Early Adversity and Lifelong Health: Risk & Resilience

Sarah Enos Watamura, Ph.D.
Our mission is to advance SEED Science, an approach to understanding stress, early experiences and development that promotes intergenerational health, wellbeing and resilience by fostering rigorous interdisciplinary, policy-relevant research with collaborative community partners.
Plan for Today

1) Early adversity can have life-long consequences for individuals and society

2) Intergenerational transmission of adversity

3) Resilience, relationships & the Toxic Stress Framework

4) The power of parents

5) Sensitive periods across the lifespan

6) Prevention
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Long-term Effects of Chronic Stress

- influences susceptibility to or progression of a number of diseases:
  - cardiovascular disease (Smith & Ruiz, 2002)
  - diabetes (Mooy, 2000)
  - infectious illness (Cohen & Williamson, 1991)

- increases the risk of "risk":
  - obesity (Brunner et al., 2007)
  - decreases immune function (Segerstrom & Miller, 2004)
  - Increased metabolic syndrome (Chandola, Brunner, Marmot, 2006)

- can impair cognitive functioning:
  - memory (Lupien et al., 1998)
  - attention (Liston, McEwen, & Casey, 2009)

- increases risk for mental health problems:
  - depression (Siegrist, 2008)
  - anxiety (Eisenberg, 2007)

- can accelerate aging:
  - shorter telomere length, less telomerase activity (Epel et al., 2004)
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Cellular Aging
Risk Factors’ Effect on Life Expectancy

- Smoking 10 years\textsuperscript{1}
- Obesity 6-7 years\textsuperscript{2, 3}
- High blood pressure 5 years\textsuperscript{4}
- Diabetes 7-8 years\textsuperscript{5}

Risk Factors’ Effect on Life Expectancy

- Smoking 10 years\(^1\)
- Obesity 6-7 years\(^2\), \(^3\)
- High blood pressure 5 years\(^4\)
- Diabetes 7-8 years\(^5\)
- Childhood Stress 20 years

Childhood Stress Effects:
Evidence from the ACE Study

For more information: http://www.cdc.gov/ace/
Adverse Childhood Experiences (ACEs) Summit: BC and Beyond

Location:
Sheraton Wall Centre
1088 Burrard Street
Vancouver, BC V6Z 2R9

Date:
November 14, 2017 to November 15, 2017

The Summit, organized by the Shared Care Committee (a partnership of Doctors of BC and the BC government) looks at taking action to address Adverse Childhood Experiences with improved policies and practices.
HOW COMMON ARE ACES?

Almost two-thirds of adults surveyed reported at least one Adverse Childhood Experience – and the majority of respondents who reported at least one ACE reported more than one.
Table 5. Prevalence of each adverse childhood experience and reporting of additional ACES

<table>
<thead>
<tr>
<th>Adverse childhood experience</th>
<th>n</th>
<th>Prevalence (%)</th>
<th>Additional ACES</th>
<th></th>
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<tbody>
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<td>0</td>
<td>≥1</td>
<td>≥2</td>
<td>≥3</td>
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<td></td>
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<tr>
<td>Abuse</td>
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<tr>
<td>Emotional abuse</td>
<td>198</td>
<td>16.9</td>
<td>18</td>
<td>9.0</td>
<td>180</td>
<td>91.0</td>
<td>151</td>
<td>76.2</td>
<td>110</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>128</td>
<td>11.0</td>
<td>9</td>
<td>6.9</td>
<td>119</td>
<td>93.1</td>
<td>107</td>
<td>83.7</td>
<td>85</td>
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<tr>
<td>Sexual abuse</td>
<td>174</td>
<td>14.9</td>
<td>33</td>
<td>19.0</td>
<td>141</td>
<td>81.0</td>
<td>110</td>
<td>63.1</td>
<td>75</td>
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<tr>
<td>Household dysfunction</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Domestic violence</td>
<td>153</td>
<td>13.1</td>
<td>8</td>
<td>5.2</td>
<td>145</td>
<td>94.8</td>
<td>122</td>
<td>79.8</td>
<td>99</td>
</tr>
<tr>
<td>Household substance abuse</td>
<td>242</td>
<td>20.7</td>
<td>37</td>
<td>15.3</td>
<td>205</td>
<td>84.7</td>
<td>158</td>
<td>65.2</td>
<td>109</td>
</tr>
<tr>
<td>Mental illness in household</td>
<td>241</td>
<td>20.6</td>
<td>40</td>
<td>16.7</td>
<td>201</td>
<td>83.3</td>
<td>151</td>
<td>62.6</td>
<td>103</td>
</tr>
<tr>
<td>Physical illness in household</td>
<td>190</td>
<td>16.3</td>
<td>79</td>
<td>41.6</td>
<td>111</td>
<td>58.4</td>
<td>77</td>
<td>40.4</td>
<td>51</td>
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<tr>
<td>Parental separation or divorce</td>
<td>205</td>
<td>17.6</td>
<td>47</td>
<td>23.0</td>
<td>158</td>
<td>77.0</td>
<td>117</td>
<td>57.0</td>
<td>79</td>
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<tr>
<td>Median</td>
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<td>16.0</td>
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<tr>
<td>Range</td>
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<td>5.2-41.6</td>
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</tbody>
</table>

Types of ACES

The ACE study looked at three categories of adverse experience: childhood abuse, which included emotional, physical, and sexual abuse; neglect, including both physical and emotional neglect; and household challenges, which included growing up in a household where there was substance abuse, mental illness, violent treatment of a mother or stepmother, parental separation/divorce or had a member of the household go to prison. Respondents were given an ACE score between 0 and 10 based on how many of these 10 types of adverse experience to which they reported being exposed.

**ABUSE**

- Emotional: 11%
- Physical: 28%
- Sexual: 21%

**HOUSEHOLD CHALLENGES**

- Mother treated violently: 13%
- Substance abuse: 27%
- Mental illness: 19%
- Separation/divorce: 23%
- Incarcerated household member: 5%

**NEGLECT**

- Emotional: 15%
- Physical: 10%
As ACEs increase, so does risk for:

- Alcoholism and alcohol abuse
- Chronic obstructive pulmonary disease
- Depression
- Fetal death
- Health-related quality of life
- Illicit drug use
- Ischemic heart disease
- Liver disease
- Poor work performance
- Financial stress
- Risk for intimate partner violence
- Multiple sexual partners
- Sexually transmitted diseases
- Smoking
- Suicide attempts
- Unintended pregnancies
- Early initiation of smoking
- Early initiation of sexual activity
- Adolescent pregnancy
- Risk for sexual violence
- Poor academic achievement
ACES CAN HAVE LASTING EFFECTS ON BEHAVIOR & HEALTH...

Simply put, our childhood experiences have a tremendous, lifelong impact on our health and the quality of our lives. The ACE Study showed dramatic links between adverse childhood experiences and risky behavior, psychological issues, serious illness and the leading causes of death.

The following charts compare how likely a person with 1, 2, 3, or 4 ACEs will experience specified behaviors than a person without ACEs.

*Having an ACE score of zero does not imply an individual could not have other risk factors for these health behaviors/diseases.

PHYSICAL & MENTAL HEALTH
- SEVERE OBESITY
- DIABETES
- DEPRESSION
- SUICIDE ATTEMPTS
- STDs
- HEART DISEASE
- CANCER
- STROKE
- COPD
- BROKEN BONES

BEHAVIORS
- LACK OF PHYSICAL ACTIVITY
- SMOKING
- ALCOHOLISM
- DRUG USE
- MISSED WORK

ACE SCORE 0

ACE SCORE 1

ACE SCORE 2

ACE SCORE 3

ACE SCORE 4
<table>
<thead>
<tr>
<th>ACE risk profile category(^a)</th>
<th>Mental health condition/Addiction</th>
<th>Circulatory condition</th>
<th>Respiratory condition</th>
<th>Chronic pain condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk abuse, high risk household dysfunction</td>
<td>aOR (95% CI)(^b)</td>
<td>uOR (95% CI)</td>
<td>aOR (95% CI)</td>
<td>uOR (95% CI)</td>
</tr>
<tr>
<td></td>
<td>2.64 (1.49, 4.67)</td>
<td>3.56 (2.16, 5.87)</td>
<td>1.18 (0.69, 2.02)</td>
<td>0.89 (0.58, 1.37)</td>
</tr>
<tr>
<td>High risk abuse, low risk household dysfunction</td>
<td>aOR (95% CI)(^b)</td>
<td>uOR (95% CI)</td>
<td>aOR (95% CI)</td>
<td>uOR (95% CI)</td>
</tr>
<tr>
<td></td>
<td>3.20 (1.94, 5.28)</td>
<td>3.41 (2.18, 5.34)</td>
<td>0.85 (0.54, 1.34)</td>
<td>1.04 (0.72, 1.49)</td>
</tr>
<tr>
<td>High risk abuse and high risk household dysfunction</td>
<td>aOR (95% CI)(^b)</td>
<td>uOR (95% CI)</td>
<td>aOR (95% CI)</td>
<td>uOR (95% CI)</td>
</tr>
<tr>
<td></td>
<td>4.13 (2.53, 6.74)</td>
<td>4.70 (3.06, 7.24)</td>
<td>1.04 (0.65, 1.67)</td>
<td>0.99 (0.68, 1.43)</td>
</tr>
<tr>
<td>Omnibus p-value for ACE risk profile variable (adjusted model)(^b)</td>
<td>&lt;0.001</td>
<td>0.786</td>
<td>0.051</td>
<td>&lt;0.001</td>
</tr>
</tbody>
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\(^a\) Reference group: Low risk abuse, low risk household dysfunction

\(^b\) Adjusted for income, education, employment status, marital status, number of children in household, born in Canada, ethnicity, community type, gender, and age.
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Prenatal Stress Hormone Exposure & Newborn Stress Responsivity

- Infants exposed to low prenatal maternal cortisol exhibited a rapid decrease in infant behavioral state, reaching baseline levels within 3 minutes.
- Infants exposed to high prenatal maternal cortisol showed a delayed decrease in infant behavioral state, with a peak at 1 minute followed by a gradual decline.

Graph shows the time (in minutes) on the x-axis and infant behavioral state on the y-axis, with two lines representing the two groups: low and high prenatal maternal cortisol.
Even While Sleeping, Infants Track Family Conflict

Maternal ACE Score in Early Head Start Sample

- 32, 22% (6+ or 0)
- 28, 19% (4 or 5)
- 27, 18% (3)
- 18, 12% (2)
- 30, 20% (1)
- 13, 9% (0)

Legend:
- 0
- 1
- 2
- 3
- 4 or 5
- 6+ or 0
Figure 11. Percentage of Parents Reporting Child Needs Mental Health Services. *Note. *statistically significant
Figure 13. Odds of ADD/ADHD and Externalizing Behavior Problems by Parental ACE Score.
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The ACE Story

Lifetime prevalence of depression by ACE Score

0 ACES

5+ ACES
The Other Side of the ACE Story

Lifetime prevalence of depression by ACE Score

0 ACES

5+ ACES
Resilience

Better than expected outcomes, given assessments of risk
THE MOST IMPORTANT RESOURCE?

• Buffering Relationships
The “Toxic Stress” Framework

- A framework offered by:
  - pediatrician Jack Shonkoff
  - pediatrician and researcher Tom Boyce
  - basic science researcher Bruce McEwen
  - (Shonkoff, Boyce & McEwen, 2009)
Positive, Tolerable, Toxic

- **Positive Stress:** Moderate, short-lived increases in heart rate, blood pressure, and stress hormone levels
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• **Tolerable Stress:** A physiological state that could potentially disrupt brain architecture but is buffered by supportive relationships that facilitate adaptive coping.
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- **Tolerable Stress:** A physiological state that could potentially disrupt brain architecture but is buffered by supportive relationships that facilitate adaptive coping.

- **Toxic Stress:** Strong, frequent, and/or prolonged activation of the body’s stress-response systems in the absence of the buffering protection of adult support.
What is “Toxic Stress”? 

- When chronic or significant stressors happen (particularly in childhood)....

AND, buffering relationships are not available.
ACEs & Toxic Stress
How to Talk About Toxic Stress?
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Investing in Children

- Early life is the first and likely most important sensitive period
- Early adversity is linked to life-long well-being
- Because we have good ROI data
- Because it is intuitive
Recognition of the Importance of Brain Development in Adolescence

Substantial structural and functional remodeling within:

- Limbic and cortical regions
- Hippocampus
- Amygdala
Focus is often on Limitations.....

- Decision making
- Risk taking
- Emotion regulation...
Focus is often on Limitations.....BUT!

- Decision making
- Risk taking
- Emotion regulation...

- Adolescence is also a positive, sensitive period!
Stress in Early Life & Adolescence: Adulthood Health

- Minnesota Longitudinal Project of Risk and Adaptation

- Age 32 health especially impacted when stress occurred both in early life and in adolescence

- Positive parenting reduced these effects

Parenting Changes Your Brain!
Neural Changes in Support of Parenting

• Work from animal models and human mothers and fathers reveals major structural and important functional neural changes that:
  – Change the way stress is handled
  – Promote positive emotions and bonding
  – Increase parental motivation
  – Promote caregiving behaviors

• Changes have been documented in the reward circuit, the emotion regulation circuit and the social information processing circuit
Example: Changes in the Reward Circuit
Changes in the Reward Circuit

- New mothers and fathers during the first few months postpartum exhibit **structural growth** of the reward circuit.

- The **amount of the growth is associated with positive feelings** mothers reported about their baby (e.g. beautiful, perfect).

- More **functional brain activity** in this region also occurs when looking at pictures of one’s own vs. other infants.
The Social Information Circuit
Emotion Regulation Circuits
Changes in the Emotion Regulation Circuits
Neural Associations in Stressed Parents

- Decreased responses to infant cries and images is associated with chronic stress, depression and substance abuse among parents.
Interacion of Early & Later Adversity Exposure

Fig. 2. Cumulative risk over time of cardiovascular disease events by the level of exposure to childhood psychosocial adversity and adult neighborhood disadvantage.

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WHAT DOES IT TAKE TO STOP THE INTERGENERATIONAL TRANSMISSION OF TOXIC STRESS?
Apply a Public Health Lens

• Solutions to public health problems need:
  – Community buy-in and understanding
  – Effective policy
  – Government support and perhaps regulation
  – Business and legal support
  – Practical solutions (CBOs/NGOs)
  – Targeted prevention & intervention programs
  – Knowledgeable screening and referral by front line supports to families
  – An active, flexible, innovative research community
  – ALL OF US
Child Abuse and Neglect

British Columbia Specific Information

Physical, verbal, or sexual abuse at any time, at any age, or in any relationship is not ok.

Call 9-1-1 or your local emergency number if you or someone you know is in immediate danger from assault or abuse. To speak to someone confidentially and to get more information, call HealthLink BC at 8-1-1 or contact one of the services below.

- **Helpline for Children**
  If a child anywhere in B.C. needs help, call the Helpline at 310-1234 any time of the day or night to speak to a social worker, no area code is needed. If you are deaf or hearing impaired, call 1-866-660-0505 for TTY services. This is a toll-free service, and there is no charge to call the operator if you need to call from a pay phone. This helpline is available for children, parents, and other community members to report abuse. For more information, visit HelpLine for Children.

- **Kids Help Phone**
  Children and teens can call the Kids Help Phone to speak to a counsellor day or night at 1-800-668-6868. Counsellors are available to speak to anonymously about concerns with abuse and can help children and teens call the police or child protective services. For more information about the resources and support available visit Kids Help Phone.

- **VictimLink BC**
  If you or someone you know are a victim of crime and need more information or support, call VictimLink BC at 1-800-563-0808 for toll-free, confidential, multilingual service available 24 hours a day.

Want More Information?

HealthLink BC, your provincial health line, is as close as your phone or the web any time of the day or night, every day of the year.

Call 8-1-1 toll-free in B.C. or for deaf and hearing-impaired, call 7-1-1.

You can speak with a health service navigator, who can also connect you with a:
- registered nurse any time, every day of the year;
- registered dietitian from 9am to 5pm PT, Monday to Friday;
- qualified exercise professional from 9am to 5pm PT, Monday to Friday;
- pharmacist from 5pm to 9am PT, every day of the year.

Translation services are available in more than 130 languages.
Prevention Recommendations: BC, Canada

Prevention tips for parents and caregivers

- Learn how to handle children when they misbehave. Avoid using physical punishment. Parenting classes are offered in most communities. Ask your doctor or call a local hospital for more information.
- Learn healthy ways to resolve conflicts and manage stress. For more information, see the topic Stress Management.
- Ask for help when you need it. Call a family member or friend to give you a break if you feel overwhelmed. Find out about community resources that can help you with child care or other services. Call a doctor or local hospital for information.
- Get treatment if you were ever a victim of abuse. Treatment can help problems like depression, alcohol or drug use problems, or violent behaviour.
- Remove firearms and other dangerous weapons from your home.
- Learn more about how children grow at different stages in their lives. For example, lack of knowledge about why babies cry can make the crying a trigger for shaken baby syndrome.

Prevention tips for everyone

- Get to know the children in your neighbourhood. Learn their names, and show you care simply by waving to them or asking about how they're doing at home and school.
- Give parents a break. Relieve a friend, neighbour, or relative who is feeling overwhelmed with child care and other issues.
- Learn the signs of child abuse and neglect.
- Encourage your community to offer services to help families who are at risk for abuse or neglect.
- Volunteer in child abuse programs.
First, Prevention (CDC Recommendations, U.S.)

CDC Prevention Strategies

| Economic supports for families |
| Changing social norms: support families & positive parenting |
| Provide early high quality care & education |
| Enhance parenting skills |
| Intervene to lessen harms & prevent future risk |
| Sector involvement |
| Monitoring & Evaluation |

Solutions Should Tackle Stressors AND Buffers

• 1) Can you reduce the adversity, particularly the structural inequity?
   – Cash transfer
   – Neighborhood safety
   – Workforce development
   – .....
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• 2) Can you reduce the uncontrollability or unpredictability of the stressors (make threat into challenge)
   – Increase agency, efficacy
   – Support goal-setting, planning
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  – Support goal-setting, planning

• 3) Can you increase social/relational buffering
  – Of parents
  – By parents
Acknowledgements

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Ariel Julian
Tasha Link
Allison Stiles
Brian Wolff
Samantha Brown
Questions?

Now, or later – I’m easy to find!

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