Family qualitative review of participation in the Technology Assisted Language Intervention for children with Down syndrome

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Language Development in Children with T21

- Children with Trisomy 21 (T21) experience persistent and heterogeneous language delays, even with early speech-language intervention
- Common needs include support for speech production, expanding utterances, and asking questions
- Children with T21 often have difficult processing verbal input and show slower development of syntax (formation of phrases and sentences).
- Speech sound disorders are prevalent, and many children benefit from augmentative and alternative communication (AAC) to support communication

Gaps in Care

- AAC has primarily been applied to children with T21 with significant speech production needs, despite evidence that AAC can support broader language development
- AAC informed language interventions are commonly used in early childhood, but their continued, structured use of language learning in older children and adolescents with T21 is inconsistent and understudied
- Limited pathway of developmentally targeted, scalable interventions to support ongoing language growth across childhood and adolescence in T21
- Family perspectives are rarely systematically integrated into intervention design and evaluation, limiting understanding of feasibility, acceptability, and real-world implementation

Technology-Assisted Language Intervention (TALI)

- New approach of incorporating AAC into SLP therapy as **language learning tool** (vs. speech generating)
- Leverages AAC technology (TouchChat HD with WordPower on iPads) to teach, model, prompt, recast, and provide feedback for language development
- Shown to improve spoken expressive and receptive language in children who are deaf/hard of hearing
- Leverages known learning strengths in T21: AAC provides visual, supported input aligned with language profiles

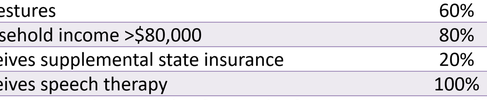
Objective

Understand the feasibility and acceptabillity of the Technology-Assisted Language Intervention for children with T21 from the family perspective through a pilot study

Methods and Therapy Approach

- Enrolled children (10 to date) with T21 ages 5-12 years
- Twenty-four week intervention of four 6-week cycles alternating across clinician-guided sessions with home-based practice (**Fig1**)

Figure 1. TALI Cycles and Evaluation Timing



Indicates timing of language samples. Assessments occur at baseline, week 12, and week 24

- Exit questionnaires were admistered to families at the end of the study (24 weeks) about their experiences
- Questions focused on
  - Their child's response to therapy
  - Was it easy to use the iPad? What were the barriers to use? Did the child face difficulties in understanding how to use it? Were there any attention or motor issues?
  - Did teacher notice any behavior or communication changes? Is child using the iPad with friends/family?
  - What surprised them about the therapy; what is the best way to support families during therapy; what would they change?
- Answers to questions were evaluated by investigative team separately and summarized in broad themes under each question
- Results are reported as direct quotes as well as a summary of responses

Characteristics	n=10
Median age at study in years (range)	7.9 (5.0-12.1)
Gender at birth, Female	50%
Race (all non-Hispanic) -	
Black/African American	10%
White	90%
Communication modalities used	
Spoken English	100%
ASL/sign language	40%
Gestures	60%
Household income >$80,000	80%
Receives supplemental state insurance	20%
Receives speech therapy	100%
Vineland Adaptive Behavior Composite Score – mean	74 (4.3)
Baseline language age equivalents in mo*	***Mean (SD) [range]***
Receptive language age**	54.5 (17) [36-77]
Expressive language age**	47.7 (22) [27-91]

**including only those with completed follow-up;*
***similar to standard scores, but overcomes floor effects*

Results – Identified Themes

Response to Therapy (is it working)

Motivated and engaged

Children were participatory and responded well to therapy

- *She responded well, she is motivated by the iPad and praise.*

Improvements in speech and sentences

Families reported gains in sentence complexity and clarity

- *It definitely helped with building speech and move to using more sentences*
- *He is speaking in more complete and complex sentences*

Ease of use with the iPad©

Broad use across settings

Used at home, in therapy, and in community activities

- *We used it at home and also helped at Scout meetings (we programmed the Scout Oath)*

Supports practice and modeling

Helped reinforce skills outside sessions

- *It was great for modeling and sentence building*

Easy to learn

Children and families quickly learned the system

- *She learned it really well and easily*

Difficulties and barriers with the iPad©

Context-dependent use

Not always used in all settings due to logistics

- *We didn't have any difficult times, we just didn't bring it if we expected barriers.*

Child-related factors

Fatigue, habits, and preferences influenced use

- *When she wants to defer to her own methods of communication/habits. Changing communication methods was hard/still is. Maybe related to trying to obtain new information.*

Emerging benefit

- *Noticed more engagement in reading, stated descriptions and clarity are improved.*

Teacher/Generalization Questions

Progress towards speech and communication goals

Families, educators reported measurable gains in targeted goals, including verbal output and clearer communication

- *She has quickly met some goals after just 3 months.*

Increased functional communication

Children were using more spoken language in everyday contexts

- *She has been verbally communicating more*

Observed improvements across settings

Caregivers, communication partners noted carryover

- *Many around him have noticed how much better he is speaking and communicating*

Results – Identified Themes

What surprised you? (Unexpected outcomes)

Reading gains

Families noted improved reading and engagement

- *I was surprised at how pairing TouchChat © also helped my daughter with her reading skills.*
- *The improved reading! And how well/quickly he has learned where the icons are.*

Language generalization

- *How well he did at repeating what he was hearing and then putting that into daily use.*
- *Good at teaching her past tense, etc.*

Supporting families during therapy

Need for structured guidance and practice

Families wanted clear, ongoing direction on how to support skills at home

- *Giving what to work on each week. Also teaching him how to use the device.*

Desire for concrete practice opportunities

Families requested examples, activities and routines to apply skills in daily life

- *Giving more examples to practice with at home. Example games or scenarios to navigate.*

Suggested improvements to therapy

High satisfaction and perceived effectiveness

Most families reported the TALI worked well with no major changes needed, highlighting strong acceptability

- *It worked well…we had a great experience*

Interest in more intensive early support

Some suggested increasing frequency early to accelerate learning and device familiarity

Summary of Findings

- **TALI was feasible for home implementation and well accepted by** families
- Families reported **high usability** and successful integration in daily routines
- Children demonstrated **strong engagement** and **improvements** in speech clarity, sentence use, and communication
- Families identified **practical barriers** (e.g., learning curve)
- Family feedback **provided clear recommendations** to improve delivery, including structured guidance and early support