Child and Adolescent Behavioral Health Webinar Series:

Executive Functions in Children with Neurodevelopmental Disorders

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May 14, 2026

Introducing the Presenters

Michele Iemolo PsyD, R-DMT, BCBA is a licensed psychologist with experience in the screening, assessment, diagnosis and treatment of children with autism and related neurodevelopmental disorders. Dr. Iemolo has extensive training and experience in treatment approaches for children and families including applied behavior analysis and dance-movement therapy, as well as parent coaching programs aimed at improving social communication. She conducts diagnostic evaluations of children zero to five years of age at her private practice in Albuquerque, New Mexico. Dr. Iemolo has a contract with Indian Health Services through UNM to develop and disseminate webinars in the area of neurodevelopmental disorders.

Dina Hill PhD, is a licensed clinical neuropsychologist with experience in the assessment and diagnosis of children with genetic, neurological, and neurodevelopmental disorders. Over the past nine years, Dr. Hill has worked with the UNM CDD Fetal Alcohol Spectrum Disorders (FASD) Clinic and the Early Childhood Evaluation Program (ECEP). She is a co-investigator on FASD grants, including the UNM center grant investigating the effects of prenatal alcohol exposure on the developing child. Dr. Hill has a contract with Indian Health Services through UNM to develop and disseminate webinars in the area of neurodevelopmental disorders.

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There is no commercial interest support for this educational activity.

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Executive Functions in Children with Neurodevelopmental Disorders

This webinar will focus on developing healthcare teams' understanding of executive functions in neurotypical children and the differences in executive functions in children with neurodevelopmental disorders. The webinar will also provide healthcare teams with resources to support families/caregivers of children with neurodevelopmental disorders and executive functioning problems. Teaching tools will include a resource page and a quick facts tip sheet for providers.

Objectives

At the end of this presentation, participants will be able to:

1. Examine key components of executive functioning skills in neurotypical children.
2. Identify the possible differences in executive functions in children with neurodevelopmental disorders.
3. Provide families/caregivers of children with neurodevelopmental disorders and executive functioning problems with resources to support their child's development.

Objective 1:

Examine key components of executive functioning skills in neurotypical children.

What is Executive Function?

"The concept of 'executive function' refers to the higher order control processes necessary to guide behavior in a constantly changing environment" (Robinson et al., 2009)

Core Executive Function (EF) processes includes:

- Inhibition/Interference Control
- Working Memory
- Cognitive Flexibility

Executive Function Core Processes: Inhibition/Interference Control

Definition: "…being able to control one's attention, behavior, thoughts, and/or emotions to override strong internal predisposition or external lure, and instead do what's more appropriate or needed"

Diamond, A. (2013), pg. 2

Skills: selective attention, suppressing prepotent responses or mental representations, resisting proactive/retroactive interference, self-control over behavior/emotions, ability to stay on task despite distractions, delayed gratification

Executive Function Core Processes: Working Memory

Definition: "…involves holding information in mind and mentally working with it (or said differently, working with information no longer perceptually present)" Diamond, A. (2013), pg. 6

Skills: mental reordering, mental calculations, translating instructions into action plans, considering alternatives, reasoning, completing multistep directions, reading comprehension, organization

Executive Function Core Processes: Cognitive Flexibility

Definition: "…ability to appropriately adjust one's behavior according to changing environment" Dajani & Uddin (2015), p. 1

Skills: transition: disengage from previous task, reconfigure new response set, implement new response set, shift to new strategy, adapting to change: look at something a new way, improvising, understanding perspectives/empathy, problem solving.

Executive Functioning Skills

Many skills involve more than one core executive function:

- Multi-Tasking
- Time Management
- Task Initiation & Completion
- Planning/Prioritization
- Goal Directed Persistence
- Metacognition/Self-Monitoring
- Emotional Control

Timeline Development of Executive Functions

https://occupationaltherapy.com.au/executive-functioning-milestones

AGE	EXECUTIVE FUNCTION SKILLS
By age 1 year	Attending to thing for longer periods of time; behavior is still reflexive
Ages 1-2 years	Inhibits some reflexive behaviors (inconsistent); shifts attention to new things
Ages 3-6 years	Increases impulse control, attention/concentration; resists some distractions; follows 2-4 step tasks; demonstrates knowledge of rules
Ages 7-9 years	Performs self-talk; processes new information faster/more accurately; resists more distractions; develops goals, learns from mistakes, switches between tasks
Ages 10-12 years	Increases impulse control; attention/concentration for longer periods; switches between multiple tasks; learns from mistakes/creates alternatives more often; plans/organizes tasks more efficiently
Teens	Increases working memory capacity; increases cognitive flexibility; able to plan/organize more complex tasks; demonstrates better decision making/goal selection

Executive Function (EF) & Future Outcomes

“Variations in executive functioning predict concurrent success in schooling, relationships, and behavior, as well as important life outcomes years later.”

- **Academic/Employment**
  - School Readiness/Academic Competence
  - Job Success
- **Social**
  - Social Competence
- **Physical/Mental Health**
  - Emotional Regulation, Healthier Lifestyle Choices

Objective 2:

Identify the possible differences in executive functions in children with neurodevelopmental disorders

DSM 5 – TR
Neurodevelopmental Disorders

Definition:

The neurodevelopmental disorders are a group of conditions with onset in the developmental period. The disorders are typically manifested early in development, often before the child enters school, and are characterized by developmental deficits or differences in in brain processes that produce impairments of personal, social, academic, or occupational functioning.

DSM 5 – TR
Neurodevelopmental Disorders

Intellectual Developmental Disorders (Intellectual Disability)**

Communication Disorders

Autism Spectrum Disorder**

Attention-Deficit/Hyperactivity Disorder**

Specific Learning Disorder

Motor Disorders

Other Neurodevelopmental Disorders (Fetal Alcohol Spectrum Disorders)**

Signs of Executive Functioning Challenges

Individuals with executive function difficulties may:

- Struggle to initiate tasks or generate ideas independently
- Have difficulty organizing materials or breaking down assignments
- Frequently miss deadlines or underestimate time
- Find it hard to shift between tasks or multitask
- Exhibit impulsive behavior or emotional dysregulation
- Have trouble following multi-step directions

https://childfamilyinstitute.com/2025/04/30/executive-functioning-fact-sheet/

Executive Functions and Intellectual Developmental Disorders (IDDs)

- Executive function and intellectual function are distinct constructs
- EFs less examined in individuals with IDDs than other neurodevelopmental disorders
- EFs impaired in IDDs include set-shifting, conceptual shifting, sustained attention, planning, inhibition, and working memory.
- EFs deficits related to impairments in adaptive functioning
- EFs more impaired in individuals with IDDs than mental-age matched controls

Executive Functions and Attention-Deficit/Hyperactivity Disorder (ADHD)

Relationship between EFs and ADHD has been well studied (93,000+)

Research (T Brown) has identified 6 clusters of EF impairment in ADHD:

1. Organizing, prioritizing and activating for tasks
2. Focusing, sustaining and shifting attention to task
3. Regulating alertness, sustaining effort and processing speed
4. Managing frustration and modulating emotions
5. Utilizing working memory and accessing recall
6. Monitoring and self-regulating action

Executive Function and Autism Spectrum Disorder (ASD)

Areas of EFs strength and difficulty that can vary by individuals:

- EF areas preserved can include processing speed, aspects of working memory, focused attention
- EF difficulties have been found in individuals with ASD in the areas of planning, mental flexibility, inhibition, generativity, and self-monitoring

ASD behaviors thought to be accounted for by EF dysfunction include need for sameness, strong liking of repetitive behaviors, poor impulse control, difficulty initiating new non-routine actions, and difficulty switching between tasks.

EFs show improvement from childhood to adolescence

Executive Function and Fetal Alcohol Spectrum Disorders (FASD)

- EF considered a “hallmark deficit” in children with FASD, specifically planning, problem solving, self-monitoring, cognitive flexibility, rapidly producing responses, use of feedback
- Deficits in these EF areas greater in FASD group than ADHD group
- EF deficits likely related to prenatal exposure to alcohol affecting frontal lobe development

Objective 3:

Provide families/caregivers of children with neurodevelopmental disorders and executive functioning problems with resources to support their child's development

Misconceptions of Executive Function

- Kids outgrow EF challenges
- Disorganized kids are just lazy or unmotivated
- EF dysfunctions are the same as ADHD
- Smart kids should not struggle with EF
- More effort and trying harder will fix EF dysfunction
- Only teens have to worry about EF skills
- EF intervention can “fix” the brain

Executive Function Assessments

- Delis-Kaplan Executive Function System (D-KEFS)
- Trail Making Test (TMT)
- Verbal Fluency Test (VFT) – F, A, S
- Digit Span (Forward, Backward, Sequencing)
- Stroop Test
- Wisconsin Card Sorting Test (WCST)
- NEPSY II Inhibition Subtest
- Behavior Rating Inventory of Executive Functioning – Second Edition (BRIEF 2)
- Brown Executive Function/Attention Scales (Brown EF/A Scales)
- Comprehensive Executive Function Inventory (CEFI)
- Executive Functions Tests – Elementary: Normative Update (EFT-E: NU)
- Test of Everyday Attention for Children-Second Edition (TEA-Ch2) & The Test of Everyday Attention (TEA)

Key “Ingredients” of Effective Executive Function Intervention

- Executive functions should be challenged throughout training
- Scaffolding provided as needed
- Repeated practice and progression
- Modeling of skills
- Positive reinforcement
- Child-centered approach

Interventions for Executive Function in Preschool-Aged Children

- **Active Games**: Role playing to practice self-regulation and inhibition, games that promote inhibitory control/attention
- **Hiding Games**
- **Conversation/Story Telling**
- **Imaginary Play**
- **Physical Activity**
- **Mindfulness Strategies**
- **Resource:** Activities Guide: Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence
  (https://children.wi.gov/Documents/Harvard%20Parenting%20Resource.pdf

Executive Function Interventions: School Aged Children & Teens

Computer-Aided Training Programs (CTPs):

- CogniFit for Kids, Cogmed Working Memory Training, Captain's Log, Rehacom

Curricula-Based & Social-Emotional Programs:

- Unstuck and On Target, Tools of the Mind, Beyond Booksmart, PATHS (Promoting Alternative Thinking Strategies), Activities Guide: Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence, Helping Kids Who Struggle With Executive Functions , Smart but Scattered: The Revolutionary "Executive Skills" Approach to Helping Kids Reach Their Potential

Resources

Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence (https://children.wi.gov/Documents/Harvard%20Parenting%20Resource.pdf)

Executive Functioning Fact Sheet (https://childfamilyinstitute.com/2025/04/30/executive-functioning-fact-sheet/)

A Guide to Executive Function (https://developingchild.harvard.edu/resource-guides/guide-executive-function/)

Executive Functioning: Helping Children Learn Skills for Life (https://www.brownhealth.org/be-well/executive-functioning-helping-children-learn-skills-life)

Executive Functioning Skills The OT Toolbox (https://www.theottoolbox.com/executive-functioning-skills/)

Boosting Brains: Evidence Based Interventions for Children's Executive Functioning *(https://ucebt.com/wp-content/uploads/2025/03/Boosting-Brains_Slides-1.pdf)*

Helping Kids Who Struggle with Executive Functions (https://childmind.org/article/helping-kids-who-struggle-with-executive-functions/)

Executive Function Disorder: Resources (https://libguides.urmc.rochester.edu/pediatric_executive_function)

Quick Facts for Providers

Definitions

"The concept of 'executive function' refers to the higher order control processes necessary to guide behavior in a constantly changing environment" (Robinson et al., 2009). Core Executive Function (EF) processes includes:

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  - **Skills:** selective attention, suppressing prepotent responses or mental representations, resisting proactive/retroactive interference, self-control over behavior/emotions, ability to stay on task despite distractions, delayed gratification
- **Working Memory**
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  - **Skills**: mental reordering, mental calculations, translating instructions into action plans, considering alternatives, reasoning, completing multistep directions, reading comprehension, organization
- **Cognitive Flexibility**
  - **Definition: "…**ability to appropriately adjust one's behavior according to changing environment" Dajani & Uddin (2015), p. 1
  - **Skills:** transition: disengage from previous task, reconfigure new response set, implement new response set, shift to new strategy, adapting to change: look at something a new way, improvising, understanding perspectives/empathy, problem solving.

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Questions

TBHCE Archived Webinars:
https://www.ihs.gov/teleeducation/webinar-archives/

Consultation Clinic

Office hours for providers:

One-on-one consultation with Drs. Hill and Iemolo

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