

# Understanding & Developing Executive Functioning in Young Children

Jolene Johnson, Ed.D. & Kerry Miller, Ph.D.



## Introduction

<https://www.youtube.com/watch?v=0CnJFOzzhAA>

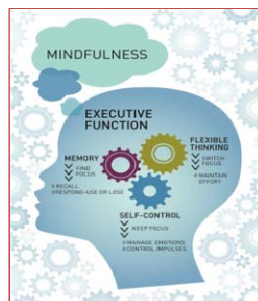


## What are Executive Functions?

Brain-based skills involved in deliberate, top-down, goal-directed control of attention, thought, emotion and behavior

Cognitive processes located in the prefrontal cortex that coordinate and integrate the broader functions of thought, memory, emotions and motor movement. Likened to an Air Traffic Control Center.

- Cognitive Flexibility
- Working Memory
- Inhibitory Control



## Why does EF matter for children?

EF provides a foundation for learning and adaptation across situations.

- In social situations; to change behaviors; for problem solving (get outside the box)

### School Readiness

- Pay attention to teacher directions
- Remember and apply teacher directions
- Focus
- Transition
- Manage emotions
- Maintain positive peer relations
- Think with flexibility



Haight, Jones, Bailey, 2GenExec Funct, 2016; Toub, Reflection Sciences, 2017



## EF in Adults

Many studies of EF in Adults  
 Feelings inform thoughts and vice versa—appraisal networks  
 Self-directed actions directed towards a future action

### Sets of Actions to the Self:

- Self-Awareness
- Self-Inhibitory –Self-Control
- Non Verbal Working Memory- Images
- Verbal—Self-Talk using Words
- Emotional/Self-Motivating
- Planning & Problem Solving— Internalized Play

Reflection  
 Mindfulness  
 Problem solving  
 Detachment or ability to examine emotions  
 Higher-order thinking  
 Purposeful, goal-directed behavior  
 More purposeful teaching and parenting

Ba



## Timeline of 3 years

Year 1

- Needs Assessment/Focus Groups
- Overview of Pyramid/Positive Behavior Supports
- Conscious Discipline Training
- Establishment of Behavior Support Teams
- Online CSEFEL modules

Year 2

- Executive Functioning and Safe from the Start Workshop
- MEFS administration (5 sites)
- Implementation of Pyramid Teams; Apply for NE Pyramid process
- Reflective Consultation Train the Trainer
- Planning for integration of parents

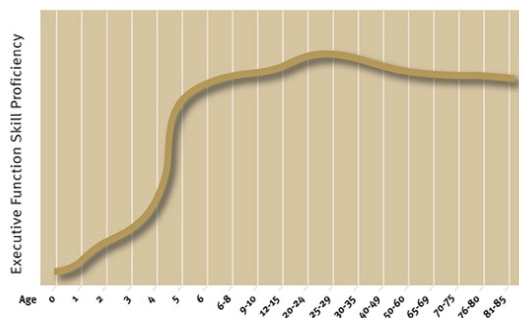
Year 3

- Safe from the Start Trauma Training (site level) Parents and Staff
- Brain Bags (3 for all; 4<sup>th</sup> for students transitioning to K)
- Reflective Consultation
- Parent Groups (Circle of Security; PBIS groups)
- Child Parent Psychotherapy (CPP)



## Why is EF So Important in Young Children? How Do Executive Functions Develop?

Executive Function Skills Build Into the Early Adult Years



Center on the Developing Child,  
2011



## What influences EF?

Stress

Poverty

Trauma

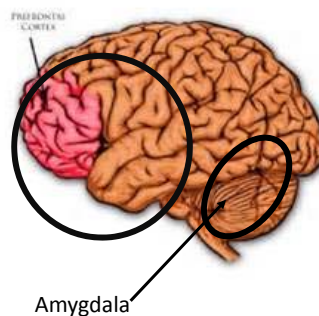
### Prefrontal cortex:

decision or control center: planning, goal setting and inhibiting impulses.

### Amygdala and limbic structures:

Reactive center of brain, arousal, fear, anxiety, anger, motivation.

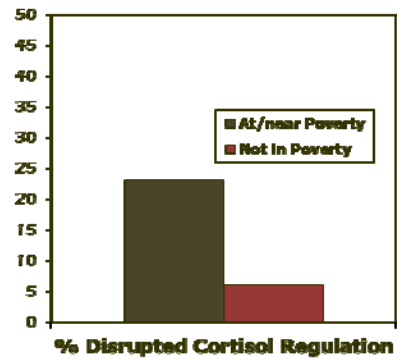
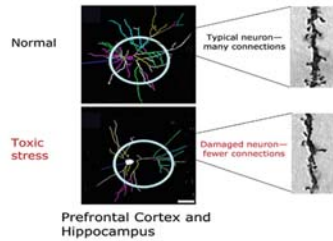
These brain regions are closely linked in stress response system—stress undermines EF and goal-directed behavior.



## Why is EF so important in Educare? What influences EF?

Stress    Poverty    Trauma

### Persistent Stress Changes Brain Architecture



## Can we Improve EF for Children? Mindful Children

### Social Emotional Curricula/Broad Frameworks

**Conscious Discipline**  
CSEFL/PBIS/Teaching Pyramid

**Second Step Preschool Kindergarten Social and Emotional Learning Curriculum** (Upshur et al, 2013)

Others-

\* Flip It

\* Mind Up

\* REDI (Research Based, Developmental Informed)-  
(Bierman et al., 2008)

- Broader than EF Curricula
- Focus on self-regulation, behavior regulation



## EF and Young Children

- EF involves a complex set of brain-based functions—that cross brain cognitive and emotion centers
- EF is fundamental as a control center for children and adults.
- EF is important for school and life skills.
- A prime time for development is during the preschool years.
- Poverty with attendant stressors associates negatively with EF development—through both cognitive and emotion centers.
- EF develops well when children have clear and consistent interactions that support development of autonomy and choices—in classrooms and at home.
- There are things we can do in classrooms and with parents that support the development of EF.



[Anna's perspective](#)

# Minnesota Executive Function Scale (MEFS)

Carlson, S.M., & Zelazo, P.D. (2014)

Students in Nebraska Educare  
Assessed Fall and Spring (2016-2018)  
Beginning at age 2 years



## Minnesota Executive Function Scale (MEFS™)



- First **objective, scientifically based** measure of EF
- Developed at the **University of Minnesota**
  - Over **9 years of research**
  - \$1.3 million of funding from the **National Institutes of Health**
- Released in **September of 2014**, MEFS has already been used to assess executive function over 21,000 times in 100+ locations



## Minnesota Executive Function Scale – Childhood Version



- Measure of Executive Function designed for convenient use with children **2-13 years**
- Sensitive to **individual differences** across wide ability range, including **very low** and **very high** functioning children



## Minnesota Executive Function Scale Key Features



- Suitable for ages 2+ years
- Time to administer: 3-6 min (avg = 4 min)
- Multiple forms for repeated administration (e.g., to measure change)
- Adaptive
- Automated scoring
- Clear guidelines for using and interpreting the data
- Reliable ( $ICC = .94$ )
- Validated
- Normed (currently ~7,500 children and 600 adults)
- English, Spanish, Mandarin, Dutch, German, Swedish, Somali, Hmong





## Psychometrics

### Construct Validity:

Convergent: High correlations with other measures of EF including NIH Toolbox Battery of EF and Head-Toes-Knees-Shoulders (HTKS)

Divergent: Low correlations with IQ (Stanford-Binet Early 5; WPPSI)

### Criterion Validity:

High correlations with Woodcock-Johnson III-NU



## Current Sample

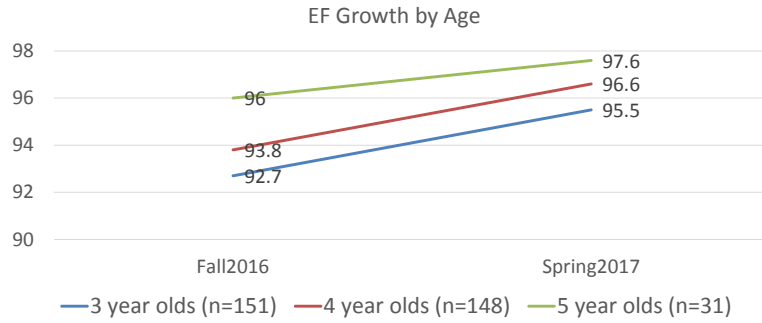
4 Nebraska Educare Programs

Matched sample over 1 academic year, aged 3-years and older  
(n = 330)

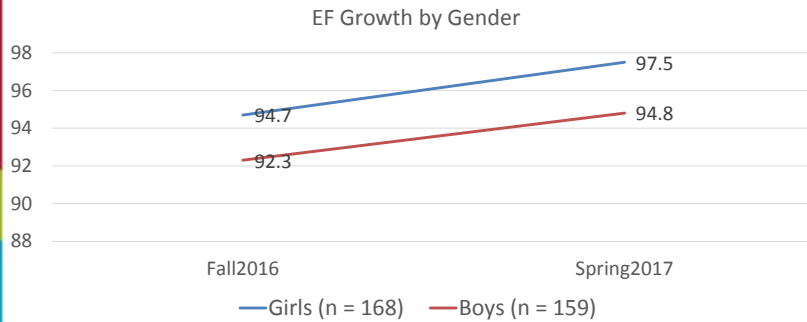
Gender	Race/Ethnicity	Age (in months, as of Fall 2016)	Dosage
51% Female	43% White 28% Native American 22% Black 7% Other/Multi-racial	Mean = 46.1 months (StdDev = 7.4 months) 46% 3 year olds 45% 4 year olds 9% 5 year olds	31% in 1 <sup>st</sup> year 26% in 2 <sup>nd</sup> year 19% in 3 <sup>rd</sup> year 24% in 4 <sup>th</sup> + year



# Age and EF Growth



# Gender and EF Growth



## Implications

*How can information from this study inform or advance early childhood practice?*

EF is an important area and warrants attention and interventions

EF strategies in ECD may improve children's school readiness

*How can information from this study inform or advance early childhood public policy?*

Continued support for high quality ECD programs, particularly those with an EF component



## Implications & Future Directions

*How can lessons from practice or policy inform this line of research?*

Targeted EF interventions may result in positive outcomes and continued growth after first year

*What additional research is needed to inform or advance early childhood practice and/or policy?*

Further explore factors associated with EF (role of adults, etc.)

Include additional EF measures

Look at age of entry and possible impacts/key time periods

Are we seeing a 'ceiling effect' or limit to growth that can be made?



## MEFS and Educare Measures

Measure	1	2	3	4	5	6	7
MEFS F							
MEFS S	.347**						
PPVT F	.324**	.400**					
PPVT S	.425**	.429**	.768**				
PLS F	.391**	.435**	.672**	.647**			
PLS S	.382**	.486**	.616**	.611**	.752**		
DECA BC	-.068	-.096	-.097	-.078	-.148*	-.143*	
DECA PF	.250**	.265**	.327**	.303**	.334**	.292**	-.496**

\*\*p<.01; \*p<.05



## Brain Bags

All about the Brain

Encourage and inform

Books, activities and tips

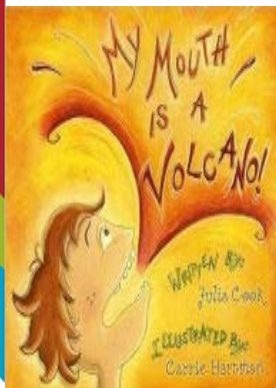


## Social Emotional & Executive Functions

Understanding Emotions  
 Planning  
 Memory  
 Cognitive Flexibility  
 Self-Regulation



## Book: My Mouth is A Volcano by Julia Cook



All of Louis' thoughts are very important to him. In fact, his thoughts are so important to him that when he has something to say, his words begin to wiggle, and then they do the jiggle, then his tongue pushes all of his important words up against his teeth and he erupts, or interrupts others. His mouth is a volcano! My Mouth Is A Volcano takes an empathetic approach to the habit of interrupting and teaches children a witty technique to capture their rambunctious thoughts and words for expression at an appropriate time. Told from Louis' perspective, this story provides parents, teachers, and counselors with an entertaining way to teach children the value of respecting others by listening and waiting for their turn to speak.



# Handout: How to Use Positive Language to Improve Your Child's Behavior



## How to Use Positive Language to Improve Your Child's Behavior

*By Dr. Hugh, M.D. and Dr. M. Williams*

**Backpack Connection Series**

**About this Series**

The Backpack Connection Series is a series of 10 handouts that provide parents and teachers with practical strategies for using positive language to improve children's behavior. Each handout focuses on a specific behavior and provides examples of positive language to use in various situations. The series is designed to be used in a variety of settings, including classrooms, homes, and community settings.

**The Pyramid Model**

The Pyramid Model is a framework for promoting positive social and emotional development in young children. It is based on the science of early childhood development and is designed to be used in a variety of settings, including classrooms, homes, and community settings. The model is organized into three levels: Individual Child, Interactions, and Environment. Each level provides specific strategies for promoting positive social and emotional development.

**More Information**

For more information about this topic, visit [www.challengingbehavior.org](http://www.challengingbehavior.org). This handout is part of the Backpack Connection Series, which is available for free download on the website.

**Try This at Home**

Practice using positive language in your home. When your child is having a difficult time, use the strategies provided in this handout to help them feel better. You can also use these strategies in other settings, such as at school or in the community.

**Practice at School**

Use the strategies provided in this handout to help your child improve their behavior in school. You can work with your child's teacher to develop a plan for using positive language in the classroom.

**The Bottom Line**

Using positive language is a powerful way to improve your child's behavior. By using the strategies provided in this handout, you can help your child learn to manage their emotions and improve their behavior. Remember, the key is to be consistent and to use positive language every time.

**www.challengingbehavior.org**

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# Activity: Bubbles

## Teaching Executive Function Skills with Bubble Lessons

Frontal Lobe – Executive functions, thinking, planning, organizing and problem solving, emotions and behavior control, personality.  
 Motor Cortex – Movement  
 Sensory Cortex – Sensations



Adapted from: <http://activebabysmartkids.com>



### Lesson One: Self Control

Turn the activity of popping bubbles into an executive function lesson. Parents and children can take turns blowing and popping bubbles. Switch during the activity and encourage children to not pop the bubbles when it is not their turn.

Caregivers can discuss situations in life when children can make better choices by demonstrating self-control – just like they did when they did not pop the bubbles.

### Lesson Two: Deep Breaths

Caregivers can discuss with children how it feels to be sad, angry, upset, or frustrated. Describe how the emotions can feel and what they can do to calm down and regain control. Deep breaths help children learn to take a break from a stressful situation and let the emotions out slowly – just like blowing bubbles.

Take turns blowing bubbles, demonstrating how it has to be a deep, slow breath. When children practice coping skills through play activities, they are more likely to succeed when real life situations arise.

### Lesson Three: Flexible Thinking

Cognitive Flexibility, or the ability to think flexibly and to shift approaches, is a critical executive function for learning. Cognitive flexibility is essentially the capacity to switch gears and adjust to changing demands, priorities, or perspectives.

During this activity, children can start by popping bubbles with any specific part of their body such as their hands. Once the children have spent a few minutes popping bubbles with their hands, change the rules! Tell the children that it is now time to pop bubbles with another part of their body such as their elbows (or knees). Continue to change the rules for popping bubbles to increase the child's flexible thinking.

## HANDOUT LINKS

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<https://46y5eh11fhgw3ve3ytpwxt9r-wpengine.netdna-ssl.com/wp-content/uploads/2015/05/Executive-Function-Activities-for-18-to-36-month-olds.pdf>

<https://46y5eh11fhgw3ve3ytpwxt9r-wpengine.netdna-ssl.com/wp-content/uploads/2015/05/Executive-Function-Activities-for-3-to-5-year-olds.pdf>



## GROUP TIME

You will have approximately 10 minutes per group rotation.

- MEFS practice ( 3 per group)
- Case Studies (5 per group – 5 groups) Try to mix disciplines and age groups
- Brain Bags (Rotate through each)
  - Infant
  - Toddler
  - Pre-K

