Connecting Early Childhood Development and Lifelong Health in a COVID-19 World

JACK P. SHONKOFF, M.D.
Julius B. Richmond FAMRI Professor of Child Health and Development,
Harvard Graduate School of Education & Harvard T.H. Chan School of Public Health.
Professor of Pediatrics, Harvard Medical School & Boston Children’s Hospital.
Research Staff, Massachusetts General Hospital.
Director, Center on the Developing Child at Harvard University.

Protecting Our Children: COVID-19’s Impact on Early Childhood and ACEs
NICHM Foundation Webinar | September 10, 2020
COVID-19 Through an Early Childhood Lens

Disparities associated with poverty, racism, and other structural inequities are not new—but striking variations in susceptibility to illness and response to treatment underscore the differential impacts of adversity on health.
COVID-19 Through an Early Childhood Lens

Disparities associated with poverty, racism, and other structural inequities are not new—but striking variations in susceptibility to illness and response to treatment underscore the differential impacts of adversity on health.

The health and well-being of young children is inextricably tied to the health and well-being of the adults who care for them.
COVID-19 Through an Early Childhood Lens

Disparities associated with poverty, racism, and other structural inequities are not new—but striking variations in susceptibility to illness and response to treatment underscore the differential impacts of adversity on health.

The health and well-being of young children is inextricably tied to the health and well-being of the adults who care for them.

Pre-existing medical conditions that impose the highest risk for adults are associated with greater adversity early in life.
21st-Century Science is Deepening our Understanding About the Origins of Disparities in Early Development and Lifelong Health

Connecting the Brain to the Rest of the Body
21st-Century Science is Deepening our Understanding About the Origins of Disparities in Early Development and Lifelong Health

Connecting the Brain to the Rest of the Body

Variation in Sensitivity to the Environment
21st-Century Science is Deepening our Understanding About the Origins of Disparities in Early Development and Lifelong Health

- Connecting the Brain to the Rest of the Body
- Variation in Sensitivity to the Environment
- Timing & Critical Periods
The Biology of Adversity and Resilience Explains How Excessive Stress Can Undermine the Foundations of Healthy Development.
The Biology of Adversity and Resilience Explains How Excessive Stress Can Undermine the Foundations of Healthy Development

- Genetic Variation
- Environmental Stressor
- Time

Stress hormones

X

Learning, Behavior & Health
The Biology of Adversity and Resilience Explains How Excessive Stress Can Undermine the Foundations of Healthy Development

- Genetic Variation
- Environmental Stressor
- Time

Heart rate & blood pressure
Stress hormones
Learning, Behavior & Health

Explains How Excessive Stress Can Undermine the Foundations of Healthy Development

Center on the Developing Child, Harvard University
The Biology of Adversity and Resilience Explains How Excessive Stress Can Undermine the Foundations of Healthy Development

Genetic Variation

Environmental Stressor

Time

Stress hormones

Heart rate & blood pressure

Inflammation

Learning, Behavior & Health

Center on the Developing Child, Harvard University
The Biology of Adversity and Resilience Explains How Excessive Stress Can Undermine the Foundations of Healthy Development

- Genetic Variation
- Environmental Stressor
- Time
The Biology of Adversity and Resilience Explains How Excessive Stress Can Undermine the Foundations of Healthy Development

- Genetic Variation
- Environmental Stressor
- Time

Heart rate & blood pressure
Inflammation
Metabolic regulation
Epigenetic effects on gene expression & developmental pacing

Learning, Behavior & Health
The Biology of Adversity and Resilience Explains How Excessive Stress Can Undermine the Foundations of Healthy Development

- Genetic Variation
- Environmental Stressor
- Time

Diagram:
- Heart rate & blood pressure
- Inflammation
- Metabolic regulation
- Brain circuitry & electrical activity
- Epigenetic effects on gene expression & developmental pacing

Flow:
- Genetic Variation → Environmental Stressor → Time → Learning, Behavior & Health
Early Childhood Investments that Protect Biological Systems from Toxic Stress Will Generate a Larger ROI

3 of the 5 Most Costly Adult Diseases are Associated with Early Life Adversity

- Cardiovascular Conditions #1: $294 billion
- Diabetes #2: $189 billion
- Depression #5: $99 billion

Sources: Waters, Graf (Milken Institute, 2018); Greenberg et al. (2015)
Early Childhood Investments that Protect Biological Systems from Toxic Stress Will Generate a Larger ROI

3 of the 5 Most Costly Adult Diseases are Associated with Early Life Adversity

<table>
<thead>
<tr>
<th>Annual Cost</th>
<th>Cardiovascular Conditions #1</th>
<th>Diabetes #2</th>
<th>Depression #5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$300 billion</td>
<td>$294 billion</td>
<td>$189 billion</td>
<td>$99 billion</td>
</tr>
<tr>
<td>$250 billion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$200 billion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$150 billion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$100 billion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$50 billion</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Take-Home:** Science-informed investments that reduce hardships and adverse exposures faced by pregnant women and families raising young children offer a promising pathway to enormous savings in health care costs.

Sources: Waters, Graf (Milken Institute, 2018); Greenberg et al. (2015)
The Brain Circuits Underlying Motivation: An Interactive Graphic

Experiences Create Pathways Between Brain Regions
How Motivation Systems Develop

- dopamine pathways
- mesolimbic pathways
- mesocortical pathways
- emotional pathways
- appetitive pathways
- reward pathways

1. Emotions trigger neural circuits in certain regions of the brain to send chem signals to other regions in different regions.
2. Repeated experiences create different pathways in the brain that then become associated with thoughts, memories, and behaviors.
3. These linked pathways create emotional associations between what we do and the memories of how that made us feel physically and emotionally, and that drives our behavior.
4. We are motivated to repeat those experiences that made us feel good, and avoid those that did not.

www.developingchild.harvard.edu