 shared book reading;
  - 18 naturalistic play/routines
- **Control Group:** BAU, waitlist
Meta-analysis: Kaiser-BWG, 017

- What is the impact of parent-implemented intervention on child expressive and receptive language outcomes?

<table>
<thead>
<tr>
<th></th>
<th>g</th>
<th>CI</th>
<th>p</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expressive language</td>
<td>0.27</td>
<td>(0.10-0.44)</td>
<td>0.05</td>
<td>13</td>
</tr>
<tr>
<td>Receptive language</td>
<td>0.09</td>
<td>(-0.11,0.28)</td>
<td>NS</td>
<td>10</td>
</tr>
</tbody>
</table>
Child Expressive Language Outcomes

<table>
<thead>
<tr>
<th>Study</th>
<th>Effect Size (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kasari (2014)</td>
<td>-0.24 (-0.71, 0.24)</td>
</tr>
<tr>
<td>Hardan (2014)</td>
<td>0.07 (-0.49, 0.63)</td>
</tr>
<tr>
<td>Sheridan (2011)</td>
<td>0.11 (-0.16, 0.37)</td>
</tr>
<tr>
<td>Casenhiser (2011)</td>
<td>0.16 (-0.24, 0.55)</td>
</tr>
<tr>
<td>Solomon (2014)</td>
<td>0.16 (-0.24, 0.55)</td>
</tr>
<tr>
<td>Siller, M (2013)</td>
<td>0.22 (-0.27, 0.70)</td>
</tr>
<tr>
<td>Schertz (2013)</td>
<td>0.43 (-0.37, 1.23)</td>
</tr>
<tr>
<td>Chao (2006)</td>
<td>0.54 (-0.07, 1.16)</td>
</tr>
<tr>
<td>Baranek (2014)</td>
<td>0.60 (-0.50, 1.16)</td>
</tr>
<tr>
<td>Roberts (2012)</td>
<td>0.68 (-0.00, 1.35)</td>
</tr>
<tr>
<td>Buschmann (2009)</td>
<td>0.73 (0.15, 1.31)</td>
</tr>
<tr>
<td>Colmar (2014)</td>
<td>0.84 (0.02, 1.66)</td>
</tr>
<tr>
<td>Fey (1993)</td>
<td>0.89 (-0.01, 1.80)</td>
</tr>
<tr>
<td>Overall (I-squared = 22.1%, p = 0.220)</td>
<td>0.27 (0.10, 0.44)</td>
</tr>
</tbody>
</table>

Favors Control  Favors Intervention
Child Receptive Language Outcomes

<table>
<thead>
<tr>
<th>Study</th>
<th>Hedges' g</th>
<th>Effect Size (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schertz (2013)</td>
<td>-0.71</td>
<td>(-1.52, 0.11)</td>
</tr>
<tr>
<td>Tannock (1992)</td>
<td>-0.31</td>
<td>(-0.99, 0.37)</td>
</tr>
<tr>
<td>Kasari (2014)</td>
<td>-0.19</td>
<td>(-0.67, 0.28)</td>
</tr>
<tr>
<td>Guttentag (2014)</td>
<td>0.07</td>
<td>(-0.19, 0.34)</td>
</tr>
<tr>
<td>Solomon (2014)</td>
<td>0.17</td>
<td>(-0.18, 0.51)</td>
</tr>
<tr>
<td>Hardan (2014)</td>
<td>0.22</td>
<td>(-0.35, 0.79)</td>
</tr>
<tr>
<td>Roberts (2012)</td>
<td>0.46</td>
<td>(-0.21, 1.12)</td>
</tr>
<tr>
<td>Chao (2006)</td>
<td>0.47</td>
<td>(-0.15, 1.09)</td>
</tr>
<tr>
<td>Baranek (2014)</td>
<td>0.71</td>
<td>(-0.40, 1.82)</td>
</tr>
<tr>
<td>Overall</td>
<td>0.09</td>
<td>(-0.11, 0.28)</td>
</tr>
</tbody>
</table>

Overall (i-squared = 24.2%, p = 0.228)
**Meta-analysis: Kaiser-BWG, 2017**

What is the impact of parent-implemented intervention on child vocabulary outcomes? Do child vocabulary outcomes vary by type of intervention?

<table>
<thead>
<tr>
<th></th>
<th>g</th>
<th>CI</th>
<th>p</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary overall</td>
<td>.39</td>
<td>(.06-.71)</td>
<td>.05</td>
<td>16</td>
</tr>
<tr>
<td>Vocabulary Routines</td>
<td>.41</td>
<td>(.19-.62)</td>
<td>.00</td>
<td>7</td>
</tr>
<tr>
<td>Vocabulary Naturalistic</td>
<td>.38</td>
<td>(.19-.56)</td>
<td>.05</td>
<td>9</td>
</tr>
</tbody>
</table>
Child Vocabulary Outcomes

<table>
<thead>
<tr>
<th>Study</th>
<th>Hedges' g</th>
<th>Effect Size (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine/Play Based</td>
<td>-0.21</td>
<td>(-0.60, 0.19)</td>
</tr>
<tr>
<td>Solomon (2014)</td>
<td>0.13</td>
<td>(-0.55, 0.80)</td>
</tr>
<tr>
<td>Tannock (1992)</td>
<td>0.26</td>
<td>(-0.30, 0.83)</td>
</tr>
<tr>
<td>Hardan (2014)</td>
<td>0.28</td>
<td>(-0.12, 0.68)</td>
</tr>
<tr>
<td>Aldred (2011)</td>
<td>0.56</td>
<td>(-0.23, 1.35)</td>
</tr>
<tr>
<td>Drew (2002)</td>
<td>0.59</td>
<td>(-0.08, 1.26)</td>
</tr>
<tr>
<td>Roberts (2012)</td>
<td>1.07</td>
<td>(0.25, 1.88)</td>
</tr>
<tr>
<td>Girolametto (1996)</td>
<td>1.61</td>
<td>(0.39, 2.84)</td>
</tr>
<tr>
<td>Baranek (2014)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal (I-squared = 55.0%, p = 0.029)</td>
<td>0.39</td>
<td>(0.06, 0.71)</td>
</tr>
<tr>
<td>Shared Book Reading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heubner (2000)</td>
<td>0.20</td>
<td>(-0.19, 0.59)</td>
</tr>
<tr>
<td>Lonigan (1998)</td>
<td>0.36</td>
<td>(-0.25, 0.97)</td>
</tr>
<tr>
<td>Boyce (2010)</td>
<td>0.37</td>
<td>(-0.09, 0.83)</td>
</tr>
<tr>
<td>Crain-Thoreson (1999)</td>
<td>0.38</td>
<td>(-0.48, 1.25)</td>
</tr>
<tr>
<td>Pile (2010)</td>
<td>0.46</td>
<td>(-0.19, 1.11)</td>
</tr>
<tr>
<td>Buschman (2009)</td>
<td>0.72</td>
<td>(0.14, 1.30)</td>
</tr>
<tr>
<td>Fung (2005)</td>
<td>0.90</td>
<td>(-0.01, 1.81)</td>
</tr>
<tr>
<td>Subtotal (I-squared = 0.0%, p = 0.756)</td>
<td>0.41</td>
<td>(0.19, 0.62)</td>
</tr>
<tr>
<td>Overall (I-squared = 29.4%, p = 0.136)</td>
<td>0.38</td>
<td>(0.19, 0.56)</td>
</tr>
</tbody>
</table>
Meta-analysis Summary
Kaiser et al. -BWG, 2017

- Overall results support the use of parent implemented interventions to improve child vocabulary and expressive language development.

- Finding replicate Roberts and Kaiser’s (2011)
  - Positive effect of parent-implemented intervention on child expressive language (.61 vs .27)
  - BUT did not replicate receptive language (.35 vs. 09).
  - Vocabulary outcomes were similar (.38/.41 vs .39)
  - Seven studies overlap in two meta analyses

- ES were similar across shared book reading and routine/play-based language interventions for vocabulary outcomes (. 38, .41)

- Few studies (less than 20%) had primarily low SES families; few studies report data to allow SES analysis
Evidence of Effectiveness for Parent Implemented Interventions

- Roberts & Kaiser, 2011
  - 14 group design studies across populations with parent-implemented intervention with children with language impairment under age 8
    - ES for expressive language $d = .67$ [0.00-1.21]
    - ES for expressive vocabulary $d = .42$ [.24-73]
    - ES for receptive vocabulary $d = .38$ [.10-.66]
  
- Hampton & Kaiser, 2015
  - 22 group design studies of children with ASD under age 8 with parent-implemented (9) or parent plus therapist-implemented intervention (13)
    - ES for spoken language parent only $g = .11$ [.06-.28]
    - ES for spoken language parent plus therapist $g = .42$ [.24-.60]

- Kaiser et al, BWG 2017
  - 25 RCT studies of children under age 5 with parent-implemented intervention
    - ES for vocabulary outcomes $g = .38$ [06-.71]
    - ES for expressive language $g = .27$ [0.10- 0.4]
    - ES for receptive language $g = .09$ [-0.11, 0.28]
Effect Sizes Across Meta Analyses

- Roberts + Kaiser: 0.61
- Hampton + Kaiser: 0.42
- Kaiser-BWG: 0.38

Legend:
- Express Lang
- Rec Lang
- Exp Vocab
- Rec Vocab
- Column1
Important Limitations

- Effects are variable within and across studies
- Effects are relatively modest even when significant
  - Largest effects are treatment vs control
- Few studies measure fidelity or examine the impact of fidelity
  - Parent training
  - Parent implementation
- Relatively is known about active ingredients in parent implementation
- Results are largely for middle SES families
- Very little information about individual differences in parents or children
  - General findings: IQ, Receptive language predict better child outcomes
  - No family characteristics consistently predict implementation
Bottom Line

- There is potentially as much evidence for the positive effects of including parents in implementing early communication intervention as for any single aspect of language intervention.

- We can do better research, but we must move what has been researched into practice.
Implications for Translating Research to Practice:
Describe key components of parent training interventions

- **Describe the components of the intervention**
  - What are the active ingredients in the primary intervention?
  - What are the dosage and frequency of the intervention?
  - What are the intervention active ingredients are parents taught?
  - What are the procedures and settings for teaching parents to implement the intervention?
  - What are the procedures and measures for insuring fidelity across the primary intervention, training parents and parent implementation?

- **Measure implementation dosage and fidelity**
  - Primary intervention
  - Parent training
  - Parent implementation
  - Parent generalization and maintenance
Implications for Research to Practice: Build systems for implementation

- **Manualize treatments with fidelity instruments**
  - Primary intervention descriptions, fidelity instruments, benchmarks for implementation
  - Parent training intervention—descriptions, fidelity instruments, benchmarks for implementation
  - Parent implementation, fidelity instruments, benchmarks

- **Develop procedures for training parent trainers**
  - Complex skill set
  - Fluency in using primary intervention
  - Fluency in parent training strategies
  - Skills for responding to parent context, needs, knowledge,
  - Ability to troubleshoot child challenges (behavior, preferences, slow learning) and parent challenges (child behavior, activities)
Barriers to Effective Parent-Implemented Interventions in Practice

- Few professionals are trained to teach parents
- Few language intervention approaches are well-specified for both therapist implementation and parent training components
- General need for longer term, coordinated intervention to optimize child outcomes.
Appreciation!

- KidTalk Research Team at Vanderbilt
  - Jennifer Nietfeld, Suzanne Thrower, Courtney Wright, Lauren Hampton*, Lizzy Fuller*, Jodi Heidlage*, Kim McCulla, Tatiana Peredo, Emily Quinn, Jennifer Cunningham *, Madeline Hinson, Sabrina Evans, Ashlyn Campagna

- Families and children who participated in our studies

- Our funding agencies: IES, NIH, Merck Foundation, HRSA, NIDCD

- Meta* collaborators
  - Erin E Barton (Vanderbilt) and her students
  - Jennifer Frey ( GWU) and her students
  - Megan Roberts ( Northwestern Univ) and her students
  - Carol Trivette ETSU (BWG) and her students
  - BWG Research Network: Judith Carta, PI, Univ. of Kansas
  - Jodi Heidlage, Jennifer Cunningham, Lauren Hampton, Lizzy Fuller,

For more information
Ann.Kaiser@Vanderbilt.edu
This talk will be posted at Kidtalk.org
Key References

Thank you!

• Questions? Comments?

• For more information
  Ann.Kaiser@Vanderbilt.edu

  This talk will be posted at Kidtalk.org