Communication growth in minimally verbal children with ASD

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Novel Interventions Needed

- Few interventions specifically for minimally verbal children

- Language teaching is focus of early interventions

- Most early intervention studies focus on *preverbal* children
  - Children will talk, just not talking now
Spoken language by school entry

• Cannot currently predict with great confidence who will remain nonverbal at school age (Anderson et al, 2009; Kasari et al, 2012; Magiatı et al, 2007; Thurm et al, 2007)

• Clear that speaking with spoken language by age 5 years is critical to later optimal outcomes (Rutter & Lockyer, 1967; Venter et al, 1992)

• Paradox: children not speaking by school age often receive decreased language services not more!
Who are the minimally verbal?

- Autism heterogeneity

- As many as 25-30% minimally verbal by school age
  - Up to 50% depending on definitions (Anderson et al, 2009)

- Clear that most children are not ‘nonverbal’
  - There are some that cannot make sounds, words; we don’t know extent but likely a small percentage

- Issue that most studies exclude children who may be nonverbal
  - <35 IQ
  - <12 months
Novel Interventions partially motivated by dismal results....

- Review suggests individuals with ASD can learn to speak after age 5
  - Most between 5-7 years (none older than 13 years)
  - Most with IQs above 50
  - Clear not enough description

- Interventions that give rise to later speech development
  - Examples mostly ABA based
  - 70% of individuals increase in words; 30% increase in phrases or sentences
Induction into this area

• Preverbal children
  • Nearly 80% of children from our early intervention studies obtained spoken language by age 8-9 years (Kasari et al, 2012) (funded by NIH)

• Characterizing Cognition in Nonverbal Individuals with Autism (CCINIA, 2008-2011) (funded by Autism Speaks)

• Adaptive Interventions for Minimally verbal children with ASD in the community (AIM-ASD) (funded by NIH)
CCNIA (Kasari, UCLA; Kaiser, Vanderbilt; KKI, Landa)
Funded by Autism Speaks

- 63 minimally verbal 5 to 8 year olds with ASD
- < 20 functional words; minimum of 24 months nonverbal cognition/receptive language; 2 years of early intervention
- 6 month treatment, 2 times per week; 3 month follow up
- Therapist-child intervention, augmented with parent training at month 3.

Design considerations
- Important to offer an efficacious intervention to all children
  - Already had ‘failed’ to make good language progress
- SMART design
  - Sequential multiple assignment randomized trial (Murphy, 2005).
  - Goal is to test a ‘sequence’ of intervention and determine best sequence for different children
Summary

• Presentations at SRCD and IMFAR

• Nonverbal IQ range from 38 to 140
  • Not associated with socially communicative language changes

• Best sequence….starting with AAC + JASP-EMT from beginning
  • Language sample data at 4 timepoints
  • Non-AAC group catches up at time 4 (slower pace)

• Session data (taped sessions monthly)
  • Significant increase of 4+ matched conversational turns over time with AAC group still outperforming initially
Summary

• Suggests that access to communication is critical.

• An AAC device can be instrumental, but only in the context of an intervention where children learn to communicate with others, using the device.

• These pilot data led directly to our ACE proposal.

• Note: Few children have access to AAC speech generating devices in school settings (PECS most common AAC).

• Prompted our ACE to offer an AAC in both intervention arms.
Adaptive Intervention for Minimally Verbal Children with ASD (AIM-ASD)

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Ann Kaiser, PhD

Tristram Smith, PhD

Catherine Lord, PhD

Daniel Almirall, PhD

Susan Murphy, PhD
Study Aims

• Goal: Construct an adaptive intervention (individualized treatment protocol adjusted based on child’s response to initial treatment)

  • Primary Aim: To determine which intervention (JASP-EMT vs. CORE-DTT) produces greater increases in socially communicative utterances (SCU-primary outcome)

  • Secondary Aim 1: To determine whether adding a parent training component provides additional benefit for early responders.

  • Secondary Aim 2: Compare and contrast four pre-specified adaptive interventions in terms of primary and secondary outcomes.

  • Tertiary Aim 3: Identify moderators (e.g., parent buy into parent training)
Study Design

Participant Details:
• 48 children per site (total=192 children)
• Ages 5 to 8 years
• Minimally verbal, fewer than 20 words
• 18 months nonverbal cognitive age

Intervention Details:
• CORE-DTT versus JASP-EMT
• 4 months tx; 4 months follow up
• Daily contact in the community (schools)
DTT vs. JASP-EMT

DTT: Adult directed discrete trials

JASP-EMT: Play based
Screening & Entry Assessments (1 week) → Phase 1 Treatment (6 weeks/1.5 months) → Early Response (1 week to assess & decide) → Phase 2 Treatment (10 weeks/2.5 months) → Follow-Up Phase (16 weeks/4 months)

Screening Assessments, Randomize to Phase 1 TX

- Phase 1: CORE-DTT
  - Early Response Assessments
  - Re-Randomize CORE-DTT Early Responders
  - Re-Randomize CORE-DTT Early Slow-Responders

- Phase 1: JASP-EMT
  - Early Response Assessments
  - Re-Randomize JASP-EMT Early Responders
  - Re-Randomize JASP-EMT Early Slow-Responders

Phase 2:
- Rescue Protocol
- Continue CORE-DTT
- Continue CORE-DTT + Parent Training
- Continue JASP-EMT
- Continue JASP-EMT + Parent Training

Exit Assessments → Monthly Follow-Ups (3) → Final Follow-Up
AIM-ASD Design Overview

SMART Design

Screening & Entry Assessments (1 week)

Phase 1 Treatment (6 weeks/1.5 months)

Early Response (1 week to assess & decide)

Phase 2 Treatment (10 weeks/2.5 months)

Follow-Up Phase (16 weeks/4 months)

Screening Assessments
Entry Assessments, Randomize to Phase 1 TX

Phase 1: CORE-DTT
Early Response Assessments
Re-Randomize CORE-DTT Early Responders
Phase 2: Rescue Protocol
Re-Randomize CORE-DTT Slow-Responders
Phase 2: Continue CORE-DTT

Phase 1: JASP-EMT
Early Response Assessments
Re-Randomize JASP-EMT Early Responders
Phase 2: Rescue Protocol
Re-Randomize JASP-EMT Early Slow-Responders
Phase 2: Continue JASP-EMT

Phase 2: Continue JASP-EMT + Parent Training
Phase 2: CORE-DTT + Parent Training

Exit Assessments
Monthly Follow-Ups (3)
Final Follow-Up

Phase 2: JASP-EMT + Parent Training
Phase 2: Continue JASP-EMT
Phase 2: Rescue Protocol
Screening & Entry Assessments (1 week) → Phase 1 Treatment (6 weeks/1.5 months) → Early Response (1 week to assess & decide) → Phase 2 Treatment (10 weeks/2.5 months) → Follow-Up Phase (16 weeks/4 months).

**Phase 1:**
- CORE-DTT
- Early Response Assessments
- Re-Randomize CORE-DTT Early Responders
- Re-Randomize JASP-EMT Early Responders

**Phase 2:**
- Rescue Protocol
- Continue CORE-DTT
- Continue CORE-DTT + Parent Training
- JASP-EMT + Parent Training
- Continue JASP-EMT
- Rescue Protocol

**Follow-Up Phase:**
- Exit Assessments
- Monthly Follow-Ups (3)
- Final Follow-Up

Screening Assessments, Randomize to Phase 1 TX
AIM-ASD Design Overview

SMART Design

Screening & Entry Assessments (1 week) → Phase 1 Treatment (6 weeks/1.5 months) → Early Response (1 week to assess & decide) → Phase 2 Treatment (10 weeks/2.5 months) → Follow-Up Phase (16 weeks/4 months)

Phase 1: CORE-DTT
- Early Response Assessments
  - Re-Randomize CORE-DTT Early Responders
  - Phase 2: Rescue Protocol
  - Phase 2: Continue CORE-DTT

Phase 1: JASP-EMT
- Early Response Assessments
  - Re-Randomize JASP-EMT Early Responders
  - Phase 2: Rescue Protocol
  - Phase 2: JASP-EMT + Parent Training

Phase 2: CORE-DTT
- Early Slow-Responders
  - Re-Randomize CORE-DTT Early Slow-Responders
  - Phase 2: Continue CORE-DTT + Parent Training

Phase 2: JASP-EMT
- Early Responders
  - Re-Randomize JASP-EMT Early Responders
  - Phase 2: Continue JASP-EMT

Follow-Up Phase
- Exit Assessments
  - Monthly Follow-Ups (3)
  - Final Follow-Up

Screening Assessments
- Entry Assessments, Randomize to Phase 1 TX

Phase 1 Treatment (6 weeks/1.5 months)
- Early Response (1 week to assess & decide)

Phase 2 Treatment (10 weeks/2.5 months)
- Follow-Up Phase (16 weeks/4 months)

AIM-ASD Design Overview

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- Early Response Assessments
  - Re-Randomize CORE-DTT Early Responders
  - Phase 2: Rescue Protocol
  - Phase 2: Continue CORE-DTT

Phase 1: JASP-EMT
- Early Response Assessments
  - Re-Randomize JASP-EMT Early Responders
  - Phase 2: Rescue Protocol
  - Phase 2: JASP-EMT + Parent Training

Phase 2: CORE-DTT
- Early Slow-Responders
  - Re-Randomize CORE-DTT Early Slow-Responders
  - Phase 2: Continue CORE-DTT + Parent Training

Phase 2: JASP-EMT
- Early Responders
  - Re-Randomize JASP-EMT Early Responders
  - Phase 2: Continue JASP-EMT

Follow-Up Phase
- Exit Assessments
  - Monthly Follow-Ups (3)
  - Final Follow-Up

Screening Assessments
- Entry Assessments, Randomize to Phase 1 TX

Phase 1 Treatment (6 weeks/1.5 months)
- Early Response (1 week to assess & decide)

Phase 2 Treatment (10 weeks/2.5 months)
- Follow-Up Phase (16 weeks/4 months)
AIM-ASD Design Overview

**SMART Design**

**Screening & Entry Assessments** (1 week)

**Phase 1 Treatment** (6 weeks/1.5 months)

**Early Response** (1 week to assess & decide)

**Phase 2 Treatment** (10 weeks/2.5 months)

**Follow-Up Phase** (16 weeks/4 months)

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**Phase 1:**
- **CORE-DTT**
- **JASP-EMT**

**Early Response Assessments**

- Re-Randomize CORE-DTT Early Responders
- Re-Randomize JASP-EMT Early Responders

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**Phase 2:**
- **Rescue Protocol**
- **CORE-DTT**
- **CORE-DTT + Parent Training**
- **JASP-EMT**
- **JASP-EMT + Parent Training**
- **Continue JASP-EMT**

**Exit Assessments**

- **Monthly Follow-Ups (3)**
- **Final Follow-Up**

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**Exit Assessments**

- **Monthly Follow-Ups (3)**
- **Final Follow-Up**
AIM-ASD Design Overview

SMART Design

Screening & Entry Assessments (1 week) → Phase 1 Treatment (6 weeks/1.5 months) → Early Response (1 week to assess & decide) → Phase 2 Treatment (10 weeks/2.5 months) → Follow-Up Phase (16 weeks/4 months)

Phase 1: CORE-DTT → Early Response Assessments → Re-Randomize CORE-DTT Slow-Responders → Phase 2: Rescue Protocol

Phase 1: CORE-DTT → Early Response Assessments → Re-Randomize CORE-DTT Early Responders → Phase 2: CORE-DTT

Phase 1: JASP-EMT → Early Response Assessments → Re-Randomize JASP-EMT Early Responders → Phase 2: Continue CORE-DTT

Phase 1: JASP-EMT → Early Response Assessments → Re-Randomize JASP-EMT Early Slow-Responders → Phase 2: Rescue Protocol

Phase 2: CORE-DTT → Early Responders → Re-Randomize CORE-DTT Early Responders → Phase 2: CORE-DTT

Phase 2: JASP-EMT → Parent Training → Early Responders → Re-Randomize JASP-EMT Early Responders → Phase 2: Continue JASP-EMT

Exit Assessments → Monthly Follow-Ups (3) → Final Follow-Up

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AIM-ASD Design Overview

SMART Design

Screening & Entry Assessments (1 week)

Phase 1 Treatment (6 weeks/1.5 months)

Early Response (1 week to assess & decide)

Phase 2 Treatment (10 weeks/2.5 months)

Follow-Up Phase (16 weeks/4 months)

Screening Assessments

Entry Assessments, Randomize to Phase 1 TX

Phase 1: CORE-DTT

Early Response Assessments

Re-Randomize CORE-DTT Early Responders

Re-Randomize CORE-DTT Slow Responders

Phase 2: Rescue Protocol

Exit Assessments

Monthly Follow-Ups (3)

Final Follow-Up

Phase 1: JASP-EMT

Early Response Assessments

Re-Randomize JASP-EMT Early Responders

Re-Randomize JASP-EMT Early Slow Responders

Phase 2: Rescue Protocol

Phase 2: JASP-EMT + Parent Training

Phase 2: CORE-DTT + Parent Training

Phase 2: CORE-DTT

Phase 2: JASP-EMT

Phase 2: Continue CORE-DTT

Phase 2: Continue JASP-EMT

Phase 2: Rescue Protocol
Screening & Entry Assessments (1 week)

Phase 1 Treatment (6 weeks/1.5 months)

Early Response (1 week to assess & decide)

Phase 2 Treatment (10 weeks/2.5 months)

Follow-Up Phase (16 weeks/4 months)

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**Smart Design**

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**AIM-ASD Design Overview**

**Phase 1:**
- CORE-DTT
- Early Response Assessments

**Phase 2:**
- Rescue Protocol
- CORE-DTT
- CORE-DTT + Parent Training
- JASP-EMT
- JASP-EMT + Parent Training

**Follow-Up Phase:**
- Exit Assessments
- Monthly Follow-Ups (3)
- Final Follow-Up

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Screening Assessments

Entry Assessments, Randomize to Phase 1 TX

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Phase 1: CORE-DTT

Early Response Assessments

Re-Randomize CORE-DTT Early Responders

Re-Randomize CORE-DTT Slow-Responders

Phase 2: Rescue Protocol

Phase 2: CORE-DTT

Phase 2: CORE-DTT + Parent Training

Phase 2: JASP-EMT + Parent Training

Phase 2: Continue CORE-DTT

Phase 2: Continue JASP-EMT

Phase 2: Continue JASP-EMT

Phase 2: Rescue Protocol

Re-Randomize JASP-EMT Early Responders

Re-Randomize JASP-EMT Early Slow-Responders

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Expected Outcomes

- Sequence of treatment will be superior
- Some children will benefit more than others to a particular sequence
- Characteristics of children who are slow responders will become more clear

- Ultimate goal is to predict an effective sequence of interventions that personalizes intervention based on child response
Acknowledgements

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