IMPROVING EARLY COMMUNICATION OUTCOMES FOR TODDLERS WITH DOWN SYNDROME

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TODAY’S TALK

- Characteristics of language development, learning, and interaction in young children with DS
- Outcomes of communication interventions for children with DS
- What children with DS bring to intervention
- What are pivotal behaviors for children with DS and their partners
- Future research
Young children with Down Syndrome

Delayed in the acquisition of both speech and language

- motor development
- auditory memory
- cognitive impairment
- executive functions

Relative strengths in receptive vocabulary and social engagement, affect expression, visual memory

Challenges in transition to productive syntax, comprehension of complex syntax, pragmatics of conversation

Nearly all children with DS benefit from early communication intervention and continuous support for language development
KIDTALK PROGRAM OF RESEARCH RELATED TO CHILDREN WITH DOWN SYNDROME

Goals:
- Improving language and communication outcomes for children with DS
- Understanding the influence of child characteristics on teaching and learning language and communication
- Teaching partners strategies for supporting children’s language and communication
KIDTALK: ENHANCED MILIEU TEACHING

Naturalistic language teaching strategy designed to teach communication skills in everyday conversational interactions

More than 50 studies have investigated the effects of KidTalk and related naturalistic teaching procedures on children’s communication development

See Kaiser & Hampton, 2016
ENHANCED MILIEU TEACHING: ACTIVE INGREDIENTS

Environmental arrangement to promote communication
Play and engage
Follow child’s interests in play and activities
Respond to child communication
Model language in context
Expand child communication
Use Time Delays to promote requests and initiations
Use Milieu Teaching Prompts to promote target practice
Teach across settings, activities and partners
CHILD COMMUNICATION GOALS

1. Increase duration of engagement
   - Social (joint engagement)
   - Objects (play)

2. Increase rate of communication
   - Emphasize spontaneous social initiations

3. Increase diversity of communication
   - Same level forms
   - More words and phrases
   - More functions (requests, comments, questions)
   - Across more contexts

4. Increase complexity of communication
   - Higher level forms
   - Prelinguistic to linguistic,
   - Mean length of utterances
   - Complexity of utterance types

5. Increase independence
   - Initiated social communication
   - Generalization across contexts, people
RQ1 Can parents learn and generalize EMT strategies in interactions with their children with ID across settings at home?

RQ2 Is Parent plus Therapist more effective than Therapists only as a communication intervention for preschool children with ID?

What are the primary effects of EMT delivered by Parents +Therapists vs Therapists only?

What are the generalized effects of EMT delivered by Parents + Therapists vs Therapists only?
### Study Component

<table>
<thead>
<tr>
<th>Study Component</th>
<th>Description</th>
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</table>
| **Design**      | Randomized Clinical Trial  
38 Therapist Condition, 39 Parent +Therapist |
| **Intervention**| EMT with training across activities, settings, partners  
36 sessions (24 clinic, 12 at home across routines) |
| **Parent vs. Therapist** | Pre, Post, 6 months, 12 months  
Standardized, observational, parent report |
| **Participants** | Average age: 40 months  
Average Leiter NV IQ: 70  
Gender: 74% male  
PLS-3 Total Standard Score: 60  
Disability Type: DD (55%), ASD (22%), ( DS (23%)) |
OUTCOMES FOR CHILDREN WITH DS AND CHILDREN WITH DD AND ASD

Adjusted PLS-4 Total Standard Scores

Post 1 | Post 2 | Post 3
--- | --- | ---
Therapist - DD + ASD | Orange Line | d = .24
Parent + Therapist - DD + ASD | Blue Line |  
Therapist - DS | Yellow Line | d = .56
Parent + Therapist - DS | Gray Line |
OUTCOMES ACROSS PROXIMAL TO DISTAL MEASURES

Children with DS

Children with ID
CHILDREN WITH INTELLECTUAL DISABILITIES

Pre-Post 1 Effect size = standardized difference between pre and post scores within group across measures
The number of different words gained during intervention needed to result in an increase of one EVT standard score points at the end of intervention.

<table>
<thead>
<tr>
<th></th>
<th>Intellectual Disabilities</th>
<th>Down Syndrome</th>
<th>Autism</th>
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</thead>
<tbody>
<tr>
<td>Therapist-NDW</td>
<td>1.52*</td>
<td>9.00</td>
<td>1.46*</td>
</tr>
<tr>
<td>Parent-NDW</td>
<td>2.33*</td>
<td>50.00</td>
<td>1.23*</td>
</tr>
<tr>
<td>Language Sample-NDW</td>
<td>3.14*</td>
<td>13.70</td>
<td>3.91</td>
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</tbody>
</table>

*P < .05
19 infants and toddlers with DS
- Ages 10 to 28 months at entry (M = 22 months)
- Mean Mullen ELC score of 65.95 (range 50-93)

Data collected as part of a model demonstration project and an IES study on caregiver implemented intervention

Families received coaching 1-2 times per week in daily routines and activities

IGDI-ECI data was used for progress monitoring during intervention

IGDI-ECIs were administered by the SLP serving the family
DS Data and Greenwood et al. (2010) Norms
Single Word Use

Rate of Single Word Use

DS Data and Greenwood et al. (2010) Norms
Word Combinations

Rate of Multiple Word Combinations
WHAT CHILDREN BRING TO NATURALISTIC COMMUNICATION INTERVENTION

- Imitation
- Auditory memory
- Person
- Object
- Activity

- Access to Input
- Intelligibility
- Fluency
- Rate
- Form
- Functions
- Transparency to partners
- Person
- Object
- Activity

Mode

Engagement Strategies

Baseline Communication

Learning Strategies

Imitation
- Auditory memory
- Efficiency

Strategies
MODIFICATIONS FOR CHILDREN WITH DS

- Teach sequential linguistic content (vocab, syntax)
- Add discrete trials
- Increase dosage
- Increase rate of communication
- Support partner comprehension and responding
- Teach play skills
- Increase object-person engagement
- Increase coordinated joint attention with symbols
- Decrease interfering behavior
- Improve instruction following and persistence
- Teach play skills
- Increase object-person engagement
- Increase coordinated joint attention with symbols
- Decrease interfering behavior
- Improve instruction following and persistence

Mode
Engagement Strategies
Baseline Communication
Learning Strategies

- Provide alternative mode
- Teach partners mode
- Recast/support speech
PHENOTYPIC SPECIFIC COMMUNICATION INTERVENTION FOR CHILDREN WITH DOWN SYNDROME

Randomized Clinical Trial

72 children with DS
- 30-42 months
- 18 months cognitive on Mullen
- MLU less than 1.25 (single word users)
- About 50% low SES, Spanish speaking

Parent + Therapist J-EMT
- 48 total sessions, 4/week, 45 minutes
- 2 therapist only and 2 parent/therapist at home
Effects of an Intervention Depend on Child Receiving the Intervention at Sufficient Dosage

Child characteristics can make it more difficult to deliver the intervention

- Brief attention paired with difficulty in auditory-based learning
- Limited task persistence
- Limited object interest and play skills

Even when the adult is providing the intervention components at fidelity, the child may not be receiving them

- Non-response or refusals of prompts
- Limited spontaneous imitation
- Difficulty with multi-turn conversation even when supported

Modifications in the intervention procedures (delivering) may be needed to increase the child’s participation in intervention (receiving)
<table>
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<tr>
<th>Communication Challenges</th>
<th>Adaptations</th>
<th>Additions</th>
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<tbody>
<tr>
<td>Low rate of symbol infused joint attention</td>
<td>Model communication in joint engagement episodes,</td>
<td>Increase object interaction Support motor development as foundation</td>
</tr>
<tr>
<td>Poor articulation skills</td>
<td>Teach AAC as mode</td>
<td>Start earlier</td>
</tr>
<tr>
<td>Poor auditory memory/strong visual skills</td>
<td>Model in AAC</td>
<td>Start earlier, teach more systematically</td>
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<tr>
<td>Poor generalization across partners, settings</td>
<td>Teach multiple partners, settings, activities</td>
<td>Teach partners behavior support, persistence, high frequency engagement</td>
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<tr>
<td>Slow rate of learning Limited concept learning Difficulty with transition to syntax Difficulty with social pragmatics Interfering behavior: noncompliance, low engagement, low persistence, rigid routines</td>
<td></td>
<td>Add direct instruction, Blend instructional methods, stimuli Teach specific linguistic skills Teach and support behavior</td>
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TRIADIC INTERVENTION TO SUPPORT COMMUNICATION

- Establishing
- Direct teaching: mode, foundations, advanced skills
- Learning skills
- Concepts
- Conversational
- Communication strategies

Functional skills in context
Generalization of foundations, mode, concepts and conversation
SUMMARY
PIVOTAL SKILLS FOR CHILDREN WITH DS

Object interest, attention, interaction and coordination

Behavior regulation: sustained attention, persistence, responsiveness, compliance

Communication production (speech or AAC mode)

Concept comprehension

Rate of communication
Many, but not all pivotal skills are similar for children with ASD and DS.

Intensive primary intervention, not just parent-implemented interventions in the first three years may be critical for both populations.

Although the foundational skills for partners are similar across populations, modifications that address both the behavioral patterns and the learning characteristics of children with DS should prompt dyad specific adaptations.

Intervention research will further differentiate the phenotype of DS.
Next Generation of Early Language Intervention Research for Children with DS

**Experimental adaptations for children with DS**
- Dosage, context, timing, sequence of skills
- Blended direct and naturalistic teaching
- Adaptive research designs
  - Benchmarks for treatment response, determine sequences of treatments, optimizing treatments
- Fine grained analysis of child response to treatment components
  - What are the active ingredients for children with DS?
  - What is the specific dosage of active ingredients being received?
  - Will child outcomes improve with increases in “received” dosage?
  - Do underlying language learning processes change with intervention?

**Multi-partner/multi-setting interventions for generalized change in communication**
- Assess generalization across partners as a primary outcome
- Systematic generalization programming across proximal to distal measures, settings, and people

**DS specific intensive early intervention specific to children with DS**
REFERENCES


THANK YOU!

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