UNDER P.A.R.:

The Biology Underlying Poverty, Adversity and Resilience

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CME Disclosures

• I do **NOT** intend to discuss off-label uses for FDA-approved products

• I do **NOT** have any financial relationships to disclose
My 3 Objectives For Today

• Explain how toxic stress mediates the relationship between childhood adversity and poor adult health

• Describe an “ecobiodevelopmental framework” and list its advantages

• Discuss the implications for:
  – family-centered pediatric medical home in an era of healthcare transformation
CHILD DEVELOPMENT:
a basic science for
PEDIATRICS

NOT A NEW IDEA!!

Julius Richmond

October 23, 1966

C. Anderson Aldrich Award
Have we translated what we **KNOW** into what we actually **DO**?
Dramatic Advance #1

Life-Course Science

Experiences in childhood (both good and bad) are strongly associated with behaviors, health and economic productivity ...

... DECADES LATER!
Linking **Childhood Experiences and Adult Outcomes**

**Childhood Experience**
- Parent Engagement
- Quality Childcare
- Play

**ACEs**
- Poverty
- Violence

**Adult Outcomes**
- Healthy Lifestyles
- Academic Success
- Economic Stability

**Childhood Experience** → **Adult Outcomes**
## ACE Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Women (n=9,367)</th>
<th>Men (n=7,970)</th>
<th>Total (17,337)</th>
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</thead>
<tbody>
<tr>
<td>Abuse</td>
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<tr>
<td>- Emotional</td>
<td>13.1%</td>
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<tr>
<td>- Physical</td>
<td>27.0%</td>
<td>29.9%</td>
<td>28.3%</td>
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<td>- Sexual</td>
<td>24.7%</td>
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<td>Household Dysfunction</td>
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<td>- Mother Treated Violently</td>
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<td>- Household Substance Abuse</td>
<td>29.5%</td>
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<td>- Household Mental Illness</td>
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<td>- Parental Separation or Divorce</td>
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<td>- Incarcerated Household Member</td>
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<td>4.1%</td>
<td>4.7%</td>
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<tr>
<td>Neglect*</td>
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<tr>
<td>- Emotional</td>
<td>16.7%</td>
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<tr>
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<td>9.2%</td>
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<td>9.9%</td>
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* Wave 2 data only (n=8,667)  
Data from [www.cdc.gov/nccdphp/ace/demographics](http://www.cdc.gov/nccdphp/ace/demographics)
ACEs Impact Multiple Outcomes

Risk Factors for Common Diseases:
- Smoking
- Alcoholism
- Promiscuity
- High Perceived Risk of HIV
- Obesity
- Illlicit Drugs
- IV Drugs
- Multiple Somatic Symptoms
- Poor Perceived Health

Prevalent Diseases:
- Cancer
- Liver Disease
- Chronic Lung Disease
- Skeletal Fractures
- Ischemic Heart Disease
- Sexually Transmitted Diseases

General Health and Social Functioning:
- Relationship Problems
- High perceived stress
- Difficulty in job performance
- Married to an Alcoholic

Mental Health:
- Depression
- Anxiety
- Panic Reactions
- Memory Disturbances
- Poor Anger Control

Sexual Health:
- Teen Paternity
- Teen Pregnancy
- Unintended Pregnancy
- Fetal Death
- Sexual Dissatisfaction

Sexual Health:
- Sexual Dissatisfaction

ACEs

Poverty
- Early Age of First Intercourse
- Poor Self-Rated Health
- Hallucinations
- Sleep Disturbances
- Memory Disturbances
- Poor Anger Control

Poor Perceived Health
- Illlicit Drugs
- IV Drugs
- Multiple Somatic Symptoms
- Poor Perceived Health

ACEs Impact Multiple Outcomes
Developing a Model of Human Health and Disease

Early childhood ecology strongly associates with lifelong developmental outcomes.

How do you begin to define or measure the ecology?

What are the mechanisms underlying these well-established associations?
Defining Adversity or Stress

• How do you define/measure adversity?

• Huge individual variability
  – Perception of adversity or stress (subjective)
  – Reaction to adversity or stress (objective)

• National Scientific Council on the Developing Child (Dr. Jack Shonkoff and colleagues)
  – Positive Stress
  – Tolerable Stress
  – Toxic Stress

  Based on the REACTION (objective physiologic responses)
Defining Adversity or Stress

- **Positive** Stress
  - Brief, infrequent, mild to moderate intensity
  - Most normative childhood stress
    - Inability of the 15 month old to express their desires
    - The 2 year old who stumbles while running
    - Beginning school or childcare
    - The big project in middle school
  - **Social-emotional buffers** allow a return to **baseline** (responding to non-verbal clues, consolation, reassurance, assistance in planning)
  - **Builds motivation and resiliency**
  - Positive Stress is NOT the **ABSENCE** of stress
Defining **Adversity** or **Stress**

- **Toxic Stress**
  - Long lasting, frequent, or strong intensity
  - More extreme precipitants of childhood stress (**ACEs**)
    - Physical, sexual, emotional abuse
    - Physical, emotional neglect
    - Household dysfunction
  - **Insufficient social-emotional buffering**
    (Deficient levels of emotion coaching, re-processing, reassurance and support)
  - Potentially permanent changes and long-term effects
    - **Epigenetics** (there are lifelong / intergenerational changes in how the genetic program is turned **ON** or **OFF**)
    - **Brain architecture** (the mediators of stress impact upon the mechanisms of brain development / **connectivity**)

Dramatic Advance #2

EPIGENETICS

• “Above the genome”

• Change in gene expression/no change in DNA sequence

• Larger revolution in genomic science
  - OLD VIEW = STATIC; NEW VIEW = PLASTIC (environ. input)

• Complex set of SWITCHES
  - Some are: Master; Dynamic; Programmed Early and Stable

“Genes load the gun; the environment pulls the trigger”

“Epigenetics: NOT your parents’ genome!”
Impact of Early Stress

- Maternal Stress

- Newborn HPA reactivity and salivary cortisol levels

- Methylation of the fetal glucocorticoid (GC) receptor gene

- Brain expression of the GC receptor
Through epigenetic mechanisms, the early childhood ecology becomes biologically embedded, influencing how/which genes are used
Dramatic Advance #3
Developmental Neuroscience

- **Brain Architecture** is experience dependent
  (individual connections or “synapses” and complex circuits of connections or “pathways” are both dependent upon activity)

- **Ecology** (environment/experience) influences how brain architecture is **formed** and **remodeled** (plasticity)

- **Diminishing cellular plasticity** limits remediation

- **Differential Maturation + Significant Adversity -> Vicious Cycle of Stress**

- **Early Experiences create potentially permanent alterations in brain architecture and functioning**
Impact of Early Stress

CHILDHOOD STRESS

Hyper-responsive stress response; calm/coping

Chronic “fight or flight;” cortisol / norepinephrine

Changes in Brain Architecture
Declining plasticity in the developing brain results in potentially permanent alterations in brain functioning and development.
Eco-Bio-Developmental Model of Human Health and Disease

**NOT:**
“What’s WRONG with you?

**BUT:**
“What’s HAPPENED to you?

*Ecology* Becomes *biology, development*
And together they drive *development* across the lifespan
The critical challenge now is to translate game-changing advances in developmental science into effective policies and practices for families with children to improve education, health, and lifelong productivity.
Advantages of an EBD Framework

• Though grounded in developmental science, the simplicity of the EBD framework may promote understanding as well as support for translation (early investments are the right thing to do biologically)

• Psychosocial stressors and other salient features of the ecology are every bit as biological as nutrition or lead (no distinction between mental and physical health, just healthy vs. unhealthy development)

• Emphasizes the dimension of time – to reflect the on-going, cumulative nature of benefits and threats to health, educational success, and economic productivity
Development results from an ongoing, re-iterative, and cumulative dance between nurture and nature.

Experience
Protective and Personal (versus Insecure and Impersonal)

Brain Development
Alterations in Brain Structure and Function

Epigenetic Changes
Alterations in the Way the Genetic Program is Read

Behavior
Adaptive or Healthy Coping Skills (vs. Maladaptive or Unhealthy Coping Skills)

Adapted from: Helping Foster and Adoptive Families Cope with Trauma
Advantages of an **EBD** Framework

• Underscores the need to improve the early childhood **ecology** in order to:
  – Mitigate the **biological** underpinnings for educational, health and economic **disparities**
  – Improve **developmental**/life-course trajectories
    • Changing the early childhood ecology will require a **PUBLIC HEALTH** approach ... and collaboration!!

• Highlights the pivotal role of **toxic stress**
  – Not just “**step on the gas**” / enrichment (**Ed model**)
  – But “**take off the brake**” by treating, mitigating or immunizing against toxic stress (**Med model**)
Critical Concept #2

Yin/Yang of Early Childhood:
- Protect the Brain
- Build New Skills

SE Buffers
Toxic Stress
Release the Brake!!
Step on the Gas!!
Reinventing the Wheel - All over again?

Models

Maslow’s Hierarchy of Needs
(Theoretical - 1943)

Needs

Self-Actualization

Need to know, explore and understand

Unmet needs are potential sources of STRESS!!
Adversity & Resilience

- **Adversity** leads to physiologic stress
  - Positive (if buffered by S/S/N relationships)
  - Toxic (if unmitigated by S/S/N relationships)

- **Resilience** is the ability to handle adversity in a healthy manner
  - In the absence of S/S/N relationships, toxic stress leads to maladaptive responses
  - In the presence of S/S/N relationships, positive stress builds motivation & resilience
  - It’s all about “relational health”
Childhood Experience

Safe, Stable and Nurturing Relationships
Social-Emotional Learning
Healthy Adaptations

Parent Engagement
Quality Childcare
Play

Toxic Stress
Epigenetic Modifications
Disruptions in Brain Architecture
Behavioral Allostasis

ACEs
Poverty
Violence

Adult Outcomes
Healthy Lifestyles
Academic Success
Economic Stability

Poor Health
Academic Failure
Economic Hardship
The **BIG** Questions are…

Since **TOXIC STRESS** mediates the association between **ACE exposure** and **poor adult outcomes**, it raises the following BIG questions:

- Are there ways to:
  - Treat,
  - Mitigate, and/or
  - Prevent toxic stress?

But the corollary is ...
The **BIG** Questions are...

Since **RELATIONAL HEALTH** is the antidote to toxic **stress**, it raises the following BIG questions:

- Are there ways to:
  - Repair,
  - Eliminate barriers to, and/or
  - Promote relational health?

- If so:
  - What does this mean for the **FAMILY-CENTERED PEDIATRIC MEDICAL HOME** during an era of healthcare transformation?
Decrease Toxic Stress / Promote Relational Health

• **Treating TS / Repairing RH**

  – Consequences are **Biological Mal-adaptations**
    (“what’s wrong with you,” vs “what’s happened to you”)

  – **PCIT** and **CPP** are evidence-based tx (RH)

  – Efficacy linked to age / chronicity (**brain plasticity**)

  – **REACTIVE** – mal-adaptations are happening!

  – **ACCESS** – interventions must be local
    - More **providers** / better **reimbursement** / advocacy
    - Need a **universal but local platform** (Medical homes? Schools?)
      - Better identification
      - Better coordination / communication between HC/ED/SS
New AAP Resource:

Trauma Toolbox for Primary Care

www.aap.org/TRAUMAGUIDE

1) Adverse Childhood Experiences and the Lifelong Consequences of Trauma
2) Addressing Adverse Childhood Experiences and other types of Trauma in the Primary Care Setting
3) The Medical Home Approach to Identifying and Responding to Exposure to Trauma
4) Bring Out the Best in Your Children
5) When Things aren’t Perfect: Caring for Yourself and Your Children
6) Protecting Physician Wellness: Working with Children Affected by Traumatic Events
7) Helping Foster and Adoptive Families Cope with Trauma
Mitigating TS / Reducing RH barriers

- Focused, targeted interventions for those deemed to be “at high” or the “highest risk”
- Home Visiting Programs (NFP, PAT, Child First, etc.)
- Parenting Programs (PPP, Nurturing Parenting, Legacy)
- Still issues with stigma; numbers of/access to providers/programs
- Who is “at high risk?” Requires screening

(Not perfect! No ‘OMNI-screen! Child vs Family? Dysfunction vs Risk?)

Decrease Toxic Stress / Promote Relational Health
### WHOM and WHAT are we screening for?

<table>
<thead>
<tr>
<th>Factors Increasing Risk of Dysfunction/Maladaptation</th>
<th>MEASURES of Dysfunction or Behavioral Maladaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Child</td>
<td>Behavioral measures (e.g., Baby Pediatric Symptom Checklist, ECSA)</td>
</tr>
</tbody>
</table>

#### How Far UPSTREAM Do We Want To GO?

- The Child
- Behavioral measures (e.g., Baby Pediatric Symptom Checklist, ECSA)
Preventing TS / Promoting RH

- Proactive, universal preventions to make stress positive, or tolerable instead of toxic
- Acknowledges that preventing all childhood adversity is impossible and even undesirable
- Models: 5Rs (EL), 7Cs (Resilience), Optimism, VIP
- SE Buffers allow the physiologic stress response to return to baseline
  - SEL skills for older children (www.casel.org)
  - Parenting/Caregiving skills for younger children
Social-Emotional Skills are Taught / Learned

THESE ARE THE RUDIMENTS OF RELATIONAL HEALTH

Illinois Learning Standards

Social/Emotional Learning (SEL)

The standards describe the content and skills for students in grades K - 12 for social and emotional learning. Each standard includes five benchmark levels that describe what students should know and be able to do in early elementary (grades K - 3), late elementary (grades 4 - 5), middle/junior high (grades 6-8), early high school (grades 9-10), and late high school (grades 11-12). These standards build on the Illinois Social/Emotional Development Standards of the Illinois Early Learning Standards.

These standards have been developed in accordance with Section 15(a) of Public Act 93-0495. This Act calls upon the Illinois State Board of Education to “develop and implement a plan to incorporate social and emotional development standards as part of the Illinois Learning Standards.”

Introduction

Goals

- Goal 1 - Develop self-awareness and self-management skills to achieve school and life success
- Goal 2 - Use social-awareness and interpersonal skills to establish and maintain positive relationships
Critical Concept #3

SOCIAL-EMOTIONAL SKILLS…
(a.k.a – Affect Regulation, Non-Cognitive Skills, Mindfulness)

...Are learned (they can be modeled, nurtured, taught, practiced, and reinforced)

...Effectively buffer against toxic stress
(by helping to turn off the physiologic stress response)

...Increase test scores
(an average of 11 points by meta-analysis!)
Parenting as **Primary** Prevention

- Promoting **PARENTING SKILLS** in the first 1000 days
  - Parenting is personal – makes pediatricians **NERVOUS**!
  - “Positive/Nurturing/Supportive” Parenting
  - A Poor investment?
    - Are parenting skills “**TEACHABLE**?” **YES!!**
    - Is there a “**CEILING EFFECT**” on returns?
  - Or the “**GOLD STANDARD**?”
    - Shouldn’t **SAFE, STABLE, and NURTURING RELATIONSHIPS** be THE reference point (NOT routine, general, or control populations)

- Significant Challenges:
  - Consensus re: what the basic, **BIOLOGICAL NEEDS** of children are
  - Utilize a **TWO GENERATION APPROACH** to meet those needs
  - Utilize a **PUBLIC HEALTH APPROACH** to match the **FAMILY’S NEEDS** with the indicated, local services
Social-Emotional Safety Nets
A Public Health Approach to “Toxic Stress”

Universal Primary Preventions
AG “Plus” (ROR / PFR / BF Grid)
Consistent messaging (CTC)
No identification
No stigma
Ceiling effects = Limited evidence base

Targeted Interventions
(for those “at risk”)
Home visiting (NFP/PAT)
Parenting programs (Legacy/PPP)
Early Intervention (Ideally!)
Less ceiling = More evidence
Requires screening
Issues with stigma

Evidence-Based Treatments
(for the symptomatic)
PCIT; TB-CBT; Pharmacotx
Treatment works!
Screening / stigma / access

ALL are necessary – NONE are sufficient!
A Broader Vision for Pediatrics?

NOT just about children ...  
But about their families and communities

NOT just about physical health ...  
But about social-emotional or relational health

NOT just about child development ...  
But about life course trajectories

NOT just about acute or chronic care ...  
But about proactively building WELLNESS ...  
... NOT a new idea!!
“The study of psychopathology and the management of disturbed children is a legitimate and socially necessary function. But pediatricians are concerned primarily with the developmental process and prevention, which I submit is a quite different frame of reference ...”

JULIUS RICHMOND, receiving the AAP’s Aldrich Award, October 23, 1966
Will it be “BACK TO THE FUTURE?”

“I refer to the dynamic development of individual differences in behavior patterns, the observation of child rearing practices and their consequences, the emergence of curiosity, learning patterns, coping behavior, and personality, and the capacities of children and families to master adversity.”

JULIUS RICHMOND, receiving the AAP’s Aldrich Award, October 23, 1966
<table>
<thead>
<tr>
<th>Type of Prevention</th>
<th>Chronic Care</th>
</tr>
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<tbody>
<tr>
<td><strong>Wellness Care</strong></td>
<td><strong>Tertiary</strong></td>
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<tr>
<td><strong>Acute, “Sick” Care</strong></td>
<td><strong>Indicated</strong></td>
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<tr>
<td><strong>Chronic Care</strong></td>
<td>(those who are diagnosed)</td>
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</table>

<table>
<thead>
<tr>
<th>Population</th>
<th>Primary Objective</th>
<th>Essential Elements</th>
<th>Example Resources</th>
<th>Possible Venues</th>
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<tbody>
<tr>
<td>Universal</td>
<td>To avoid the occurrence of disease</td>
<td>• Promote Wellness</td>
<td>Bright Futures, Connected Kids</td>
<td>Medical Homes</td>
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<tr>
<td>Selective or Targeted (those who are symptomatic)</td>
<td>To diagnose and treat disease in the early stages - before it causes significant morbidity or mortality</td>
<td>• AG “Plus” (to actively build foundational skills)</td>
<td>PALS, Algorithms for Dx/Tx</td>
<td>Urgicenters/RBCs</td>
</tr>
<tr>
<td>Indicated</td>
<td>To reduce negative impact of known disease by restoring function and reducing disease-related complications</td>
<td>• Ecobiodevelopmental Surveillance for Risk Factors</td>
<td>Health Supervision for Tri-21, Asthma, DM</td>
<td>School-based Health Clinics</td>
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<tr>
<td></td>
<td></td>
<td>• Immunizations</td>
<td></td>
<td>Emergency Departments</td>
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<td></td>
<td></td>
<td>• Early identification and diagnosis of disease</td>
<td></td>
<td>Urgicares/RBCs</td>
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<td></td>
<td></td>
<td>• Initial treatment or stabilization of disease</td>
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<td>Medical Homes</td>
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<tr>
<td></td>
<td></td>
<td>• On-going disease education and management</td>
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<td>Specialty Care Clinics</td>
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<tr>
<td></td>
<td></td>
<td>• Minimizing disease progression</td>
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**Example Resources**
- Bright Futures
- Connected Kids
- PALS
- Algorithms for Dx/Tx
- Health Supervision for Tri-21, Asthma, DM

**Possible Venues**
- Medical Homes
- Urgicenters/RBCs
- School-based Health Clinics
- Medical Homes
- Specialty Care Clinics

**Chronic Care**
- Health Supervision for Tri-21, Asthma, DM
  - Medical Homes
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<td><strong>Importance of Continuity (Therapeutic Partnership)</strong></td>
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<td><strong>Importance of Context (Social + Family Histories)</strong></td>
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<td><strong>Amenable to Algorithms</strong></td>
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<td><strong>Addressed in Training</strong></td>
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<td><strong>Incentivized Through Reimbursements</strong></td>
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<tr>
<td><strong>Long Term Returns on the Initial Investment</strong></td>
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</table>
A Pivotal Point for Pediatrics:

“Back to the Future?” ... or “Oh, Canada!”

Pediatrics:
1) Reclaims “wellness care”
2) Embraces a broader vision
3) Collaborates and even coordinates local efforts to proactively build wellness

Pediatrics:
1) Is relegated to consult care
2) Surrenders “wellness care”
3) Remains “silo-ed” – with little connection to social and educational services
A Broader Mission for Pediatrics?

To support and empower parents, caregivers and communities as they nurture their children’s development

This mission will require:

• A nested/layered/tiered/’public health’ approach

• A “train the trainer” or 2GEN approach *(it’s all about relationships!)*

• A grass-roots, community-based, team approach
To remain relevant and to bring value to an emerging “well-care” system, pediatrics must:

- **Bridge the gap between what we know and what we do** (translate the science)
- **Give parents what they want** (developmental reassurance and guidance)
- **Focus on WELLNESS** – and that demands a public health approach and medical homes that are integrated into (if not actually coordinating) the broader efforts of their local communities
CONCLUSION:

It is easier to build strong children than to repair broken men.

Frederick Douglass
TABLE DISCUSSIONS: I

• **IN THE NEXT 10 MINUTES:**

• **INTRODUCTIONS** around your table:
  – Name, Organization, Position

• **Share 1 INITIAL THOUGHT** from the talk:
  – Was there one item or comment that struck you?
  – Was there something that you did not know?
  – Did you begin to view something in a different manner?
TABLE DISCUSSIONS: II

IN THE NEXT 20 MINUTES:

IDENTIFY A RECORDER/REPORTER:
- To keep track of all the good ideas being shared at your table
- To briefly report out to the larger group at the end

DISCUSS THE FOLLOWING, IN ORDER:

1. What are the precipitants of childhood toxic stress / barriers to relational health in your particular community?
2. What is your practice already doing to address these precipitants / barriers? What more could you probably do?
3. Recognizing that the FCPMH cannot address these issues alone, who are the groups, stakeholders and individuals that need to be engaged to move forward on at least 1 issue? What might that issue be (e.g., cyberbullies, maternal depression, NAS)?
TABLE DISCUSSIONS: III

• IN THE NEXT 20 MINUTES:

• EACH TABLE GIVES A BRIEF REPORT
  – 2-3 MINUTES

• REPORTERS:
  – PLEASE SHARE NOVEL COMMENTS THAT HAVE NOT
    BEEN MADE BY THE OTHER TABLES

  – PLEASE TURN IN YOUR NOTES AT THE END
Developing a Shared “VISION”

Toxic Stress

It’s like a snake!

It’s like a tree trunk!

It’s like a straw fan!
Public Health Implications

• What we **DO:**
  – 95% of the trillions of dollars that we spend on health is on **treatment** and **NOT prevention**

• What we **KNOW:**
  – That **70% of early deaths are preventable**, with...
  – The **majority (40% overall)** due to **behavioral patterns** that lead to **chronic disease**.
  – Is this **Behavioral Allostasis** due to toxic stress?

McGinnis, Williams-Russo and Knickman, 2002
Proximal Causes of Death: Chronic Disease

EXHIBIT 2
Total Deaths And Age-Adjusted Death Rates (Per 100,000 Population) For The Fifteen Leading Causes Of Death In The Total U.S. Population, 2003

<table>
<thead>
<tr>
<th>Cause</th>
<th>Number of deaths (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases of heart</td>
<td>(232.3)</td>
</tr>
<tr>
<td>Malignant neoplasms (cancer)</td>
<td>(190.1)</td>
</tr>
<tr>
<td>Cerebrovascular diseases (stroke)</td>
<td>(53.5)</td>
</tr>
<tr>
<td>Chronic lower respiratory diseases</td>
<td>(43.3)</td>
</tr>
<tr>
<td>Accidents (unintentional injuries)</td>
<td>(37.3)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>(25.3)</td>
</tr>
<tr>
<td>Influenza and pneumonia</td>
<td>(22.0)</td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td>(21.4)</td>
</tr>
<tr>
<td>Nephritis, nephrotic syndrome, nephrosis</td>
<td>(14.4)</td>
</tr>
<tr>
<td>Septicemia</td>
<td>(11.6)</td>
</tr>
<tr>
<td>Intentional self harm (suicide)</td>
<td>(10.8)</td>
</tr>
<tr>
<td>Chronic liver disease and cirrhosis</td>
<td>(9.3)</td>
</tr>
<tr>
<td>Essential hypertension/hypertensive renal disease</td>
<td>(7.4)</td>
</tr>
<tr>
<td>Parkinson’s disease</td>
<td>(6.2)</td>
</tr>
<tr>
<td>Assault (homicide)</td>
<td>(6.0)</td>
</tr>
</tbody>
</table>

**Acute causes of death are the exception, not the rule**


**NOTE:** Numbers in parentheses are age-adjusted death rates per 100,000 population.
Distal Causes of Death: Unhealthy Lifestyles

Table 2. Actual Causes of Death in the United States in 1990 and 2000

<table>
<thead>
<tr>
<th>Actual Cause</th>
<th>No. (%) in 1990*</th>
<th>No. (%) in 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>400 000 (19)</td>
<td>435 000 (18.1)</td>
</tr>
<tr>
<td>Poor diet and physical inactivity</td>
<td>300 000 (14)</td>
<td>400 000 (16.6)</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>100 000 (5)</td>
<td>85 000 (3.5)</td>
</tr>
<tr>
<td>Microbial agents</td>
<td>90 000 (4)</td>
<td>75 000 (3.1)</td>
</tr>
<tr>
<td>Toxic agents</td>
<td>60 000 (3)</td>
<td>55 000 (2.3)</td>
</tr>
<tr>
<td>Motor vehicle</td>
<td>25 000 (1)</td>
<td>43 000 (1.8)</td>
</tr>
<tr>
<td>Firearms</td>
<td>35 000 (2)</td>
<td>29 000 (1.2)</td>
</tr>
<tr>
<td>Sexual behavior</td>
<td>30 000 (1)</td>
<td>20 000 (0.8)</td>
</tr>
<tr>
<td>Illicit drug use</td>
<td>20 000 (&lt;1)</td>
<td>17 000 (0.7)</td>
</tr>
<tr>
<td>Total</td>
<td>1 060 000 (50)</td>
<td>1 159 000 (48.2)</td>
</tr>
</tbody>
</table>

*Data are from McGinnis and Foege.† The percentages are for all deaths.

If these unhealthy lifestyles are manifestations of behavioral allostasis, a **FUNDAMENTAL** cause of death is **TOXIC STRESS**!
By 2030, **90%** of the morbidity in high income countries will be due to **NCDs (Non-Communicable Diseases)**.

NCDs are due to **unhealthy behaviors** (overeating/inactivity, smoking, alcohol, and substance abuse).
How/When do those automatic processes form in the first place!??
Critical Concept #4

Do we continue to treat disease,
the unhealthy lifestyles that lead to disease,
or the TOXIC STRESS that leads to the adoption of unhealthy lifestyles??
What is Toxic Stress?

- A physiologic stress response that is excessive or prolonged (reflects an inability to “turn it off”)

- Results in potentially permanent changes in:
  - Gene expression (epigenetics)
  - Brain development (neuroscience)
  - Behavior (allostasis)
SUMMARY

Why should we care?

- **Toxic stress** is a **MEDIATOR** between early childhood **adversity** and less than optimal outcomes in **learning**, **behavior** and **health**

- Understanding the **BIOLOGY** underlying these well established associations opens up new opportunities for **primary prevention** and **early intervention**
Linking Childhood Experiences and Adult Outcomes

**Toxic Stress**
- Epigenetic Modifications
- Disruptions in Brain Architecture

**Behavioral Allostasis**
- Maladaptive behaviors
- Non-communicable Diseases

Improve caregiver/community capacity to prevent or minimize toxic stress (e.g., efforts to promote the safe, stable and nurturing relationships that turn off the physiologic stress response)

Improve caregiver/community capacity to promote healthy, adaptive coping skills (e.g., efforts to encourage rudimentary but foundational SE, language, and cognitive skills)
SUMMARY

• What can we do about it?

- **EDUCATION** – for providers, trainees, families, the general public and business/philanthropic communities (re: science, TS, and EBD frame)

- **MESSAGING** – be a “convener” (ala CTC); develop a shared “vision” locally to support a public health approach towards toxic stress

- **ADVOCACY** – partner with like-minded stakeholders to “incentivize” wellness/relational health, population health, and long-term outcomes

- **RESEARCH** – basic (non-invasive biomarkers, personalized med), clinical (standardized screens – not just for the child, but the family; not just for dysfunction, but those at risk), and translational (medical homes, schools, communities are integrated vertically and horizontally)

- **PRACTICE TRANSFORMATION** – promote wellness (over chronic/acute care), support families, develop QI/MOC Learning Collaboratives
POLICY MAKER INSIGHT: YOU make the call!

<table>
<thead>
<tr>
<th></th>
<th>HEALTHCARE</th>
<th>SOCIAL SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD</td>
<td>$1</td>
<td></td>
</tr>
<tr>
<td>U.S.A.</td>
<td>$1</td>
<td></td>
</tr>
</tbody>
</table>

AN URGENT CALL FOR ADVOCACY!!

- Not all healthcare dollars are **the same**!
- This **distinction** is part of the problem!
- Who, at the local level, is able to begin **integrating** health and human services?
- New models of **payment** (population level wellness)
- New models of **collaboration** (Healthleads)
Since there are known, established ways to treat, mitigate and even prevent toxic stress, WHY ARE WE NOT DOING THEM?! 

- “They cost too much” or “TS is not my concern”
  When kids don’t fulfill their potential, we ALL lose

- “Defensiveness” (“It’s not MY fault” or “It’s THEM!”)
  Toxic stress is not restricted by race, wealth, zip code

- “Too complicated”
  The biology suggests that it is all about relationships

- “Too hard”
  1) understand the science, 2) advocate for a public health approach, 3) develop a shared language/vision