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Early Executive Functions: Self Regulation, Effort Control, Impulse Control, and Attention

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Section A

Executive Function

By the End of this Lecture You Will Be Able to:

- Define and explain the significance of executive function (EF)
- Understand EF tasks at each developmental stage
- Understand EF and emotional, cognitive, and social growth
- Understand the interaction between EF and attention control as well as ADHD
- Gain an overview of EF dysfunction

Define “Executive Function”

- The brain-based steps we take to control our behavior and thoughts to ...
 - Make decisions
 - Solve problems
 - Reach goals
 - Master challenges

Commonly Defined as ...

- Initiate problem solving, shift between choices, inhibit, sustain attention, plan, organize, strategize, self-monitor (Denkla, 1989 and 2001)
- Self-regulation, flexibility, inhibiting nonproductive behaviors, planning, and organizing steps toward a goal (Eslinger, 1996)

EF Is Hardwired—Frontal Lobe Is Command Central

- **Focus** on the new data
- **React** and regulate the reaction
- **Assert effortful control** to stay on target
- **Take constructive action**—scan, sort, organize, integrate into memory

Think of the Significance

- **Instinct** from our innate quest for mastery and self-competence (White, 1959) and ...
- **Quest** for self-efficacy (Bandura, 1970)
- **Drive** to master challenges in the face of adversity (Masten, 2003)
 - Infants seek nurturance: food, rest, warmth
 - Preschoolers seek self-care independence
 - Children seek academic mastery
- **School mastery: EF is central factor of mastery** (Blair and Razza, 2007)

Lifelong Trajectory

- Weak executive function skills account for many
 - In the criminal justice system
 - People who are unable to keep jobs
- Youth with disorders of conduct including violence and substance abuse have a history of weak executive function skills as well as other social/emotional stressors (Embry, 2002)

Culture Bound

- Cultures differ on goal of self-regulation
- Westerners value self-regulation to aim for autonomy
- Many African and Asian cultures teach self-regulation to help with the community
 - Autonomy is viewed as anti-social or egocentric

Executive Functions

- What are the executive functions, and how do they develop?

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Executive Functions Follow a Path

- Executive functions are on a growth continuum
- A developmental course impacted by the child's genetics, temperament, and environment
- A child acts out of
 - Choice—temperament
 - Brain development—cognitive stage
 - Environmental training—role models

Problem Solving

- The foundation skills ...
 - Self-regulation
 - Effortful control

... impact problem solving

Self-Regulation

- Anterior cingulate gyrus, regulating
 - Cognition
 - Behavior
 - Emotion

Environment and Self-Regulation

- Continuous exposure to trauma →
 - Flooding of cortisol
 - ▶ Diminishes brain functioning
 - ▶ Diminishes self-regulatory capacity
 - Results in poor self-control and decision making

Baby to Adult: Coping with Stressors

- Self-soothing is the first self-control strategy
- Self-soothing is a problem solving strategy
- Stressor presents itself
 - Baby reacts, self-soothes, and then calms down to deal with the stressor
- Skills persist as self-calming skills throughout life

Self-Regulation Development

- Infant:
 - Learns self-regulation to calm self

- Toddler:
 - Learns effortful control to conform to others' demands while pushing to meet own needs
 - Begin to learn impulse control of thought, behavior, and emotion

- Childhood and adolescents:
 - Refine impulse control
 - Learn “stop and think”
 - Learn to delay reacting until all information is gathered to meet goal

Attention and Focus—The Next Step

- Infant: orienting and focus; observe
- Toddler: focus for minutes, but distractible
- Preschoolers: sustain attention one to one and resist conflicting stimuli
- Children: sustain attention while in a group on single stimuli
- Teens: sustain attention not only in a group but also with multiple conflicting stimuli

Problem Solving

- Infants engage others: the social smile and social referencing
- Toddlers active problem solvers, trial by error
- Children learn how to strategize with a few options, with simple shifting between ideas to choose the relevant information to solve the problems
- Teens use logical reasoning and hypothesis testing; use memory while strategizing; learn sophisticated sorting and shifting among data; find the best options to reach the goal