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Section C

Intrinsic and Extrinsic Influences on Infant and Early Childhood Regulatory Development
Influences on the Development of Self-Regulation

- Intrinsic and extrinsic influences on the development of self-regulation

- Theoretical model of probabilistic epigenesis, depicting bidirectional influences over four levels of analysis—genetic, neural, behavior, and environment (from Gottlieb, 2007)

Influences on the Development of Self-Regulation

- Intrinsic and extrinsic influences on the development of self-regulation

- Gottlieb’s Developmental Systems Model
  - Emphasis on co-action among levels, defined as a bidirectional relationship between two or more components of the developmental system
  - Individual development as characterized by probabilistic epigenesis


- Identical twins are more temperamentally similar than fraternal twins (e.g., activity level, shyness, irritability)
  
  Goldsmith et al. (1999); Emde et al. (1992); Saudino and Eaton. (1991).

- Neuromodulator receptor function predicts emotion regulation behavior
  
  – Dopamine (COMT)
  – Serotonin (5-HTT)
  – Acetylcholine

Intrinsic: Physiological Influences on Self-Regulation

- Inhibitory activity of the parasympathetic nervous system
  - Activation of the PNS promotes a calm behavioral state and focused attention to objects and people
    
    Porges. (2007); Calkins et al. (2007); Huffman et al. (1998); Stifter and Fox. (1990); Stifter, Fox, and Porges, (1989).

- Excitatory activity of the sympathetic nervous system and neuroendocrine pathways (e.g., HPA axis)
  - Exaggerated or prolonged reactivity without recovery is associated with overarousal and emotion dysregulation
    
    Granger et al. (2007); Repetti, Taylor, and Seeman. (2002); Chatterton et al. (1996); Granger, Weisz, and Kauneckis. (1994); Stansbury and Gunnar. (1994).
Greater negative reactivity to frustration in infancy (5 months) was related to the use of fewer regulation behaviors at 10 months, such as self-soothing; also, infants who are easily frustrated are less likely to use distraction or redirection of attention

Calkins and Dedmon. (2002); Calkins and Johnson. (1998); Braungart-Rieker and Stifter. (1996).

Inhibited children who exhibit more intense fear reactivity typically display more avoidance regulation due to lack of approach to novel objects or people versus a surgent (uninhibited) child

Extrinsic: Care Giving Influences on Self-Regulation

- Quality of interactions with caregivers impacts regulatory development as regulation skills are modeled by the parent.
  - Shapes the infant’s interpretation of affect-eliciting events and emotional responses.

- Responsive care giving coupled with positive guidance undergirds the development of appropriate self-regulatory behavior and emotional control (Fox and Calkins, 2003).

- Over-control (harsh or negative control) on the part of the caregiver is related to young children who employ maladaptive strategies in situations that call for self-regulation (Calkins et al., 1998; Crockenberg and Littman, 1990).
Low SES environments may present ...
- Physical (e.g., substandard housing, noise, ambient pollutants) stressors
- Psychosocial (e.g., family conflict, parental mental health) stressors
  - Both impact the care giving environment and children’s experience with emotion-eliciting contexts

Extrinsic: Cultural Influences on Self-Regulation

- Cultural context impacts the development of self-regulation through ...
  - Transmission of cultural display rules (e.g., when and how to hide, mask, and control emotion expressions)
  - Caregiver practices in regard to how best and when to soothe a child
  - Caregiver practices in sleeping arrangements
    - E.g., co-sleeping

Biological Sensitivity to Context

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GxE and Self-Regulation

- Diathesis stress model
  - Susceptibility to environmental adversity depends on individual vulnerabilities
    - “At-risk” versus “resilient” individuals


- Adaptive phenotypic plasticity
  - Until recently, studies have not considered the full range of environments and focused almost exclusively on adverse early environments
  - Susceptibility to take in features of a supportive or enriched environment may enhance development, including self-regulation behaviors

Ellis et al. (2011); Boyce and Ellis. (2005).
Meaney’s Rodent Model

- Epigenetic regulation in physiological and behavioral reactivity and regulation by maternal behavior
  - Observed maternal behaviors in the first 10 days of life
  - Indexed L-HPA axis and behavioral reactivity of offspring dependent on maternal LG-ABN behavior
  - Intergenerational transmission, cross-fostering studies

Sources: Meaney and Szyf. (2005); Weaver et al. (2004); Champagne et al. (2003); Meaney. (2001); Anisman et al. (1998); Liu et al. (1997).
Rodent Model of Adaptive Phenotypic Plasticity

- r strategy (high ecological stress and instability)
  - ↓ licking and grooming of pups, ↓ arched-back nursing
  - Offspring have ↓ glucocorticoid receptor expression, ↓ SAM and HPA reactivity
  - More fearful behavior, earlier puberty among females, ↓ parental investment

- K strategy (stable, predictable ecology)
  - ↑ licking and grooming of pups, ↑ arched-back nursing
  - Offspring have ↑ glucocorticoid receptor expression, ↓ startle response, ↑ resistance to illness
  - More exploration in novel environments, ↓ pregnancy rates following mating
The Orchid or the Dandelion Child?

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GxE and Self-Regulation

Exposure to childhood adversity and adjustment at age 5 years

- Children with high cortisol reactivity were rated by teachers as least prosocial when living under adverse conditions
- Most prosocial when living under more benign conditions
- This pattern held when comparing high-reactivity children to those children scoring low on cortisol reactivity

Temperament influences the way infants emotionally respond to the world.

The ability to self-regulate one’s emotions is an emergent skill, shaped by the coaction of individual factors and the early environment.

Emotional self-regulation is one of the primary developmental tasks of early childhood:
- Control arousal
- Enable readiness for learning
- Support social relationships

Concluding Remarks

- Infancy and early childhood are plastic phases of development, these systems exhibit biological sensitivity to context; thus they are malleable and potentially responsive to early intervention
  - Intervention efforts aimed at bolstering regulatory development should include parent components and consider individual differences in infants and young children