Executive Function and Play: Assessment in Natural Environments

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AGENDA

1. Review components of executive function (EF)

2. Current EF assessments

3. Presenting a model of play assessment: Project Play

4. Project Play: Research

5. Video examples from Project Play

6. Secondary Analysis: EF Components in Project Play

7. Conclusions/Future Directions

NEUROCOGNITIVE PROCESSES

Self Regulation / Emotional Regulation

Inhibition

Working Memory

Attention

Cognitive Flexibility

Planning and Organization

Executive Function (EF)

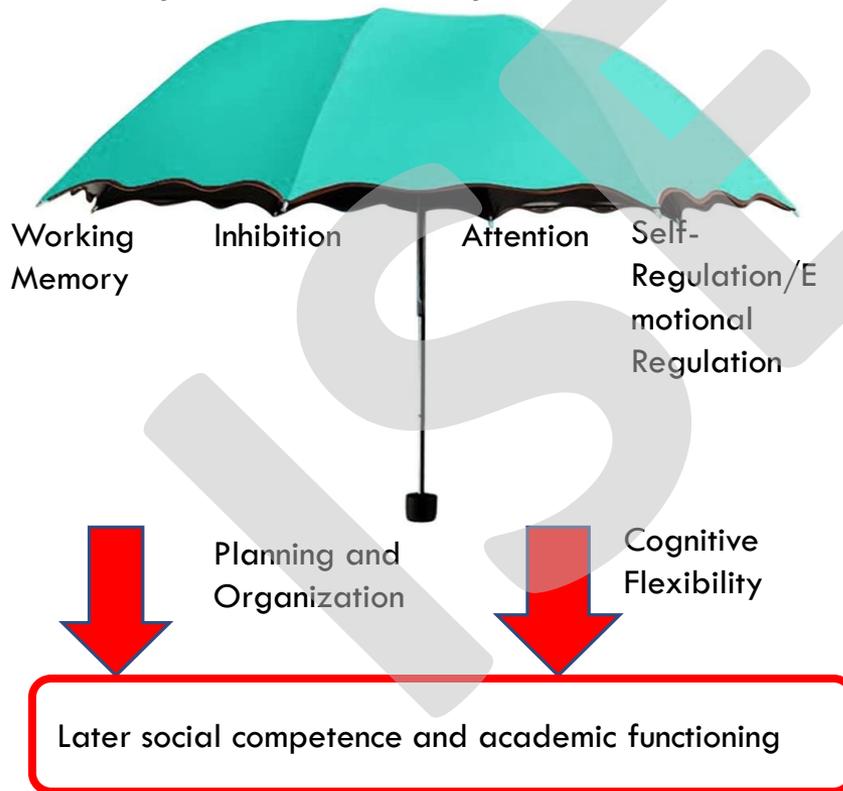Associated with important developmental outcomes (Eisenberg et al., 2009; Zelazo et al., 2016)

Working Memory

Inhibition

Attention

Self-Regulation/Emotional Regulation

Planning and Organization

Cognitive Flexibility

Later social competence and academic functioning

SELF-REGULATION

Self-regulation functions are developing from the first years of life throughout a person's entire lifetime.

Self-regulation is part of emotional control.

Emotional Control is the ability to manage emotions and feelings and respond appropriately to situations.
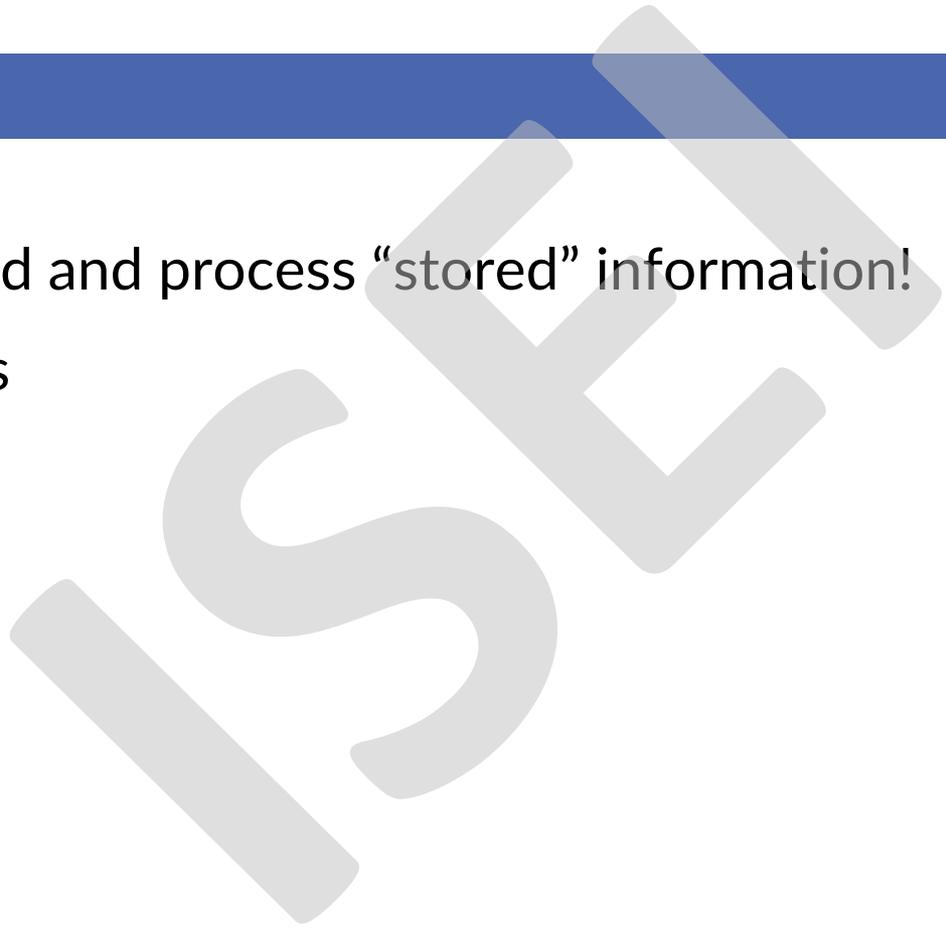
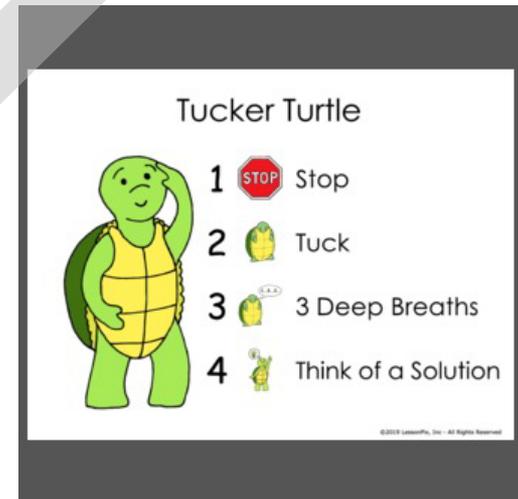# WORKING MEMORY

Ability to hold and process "stored" information!

A not B tasks

INHIBIT

Ability to control behavior and impulses

- Stop, Think, Act

- *Inhibit* is the capacity **to think** before acting.

Tucker Turtle

1 STOP Stop
2 Tuck
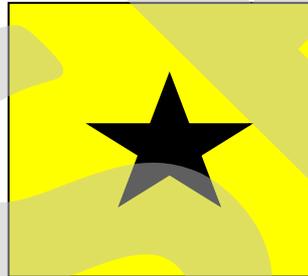3 3 Deep Breaths
4 Think of a Solution

COGNITIVE FLEXIBILITY

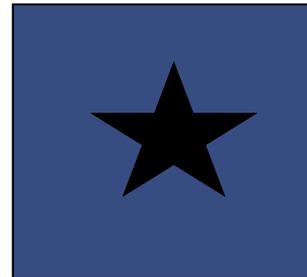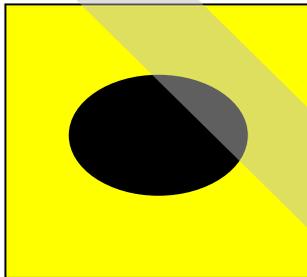Ability to shift between two different concepts or attributes

Dimensional Change Card Sort- Separated Task

Rule: Sort by Color

Rule: Sort by Shape

COGNITIVE FLEXIBILITY - EXPANDED

Adele Diamond's definition:

The ability to flexibly adjust to changed demands or priorities, to look at the same thing in different ways or from different perspectives.

If one way of solving a problem isn't working, one needs cognitive flexibility to **"think outside the box"** – that is, to find other ways of conceiving of the problem or of attacking it.

Such flexibility is needed for meeting novel, unanticipated challenges when they unexpectedly arise.

INFANT MEASURES THAT INCLUDE COMPONENTS OF EF

- Day-Night *(Inhibit)*

- Tongue Task *(Inhibit)*

- Day-Night *(Inhibit)*

- Dimensional Change Card Sort *(Cognitive Flexibility)*

- Bayley Scales of Infant Development *(Working Memory items)*

- Behavior Rating Index for Executive Function Preschool Edition *(Inhibit, Shift, Emotional Control, Working Memory, and Plan/Organize)*

- *NEW*: NIH Baby Toolbox 2025
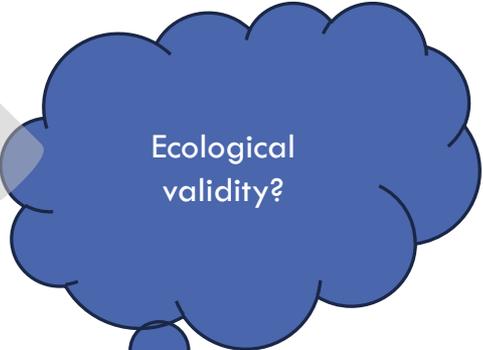
Ecological validity?

USING NATURAL PLAY TO EXAMINE EXECUTIVE FUNCTION

Background problem:

Difficulty of examining components of EF through administration of elicited test behaviors

New project:

1. Using samples of play from Project Play to explore evidence of EF in natural activities

2. Using Developmental Play Assessment for Practitioners (DPA-P) to explore EF in *mastered* versus *emerging* play activities

Please see Karin Lifter's presentation "Play Development in Young Children With and Without Delays: Guidelines for Intervention" that preceded this presentation and explained the Project Play Study.

PRIVACY SPECIFICATIONS

Again:

We will be showing videotaped segments of children and their caregivers

We ask that you do not take pictures of these recordings, given that the children and caregivers constitute a vulnerable population

DEFINITION OF PLAY (WITH TOYS)

Play "consists of spontaneous, naturally occurring activities with objects (toys) that engage attention and interest"

(Lifter & Bloom, 1998, *Infant Behavior & Development*)

Focus on Object Play

Not social, parallel or cooperative play

Not play on the playground

Not rough and tumble play

BACKGROUND: PROJECT PLAY

Children observed:

203 children developing with delays (DD)

289 children developing typically (TD)

Observed children in homes
- 30 minutes of natural play, with familiar caregiver
- videorecorded the observations
- across four sets of toys

Over age span of 8 months to 60 months

Cross-sectional design: 6-month intervals
- 8*, 12, 18, 24, 30, 36, 42, 48, 54, 60-months

ORANGE SET

Goal of PROJECT PLAY:

Developmental Play Assessment for Practitioners (DPA-P)

--> To evaluate play and to develop and implement goals in play

Developmental Play Assessment for Practitioners (DPA-P) Guidebook and Training Website

PROJECT PLAY

Karin Lifter, Emanuel J. Mason, Amanda M. Cannarella, and Ashley D. Cameron

https://routledgelearning.com/projectplay/

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WITH ONLINE TRAINING PROGRAM

14 lessons, 1 practice, & 1 final evaluation

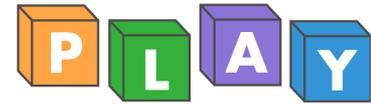**Each lesson contains:**

Video

Text

Section quizzes

Final quiz

Available on all platforms

Secondary Analysis: Using Natural Play to Examine Executive Function

Background problem:

Difficulty of examining components of EF through administration of elicited test behaviors

New project:

1. Using samples of play from Project Play to explore evidence of EF in natural activities

2. Using Developmental Play Assessment for Practitioners (DPA-P) to explore EF in *mastered* versus *emerging* play activities

METHOD – IDENTIFYING EVIDENCE OF EF SKILLS IN PLAY

❖Two researchers independently reviewed 10 DPA-P videos at different ages and coded the tapes for evidence of EF skills (previous work published in Early Human Development, Blasco, 2024).

❖Children ranged in age from 8 to 36 months.

- 5 typically developing
- 5 had developmental differences
  - 2 diagnosed with Down Syndrome
  - 2 diagnosed with ASD
  - 1 child diagnosed with Speech Delay
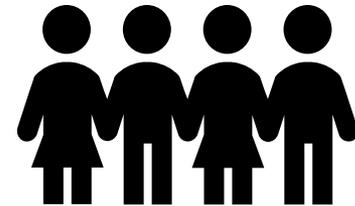
METHOD – IDENTIFYING EVIDENCE OF EF SKILLS IN PLAY

❖ Coders observed 30-minute of play and noted all EF components observed in 5 minute intervals

❖ Interrater agreement was 86%,

EF SKILLS IN PLAY

Attention – An 8-month-old engages in play with blocks by banging and looking when it falls from her hand.

Emotional Control – An 8-month-old smiles and laughs with parent during a game of peek-a-boo.

Inhibit – Parent asks an 18-month-old to stay with him on the floor and not climb up on a couch. She hesitates then sits back down on the floor and plays with blocks.

Working Memory – An 18-month-old picks up cup and spoon, stirs in the cup, feeds herself and then her parent.

Cognitive Flexibility – A 36-month-old is playing with a train he linked together (Plan and Organize) and says, "choo choo". He tells his parent, "I need a tunnel". Not finding one, he stands up and puts the train through his legs as if his legs were the tunnel.
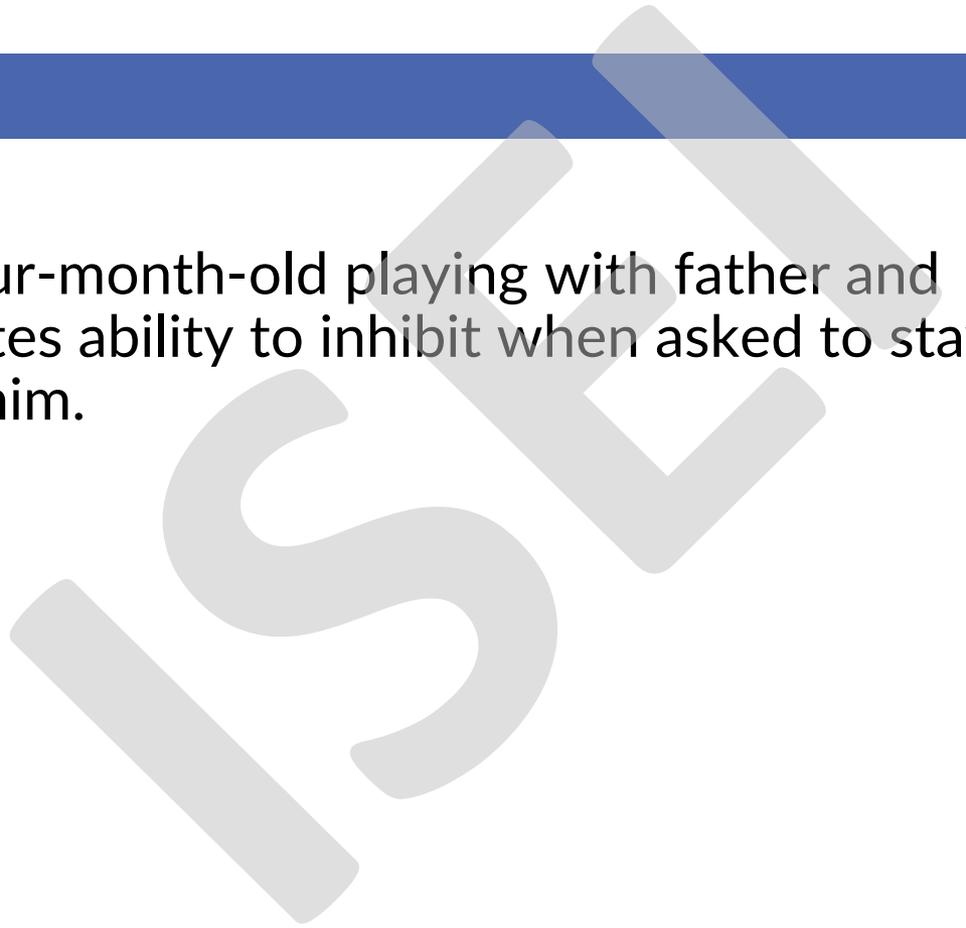
VIDEOS

Removed for privacy. Eight-month-old child and playing with a set of toys. Mostly exploratory play and attention to tasks.

VIDEOS

Twenty-four-month-old playing with father and demonstrates ability to inhibit when asked to stay on the floor with him.

VIDEOS

Thirty-six-month-old playing with a train uses his own legs as a tunnel after he couldn't find one for his train. Example of cognitive flexibility. See Adele Diamond definition.

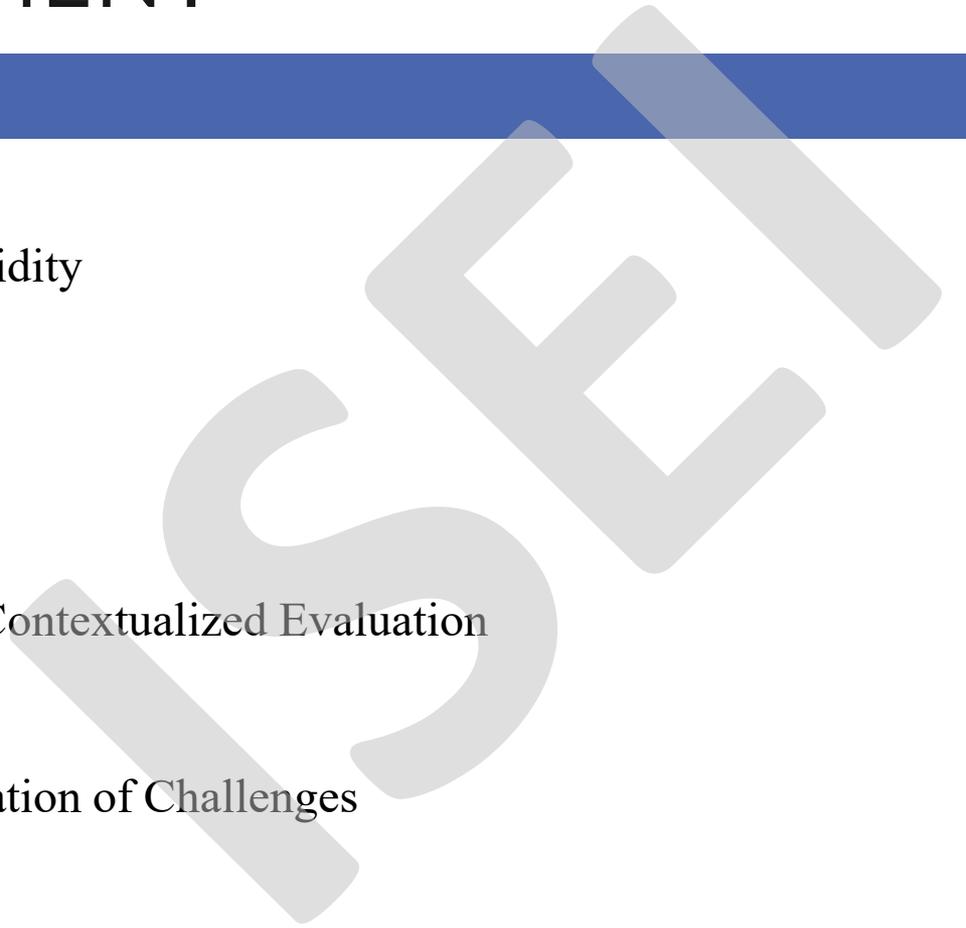# BENEFITS OF EF THROUGH PLAY ASSESSMENT

Ecological Validity

Inclusivity

Dynamic and Contextualized Evaluation

Early Identification of Challenges

LIMITATIONS OF ASCERTAINING EF THROUGH PLAY ASSESSMENT

The observation process might be more time-consuming and require skilled professionals to accurately interpret the child's behaviors.

Additionally, standardization and scoring procedures may be less established compared to traditional assessments, potentially affecting inter-rater reliability.
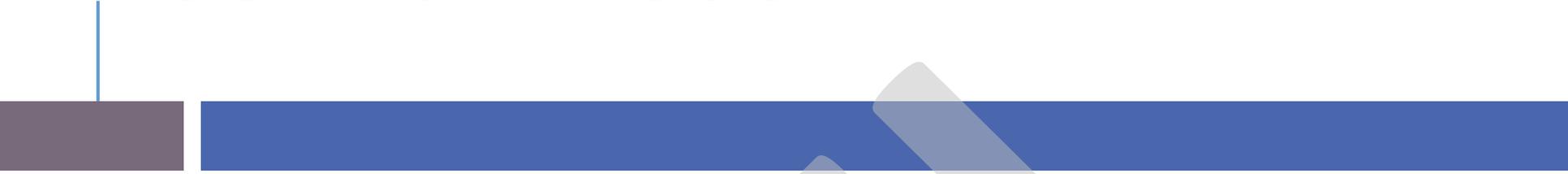
NEW DIRECTIONS

Using Naturally Occurring Play Activities

- To evaluate aspects of Executive Function in naturally occurring play activities
- To examine the interrelationship between play components and EF components.

FOOD FOR THOUGHT

1. How can we better assess executive function in infants and toddlers to lead to improved neurodevelopmental outcomes?

2. How can we change practices and policies to address new methods of assessing young children to enhance lifelong outcomes?
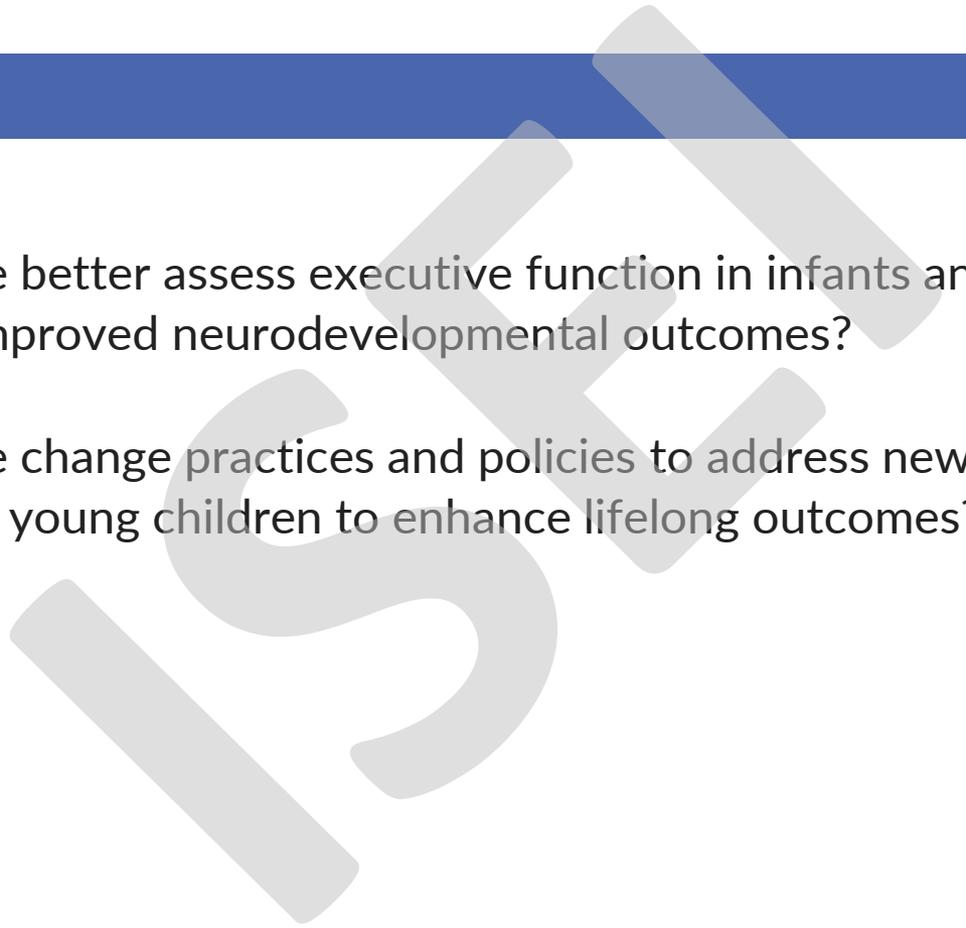
The End

Thanks! Questions?

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