Motor-Based Problem Solving in Physical Therapy for Infants:
A Synthesis of 2 NICHD Funded Clinical Trials

Stacey C. Dusing , PT, PhD, FAPTA

Sykes Family Chair of Pediatric Physical Therapy, Health, and Development

Professor

USC Division of Biokinesiology and Physical Therapy

University of Southern California

Outline

- Developmental Cascade Theory and Motor-Based Problem-Solving
- Supporting Play Exploration and Early Development Intervention (SPEEDI) → Does the timing of intervention matter?
- The SIT-PT Project: A Dose Matched Comparison on MORE-PT and START-Play → Do the key principle of intervention impact outcomes?
- Implications for research and practice
- Questions
- Introduction of Kylie for a parent's perspective

Motor Development Lab

Developmental Cascades

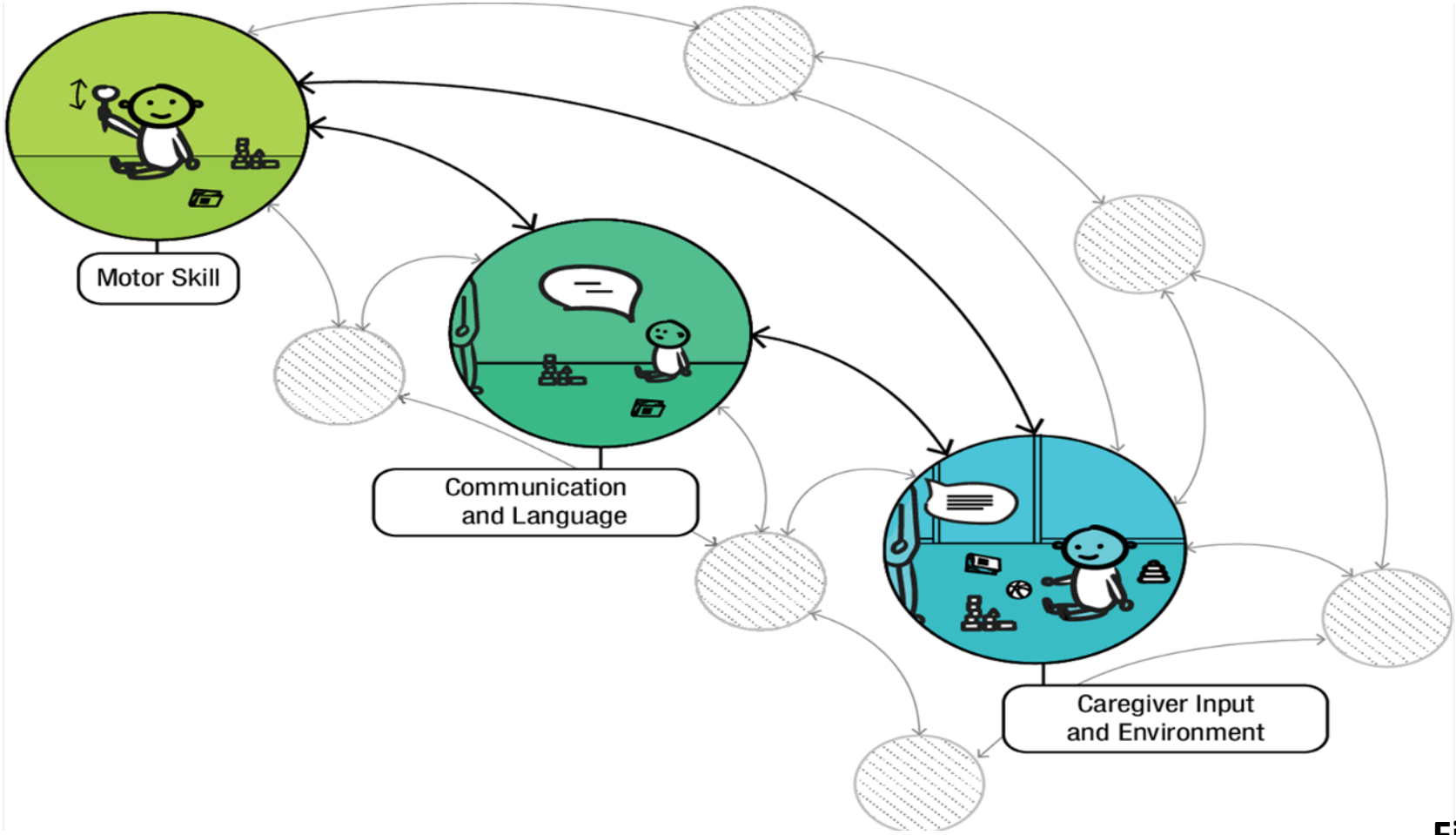


Figure from Iverson, 2021

Motor Development Lab

Motor-Based Problem Solving

SPEED!

Does Timing Matter? Efficacy of Parent Provided, Therapist Supported, Motor and Cognitive Intervention for Infants Born Very Preterm in the First Months of Life

A Multi-Site Clinical Trial

VCU

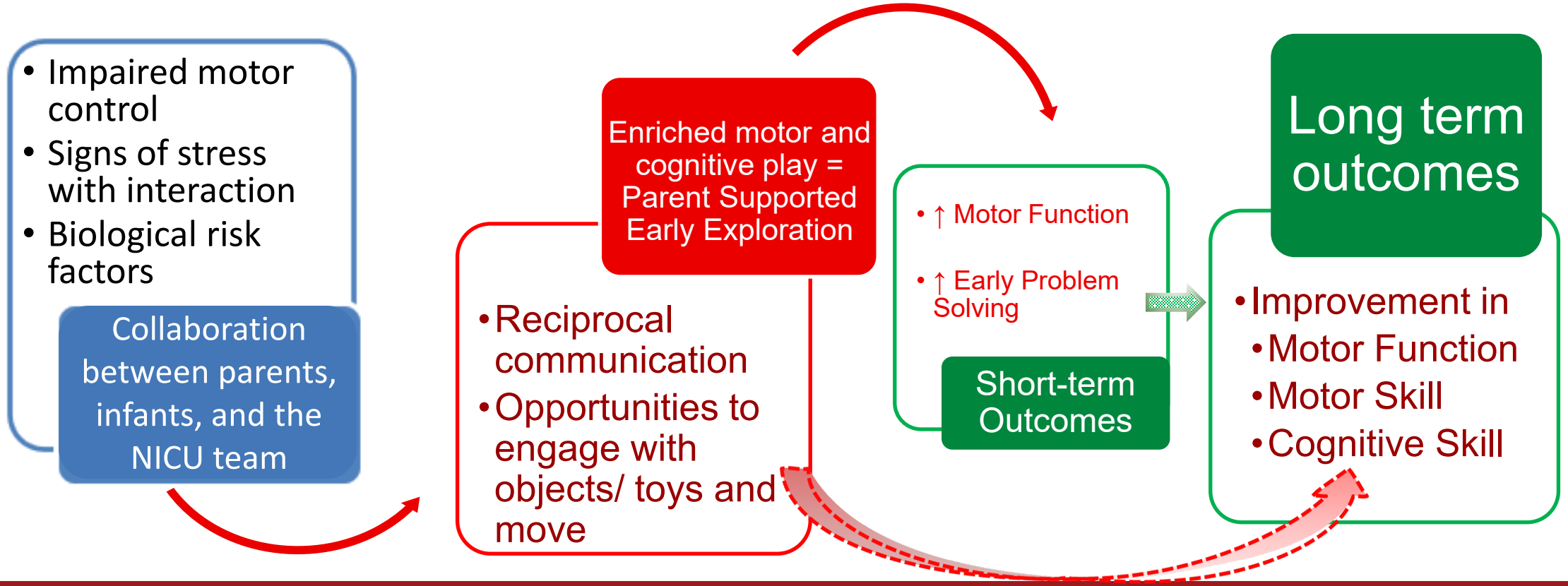
University of Virginia

USC Division of Biokinesiology and Physical Therapy

University of Southern California

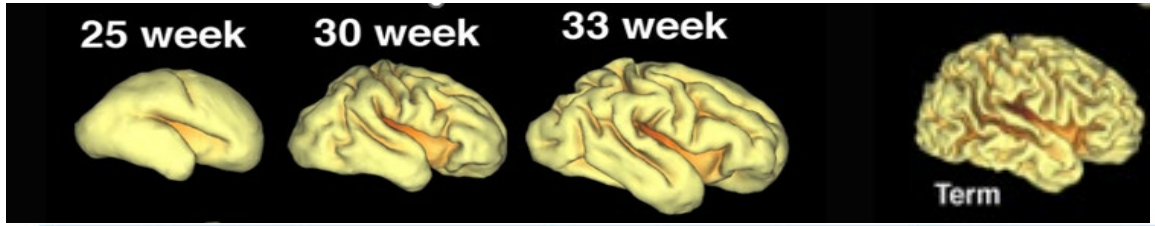
Motor Development Lab

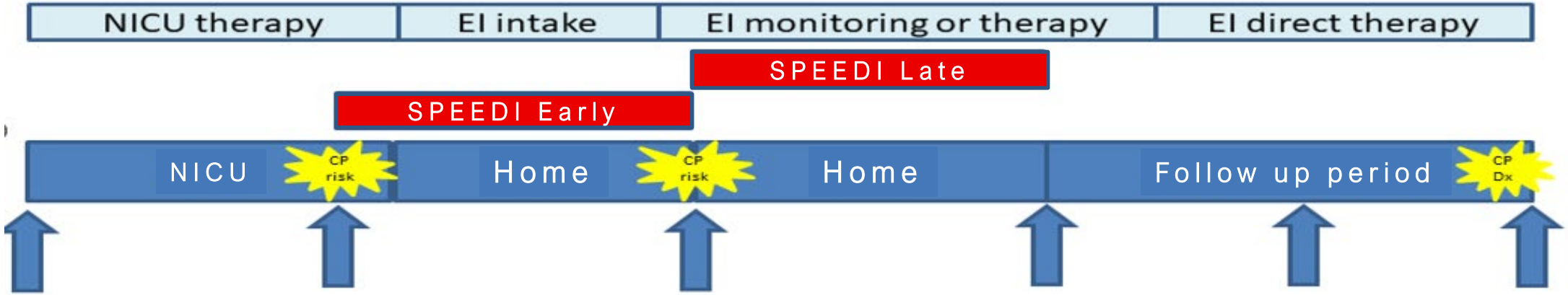
Supporting Play Exploration and Early Development Intervention (SPEEDI)



Motor Development Lab

Study Design – 3 Arm RCT





Very Preterm Birth <32 weeks

Baseline 35-42 weeks gestation

Visit 2 15 weeks post baseline

Visit 3 30 weeks post baseline

Visit 4 12 months post baseline

Visit 5 24 months of age

Demographics: 83 infants

	Usual Care (n=27)	SPEEDI_Early (n=27)	SPEEDI_Late (n=29)
Gestational Age (wks), Mean(SD)	26.56 (1.42)	26.89 (2.03)	26.07 (2.36)
Female %	13 (48.1)	15 (55.6)	17 (58.6)
High-Risk of disability%	17 (63.0)	18 (66.7)	19 (65.5)
Dx with CP at 24 months	1	3	5

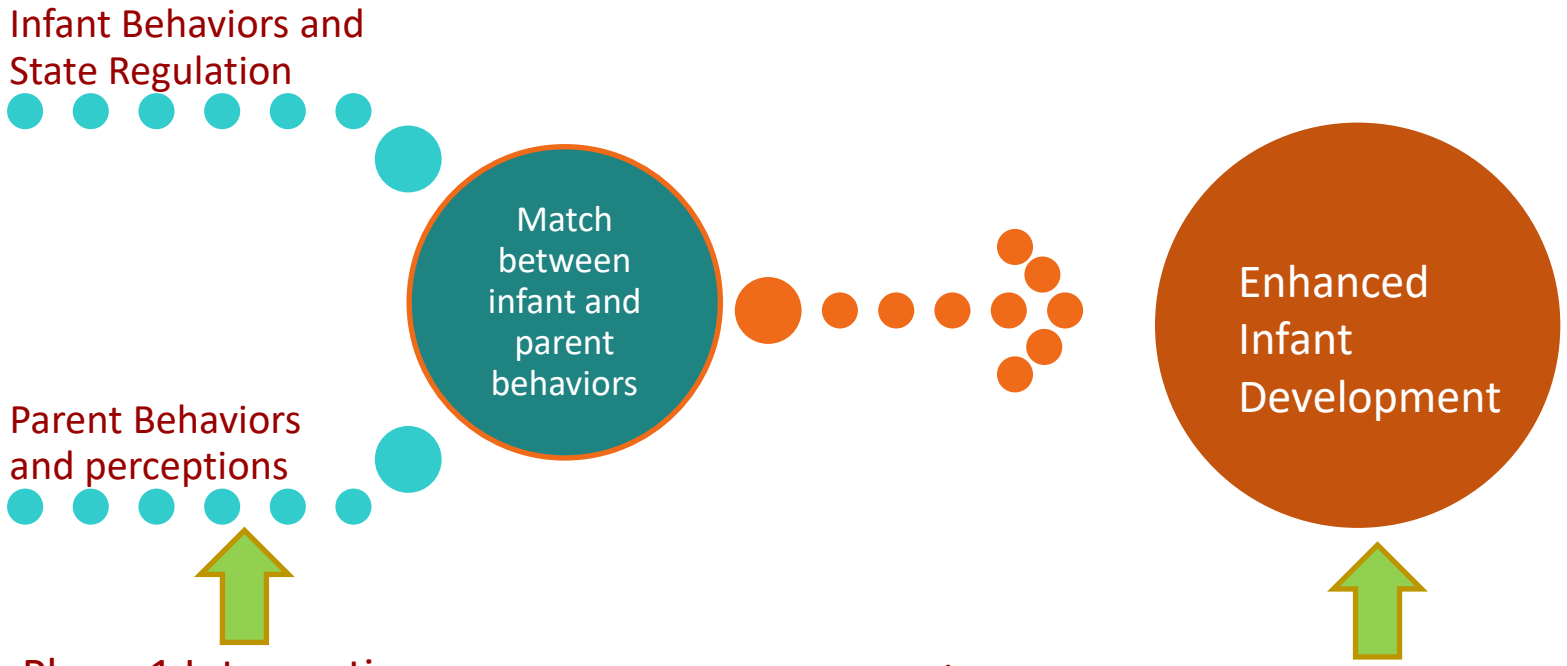
Motor Development Lab

Key Principles through Guided Participation

Learning activities: during feeding, holding, and early play

Supporting Parent: help caregivers identify meaning in the infant's behavior and make adjustments that support infant development.

SPEEDI Intervention Group



Phase 1 Intervention:
Parent and infant learn to match behaviors for successful interactions
5 visit over 21 day

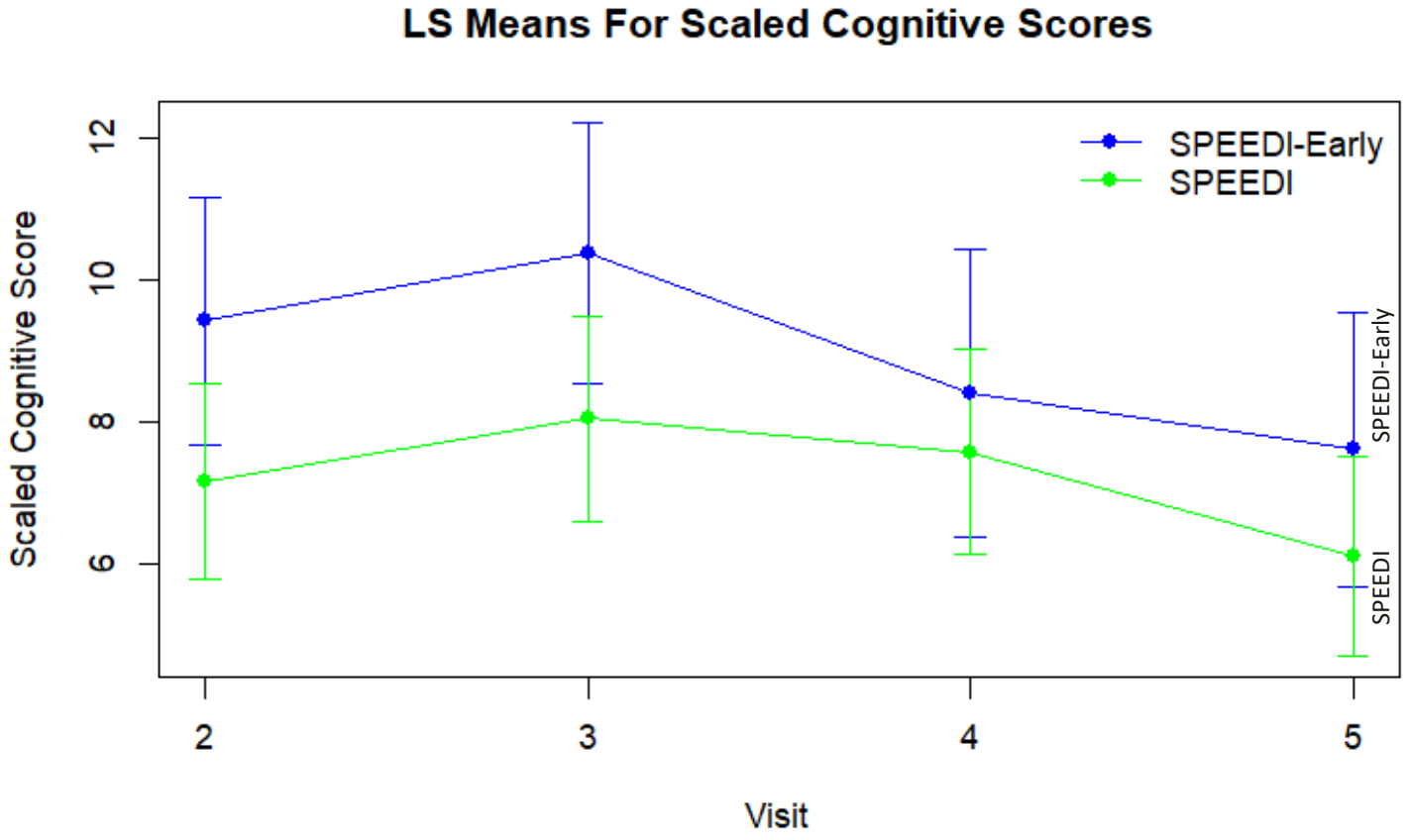
Phase 2 Intervention:
Parent provides enriched opportunities that support motor and cognitive development
5 visit over 12 weeks, with 20 min/day parent provided

Outcomes

- Gross Motor and Cognitive outcomes on the Bayley scale of infants and toddler development.

- Emotional Availability Scale: Measure of parent infant interaction during a 5 minute free play session.

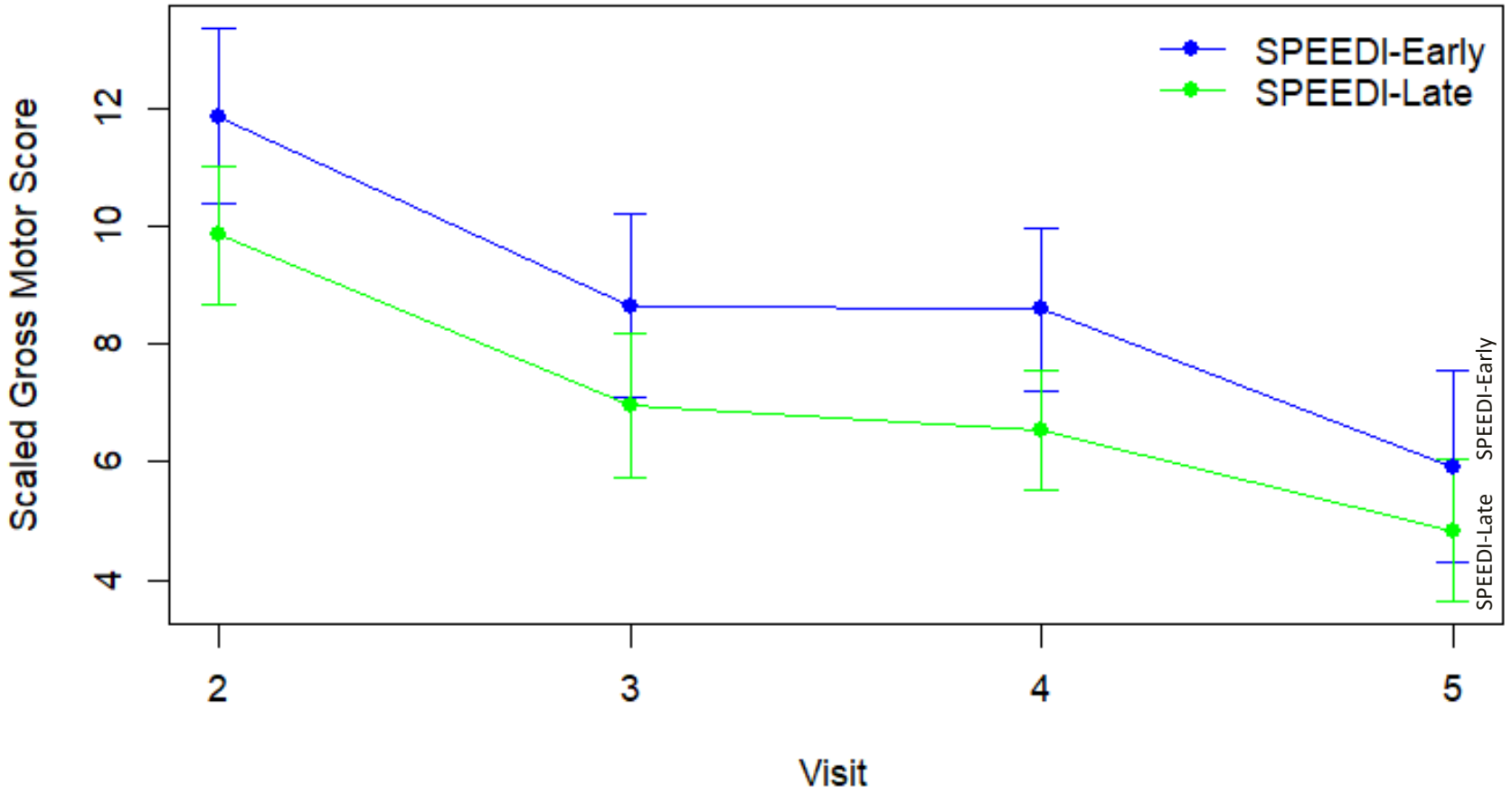
Mixed Linear Model of Change in Bayley Cognitive Scales



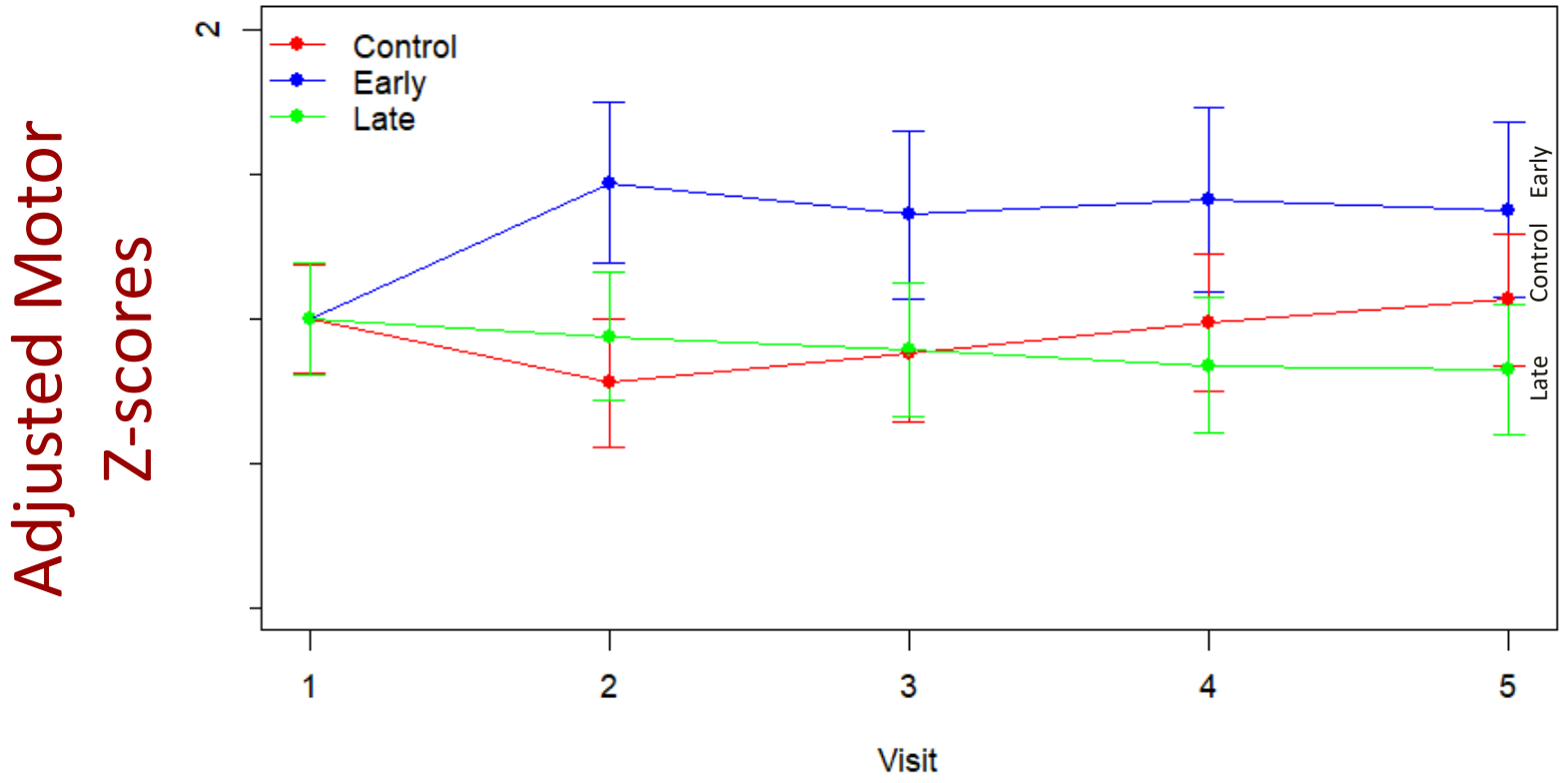
- Group ($F_{1,33.273} = 5.66$,
- p-value = 0.0233
- Visit effect ($F_{3,77.707} = 3.45$, p-value = 0.0206)

MLM Bayley Gross Motor Scales of Development

Group effect
$F_{1,28.033} = 7.53$,
p-value = 0.01
Visit effect
$F_{3,98.719} = 29.56$,
p-value < 0.000



MLM Gross Motor Skills Controlling for Baseline



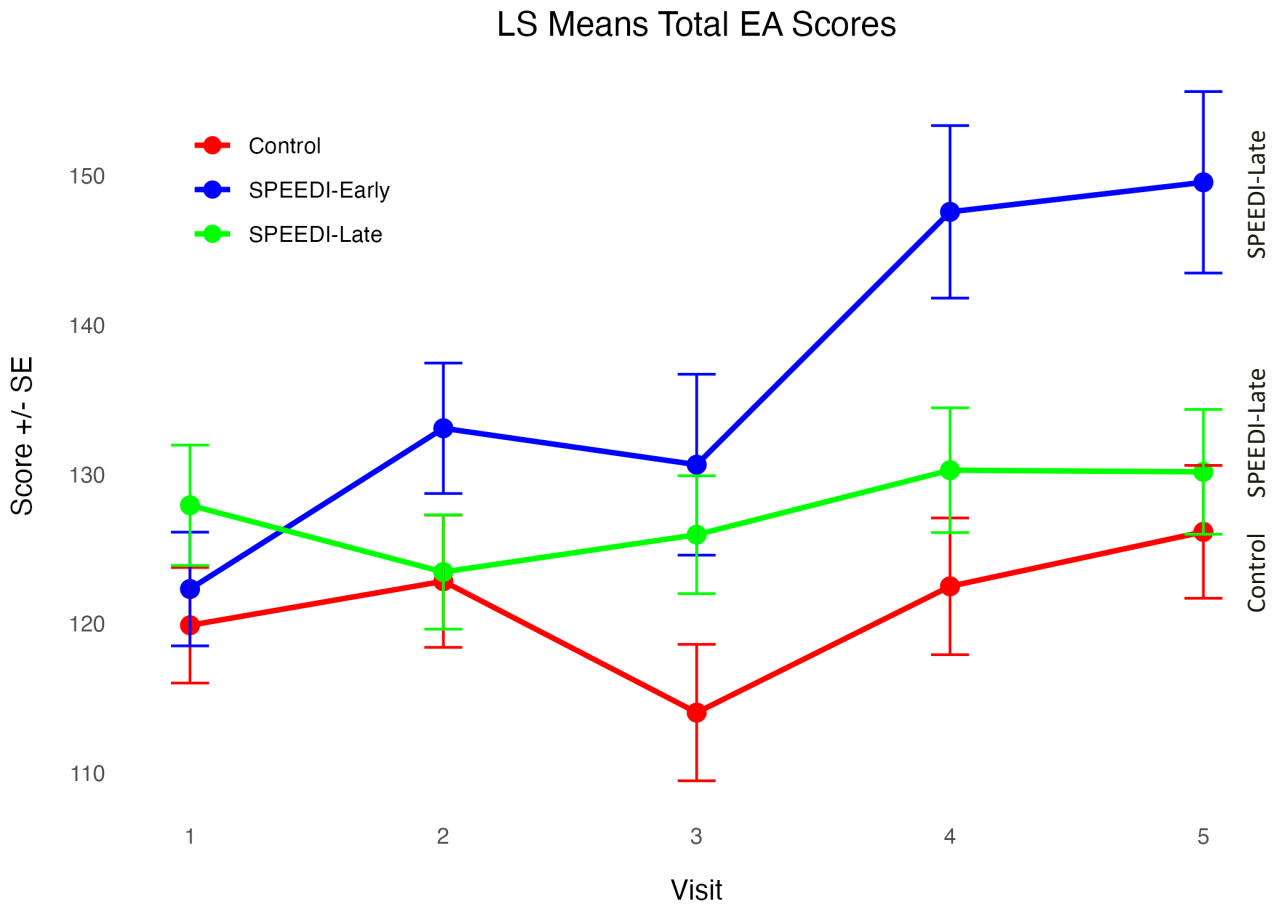
Group effect p-value = 0.006

Visit effect p-value = 0.87

Motor Development Lab

MLM Change in Emotional Availability

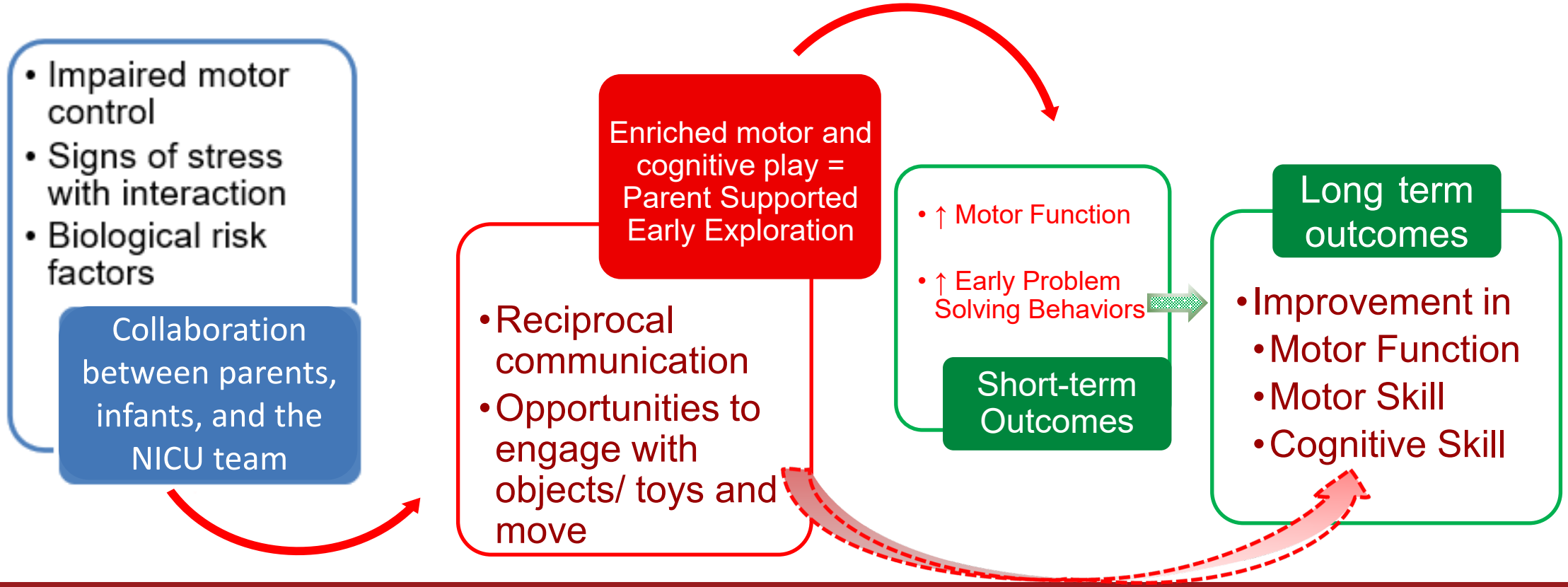
Group by Visit interaction p-value = 0.009



SPEEDI_Early may result in ongoing improvements in EA even after intervention

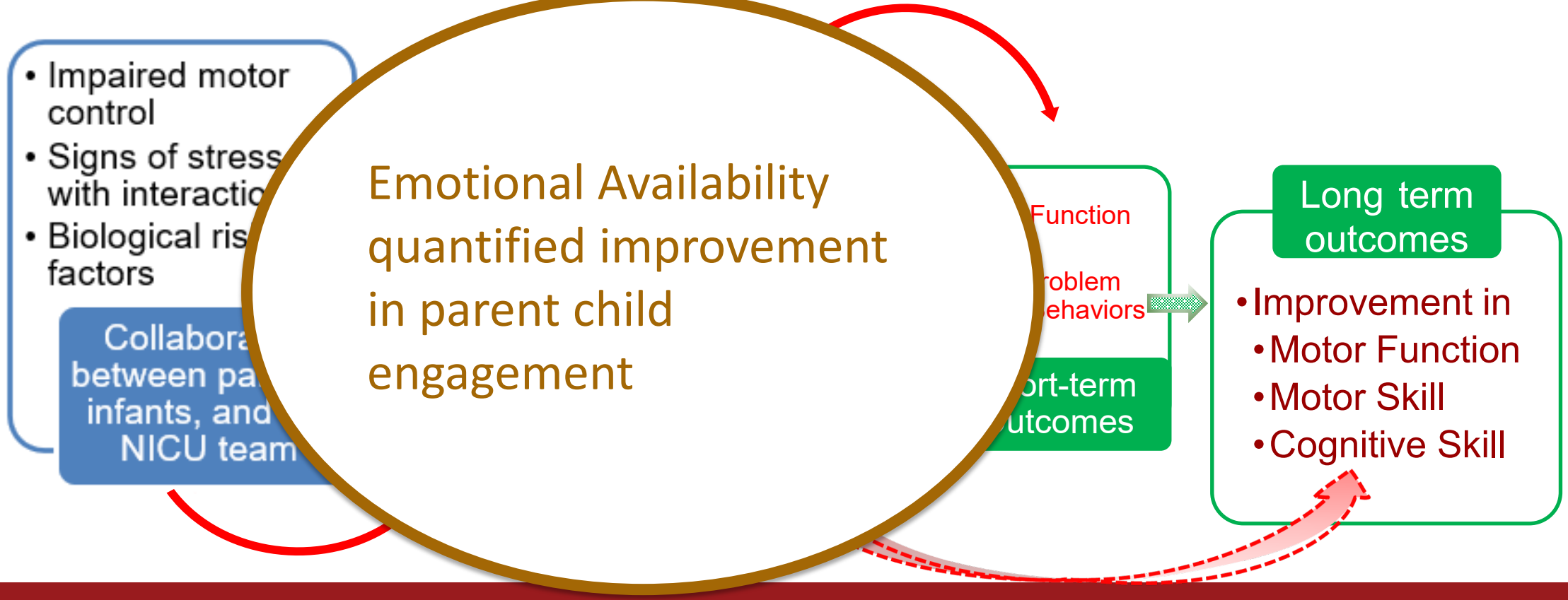
Motor Development Lab

Supporting Play Exploration and Early Development Intervention (SPEEDI)



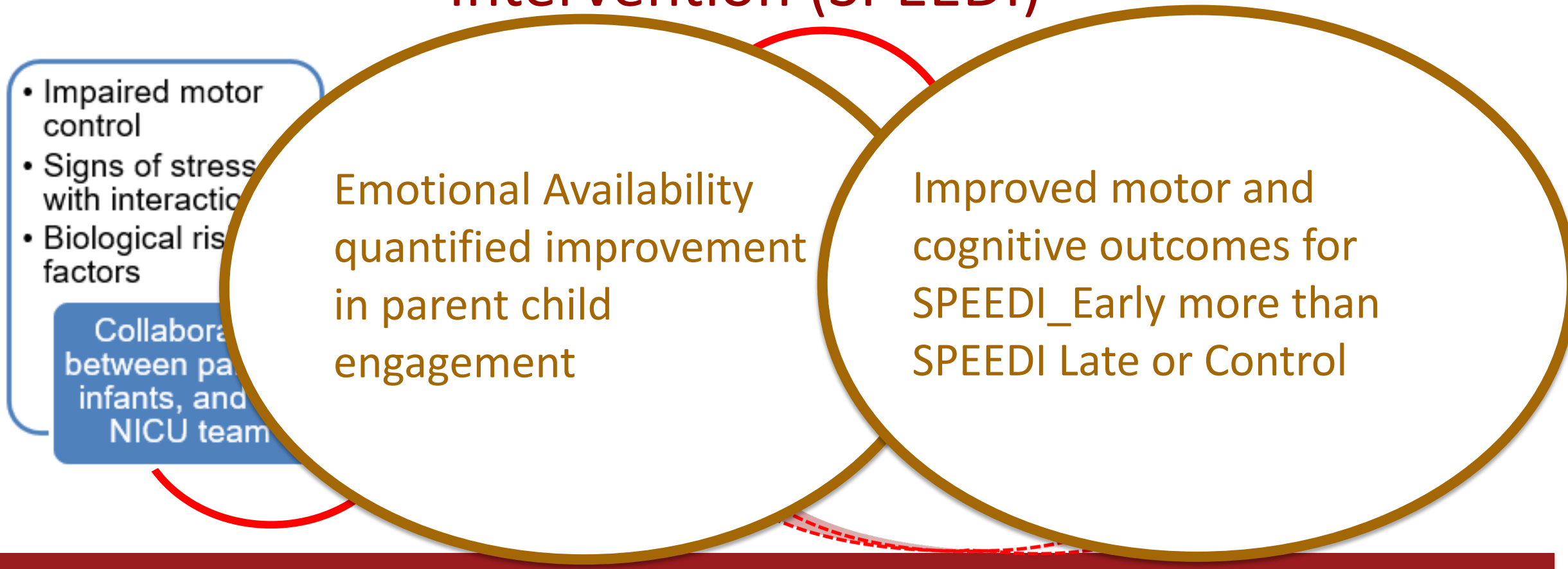
Motor Development Lab

Supporting Play Exploration and Early Development Intervention (SPEEDI)



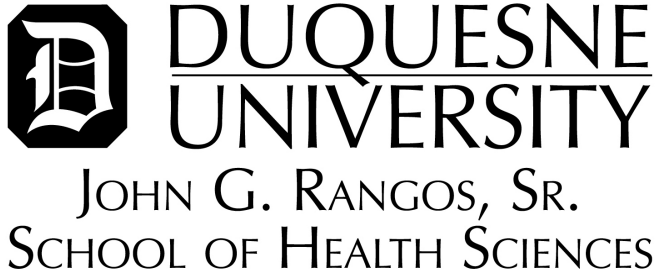
Motor Development Lab

Supporting Play Exploration and Early Development Intervention (SPEEDI)



The SIT-PT Project: A Dose Matched Comparison on MORE-PT and START-Play

USC Division of Biokinesiology and Physical Therapy



Principal Investigators

Stacey C. Dusing, University of Southern California
Regina (Reggie) Harbourne, Duquesne University

Co-Investigators

Douglas Vanderbilt, University of Southern California and Children Hospital of Los Angeles
Barbara Sargent and Kari Kretch, University of Southern California
Sarah (Sally) Westcott McCoy and Lin-Ya Hsu, University of Washington
Sandra Willet and Andrea Cucha University of Nebraska Medical Center
Natalie Koziol and Lorrey Wheeler, University of Nebraska, Lincoln

USC Division of Biokinesiology
and Physical Therapy

MORE-PT

START-Play
Sitting Together & Reaching to Play

- Movement, Orientation, Repetition, and Exercise – PT
  - Alignment, strength training
  - Repetition of movement
  - Motor skills focused
- Teach caregivers

- Sitting Together And Reaching to Play
  - Play based and child lead
  - Motor based problem solving
  - Motivation to move through play
  - Brainstorm with caregiver

- **24 visits 12 weeks, 2 times per week, Continued usual services**
- **Provided by a PT with parent presence and engagement**
- **Same outcomes every 3 months for 1 year**

USC Division of Biokinesiology and Physical Therapy

Comparison of Interventions

MORE-PT

START-Play
Sitting Together & Reaching to Play

SIT-PT Project

MORE-PT

- Movement, Orientation, Repetition, and Exercise – PT
- 24 visits
  - 12 weeks, 2 times per week
- Continued usual services

START-Play

Sitting Together & Reaching to Play

- Sitting Together And Reaching to Play
- 24 visits
  - 12 weeks, 2 times per week
- Continued usual services

Sample: 94 children

MORE-PT

- 15.6 months at enrollment
- 61% female
- 67% mild involvement
- 71% bilateral
- 40% reported Dx of Cerebral Palsy
- Mean HINE score 44.4 (range 22-66)

START-Play

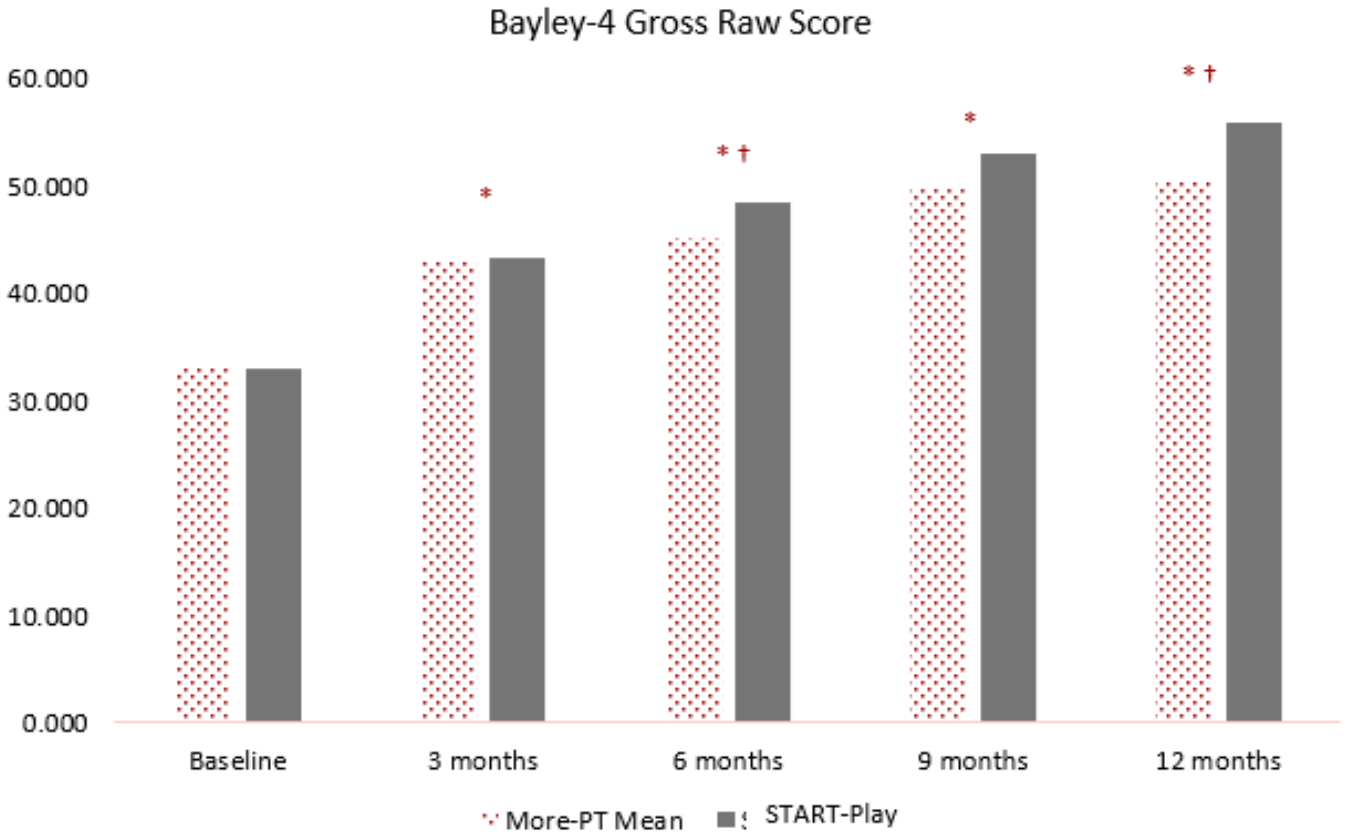
- 13.1 months at enrollment
- 52% female
- 68% mild involvement
- 71% bilateral involvement
- 49% reported Dx of Cerebral Palsy
- Mean HINE Score 45.1 (range 14-63)

Motor Development Lab

Current Timeline

Comparisons of each outcome by time

Preliminary Analysis - Gross Motor Favor START-



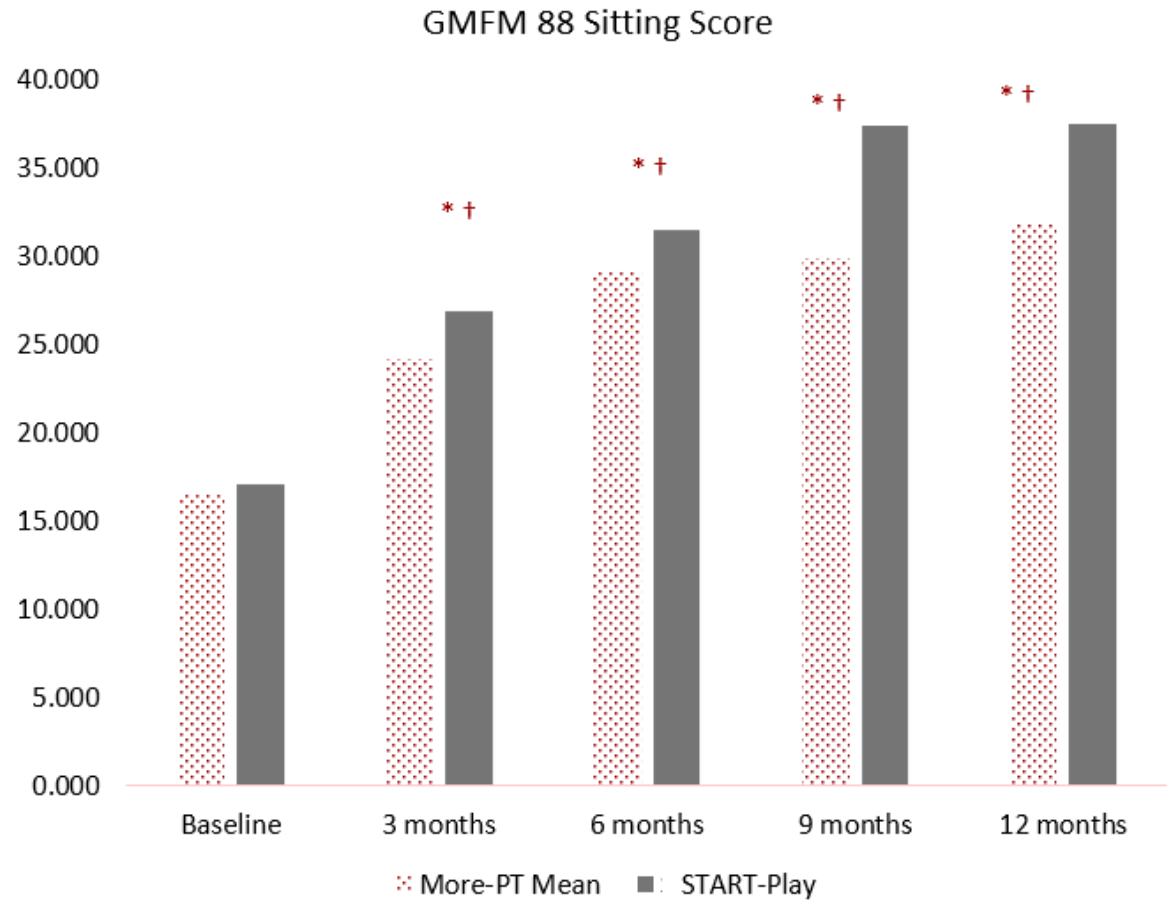
* SIT-PT significantly different from baseline

† d of a larger magnitude than More-PT

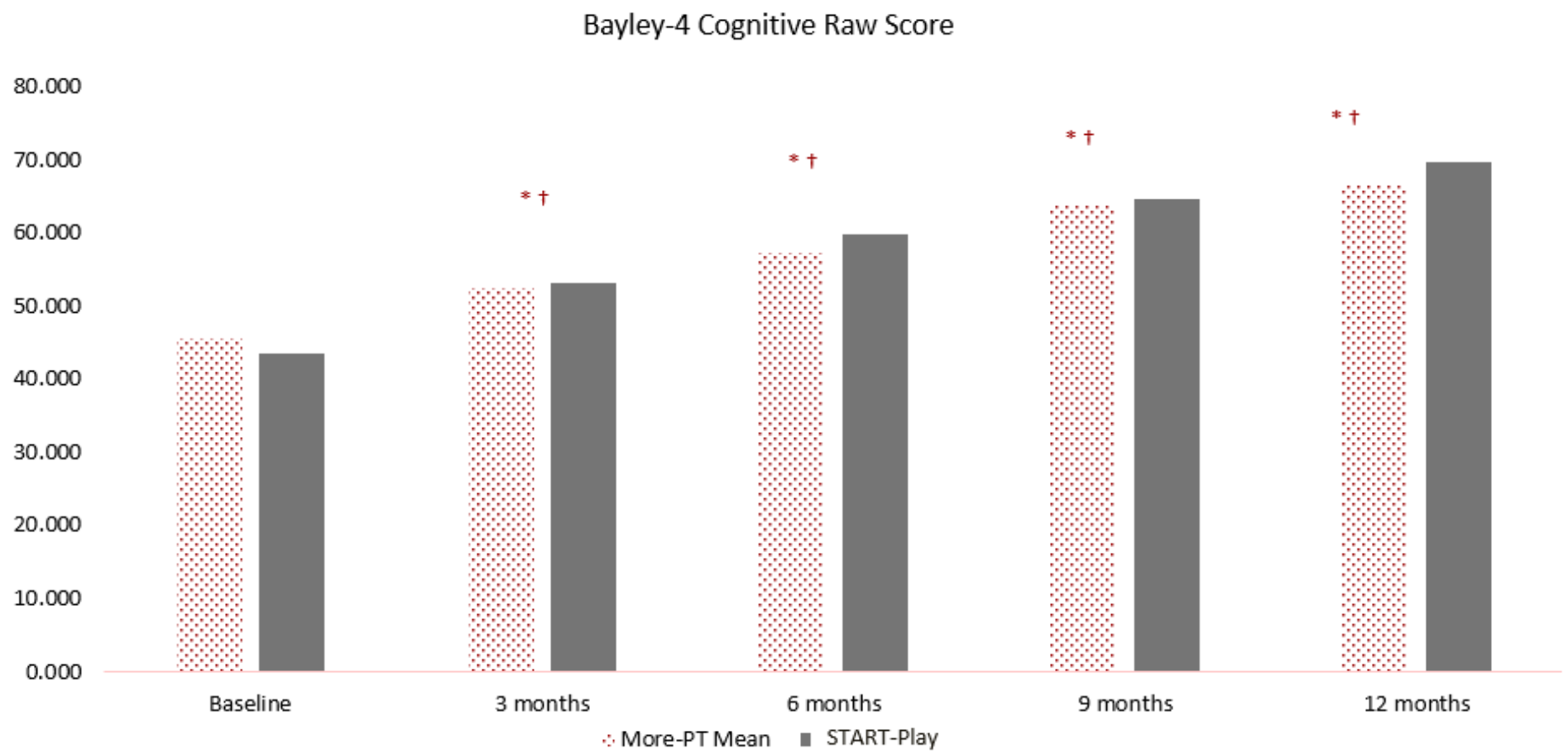
Preliminary Analysis - Gross Motor Favor START-Play

* SIT-PT significantly different from baseline

† d of a larger magnitude than More-PT



Preliminary Analysis



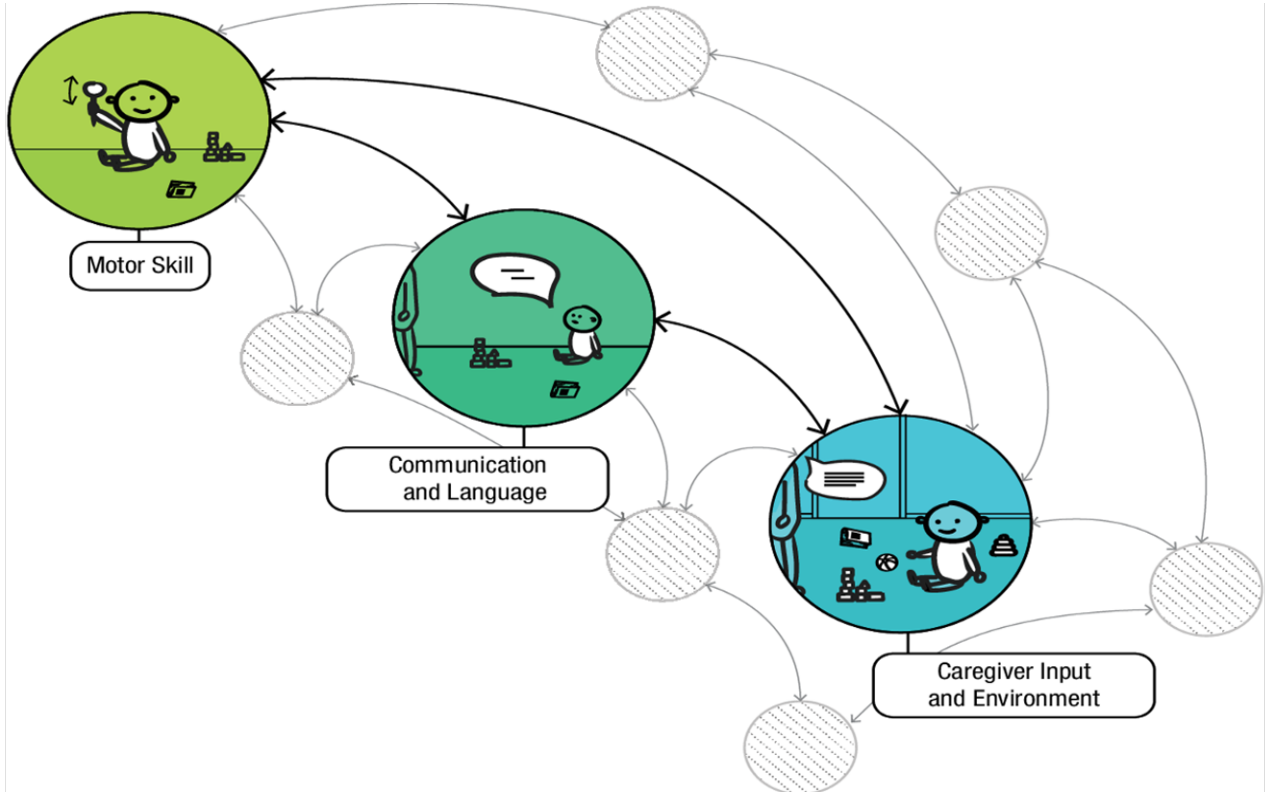
What does this look like in a 12-24 month old

Baseline

3 months post intervention

Considerations for Practice

- The key principles of the intervention NOT Just DOSE impacts the efficacy!
- Limit focus on motor skills results in less improvement in motor and cognitive outcomes
- Earlier in better, delaying dyadic intervention 12-15 weeks reduced efficacy
- Must train the next generation of researchers and clinicians in in disciplinary / multi domain intervention and assessment



- Must train the next generation of researchers and clinicians in interdisciplinary / multi domain intervention and assessment

Roadmap to Enhancing Child Outcomes

Three critical stages that transform ideas into actionable project plans

Early Identification and Intervention

Initiation of low resource high value interventions

Do NOT wait and see - empower caregivers

Educate Providers and Researchers on Developmental Cascade framework

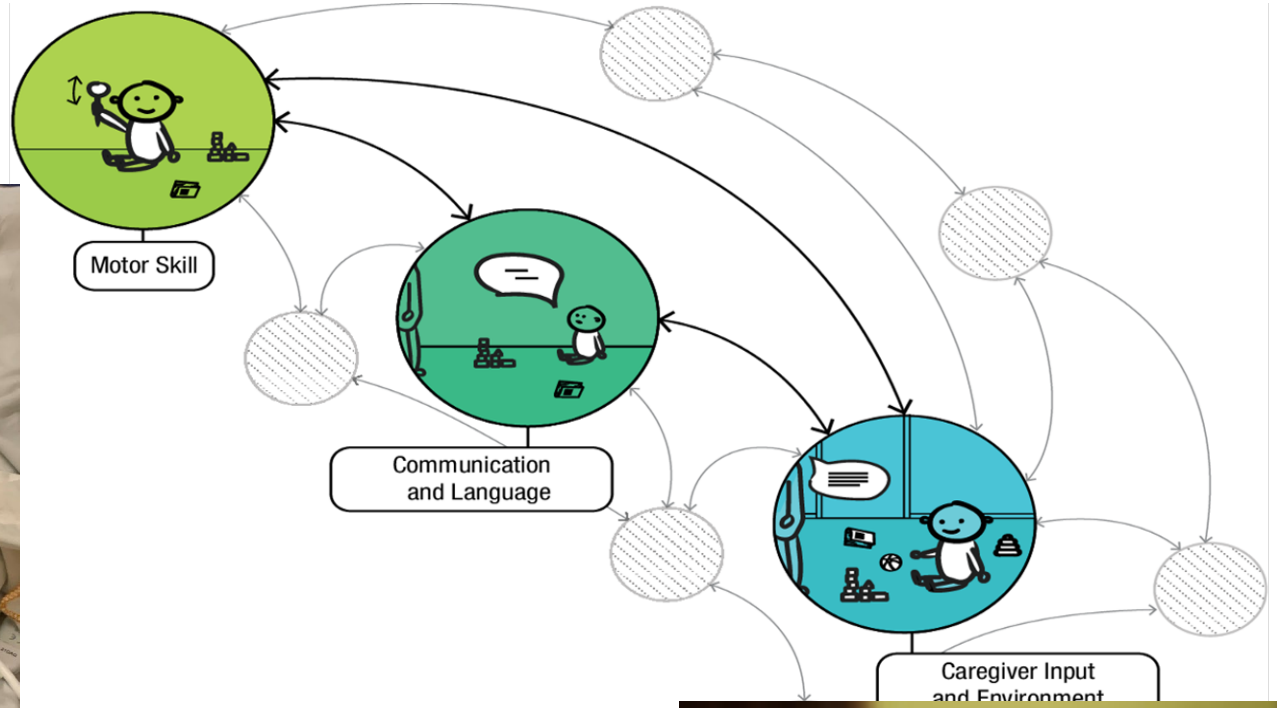
Interdisciplinary training in research and practice

Assessment across domains

Implement Motor based problem solving interventions

De-implement interventions lacking evidence

Promote stakeholder engagement in the implementation of evidence informed interventions


Motor Skill
Communication and Language
Caregiver Input and Environment

Thank You!

Contact information

Stacey Dusing, PT, PhD

Stacey.dusing@pt.usc.edu

323-442-1022

Motor Development Lab

https://sites.usc.edu/mdl/

@motordevlab

Questions

Motor Development Lab

Meet Kylie

Motor Development Lab

Participant Perspective

- Please tell us a little bit about your family about your child's development.
- How has being in this study impacted your family
  - Do you think your child benefited?
  - Would you participate in research again?
  - Anything else you would like to share with
    - Other families?
    - Researchers ?
    - Clinicians?
    - Policy makers?