EARLY CARE AND EDUCATION & THE NEUROBIOLOGICAL UNDERPINNINGS OF DEVELOPMENT

Oklahoma Early Childhood Research Symposium

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To gain some understanding of….

1. The processes through which early adversity undermines early development

2. The role of early childhood education in addressing the toxic stress that arises from early adversity

3. The directions in which ongoing research and intervention science related to early childhood education are moving, and notably how they are increasingly guided by neurobiological science.
Two strands of inquiry

Early Care and Education

• Pervasive early environment
• Normative aspect of EC years
• Opportunity to understand environment impacts on development; malleability of development

Biological Sensitivity to Context

• Individual differences in response to environmental variation
• Heritage from work on biology of adversity
• Orchids and Dandelions
Research at the Intersection of ECE & BSC

New questions being asked of ECE:
• How do children with different backgrounds and characteristics respond to their experiences in ECE?
• How does the peer environment in ECE affect answers to this question?
• Can high-quality ECE serve as an intervention for the orchids?
Motivating Questions

How is the child who is born with a tendency to be rather overactive, oppositional, and impulsive subsequently trained by the world to behave well or coerced into behaving badly?
(M. Rutter)

Why do some children have lives of disproportionate misfortune?
(T. Boyce)
Seeking Answers

• “All early care and education settings are ‘interventions’ “ (the brain)

• Effective learning requires “protecting brains, not simply stimulating minds” (J. Shonkoff)
Your Brain on Poverty

Hanson et al., PLOS ONE, 2013

Frontal Gray Matter

Volume (cm$^3$)

Age (in months)

HighSES
MidSES
LowSES

Hanson et al., PLOS ONE, 2013
The culprit? STRESS

• Demands exceed capacity to respond
• Prompts cascade of neurochemical changes
• Essential to survival
• If prolonged, changes brain functioning towards vigilance (vs. focused attention) & hyper-reactivity (vs. behavioral regulation)
What does stress take off line?

- Executive functions
  - Follow directions and remember instructions to achieve a goal
  - Resist temptations/control impulses
  - Pay attention and shift attention

- Ability to alert to mistakes & corrective feedback
  - Emotional regulation
  - Perception of and response to social threat

- Immune functioning
  - LEARNING
  - DEVELOPMENT
Social Exclusion
The Costs of Social Exclusion

Boyce, *Focus*, 2012
The “Biology of Misfortune”

Boyce, Saxton & Francis, 2012
Some children more susceptible
The Ultimate Social Exclusion

U.S. D of Ed. Office for Civil Rights, 2014
Double whammy: Disability and Exclusion

Students receiving out-of-school suspensions, by disability (IDEA) status

- Students without disabilities: 6%
- Students with disabilities (IDEA): 13%

U.S. D of Ed. Office for Civil Rights, 2014
The Crucible of ECE

• First on-going encounters with peer groups
• Increasing demands on executive functioning skills
• Increasing demands on language skills

• Teachers worry:
  • can’t sit still,
  • focus on activities
  • follow directions,
  • get along with peers
Preschoolers’ cortisol patterning at child care

Watumura, Sebanc & Gunnar (2002) *Developmental Psychobiology*
Variation with quality of caregiving

Rise in cortisol

Care Provider Attention/Sensitivity

Gunnar et al., 2010, *Child Development*
Some children more susceptible

Gunnar et al., 2011, *Developmental Psychology*
Individual Differences!

“I can’t get enough of this place!”

“Get me OUTTA here!”
Some Implications

- Typical ECE arrangements vary widely in quality; this variation is highly consequential for early brain and behavioral development. All ECE settings = early interventions.
- Some children are more sensitive to this variation than others – pay careful attention to the shy and inhibited children.
- Parents of these children need to pay special attention to the peer environment in child care. Look for tolerant, inclusive environments.
- Effective learning requires “protecting brains, not simply stimulating minds.”
- More broadly, poverty (adversity) and social exclusion affect early learning and health via stress-related impacts on the brain and body, and are active contributors to disparities in life outcomes – it is important for early childhood teachers to attend to the social surrounds of the children they care for….
Thank you
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