Playing Well Together: Executive Functions and Self-Regulation in Childhood

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Overview

• Why Executive Functions (EF) and Self-Regulation (SR) are important
• Specific descriptions of EF
• Specific descriptions of SR
• How EF & SR work (play) together
• The role of relationships in nurturing development of EF & SR
Why are Executive Functions Important?

- Peer Relationships
- Sociomoral Reasoning

Executive Functions
- Attention
- Working Memory
- Inhibitory Control

Self-Regulation
- Cognitions
- Emotions
- Behaviors

Learning
- Academic Achievement

Social Development
- Peer Relationships
- Sociomoral Reasoning
Executive Functions Are:

Higher-order cognitive capacities that are interdependent:

- Working memory
- Attention
  - Alerting and orienting – relatively fast
  - Executive attention ("top-down")
- Inhibitory control

Planning and goal-directed behavior

Problem-solving
Blue
Green
Red
Orange
Purple
Blue
Green
Red
Orange
Purple
Executive Functions involve Coordination of “Top-down” and “Bottom-up” Processes

“Top-down”
• Executive control
• Organize & direct attention
• Effortful control of emotions

“Bottom-up”
• Attentional alerting and orienting
• Arousal influences attention
• Motivation to act
How do EFs Develop?

- Brain plasticity: development of synapses and circuits in response to experience
- Prefrontal cortex development and coordination with wider networks
- Supportive relationships
- Dramatic play
- Open-ended creative play; Time spent in less-structured activities (Barker et al. 2014)
- Practice is important
  - Games (make it fun): Simon says; red light green light; reverse hopscotch; memory games
  - Physical activity, yoga, mindfulness practices
Self-Regulation is:

The ability to flexibly adapt behavior, attention, emotions, and cognitive strategies in constructive ways in response to situational demands.

Management of attention and arousal in the service of goal-directed behavior.
Self-regulation includes behaviors that are:

**Fairly automatic**
- Neural processes related to emotions
- Rapid detection of environmental stimuli (threat)
- Stress & motor response systems
- Attention – alerting and orienting; ready to respond

**More effortful**
- Suppress a more automatic response in favor of expected behavior
- Persist on an unpleasant task
- Effortful regulation of emotion
- “Effortful control” of attention; “Executive attention”

**Individual differences**
- Thresholds of activation
- Different resting states
- HOW effortful
Development of Self-Regulation

• Proceeds from co-regulation to self-regulation
• Naming emotions and “feeling felt”
• Alternating periods of activity, demands, and rest
• Clear guidelines for behavior
  • KSS: be safe with yourself, with others, with your things
• Help children to reflect on their own behavior (but help regulate emotions first)
Within-brain connections play with other brains
How do Executive Functions and Self-Regulation Play Together?
Executive Functions & Self-Regulation are Integrated, Open Systems

• Embodied & active development
• Brain & stress-response systems are open
• Adapt to child’s living conditions
• “Experience expectant”
• “Experience dependent”
EFs Support Self-regulation

- Inhibit an undesirable behavior (inhibitory control)
- Remember a rule or expectation (working memory)
- Shift behavior according to context (working memory, inhibitory control, attention)
- Notice others’ emotions or reactions to your behavior (attention)
- Make a plan and carry it out (working memory, attention, inhibitory control)
The Role of Relationships in Nurturing Development of EF & SR
Attachment Shapes the Stress-Response System

- Attachment figures are critical for ensuring young children feel safe
- Comforting infants who are not yet able to comfort themselves
- Helping young children begin to calm themselves
- Supports development of neural and endocrine architecture that is critical for self-regulation of emotions
- Sympathetic ("gas") and parasympathetic ("brake") nervous system
- Emotion is the first language infants understand
Coaching EF to support Stress-Response System

- Caregivers re-directing attention to support self-regulation
- Support ability to shift attention and build neural networks undergirding flexibility in attention
- Recognizing challenging situations and conditions
- Helping children to name emotions and “feel felt”
- Helping children to calm down before problem-solving
Nurturing relationships support development of self-regulation, good mental health

- Many mental health challenges are instances of
  - Under-regulation: externalizing and conduct disorders
  - Over-regulation: internalizing and mood disorders
- It is critical for children to have relational experiences that help them to respond to and regulate arousal in adaptive ways
EFs & SR Work Together to Support Relationships

• Awareness of others’ feelings and desires, ability to coordinate one’s own goals with those of others
• Ability to inhibit behavior that may harm relationships or disrupt interactions or play
• Ability to remember past sequences of actions and anticipate future sequences of behavior and outcomes
• Need to understand how present actions can affect people or property in the present and future
• Need ability to anticipate consequences of actions for oneself and others
• Access to positive relationships provides context for further development of EF & SR
Experiences that undermine development of neural networks involved in EF & SR

- Intrusive interactions undermine development of attention
- Low levels of sensitive and responsive caregiving – associated with elevated physiological stress
  - Interferes with development of prefrontal cortex, **connectivity** between brain regions
- Poverty
Poverty, Parenting, Stress Response, and Executive Functions At age 3:

Poverty → Stress Response → EF

Blair et al. (2011)
Stress Response Mediated Effect of Positive Parenting on EF for Children in Poverty (Blair et al. 2011)
Stress-Buffering Potential of Caring, Responsive Relationships

Cumulative Risk $\rightarrow$ Stress Physiology $\rightarrow$ Working Memory

But only for children whose mothers were low in responsive involvement

Evans et al. (2007)
Sensitivity to Environment and Experience

• Early intervention programs for children living in conditions of risk can have positive effects on EF and SR

• Sustained

• Second-generation effects of Perry Preschool Project were likely due to program effects on EF, SR

• Interventions that function through supporting EF, SR, and stress physiology – likely to be the most effective over the long term
Summary

• Ecological brain is sensitive to experience
• Development of EF and SR are largely dependent upon experiences
  • Warm, nurturing, consistent relationships
  • Help children regulate arousal
  • Coaching emotion
  • Unstructured play
  • Dramatic play
  • Physical activity, yoga, mindfulness
• Chronic stress (toxic) disrupts development of EF, BUT
• Supportive relationships can buffer effects of stress on EF
You can support children’s development of Executive Function and Self-Regulation