Pathways to a More Peaceful & Sustainable World:

Early Childhood Matters

James F. Leckman, MD, PhD
Neison Harris Professor of
Child Psychiatry, Psychology
and Pediatrics
Disclosures

Research funding: NIH (R01, R25, T32), Grifols, Tasly Inc, UBS Optimus; The Open Road Alliance, UNICEF, NIHR


Philanthropy: Associates of the Child Study Center, Fetzer Institute, AÇEV, Early Childhood Peace Consortium
"If we are to teach real peace in this world, and if we are to carry on a real war against war, we shall have to begin with the children.... You must be the change you wish to see in the world."

—Mahatma Ghandi (1869–1948)

There can be no keener revelation of a society’s soul than the way in which it treats its children.

—Nelson Mandela (1918–2013)
We are all interconnected in our ever changing world

Neural Circuits

Cosmic Dark Matter & Energy

Social Networks
Outline

- Brain development
- *Nurturing Care*
- Parenting is a key
- Another Reality – TOXIC STRESS
- The Promise of Biomarkers...?
- *Next Steps – Theory of Change – ECPC*
In the 1st year of life, the brain grows at the pace of 700-1,000 new neural connections per second, a pace that is never achieved again.

By age 3 years, a child’s brain is twice as active as an adult brain.

It is early life experiences that determine the capacity of the brain – its structure and function.
Brain Development

36 weeks gestation
Newborn 3 months 6 months 2 years 4 years 6 years

Synapse formation
Synapse pruning

Yale School of Medicine
Yale Child Study Center
Sensitive Periods

Human Brain Development
Synapse formation dependent on early experiences

- Language
- Higher Cognitive Functions
- Sensory Pathways (vision & hearing)
- Age in Months
- Age in Years
- Conception to Birth

- Sensory Pathways (vision & hearing)
- Language
- Higher Cognitive Functions

Synapses
Axon from another neuron
Cell body
Nucleus
Dendrites
Axon
Myelin sheath
Synapse
Dendrites from neighboring neurons

Yale SCHOOL OF MEDICINE
Outline

• Brain development
• *Nurturing Care*
• Parenting is a key
• *Another Reality – TOXIC STRESS*
• The Promise of Biomarkers...?
• *Next Steps – Theory of Change – ECPC*
Nurturing Care

• *Nurturing care* focuses on early child development and comprises all of the essential elements for a child to grow physically, mentally & socially:
  - *Responsive caregiving*
  - Adequate nutrition
  - *Adequate health care*
  - Security and safety
  - *Early learning and opportunities to discover the world*
This Series reviews new scientific evidence for interventions and proposes pathways for implementation of early childhood development programs at scale across the globe.

The 2017 *Lancet* Early Childhood Development Series highlights the importance of early childhood development if we are to achieve the 2030 Sustainable Development Goals.

"Young children’s healthy development depends on nurturing care—care which ensures health, nutrition, responsive caregiving, safety and security, and early learning.”
Our genetic blueprint provides the broad strokes of the development of our bodies and brains.

Environment modifies this blueprint during critical periods of development – *from pre-conception onwards*.
The quality and timing of early environments shape a child’s future potential.
Outline

• Brain development
• **Nurturing Care**
• Parenting is a key
• **Another Reality – TOXIC STRESS**
• The Promise of Biomarkers...?
• **Next Steps – Theory of Change – ECPC**
Parenting is Key

Patterns of early caregiving matter

Parenting begets parenting
Parenting is Key

- **Parenting** provides a legacy that transcends **genes** (epigenetics)
- Parenting has a direct impact on our **cognitive potential**, as well as our **mental and physical health**
Epigenetics refers to the study of changes in the regulation of gene activity and expression that are not dependent on gene DNA sequence.

Three Main Components

- **DNA methylation**
- **Histone modifications**
- **Alterations of micro-RNA transcription**
Transformative Potential

Parental behavior as a source of behavioral plasticity in the offspring?

Parental care → Epigenetic marks → Gene expression → Behavior of the offspring as parents
Parenting is Key
Key priorities include: (1) to engage fathers and couples successfully, (2) to disaggregate process and impact data by fathers, mothers, and co-parents, and (3) to pay greater attention to issues of reach, sustainability, cost, equity, and scale-up. Greater focus on the role of fathers will constitute a game change in this field.
Stress Response  ➔  Bonding

Cortisol

Copyright © 2006 Nature Publishing Group
Nature Reviews | Neuroscience
Our affiliative and our stress response circuits are closely interconnected. When we are under threat, our natural response is to want to be with those we are closest to and we begin to see the ‘other’ as fundamentally ‘different’ and to stereotype members of that group as less than human.
A Sad Reality

United We Stand

Stamp 'Em Out!

You and I
A Sad Reality

Sadly, the media’s tendency to report and track frightening events often magnifies and reinforces this tendency. As a result, members of ‘other’ groups are regarded with a negative bias of suspicion and fear based solely on their ethnic, religious, racial, or national identity. *This evolutionarily conserved tendency is intensified during conflict and can be difficult to counteract.*
Early Childhood Matters

The Heckman Equation

RETURNS TO A DOLLAR INVESTED

- Programs targeted toward the earliest years
- Preschool programs
- Schooling
- Job training

Heckman, 2013
Outline

• Brain development
• *Nurturing Care*
• Parenting is a key
• *Another Reality – TOXIC STRESS*
• The Promise of Biomarkers…?
• *Next Steps – Theory of Change – ECPC*
Another Reality

Sadly, many children in our world Do Not Receive Adequate Nurturing Care. This reality is compounded by the situations of war, conflict, and migration to which families are exposed.
Sad but True

• More children than ever before—\textit{at least 357 million \textit{globally}}—are now living in areas affected by conflict (Save the Children, 2017)

• In addition, every year, hundreds of millions of children are exposed to and are victims of domestic violence, many of them exposed at an early age.
Over 200 million children under 5 years of will likely fail to reach their full development potential because they grow up in the context of **Toxic Stress:**

- *Poverty*
- Poor health and malnutrition
- *High levels of family and environmental stress and exposure to violence*
- Abuse, neglect and exploitation
- *Inadequate care and learning opportunities*

ACEs have been shown to increase rates of disease and disability due to heart disease, cancer, chronic lung disease, major depression, suicide, PTSD, drug & alcohol abuse, sexually transmitted diseases, as well as the inter-generational transmission of maltreatment, and a shorter life expectancy.

Putnam et al., 2015
Outline

• Brain development
• *Nurturing Care*
• Parenting is a key
• *Another Reality – TOXIC STRESS*
• The Promise of Biomarkers…?
• *Next Steps – Theory of Change – ECPC*
Biomarkers

Early Childhood Programs programs aimed at enhancing responsive parenting can reduce *adverse childhood experiences* (poor nutrition, neglect, abuse, and other forms of dysfunction in the home) can positively impact brain structure and function, our hormonal and immune systems, and even how our DNA is read and transcribed!
Biomarkers

- Epigenetic alterations of gene expression
- Altered neural & somatic development
- Altered stress patterns of stress response as well as our neuroendocrine & immune systems, as well as our microbiome
- Neuroinflammation (pro-inflammatory cytokines, etc)
- Coding dyadic interactions
DNA methylome variation in a perinatal nurse-visitation program that reduces child maltreatment: a 27-year follow-up

O’Donnell et al., Translational Psychiatry, 2018

This is a unique 27-year follow-up study of a randomized controlled trial of the Nurse Family Partnership program. Even after controlling for levels of household domestic violence, the intervention group showed altered patterns of methylation across the genome.
Hair Cortisol

Insecurity, distress and mental health: experimental and randomized controlled trials of a psychosocial intervention for youth affected by the Syrian crisis

*Catherine Panter-Brick, Rana Dajani, Mark Eggerman, Sabrina Hermosilla, Amelia Sancilio, & Alastair Ager

Hair cortisol concentrations in war-affected adolescents: A prospective intervention trial

*Psychoneuroendocrinology, 2018

Rana Dajani, Kristin Hadfield, Stanvan Uum, Michael Greff, Catherine Panter-Brick

- The authors conducted a randomized clinical trial of an 8-week, group-based psychosocial intervention with Syrian and Jordanian adolescents (12–18 years old) affected by the Syria crisis.

- The intervention focused stress attunement: (a) the establishment of a ‘safe space’ within the community; (b) opportunities for increased social support and self-expression; and (c) structured, group-based activities.
Hair Cortisol

Three trajectories of hair cortisol production of refugee and non-refugee youth (N = 733) were documented over the course of an 8-wk stress-attunement intervention. Trauma exposure predicted within-individual cortisol dysregulation. Effective interventions normalized cortisol production in war-affected adolescents.

Insecurity, distress and mental health: experimental and randomized controlled trials of a psychosocial intervention for youth affected by the Syrian crisis

*JCPP*, 2017

Catherine Panter-Brick, Rana Dajani, Mark Eggerman, Sabrina Hermosilla, Amelia Sancilio, & Alastair Ager

Hair cortisol concentrations in war-affected adolescents: A prospective intervention trial

*Psychoneuroendocrinology*, 2018

Rana Dajani, Kristin Hadfield, Stanvan Uum, Michael Greff, Catherine Panter-Brick
Hair Cortisol

Hair cortisol concentrations in war-affected adolescents: A prospective intervention trial

*Rana Dajani, Kristin Hadfield, Stanvan Uum, Michael Greff, Catherine Panter-Brick

Insecurity, distress and mental health: experimental and randomized controlled trials of a psychosocial intervention for youth affected by the Syrian crisis

*Catherine Panter-Brick, Rana Dajani, Mark Eggerman, Sabrina Hermosilla, Amelia Sancilio, & Alastair Ager
Coding Dyadic Interactions
Perspective

We are all interconnected in our ever changing world

Neural Circuits

Cosmic Dark Matter & Energy

Social Networks
Children who experience early adversity at increased risk to develop emotional and physical health problems across the lifespan.
Neuroinflammation

Nusslock & Miller, Neuro-immune Network
Neural-Immune Cross-Talk

We have also co-evolved with certain microbia (our *microbiome*). Indeed, we live with at least 10 times more non-human cells than human cells. The more we learn, the more we realize that our health and well-being depends in part on these organisms.
Gut-Brain Axis

Collins et al., 2012
Biomarkers?

• *Clear scientific merit* (objective, unbiased, progress toward gaining a deeper understanding of impact of toxic stress *vs.* positive responses to stress & resilience over the course of development)

• *Trade-offs* (potential ethical issues, need to fund long-term follow-up, need to find ways to fund, refine and sustain programs of proven value)
Outline

• Brain development
• *Nurturing Care*
• Parenting is a key
• *Another Reality – TOXIC STRESS*
• The Promise of Biomarkers...?
• *Next Steps – Theory of Change - ECPC*
This Series reviews new scientific evidence for interventions and proposes pathways for implementation of early childhood development programs at scale across the globe.

The 2017 *Lancet* Early Childhood Development Series highlights the importance of early childhood development if we are to achieve the 2030 Sustainable Development Goals.

“Young children’s healthy development depends on nurturing care—care which ensures health, nutrition, responsive caregiving, safety and security, and early learning.”
Next Steps

We need to take action to make our world a better place for our children and for future generations.

Next steps include a commitment to refine, adapt, and implement in a sustainable fashion responsive parent-child programs of proven value across the globe.

© 2018 Yale Child Study Center
A Theory of Change

High quality ECD services that focus on creating and sustaining nurturing environments can make a significant contribution to peacebuilding, social cohesion and sustainable development.
Early exposure to **TOXIC STRESS**

**SOCIETAL RISKS:**

Inequalities across cultures & genders; a loss of social cohesion; decreased trust; increased rates of violent crime; intergenerational cycles of poverty, unemployment & higher expenditures for child protective services, education, health care, & the criminal justice system.
Theory of Change

IF governments, institutions, organizations design & implement Early Child Development Programs that build context-specific, peace-relevant attitudes, skills & knowledge in children, family, and government institutions;
Then there will be: (1) increased horizontal & vertical cohesion; (2) a reduced risk of transgenerational transmission of violence; & (3) increased economic growth & sustainable development within communities as well as at national & international levels.
Next Steps - ECPC

The launch of Early Childhood Peace Consortium at the UN in New York brought together over 140 partners from multiple sectors (including civil society, the social and mass media (Sesame Workshop), government officials, multi- and bi-lateral agencies, as well as practitioners and academia), agencies and countries to “create a legacy of sustained peace drawing on the transformative power of early child development”
Next Steps - ECPC

The Launch of the Early Childhood Peace Consortium was at the UN Headquarters in New York City
Next Steps - NIHR

NIHR Research Group on ECD for Peacebuilding
Towards a More Peaceful World: The Promise of Early Child Development Programmes

James F. Leckman & Pia Rebello Britto

Editors, NDCAD, 2018
Outline

• Brain development
• Nurturing Care
• Parenting is a key
• Another Reality – TOXIC STRESS
• The Promise of Biomarkers...
• Next Steps – Theory of Change – ECPC
Thank you.....Questions?