Adverse Childhood Experiences: Increased Risk for Tobacco or Substance Use

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School of Medicine & School of Social Work

13th National Reduce Tobacco Use Conference
Life isn’t Good or Bad; It is Just Stressful!

Source: AlbertaFamilyWellness.org/ToxicStress
Questions to Consider Today

• What do policymakers, practitioners/clinicians, and the public need to know about ACEs and teen substance use?

• Why is now a good time for a broader focus on ACEs to prevent youth substance use?

• What program/policy actions or research questions should be considered as priorities in our agenda?
Topic Covered

• ACEs Basics
• ACEs and Youth Tobacco and Other Substance Use
• Why They Are Particularly Vulnerable to Substance Use?
• What Can We Do to PREVENT SUBSTANCE USE AMONG ACES VICTIMS?
ACEs Basics
Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults

The Adverse Childhood Experiences (ACE) Study

Vincent J. Felitti, MD, FACP, Robert F. Anda, MD, MS, Dale Nordenberg, MD, David F. Williamson, MS, PhD, Alison M. Spitz, MS, MPH, Valerie Edwards, BA, Mary P. Koss, PhD, James S. Marks, MD, MPH
What is ACEs?

**ABUSE**
- Physical
- Emotional
- Sexual

**NEGLECT**
- Physical
- Emotional

**HOUSEHOLD DYSFUNCTION**
- Mental Illness
- Incarcerated Relative
- Mother treated violently
- Substance Abuse
- Divorce

Source: rwjf.org/aces
### Prevalence of ACEs by Category

<table>
<thead>
<tr>
<th>ACE Category</th>
<th>Women (Percent)</th>
<th>Men (Percent)</th>
<th>Total (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABUSE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Abuse</td>
<td>34.1%</td>
<td>35.9%</td>
<td>35.0%</td>
</tr>
<tr>
<td>Physical Abuse</td>
<td>15.8%</td>
<td>15.9%</td>
<td>15.9%</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>15.2%</td>
<td>6.4%</td>
<td>10.9%</td>
</tr>
<tr>
<td><strong>HOUSEHOLD CHALLENGES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intimate Partner Violence</td>
<td>15.6%</td>
<td>14.2%</td>
<td>14.9%</td>
</tr>
<tr>
<td>Household Substance Abuse</td>
<td>27.2%</td>
<td>22.9%</td>
<td>25.1%</td>
</tr>
<tr>
<td>Household Mental Illness</td>
<td>19.3%</td>
<td>13.3%</td>
<td>16.3%</td>
</tr>
<tr>
<td>Parental Separation or Divorce</td>
<td>23.1%</td>
<td>22.5%</td>
<td>22.8%</td>
</tr>
<tr>
<td>Incarcerated Household Member</td>
<td>5.2%</td>
<td>6.2%</td>
<td>5.7%</td>
</tr>
</tbody>
</table>

*Source: 2010 CDC Behavioral Risk Factor Surveillance System (BRFSS) Washington, DC, HI, ME, NE, NV, OH, PA, UT, VT, WA, WI*
Exposure to Multiple ACEs (ACE Scores)

35% have multiple ACEs

- 41% have 4 or more ACEs
- 24% have 3 ACEs
- 13% have 2 ACEs
- 8% have 1 ACE
- 14% have 0 ACEs
Exposure to Multiple ACEs (ACE Scores)

- 35% have multiple ACEs
- 14% have 4 or more ACEs
- 13% have 3 ACEs
- 8% have 2 ACEs
- 24% have 1 ACE
- 41% have 0 ACEs

As the number of ACEs increases, so does the risk for negative health outcomes.
ACEs & Public Health

BEHAVIOR
- Lack of physical activity
- Smoking
- Alcoholism
- Drug use
- Missed work

PHYSICAL & MENTAL HEALTH
- Severe obesity
- Diabetes
- Depression
- Suicide attempts
- STIs
- Heart disease
- Cancer
- Stroke
- COPD
- Broken bones

Source: rwjf.org/aces
Population Attributable Risk

Persistent Negative Effects of ACEs on Health throughout the 20th Century

Source: Dube et al. (2003). Preventive Medicine
Cost of ACEs to Our Society

Source: Alaska Mental Health Board

**41%** of Medicaid enrollment in Alaska can be linked back to ACEs.

- **22,000 Alaskans** rely on Medicaid due to ACEs at an estimated cost of **$360 million**.

**32%** of Alaskan Smokers likely smoke due to ACEs.

- **Each year, 37,000 Alaskans** with ACEs smoke at an estimated cost of **$190 million**.

**24%** non-gestational diabetes cases are linked with ACEs.

- **Each year, 10,000 Alaskans** with ACEs have diabetes and annually cost **$110 million**.

**14%** of Obesity in Alaska is linked with ACEs.

- Each year, **22,000 Alaskans** with obesity health issues related to ACEs cost more than **$31 million**.

**11%** of binge drinking is linked with ACEs.

- Each year, **11,000 Alaskans** likely binge drink due to ACEs at a cost of **$70 million**.
ACEs and Substance Use
ACEs and Tobacco Use

- 2014 IOWA Behavioral Risk Factor Surveillance System (BRFSS)

- “Do you now smoke cigarettes every day, some days, or not at all?”

Source: Central Iowa ACEs Coalition. Beyond ACEs: Building Hope & Resiliency in Iowa. 2016.
ACEs & Youth Tobacco Use

- ACEs related to early smoking initiation by age 14 (Anda et al., 1999).

<table>
<thead>
<tr>
<th>Categories of ACEs, No.</th>
<th>Prevalence, %</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early Smoking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Initiation</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>5.5</td>
<td>1.0 (referent)</td>
</tr>
<tr>
<td>1</td>
<td>8.7</td>
<td>1.6 (1.3-2.0)</td>
</tr>
<tr>
<td>2</td>
<td>11.5</td>
<td>2.2 (1.7-2.7)</td>
</tr>
<tr>
<td>3</td>
<td>12.8</td>
<td>2.7 (2.1-3.4)</td>
</tr>
<tr>
<td>4</td>
<td>15.4</td>
<td>3.5 (2.6-4.6)</td>
</tr>
<tr>
<td>≥5</td>
<td>21.1</td>
<td>5.4 (4.1-7.1)</td>
</tr>
</tbody>
</table>
Patterns of ACEs & Youth Tobacco Use

- $N = 336$, ages 18-25

- High Multiple ACEs was associated with 3-fold increase in being current smoker (Shin et al., 2018).
### ACEs and Youth Alcohol Use

<table>
<thead>
<tr>
<th>ACE score</th>
<th>Age at initiation of alcohol use&lt;sup&gt;a&lt;/sup&gt;</th>
<th>OR (95% CI)&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;sup&gt;≤ 14 years&lt;/sup&gt;</td>
<td>%</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2275</td>
<td>4.2</td>
</tr>
<tr>
<td>1</td>
<td>1943</td>
<td>6.1</td>
</tr>
<tr>
<td>2</td>
<td>1205</td>
<td>8.5</td>
</tr>
<tr>
<td>3</td>
<td>782</td>
<td>12.1</td>
</tr>
<tr>
<td>≥ 4</td>
<td>1314</td>
<td>16.9</td>
</tr>
<tr>
<td>Total</td>
<td>7519</td>
<td>8.4</td>
</tr>
</tbody>
</table>

Adverse childhood experiences and the association with ever using alcohol and initiating alcohol use during adolescence

Shanta R. Dube, M.P.H.<sup>a</sup><sup>*,</sup> Jacqueline W. Miller, M.D.<sup>a</sup>, David W. Brown, M.S.P.H., M.S.<sup>a</sup>, Wayne H. Giles, M.D., M.S.<sup>a</sup>, Vincent J. Felitti, M.D.<sup>b</sup>, Maxia Dong, M.D., Ph.D.<sup>a</sup>, and Robert F. Anda, M.D., M.S.<sup>a</sup>
ACEs and Binge Drinking from Adolescence to Young Adulthood

Source: Shin, Miller & Teicher (2013) Drug and Alcohol Dependence
ACEs and Illicit Drug Use

• Exposure to ACEs is a strong predictor of adolescent illicit drug use (Dube et al., 2006; Felitti, 2009; Shonkoff & Garner, 2012).

• For every additional ACE score, the rate of number of prescription drugs used increased by 62% (Forster et al., 2017).
### ACEs and Illicit Drug Use

<table>
<thead>
<tr>
<th>Stimulants OR (95% CI) n = 868</th>
<th>Medications for ADHD, ADD OR (95% CI) n = 1957</th>
<th>Pain Relievers OR (95% CI) n = 1917</th>
<th>Tranquilizers OR (95% CI) n = 1067</th>
<th>Polyprescription drug use IRR (95% CI) n = 1556</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.56 (1.49, 1.64)**</td>
<td>1.51 (1.46, 1.56)**</td>
<td>1.47 (1.42, 1.52)**</td>
<td>1.52 (1.45, 1.59)**</td>
<td>1.62 (1.56, 1.68)**</td>
</tr>
</tbody>
</table>

Associations between adverse childhood experiences, student-teacher relationships, and non-medical use of prescription medications among adolescents

Myriam Forster *, Amy L. Gower, Iris W. Borowsky, Barbara J. McMorris

Division of General Pediatrics and Adolescent Health - Department of Pediatrics, University of Minnesota, MN, United States
“Addiction highly correlates with characteristics intrinsic to that individual’s childhood experiences”

Robert F. Anda, M.D. the Author of the ACE study
Why?
How can ACEs cause life-long consequences?

ACEs → Disrupted Neurodevelopment → Social, Emotional and Cognitive Impairment → Adoption of High Risk Behaviors → Disease, Disability and Social Problems → EARLY DEATH
ACEs and Brain Development

Brain regions: Prefrontal Cortex & Hippocampus

Normal

Typical neuron – many connections

ACEs

Damaged neuron – fewer connections

ACEs and Reduced Gray Matter Volume

Fig. 1. Significant differences between corporal punishment (CP) subjects and controls. Significantly lower gray matter densities in CP subjects were measured in the right medial frontal gyms (medial prefrontal cortex, BA10). Crosshairs placed at x = 14, y = 47, z = 1, the right medial prefrontal cortex. Color scale: 0–5 represent t-values. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Tomoda and Teicher et al., 2009, Neuroimage
FIGURE 3. Effects of Childhood Maltreatment on Ratings of Anxiety, Depression, and Anger-Hostility of 554 Young Adults

<table>
<thead>
<tr>
<th>Type of Childhood Maltreatment</th>
<th>Anxiety</th>
<th>Depression</th>
<th>Anger-Hostility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Only (N=52)</td>
<td><img src="data1" alt="Data" /></td>
<td><img src="data2" alt="Data" /></td>
<td><img src="data3" alt="Data" /></td>
</tr>
<tr>
<td>Domestic violence (N=24)</td>
<td><img src="data4" alt="Data" /></td>
<td><img src="data5" alt="Data" /></td>
<td><img src="data6" alt="Data" /></td>
</tr>
<tr>
<td>Verbal abuse (N=20)</td>
<td><img src="data7" alt="Data" /></td>
<td><img src="data8" alt="Data" /></td>
<td><img src="data9" alt="Data" /></td>
</tr>
<tr>
<td>Both (N=8)</td>
<td><img src="data10" alt="Data" /></td>
<td><img src="data11" alt="Data" /></td>
<td><img src="data12" alt="Data" /></td>
</tr>
<tr>
<td>Physical Only (N=35)</td>
<td><img src="data13" alt="Data" /></td>
<td><img src="data14" alt="Data" /></td>
<td><img src="data15" alt="Data" /></td>
</tr>
<tr>
<td>Nonfamilial (N=7)</td>
<td><img src="data16" alt="Data" /></td>
<td><img src="data17" alt="Data" /></td>
<td><img src="data18" alt="Data" /></td>
</tr>
<tr>
<td>Familial (N=18)</td>
<td><img src="data19" alt="Data" /></td>
<td><img src="data20" alt="Data" /></td>
<td><img src="data21" alt="Data" /></td>
</tr>
<tr>
<td>Both (N=10)</td>
<td><img src="data22" alt="Data" /></td>
<td><img src="data23" alt="Data" /></td>
<td><img src="data24" alt="Data" /></td>
</tr>
<tr>
<td>Sexual Only (N=53)</td>
<td><img src="data25" alt="Data" /></td>
<td><img src="data26" alt="Data" /></td>
<td><img src="data27" alt="Data" /></td>
</tr>
<tr>
<td>Nonfamilial (N=40)</td>
<td><img src="data28" alt="Data" /></td>
<td><img src="data29" alt="Data" /></td>
<td><img src="data30" alt="Data" /></td>
</tr>
<tr>
<td>Familial (N=13)</td>
<td><img src="data31" alt="Data" /></td>
<td><img src="data32" alt="Data" /></td>
<td><img src="data33" alt="Data" /></td>
</tr>
<tr>
<td>Any Two Categories (N=111)</td>
<td><img src="data34" alt="Data" /></td>
<td><img src="data35" alt="Data" /></td>
<td><img src="data36" alt="Data" /></td>
</tr>
<tr>
<td>All Three Categories (N=53)</td>
<td><img src="data37" alt="Data" /></td>
<td><img src="data38" alt="Data" /></td>
<td><img src="data39" alt="Data" /></td>
</tr>
</tbody>
</table>

Size of Effect (Cohen's d') on Score on Measure From Kellner's Symptom Questionnaire (±95% CI)\(^a\)

Source: Teicher et al., 2006, American Journal of Psychiatry
• Impaired Executive Function System
• Impaired Executive Function System

• Many forms of functional self-regulation are difficult to learn for children with a history of ACEs (Pears & Fisher, 2005; Shields, Cicchetti, & Ryan, 1994).
What Can We Do Today?

• Develop systems for primary prevention.
Prevention Works!

Percent of Individuals with ≥ 3 ACEs

![Graph showing the percent of individuals with ≥ 3 ACEs across different age cohorts.]

Youngest Age Cohort

POSITIVE ACE TREND MEANS REDUCED CASES:

- Lack of Social Support: 1888
- Limited Activity (due to disability): 5767
- Asthma: 2128
- Cancer: 2828
- Heart Disease: 1004
- Missed work due to MI: 1065
- Mental Illness (MI): 3845
- HIV: 1264
- Binge Drinking: 3727
- Smoking: 10874
Trauma-informed approach

• **Realizes** the widespread impact of trauma and understands potential paths for recovery

• **Recognizes** the signs and symptoms of trauma in clients, families, staff, and others involved with the system;

• **Responds** by fully integrating knowledge about trauma into policies, procedures, and practices; and

• **Seeks** to actively resist re-traumatization."
What Can We Do Today?

• Why are ACEs victims more vulnerable to addictive behaviors in adolescence?

• Identifying malleable targets for intervention and prevention of substance use problems among ACEs victims is important.
The 4 Traits That Put Kids at Risk for Addiction

By MAIA SZALAVITZ  SEP'T. 29, 2016

Anxious
Hopeless
Impulsive
Sensation Seeking
### TABLE 5  Comparison of Effect Sizes across Personality-Targeted Intervention Trials: Full Intent-to-Treat Samples and Drinkers Only

<table>
<thead>
<tr>
<th></th>
<th>Full ITT Sample (Drinkers and Nondrinkers at Baseline)</th>
<th>Alcohol Users at Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Binge-Drinking at Follow-up (%)</td>
<td>Binge-Drinking at Follow-up (%)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>Intervention</td>
</tr>
<tr>
<td>Canadian trial¹⁷</td>
<td>37.5</td>
<td>30.3</td>
</tr>
<tr>
<td>Preventure UK¹⁵</td>
<td>64.6</td>
<td>41.4</td>
</tr>
<tr>
<td>Adventure (present trial)</td>
<td>28.2</td>
<td>24.9</td>
</tr>
</tbody>
</table>

Note: ITT = intent to treat; NNT = number needed to treat; OR = odds ratio.

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**Personality-Targeted Interventions Delay Uptake of Drinking and Decrease Risk of Alcohol-Related Problems When Delivered by Teachers**

Final Insights from the ACEs and Youth Substance Use Studies

• ACEs are common.

• *Children in our society often encounter multiple ACEs.*

• ACEs increase an individual’s risk for youth substance use.

• *Engaging in prevention planning efforts, it is critical to include ACEs among the primary risk factors for youth substance use.*

• Development and dissemination of trauma-informed prevention programs are urgently necessary.
Acknowledgements

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  Grace Hong (Michigan State University)
  Sat Bir Khalsa (Harvard Medical School)
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  Martin H. Teicher (Harvard Medical School)

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  Sarah Dowal
  Shinjini Bose
  Lauren Peasley
  Rachel Rosenberg
Thank You!