Toxic Stress and the Medical Home

R. Neal Davis, MD
Pediatrician, Hillcrest Pediatrics, Intermountain Healthcare

Objectives:
• Describe the impact of psychosocial stress on children over the life course
• Define a frame work for how the medical home can impact these stresses
• Identify evidence-based practices within a pediatric medical home that can positively alter the life course trajectory at health and wellness for a child
Toxic Stress and the Medical Home
Objective

- Discuss the impact of toxic stress (psychosocial stress) on children
- Discuss evidenced-based practices to address toxic stress (psychosocial stress)
Life Course Theory

Health And Wellness

- Prenatal
- Birth
- Childhood
- Adulthood

Optimal Trajectory

Sub-optimal Trajectory
Life Course Theory - Biomedical

- **Epigenetics**

  - **Epigenetic Mechanisms** are affected by these factors and processes:
    - Development (in utero, childhood)
    - Environmental chemicals
    - Drugs/Pharmaceuticals
    - Aging
    - Diet

  - **Health Endpoints**
    - Cancer
    - Autimmune disease
    - Mental disorders
    - Diabetes

  - **DNA methylation**
    - Methyl group (an epigenetic factor found in some dietary sources) can tag DNA and activate or repress genes.

  - **Histone modification**
    - The binding of epigenetic factors to histone "tails" alters the extent to which DNA is wrapped around histones and the availability of genes in the DNA to be activated.

  - **Histones** are proteins around which DNA can wind for compaction and gene regulation.
**Life Course Theory - ACE**

- **Adverse Childhood Experiences Studies (ACE)**
  - Felliti, Anda
  - 18,000 respondents
  - Kaiser, San Diego

![Graph showing life course trajectory]

- Optimal Trajectory
- Sub-optimal Trajectory

- Prenatal
- Birth
- Childhood
- Adulthood
# Categories of ACE

<table>
<thead>
<tr>
<th>Abuse, by Category</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological (by parents)</td>
<td>11%</td>
</tr>
<tr>
<td>Physical (by parents)</td>
<td>11%</td>
</tr>
<tr>
<td>Sexual (anyone)</td>
<td>22%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household Dysfunction, by Category</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance Abuse</td>
<td>26%</td>
</tr>
<tr>
<td>Mental Illness</td>
<td>19%</td>
</tr>
<tr>
<td>Mother Treated Violently</td>
<td>13%</td>
</tr>
<tr>
<td>Imprisoned Household Member</td>
<td>3%</td>
</tr>
</tbody>
</table>
ACE Score

Number of categories adverse childhood experiences are summed …

<table>
<thead>
<tr>
<th>ACE score</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>48%</td>
</tr>
<tr>
<td>1</td>
<td>25%</td>
</tr>
<tr>
<td>2</td>
<td>13%</td>
</tr>
<tr>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>4 or more</td>
<td>7%</td>
</tr>
</tbody>
</table>

• More than half have at least one ACE
Adverse Childhood Experiences

% Alcoholic as Adult

ACE Score as Child

0 1 2 3 4+

0 2 10 16 18
<table>
<thead>
<tr>
<th>Outcomes Associated with Adverse Childhood Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoholism and alcohol abuse</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease (COPD)</td>
</tr>
<tr>
<td>Depression</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Fetal death</td>
</tr>
<tr>
<td>Health-related quality of life</td>
</tr>
<tr>
<td>Illicit drug use</td>
</tr>
<tr>
<td>Ischemic heart disease (IHD)</td>
</tr>
<tr>
<td>Liver disease</td>
</tr>
<tr>
<td>Risk for intimate partner violence</td>
</tr>
<tr>
<td>Multiple sexual partners</td>
</tr>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Sexually transmitted diseases (STDs)</td>
</tr>
<tr>
<td>Smoking</td>
</tr>
<tr>
<td>Suicide attempts</td>
</tr>
<tr>
<td>Unintended pregnancies</td>
</tr>
<tr>
<td>Early initiation of smoking</td>
</tr>
<tr>
<td>Early initiation of sexual activity</td>
</tr>
<tr>
<td>Adolescent pregnancy</td>
</tr>
</tbody>
</table>
ACE Study- Conceptual Model

Mechanisms by Which Adverse Childhood Experiences Influence Health and Well-being Throughout the Lifespan
Disrupted Stress Response

- Suglia et al 2009, Arch Pediatr Adolesc Med
- Maternal intimate partner violence and increased asthma incidence in children: buffering effects of supportive caregiving.
Toxic Stress - Psychosocial Stress

- Are there evidence based strategies to help?
Social Ecological Model
The pediatric medical home is only as effective as its ability to reach into the real home and/or proximal environment of a child.
Caregiver Capacity

Risk and Resilience

Optimal Trajectory

Sub-optimal Trajectory

Health And Wellness

Prenatal Birth Childhood Adulthood

Promote Resilience

Reduce Risk

Promote Resilience

Reduce Risk
Risk and Resilience

Optimal Trajectory

Sub-optimal Trajectory

Health And Wellness

- Prenatal
- Birth
- Childhood
- Adulthood

Promote Resilience
Reduce Risk
Risk and Resilience

Health And Wellness

Prenatal Birth Childhood Adulthood

NCQA 2014

Optimal Trajectory
Sub-optimal Trajectory

Reduce Risk
Promote Resilience
Safe Environment for Every Kid (SEEK)

- SEEK Model- Identify psychosocial risk and use team-based medical home
  - Parent Questionnaire at Well Child Visits
  - Motivational Interviewing
  - Team based care
SEEK Outcomes

- SEEK I- Randomized Controlled Trial in at risk population
- Results
  - Fewer reports to CPS compared to regular care (nearly one half)
  - Fewer reports of severe or very severe physical assault compared to regular care (one third)
  - Decreased psychological aggression
  - Decreased medical neglect (non-adherence to medical care and delayed vaccines)
Dear Parent or Caregiver: Being a parent is not always easy. We want to help families have a safe environment for kids. So, we’re asking everyone these questions. They are about problems that affect many families. If there’s a problem, we’ll try to help.

Please answer the questions about your child being seen today for a checkup. If there’s more than one child, please answer “yes” if it applies to any one of them. This is voluntary. You don’t have to answer any question you prefer not to.
• PLEASE CHECK
• □ Yes □ No  Do you need the phone number for Poison Control?
• □ Yes □ No  Do you need a smoke detector for your home?
• □ Yes □ No  Does anyone smoke tobacco at home?
Parent Questionnaire

- □ Yes □ No  In the last year, did you worry that your food would run out before you got money or Food Stamps to buy more?
- □ Yes □ No  In the last year, did the food you bought just not last and you didn’t have money to get more?
Parent Questionnaire

- □ Yes □ No  Do you often feel your child is difficult to take care of?
- □ Yes □ No  Do you sometimes find you need to hit/spank your child?
- □ Yes □ No  Do you wish you had more help with your child?
- □ Yes □ No  Do you often feel under extreme stress?
Parent Questionnaire

- □ Yes □ No  In the past month, have you often felt down, depressed, or hopeless?
- □ Yes □ No  In the past month, have you felt very little interest or pleasure in things you used to enjoy?
Parent Questionnaire

- □ Yes □ No  In the past year, have you been afraid of your partner?
- □ Yes □ No  In the past year, have you had a problem with drugs or alcohol?
- □ Yes □ No  In the past year, have you felt the need to cut back on drinking or drug use?
- □ Yes □ No  Are there any other problems you’d like help with today?
Parent Questionnaire

2 Week Visit Questionnaire

Medications:

Over the counter medications/vitamins:

What are your concerns?

What do you feed your baby? __________

How often does your baby feed during the day? __________ At night: __________

Who cares for your baby during the day? __________

Is your baby sleepy while feedings? Y N

Does your baby sleep with stuffed animals, pillows, or heavy blankets? Y N

Does your baby ride rear facing in the back seat in his/her car seat 100% of the time? Y N

Is your baby passing soft, comfortable stools? Y N

Does your baby have a predictable, very hungry period each day or night? Y N

What works well to console your baby? __________

Do you have specific concerns about your baby’s development, learning, or behavior? Y N

If yes, describe: __________

How would you describe your parenting experience so far?

Circle the tasks your baby is able to do:

- Focus on your face during feeding
- Hear and respond to noises
- Lift head when sitting

Being a parent is not always easy. We want to help families have a safe environment for kids. We are asking everyone these voluntary questions, which affect many families. Please answer the following questions about your child being seen today, or any child in the home. Do not answer if you prefer not to.

Do you have the phone number for Poison Control, 1-800-222-1222 In your phone? Y N

Do you have a smoke detector and fire extinguisher In your home? Y N

Does anyone smoke tobacco at home? Y N

In the past year, did you worry that your food would run out before you got money or food stamps to buy more? Y N

In the last year, did you run out of food before you had money to get more? Y N

Do you often feel your child is difficult to take care of? Y N

Do you sometimes find you need to hit/punch your child? Y N

Do you wish you had more help with your child? Y N

Do you feel your child is over/under weight? Y N

In the past month, have you felt sad, down, or hopeless? Y N

In the past month, have you felt like you had no hope, or that life was not worth living? Y N

In the past year, have you been afraid of your partner? Y N

In the past year, have you or anyone who cares for your child had a problem with drugs or alcohol? Y N

Are there any other problems you would like help with today? Y N
**PARENT SCREENING QUESTIONNAIRE**

**Dear Parent or Caregiver:** Being a parent is not always easy. We want to help families have a safe environment for kids. We are asking everyone these questions. They are about problems that affect many families. If there is a problem, we'll try to help.

Please answer the questions about your child being seen today. If there is more than one child, please answer "yes" if it applies to any of them. This is voluntary and you don’t have to answer any question you prefer not to.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have the phone number for Poison Control, 1-800-222-1222 in your phone?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Do you have a smoke detector and fire extinguisher in your home?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Does anyone smoke tobacco at home?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>In the last year, did you worry that your food would run out before you got money or Food Stamps to buy more?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>In the last year, did you run out of food before you had money to get more?</td>
<td>Y ~ Almost</td>
<td></td>
</tr>
<tr>
<td>Do you often feel your child is difficult to take care of?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Do you sometimes find you need to hit/spank your child?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Do you wish you had more help with your child?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Do you often feel under extreme stress?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>In the past month, have you often felt down, depressed, or hopeless?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>In the past month, have you felt little interest or pleasure in things you used to enjoy?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>In the past year, have you been afraid of your partner?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>In the past year, have you or anyone who cares for your child had a problem with drugs or alcohol?</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Are there any other problems you would like help with today?</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>
PARENT SCREENING QUESTIONNAIRE

Dear Parent or Caregiver: Being a parent is not always easy. We want to help families have a safe environment for kids. We are asking everyone these questions. They are about problems that affect many families. If there is a problem, we’ll try to help.

Please answer the questions about your child being seen today. If there is more than one child, please answer “yes” if it applies to any of them. This is voluntary and you don’t have to answer any question you prefer not to.

Do you have the phone number for Poison Control, 1-800-222-1222 in your phone?  
   N  

Do you have a smoke detector and fire extinguisher in your home?  
   N  

Does anyone smoke tobacco at home?  
   Y  

In the last year, did you worry that your food would run out before you got money or Food Stamps to buy more?  
   N  

In the last year, did you run out of food before you had money to get more?  
   Y  

Do you often feel your child is difficult to take care of?  
   N  

Do you sometimes find you need to hit/slap/kick your child?  
   Y  

Do you wish you had more help with your child?  
   N  

Do you often feel under extreme stress?  
   N  

In the past month, have you often felt down, depressed, or hopeless?  
   Y  

In the past month, have you felt little interest or pleasure in things you used to enjoy?  
   Y  

In the past year, have you been afraid of your partner?  
   Y  

In the past year, have you or anyone who cares for your child had a problem with drugs or alcohol?  
   N  

Are there any other problems you would like help with today?  
   Y

[Signature]
SEEK Outcomes

- **SEEK II**
  - Community practices
  - Selected Well Child Visits
    - 2 months, 9 months, 15 months, 2 year, 3 year, 4 year, 5 year

- **Results**
  - No difference in time spent addressing psychosocial issues
  - Greater provider confidence/efficiency
SEEK and Intermountain

- License to use
- Training
  - MOC part 2
  - MOC part 4
  - CME
  - [http://theinstitute.umaryland.edu/seek/corematerials.cfm](http://theinstitute.umaryland.edu/seek/corematerials.cfm)
SEEK and Intermountain

- **Team-based care**
  - Identifying local resources, 211
  - Care Management training
  - Mental Health Integration
- **Email me**
  - Neal.Davis@imail.org
Health And Wellness

Risk and Resilience

Prenatal Birth Childhood Adulthood

Optimal Trajectory

Sub-optimal Trajectory

Reduce Risk

Promote Resilience
Risk and Resilience

Health And Wellness

Optimal Trajectory

Sub-optimal Trajectory

Promote Resilience

Reduce Risk

Prenatal Birth Childhood Adulthood
Resilience

- Suglia et al 2009, Arch Pediatr Adolesc Med
- Maternal intimate partner violence and increased asthma incidence in children: buffering effects of supportive caregiving.
Resilience in Pediatrics

- Build parent/caregiver capacity for nurturing and engaging relationships
Reach Out and Read

- National non-profit organization
- Focus on early literacy, language, and nurturing
- Evidence-based
  - 15 peer reviewed studies
  - Greatest impact in families of low SES
- Anecdotal awesomeness
Reach Out and Read

- Child is given an age appropriate book
  - Well child visits 6 months through 5 years of age
- Reading is demonstrated
  - Building parent/caregiver capacity
  - Part of a developmental assessment
- Doctors teach parents about the importance of reading to children
  - Media use
  - “Nurturing Gap”
Reach Out and Read

- North Ogden, Logan
- Nuts and Bolts
  - Funding
    - Intermountain Fund
    - Provider contribution
    - Community organizations
- Hillcrest, Holladay, Bryner, Kearns, Memorial, Mountainview
  - Sandy pending
- Email me
  - Neal.Davis@imail.org
Combined Risk/Resilience Interventions

Health And Wellness

Prenatal  Birth  Childhood  Adulthood

Optimal Trajectory

Sub-optimal Trajectory

Promote Resilience

Reduce Risk
Combined Risk/Resilience Interventions

- Optimal Trajectory
- Sub-optimal Trajectory

Health And Wellness

- Prenatal
- Birth
- Childhood
- Adulthood

Promote Resilience
Reduce Risk
Nurse Family Partnership

- David Olds et al.- Nurse home visits for high risk populations
  - Elmyra, NY
  - Memphis
  - Denver
- RNs visited homes of first time mothers starting in pregnancy and extending to age 2 of child
- New York Study
  - Avg 9 prenatal visits
  - Avg 23 postnatal visits
Nurse Family Partnership

- Birth: 79% fewer preterm deliveries
- 21 months: 50% reduction in language delays
- Age 6: 67% reduction in behavioral and intellectual problems
- Grades 1-6: 20 point increase in reading and math GPA
- 48% reduction in child abuse and neglect
- Age 15: 59% fewer arrests
- Age 18: 69% reduced use of cigarettes, alcohol or marijuana in the past 30 days

Diagram:
- Macrosystem: Attitudes, beliefs, and heritage of the culture
- Exosystem: Extended family
- Mesosystem: Day care center, family (parents & siblings)
- Microsystem: Friends, peers, school
- Child: Neighborhood play area, community services, parents' workplace
Combined Risk/Resilience Interventions

- But is a medical home supposed to run a visiting nurse program?
- What resources do we have in our community?
  - Utah Department of Health Nurse Family Partnership
  - Utah Youth Village, Parents as Teachers
- Email me
  - Neal.Davis@imail.org
Early Childhood Education

- Perry Preschool Study- Ypsilanti, Michigan
- At age 40 follow-up
  - 46 percent less likely to have been in jail/prison (28% vs. 52%)
  - 33 percent lower arrest rate for violent crimes (32% vs. 48%)
  - 42 percent higher median monthly income ($1,856 vs. $1,308)
  - 26 percent less likely to have received government assistance (e.g. welfare, food stamps) in the past ten years (59% vs. 80%)
But is a medical home supposed to run a preschool?

What resources do we have in our community?
- Children’s Center therapeutic preschool
- Early Head Start, Head Start, Parents as Teachers
- Others

Matching resources to risk

Doesn’t have to occur after delays
Primary Prevention

- 1. SEEK- PSQ
- 2. Reach out and read
- 3. Nurse home visits or similar programs
- 4. Early childhood education interventions
Secondary Prevention

- Developmental Surveillance
  - Identify signs of developmental delay
  - Screen for underlying psychosocial risk factors
  - Use team-based care to link to resources
Secondary Prevention

- Mental Health Integration
  - Behavior problems, ADHD, Depression, ODD, Somatic symptoms
  - Screen for ACEs/psychosocial stress
Toxic Stress and the Medical Home

The power of a pediatric medical home is:

- Trust
- Team
# Toxic Stress and the Medical Home

<table>
<thead>
<tr>
<th>Nurse</th>
<th>SEEK/PQ Screening</th>
<th>Reach out and read</th>
<th>Mental Health Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td>Developmental Surveillance</td>
<td>Early Intervention</td>
<td></td>
</tr>
<tr>
<td>Partnership</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prenatal</th>
<th>Birth</th>
<th>1 year</th>
<th>2 years</th>
<th>3 years</th>
<th>4 years</th>
<th>5 years</th>
<th>6 years...</th>
</tr>
</thead>
</table>
Toxic Stress and the Medical Home

Nurse Family Partnership

SEEK/PQ Screening Developmental Surveillance

Reach out and read Early Intervention

Mental Health Integration

Prenatal Birth 1 year 2 years 3 years 4 years 5 years 6 years...
Toxic Stress and the Medical Home

Nurse Family Partnership

SEEK/PQ Screening
Developmental Surveillance
Reach out and read
Early Intervention
Mental Health Integration

Prenatal Birth 1 year 2 years 3 years 4 years 5 years 6 years...
Toxic Stress and the Medical Home

Nurse Family Partnership

SEEK/PQ Screening
Developmental Surveillance
Reach out and read
Early Intervention
Mental Health Integration

Prenatal Birth 1 year 2 years 3 years 4 years 5 years 6 years...
Action Items

- Safe Environment for Every Kid/ Parent Questionnaire
  - Email me if interested: Neal.Davis@imail.org

- Reach Out and Read
  - Email me if interested: Neal.Davis@imail.org

- Nurse Family Partnership
  - Email me if interested: Neal.Davis@imail.org

- Standardize developmental surveillance

- Adopt Mental Health Integration
Victor Hugo

- The gamin
• The gamin is a beauty and, at the same time, a disease of the nation— a disease that must be cured.
• How? By light.
• Light makes whole.
• Light enlightens...
• Give them light, so they can give you warmth.