Adverse Childhood Experiences:
Drug Use and Crime in West Virginia

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What would it take...
TREATING CHILDHOOD TRAUMA

Oprah Winfrey reports on how trauma plays a role in childhood development and what new methods are being used to help kids who have experienced it.

In 1850, a Catholic orphanage called St. Aemilian was founded in Milwaukee, Wisconsin to take in children whose parents had died in a cholera epidemic. 168 years later, that same organization -- now known as "SaintA" -- is still finding shelter for thousands of children who need it, often kids who have deep trauma in their young lives, and helps those kids with a revolutionary approach that’s spreading across the country.
Adverse Childhood Experiences Study (ACE Study)

• Maybe the most important study of which most Americans are unaware
• What is unrecognized in the pediatric exam room shows up in the internal medicine exam room decades later
• Measures 10 categories of childhood abuse and neglect
  • Abuse (3): Emotional, physical, or sexual
  • Neglect (2): Emotional or physical
  • Dysfunction (5):
    • One or both biological parents missing from the household
    • Domestic violence specifically toward the mother
    • Mental illness in the household
    • Substance use in the household
    • Incarcerated members in the household

• [http://www.cdc.gov/violenceprevention/acestudy](http://www.cdc.gov/violenceprevention/acestudy)
ACE Study Findings
ACE Scores Linked to Physical & Mental Health Problems

Compared with people with no ACEs, those with 4 or more ACEs were:

- 2x more likely to smoke
- 2x more likely to have cancer or heart disease
- 6x more likely to be depressed
- 6x more likely to have had sex before age 15
- 7x more likely to be alcoholics
- 10x more likely to inject drugs
- 12x more likely to have attempted suicide
- Men with 6 or more ACEs were 46 times more likely to have injected drugs than men with no history of adverse childhood experiences

ACE Questions (1-3)

• During your first 18 years of life

1. Did a parent or other adult in the household often ... Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?

2. Did a parent or other adult in the household often ... Push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured?

3. Did an adult or person at least 5 years older than you ever... Touch or fondle you or have you touch their body in a sexual way? or Try to or actually have oral, anal, or vaginal sex with you?
ACE Questions (4-6)

4. Did you **often** feel that ...
   No one in your family loved you or thought you were important or special? **or** Your family didn’t look out for each other, feel close to each other, or support each other?

5. Did you **often** feel that ...
   You didn’t have enough to eat, had to wear dirty clothes, and had no one to protect you? **or** Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

6. Were your parents **ever** separated or divorced?
ACE Questions (7-10)

7. Was your mother or stepmother:
   - Often pushed, grabbed, slapped, or had something thrown at her? or
   - Sometimes or often kicked, bitten, hit with a fist, or hit with something hard? or
   - Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?

8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?

9. Was a household member depressed or mentally ill or did a household member attempt suicide?

10. Did a household member go to prison?
The ACE Score and a Lifetime History of Depression

Information from the original ACE Study

Percent depressed (%) vs. ACE Score:
- Women (pink bars)
- Men (light blue bars)

ACE Score categories:
- 0
- 1
- 2
- 3
- >=4

Slide courtesy of Robert Anda and Vincent Felitti
Information from the original ACE Study

The ACE Score and the Prevalence of Attempted Suicide

- Percent attempted (%)
- ACE Score

Slide courtesy of Robert Anda and Vincent Felitti
Information from the original ACE Study

Adverse Childhood Experiences and Current Smoking

ACE Score

%
Information from the original ACE Study

ACE Score and Drug Abuse

Percent With Health Problem (%)

ACE Score
- 0
- 1
- 2
- 3
- 4
- >=5

Ever had a drug problem
Ever addicted to drugs
Ever injected drugs
Information from the original ACE Study

ACE Score and Indicators of Impaired Worker Performance

- **ACE Score**
  - 0
  - 1
  - 2
  - 3
  - 4 or more

- **Prevalence of Impaired Performance (%)**
  - Absenteeism (>2 days/month)
  - Serious Financial Problems
  - Serious Job Problems

The diagram illustrates the relationship between ACE scores and various indicators of impaired worker performance, showing a significant increase in prevalence with higher ACE scores.
Economic Burden

- The lifetime costs associated with child maltreatment alone have been estimated at $210,012 to $1.8 million per child due to associated health, behavioral health, educational impairments, increased involvement in criminal justice, child welfare, social welfare systems, and lost work productivity.


Reduction in Annual Earnings from Selected Health Events (2009 Dollars)

- Obesity: $1,938
- Teen pregnancy: $1,129
- Smoking: $2,306
- Child maltreatment: $5,855

Traumatic Stress and Brain Alterations

• Traumatic stress is associated with increased cortisol and norepinephrine responses to subsequent stressors.

• Traumatic stress, particularly at sensitive periods of development, can be associated with lasting changes in certain brain areas.

• These brain alterations can predispose to addiction.

Disruptions in three areas of the brain are particularly important in the onset, development, and maintenance of substance use disorders:

- the basal ganglia
- the extended amygdala
- the prefrontal cortex
Traumatic Stress Impact on Brain

Stressor activates the Amygdala

- HPA Axis
- Release of Cortisol
  - Heart races
  - Blood goes to muscles
  - Digestion shuts down
  - Memory impacted

The brain under stress: structural remodeling

- Prefrontal cortex
  - Atrophy
- Hippocampus
  - Amygdala
  - Hypocampus, hypertrophy and later atrophy

Slides courtesy of Michelle Hoersch
Neurophysiology of Trauma

**The Limbic System**

- Corpus callosum
- Fornix
- Pineal gland
- Cingulate gyrus
- Parahippocampal gyrus
- Hippocampus
- Amygdaloid body

Involved in:
- Learning
- Memory
- Reward
- Reinforcement

Regulates:
- Hormones
- Mood
- Heartbeat
- Sexual Behavior

Fight – Flight – Freeze

Slides courtesy of Michelle Hoersch
Epigenetics: Sperm-transmitted stress in Children

• 2018 study: Tufts University

• Exposure to early life trauma can elevate risk for poor physical and mental health in individuals and their children.

• Some of the vulnerability in children may derive from stress-associated reductions in microRNAs in their father's sperm

• 28 Caucasian male volunteers, the expression of two highly related sperm miRNAs, miR-449 and miR-34, were inversely proportional to the men's ACE scores.

• Men with the most extensive early abuse (highest ACE scores) had as much as a 300-fold reduction in the two sperm miRNAs compared to men with the least abuse.

• 

  Exodus 34:7 ESV- “Keeping steadfast love for thousands, forgiving iniquity and transgression and sin, but who will by no means clear the guilty, visiting the iniquity of the fathers on the children and the children’s children, to the third and the fourth generation.”

Correlation: Opioid/Heroin Use and ACEs

- **1998 ACE study Kaiser Permanente and CDC**
  - People with ACE $\geq 3$: much greater likelihood of engaging in substance abuse, domestic violence and suicidal attempts, were more likely to be obese, to have dropped out of school, be divorced and to have diabetes, cancer and heart disease. ACE $\geq 6$: 4600% more likely to use intravenous drugs relative to ACE of zero.

- **2016 study**
  - People with ACE $\geq 5$, were 3x more likely to misuse prescription pain medication and 5x more likely to engage in injection drug use.

- **2009 study**
  - over 80% of patients seeking treatment for opioid addiction had at least one form of childhood trauma, with almost 2/3 reporting having witnessed violence in childhood.

KCHD Survey

• Distributed via press (newspaper, television, radio, web) and e-mail.
• Conducted via web-based tool from November 12-28, 2015.
• Purpose: to open a discussion on the role of adverse childhood experiences (ACEs) on our major public health problems through a snapshot survey. Not intended to be a full community cross-section.
Important Points

• Relevance of ACEs to public health problems. What this means and what it doesn’t mean.

• Think of ACE score the social equivalent of cholesterol level
  • Drug and alcohol use can happen in families with an ACE score of zero.
  • We do not want people to blame or shame parents for these issues.
  • On a population level, there is a clear correlation and biological connection between ACEs and health outcomes in adults.
Results from the KCHD Informal Survey

Respondents: N= 506
Female 76%
Male 24%

White 95%
African American 1.6%
Native American 1.4%
Asian/PI 1.2%

Other states:
KY, TN, OH, VA, CA, MI
What is your age?

Answered: 502   Skipped: 4
Summary statistics from ACE

- 72% of patients reported at least one ACE event
- Over 1 in 4 patients had a score of 4 or more
- ACEs are extremely common and relevant to the public health problems
Hillbilly Elegy

A Memoir of a Family and Culture in Crisis

J.D. Vance
Comparison between the original ACE study and our survey results

<table>
<thead>
<tr>
<th>ACE Category*</th>
<th>Total (N = 17,337)</th>
<th>HRC N = 199</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Abuse</td>
<td>10.6</td>
<td>34</td>
</tr>
<tr>
<td>Physical Abuse</td>
<td>28.3</td>
<td>30</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>20.7</td>
<td>20</td>
</tr>
<tr>
<td>Neglect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Neglect</td>
<td>14.8</td>
<td>36</td>
</tr>
<tr>
<td>Physical Neglect</td>
<td>9.9</td>
<td>19</td>
</tr>
<tr>
<td>Household Dysfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother Treated Violently</td>
<td>12.7</td>
<td>26</td>
</tr>
<tr>
<td>Household Substance Abuse</td>
<td>26.9</td>
<td>53</td>
</tr>
<tr>
<td>Household Mental Illness</td>
<td>19.4</td>
<td>31</td>
</tr>
<tr>
<td>Parental Separation or Divorce</td>
<td>23.3</td>
<td>39</td>
</tr>
<tr>
<td>Incarcerated Household Member</td>
<td>4.7</td>
<td>28</td>
</tr>
</tbody>
</table>
66% of patients reported at least one ACE event
39% patients had a score of 4 or more
ACEs are more common and severe among patients in the Harm Reduction Clinic than in the referent population.
# ACEs in Children: 2016 National Survey of Children’s Health

## TABLE 1: National and Across-State Prevalence of ACEs among Children and Youth

<table>
<thead>
<tr>
<th>Adverse Childhood Experiences (ACEs)</th>
<th>National Prevalence, by Age of Child</th>
<th>Range Across States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Children</td>
<td>Age 0-5</td>
</tr>
<tr>
<td>Child had ≥ 1 Adverse Childhood Experience</td>
<td>46.3%</td>
<td>35.0%</td>
</tr>
<tr>
<td>Child had ≥ 2 Adverse Childhood Experiences</td>
<td>21.7%</td>
<td>12.1%</td>
</tr>
</tbody>
</table>

 Nine assessed on the 2016 NSCH[^1] | % with 1+ Additional ACEs |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Somewhat often/very often hard to get by on income[^*]</td>
<td>25.5%</td>
</tr>
<tr>
<td>Parent/guardian divorced or separated</td>
<td>25.0%</td>
</tr>
<tr>
<td>Parent/guardian died</td>
<td>3.3%</td>
</tr>
<tr>
<td>Parent/guardian served time in jail</td>
<td>8.2%</td>
</tr>
<tr>
<td>Saw or heard violence in the home</td>
<td>5.7%</td>
</tr>
<tr>
<td>Victim of violence or witnessed neighborhood violence</td>
<td>3.9%</td>
</tr>
<tr>
<td>Lived with anyone mentally ill, suicidal, or depressed</td>
<td>7.8%</td>
</tr>
<tr>
<td>Lived with anyone with alcohol or drug problem</td>
<td>9.0%</td>
</tr>
<tr>
<td>Often treated or judged unfairly due to race/ethnicity[^**]</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

[^*]: 47% of children in households with poverty level incomes have parents who reported “often hard to get by on income”.
[^**]: 1 in 10 black and “other” race/ethnicity children had parents who reported their children often were treated or judged unfairly. 4.4% of Hispanic and Asian/Non-Hispanic children had parents who reported this (1% for white children)

# ACEs in Children: 2016 National Survey of Children’s Health

## TABLE 2: Prevalence of ACEs by Race/Ethnicity and Income

<table>
<thead>
<tr>
<th></th>
<th>All Children</th>
<th>White, NH⁺</th>
<th>Hispanic</th>
<th>Black, NH⁺</th>
<th>Asian, NH⁺</th>
<th>Other, NH⁺</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of all US children</td>
<td>51.9%</td>
<td>24.5%</td>
<td></td>
<td>12.7%</td>
<td>4.5%</td>
<td>6.3%</td>
</tr>
<tr>
<td>% 1+ ACEs</td>
<td>46.3%</td>
<td>40.9%</td>
<td>51.4%</td>
<td>63.7%</td>
<td>25.0%</td>
<td>51.5%</td>
</tr>
<tr>
<td>% 2+ ACEs</td>
<td>21.7%</td>
<td>19.2%</td>
<td>21.9%</td>
<td>33.8%</td>
<td>6.4%</td>
<td>28.3%</td>
</tr>
<tr>
<td>% among children with 1+ ACES</td>
<td>46.0%</td>
<td>27.0%</td>
<td>17.4%</td>
<td>2.4%</td>
<td>7.1%</td>
<td></td>
</tr>
<tr>
<td>Income &lt; 200% of Federal Poverty Level (43.7% of all US children; 58% of children with 1+ ACEs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% 1+ ACEs</td>
<td>61.9%</td>
<td>63.3%</td>
<td>57.0%</td>
<td>70.5%</td>
<td>36.4%</td>
<td>70.6%</td>
</tr>
<tr>
<td>% 2+ ACEs</td>
<td>31.9%</td>
<td>34.7%</td>
<td>25.1%</td>
<td>39.9%</td>
<td>9.0%</td>
<td>44.4%</td>
</tr>
<tr>
<td>Income 200-399% of Federal Poverty Level (26.8% of all US Children; 25.1% of children with 1+ ACEs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% 1+ ACEs</td>
<td>43.2%</td>
<td>39.7%</td>
<td>46.8%</td>
<td>59.1%</td>
<td>24.8%</td>
<td>50.7%</td>
</tr>
<tr>
<td>% 2+ ACEs</td>
<td>19.0%</td>
<td>17.2%</td>
<td>19.8%</td>
<td>29.4%</td>
<td>7.0%</td>
<td>24.5%</td>
</tr>
<tr>
<td>Income ≥ 400% of Federal Poverty Level (29.5% of all US Children; 17.0% of children with 1+ ACEs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% 1+ ACEs</td>
<td>26.4%</td>
<td>24.4%</td>
<td>35.5%</td>
<td>41.2%</td>
<td>14.3%</td>
<td>27.3%</td>
</tr>
<tr>
<td>% 2+ ACEs</td>
<td>9.2%</td>
<td>8.6%</td>
<td>12.1%</td>
<td>14.1%</td>
<td>3.6%</td>
<td>10.5%</td>
</tr>
</tbody>
</table>

*NH⁺=Non-Hispanic


## SOCIAL AND EMOTIONAL CHALLENGES COMPOUNDED

- Compared to those with no ACEs, children ages 3-5 with 2+ ACEs are over four times more likely to have three or more of the six social and emotional challenges that can impact learning listed in Figure 1.
- About two-thirds of children ages 6-17 who bully, pick on, or exclude other children—or are themselves bullied, picked on, or excluded—have ACEs.¹¹

## SCHOOL SUCCESS IMPACTED

- More than three in four (76.3 percent) U.S. children ages 3-5 who were expelled (“asked to stay home”) from preschool had ACEs.
- Children ages 6-17 with no ACEs are half as likely to be disengaged in school compared to those with 2+ ACEs (24.1 percent vs. 49.0 percent).¹¹
Percent of Children Age 0-5 with One or More Adverse Childhood Experiences in the US

Nationwide: 35.0%
State Range: 23.1%–49.1%
Percent of Children Age 0-17 with One or More Adverse Childhood Experiences in the US

Nationwide: 46.3%
State Range: 38.1%–55.9%

Percent of Children Age 0-17 or with Two More Adverse Childhood Experiences in the US

Nationwide: 21.7%
State Range: 15.0%–30.6%
Why aren’t we asking the questions?
Evidenced-based Interventions

Effective preventive interventions reduce exposure to adversity and strengthen resilience to adverse circumstances

**Home Visiting Programs** effective at reducing child abuse, neglect, and domestic violence and improving health outcomes for children and parents

**Nurse Family Partnership (NFP)**

- **48%** Reduction in rates of abuse and neglect
- **56%** Reduction in emergency room visits
- **79%** Reduction in children days hospitalized with injuries and ingestions during first two years of life


Slides courtesy of Michelle Hoersch
Evidenced-based Interventions

The Positive Parenting Program (Triple P)

- Intervention provides parents with tools to raise healthier children and deal with stressors
- Demonstrated to reduce rates of child maltreatment by over 20%
- Decreased out of home placements and childhood injuries


Slides courtesy of Michelle Hoersch
Evidenced-based Interventions

**Parent Child Interaction Therapy**

- Tool to assist parents improve quality of parent-child interaction and relationship
- Shown to reduce child abuse in participants (19% reported abuse) versus individuals in the control conditions (49% reported abuse) at a median follow-up of up to 850 days


Slides courtesy of Michelle Hoersch
Non-pharmacologic practices: Children and Adults

- Exercise
  - Regulation of HR and BP
  - Regulation of the hypothalamic-pituitary axis (HPA)
  - Decrease depression and anxiety
  - Regulation of cerebral neurotransmitters including dopamine and serotonin
  - Endorphin release

- Mindfulness-based awareness training
  - Regulation of HR, BP, and HPA
  - Anti-inflammatory effects
  - Decreases depression and anxiety
  - Decrease post-traumatic symptoms
Bottom lines

- ACEs are common but often completely overlooked.

- What is overlooked in the exam room, the classroom, and other places shows up in courts, emergency departments, and on the streets.

- Shifting the dialogue from “What’s wrong with them?” to “What happened to them?”

- Shifting the perspective from judgment to compassion.