

# Adverse Childhood Experiences: Opportunity for Integrating ACES into Genetic Conversations



**Midwest Genetics  
Network**  
Region 4

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## Presentation for the Midwest Genetics Network

**Annual Meeting**

**September 29**

Richard Murdock

Michigan Ace Initiative Coordinator

# Adverse Childhood Experiences: Opportunity for Integrating ACES into Genetic Conversations



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## Objectives for Today's Session

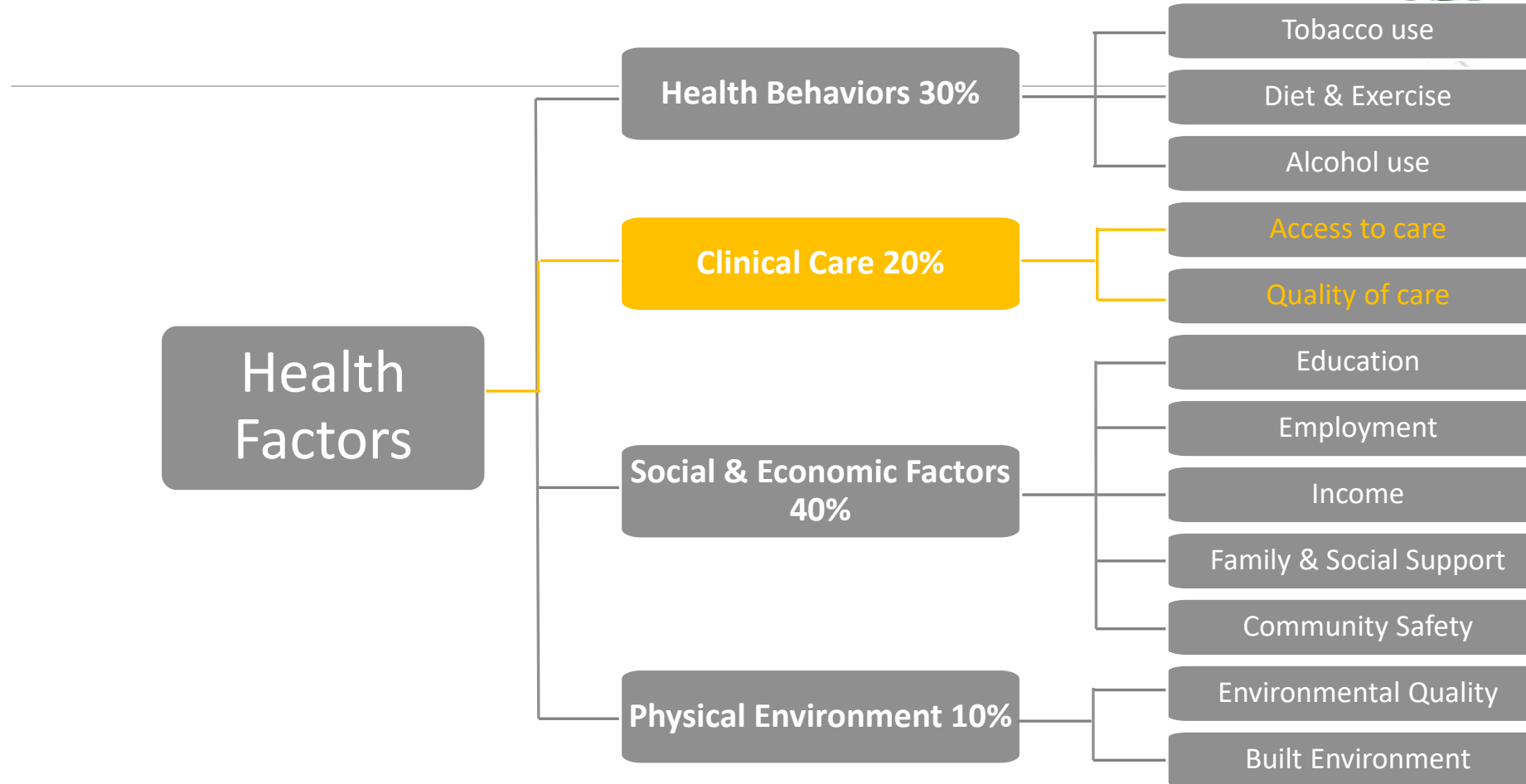
1. **Brief Overview of Adverse Childhood Experiences**
2. **Resilience**
3. **Epigenetics and Relationship to ACE Prevalence**
4. **Creating Synergy in our Program Planning**

# Health Factors Affecting Health Outcomes<sup>1</sup>



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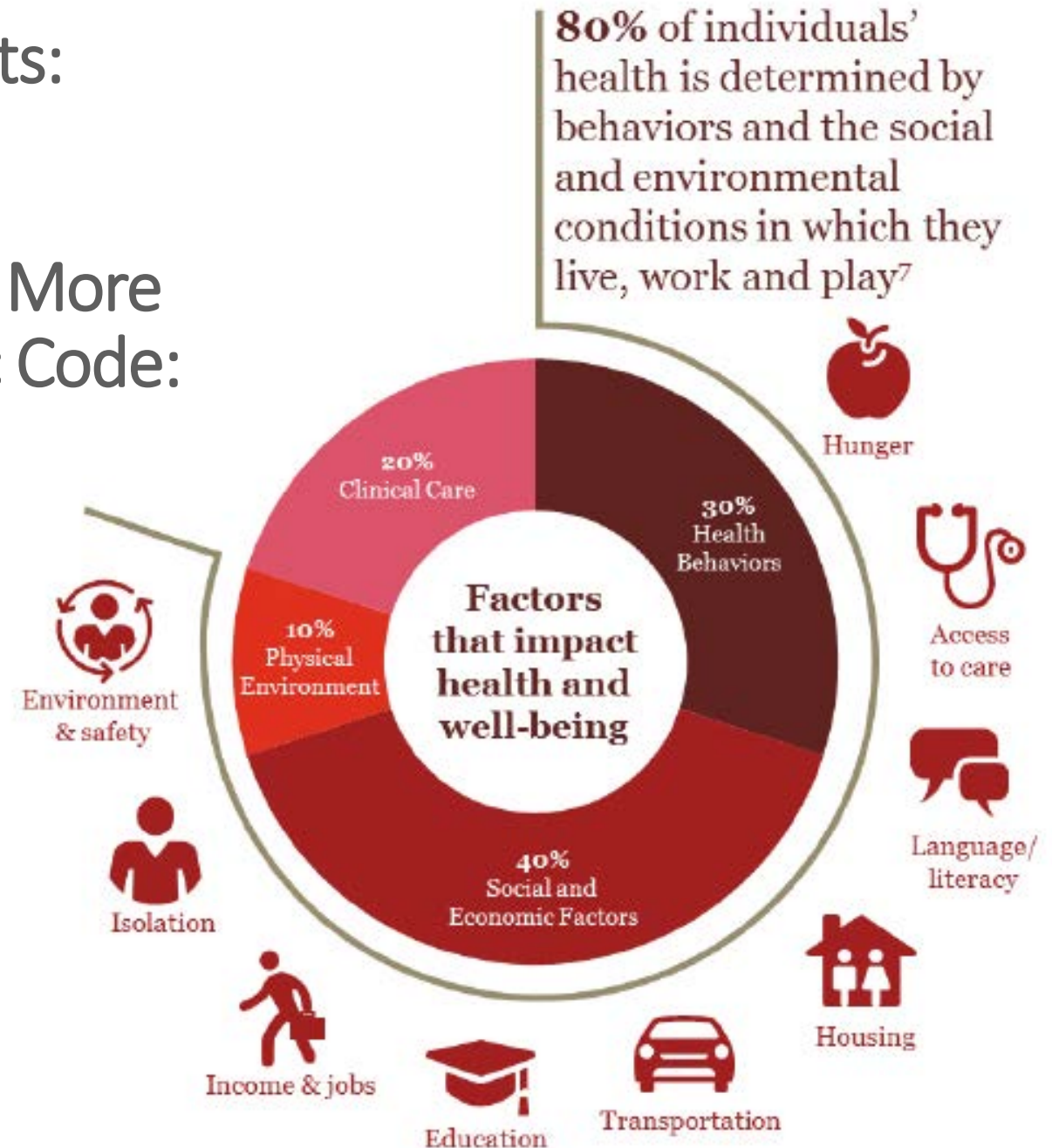
<sup>1</sup><http://www.countyhealthrankings.org/our-approach>

# Community Environments: Another Vital Sign

Your Zip Code is More  
Significant than Your Genetic Code:



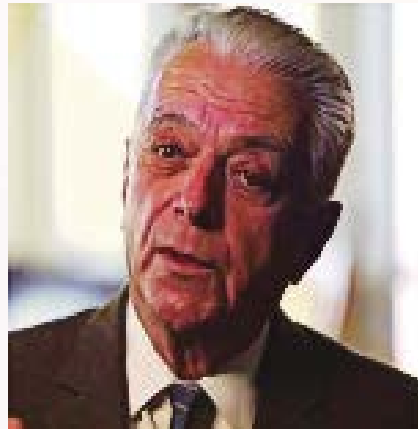
What makes us get sick? Look upstream | Rishi Manchanda



01/12/14

**NEWS**

## Early Adversity Increases Physical, Mental, Behavioral Problems, Scientists Report



Dr. Robert Anda & Dr. Vincent Felitti  
Investigators

Centers for Disease Control & Prevention,  
Kaiser Permanente Study

Over 17,000 study participants

The ACE Study confirms, with scientific evidence, that adversity early in life increases physical, mental and behavioral problems later in life.

# **ADVERSE CHILDHOOD EXPERIENCES**

## **The Most Powerful Determinate of the Public's Health**

### **Abuse and Neglect**

1. Child physical abuse
2. Child sexual abuse
3. Child emotional abuse
4. Emotional Neglect
5. Physical Neglect

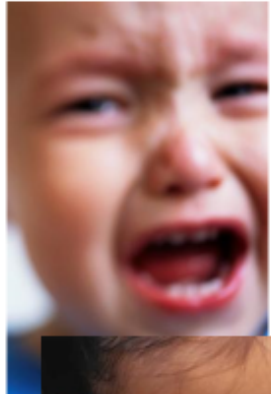
### **Indicators of Family Dysfunction**

6. Mentally ill, depressed or suicidal person in the home
7. Drug addicted or alcoholic family member
8. Witnessing domestic violence against the mother
9. Parental discord – indicated by divorce, separation, abandonment
10. Incarceration of any family member

***ACE Score: the number of categories of adverse childhood experience to which a person was exposed.***

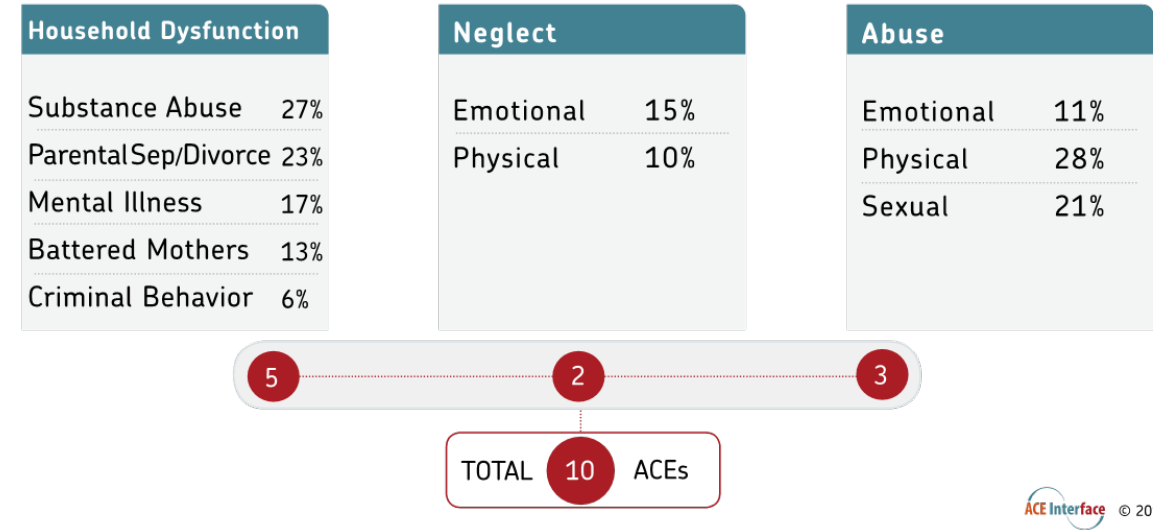
# Adverse Childhood Experiences

## The Adverse Childhood Experiences (ACE) Study



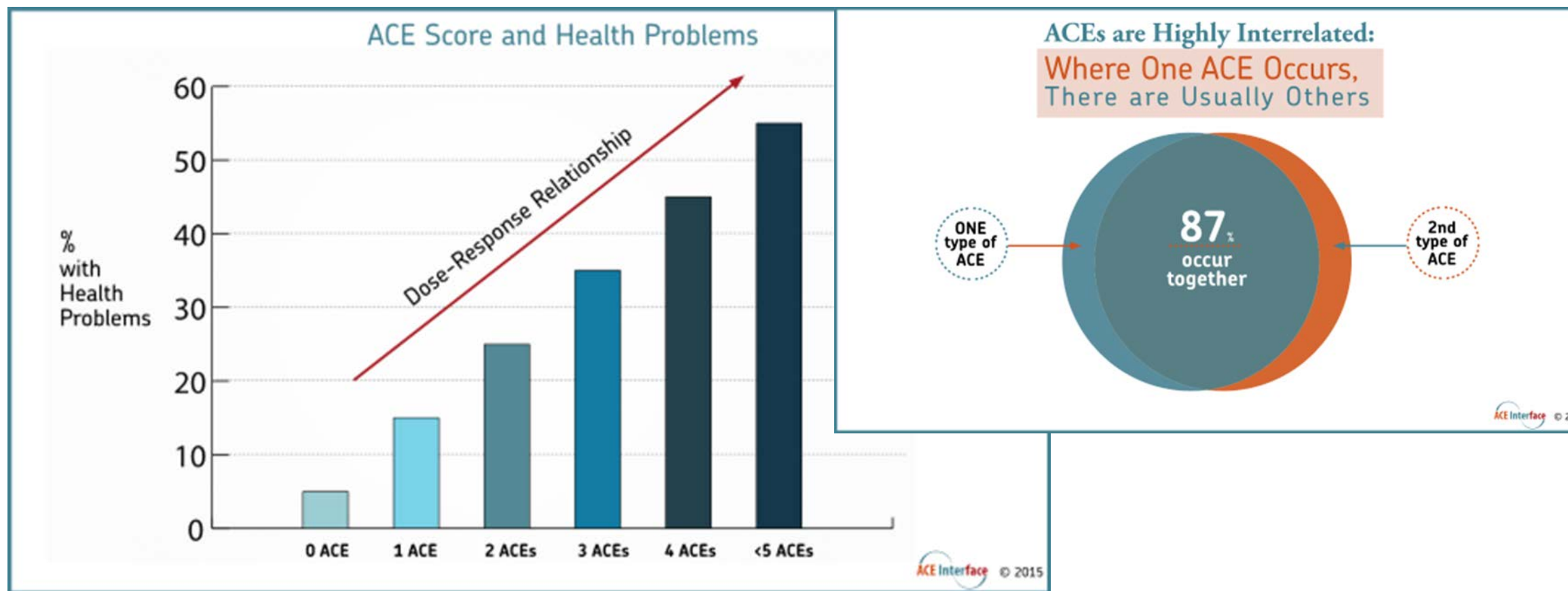
- “Probably the most important public health study you never heard of”
- ACEs sometimes referred to as toxic stress or childhood trauma
- Adverse Childhood Experiences (ACEs) are:
  - very common, and
  - strong predictors of health risks & disease from adolescence to adulthood
- This combination of findings makes ACEs one of the leading, if not the leading determinant of the health & social well-being of our nation

### Adverse Childhood Experiences **ARE COMMON**



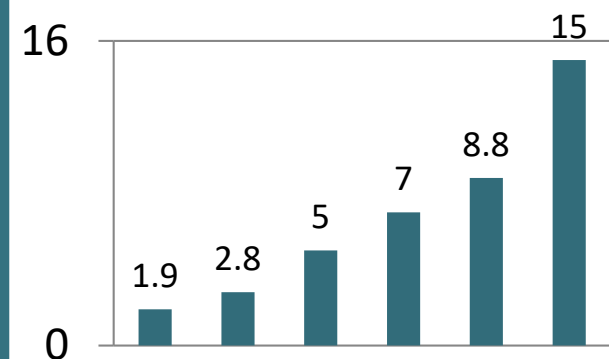


# ACEs are Highly Interrelated and More ACEs Predict More Health Problems

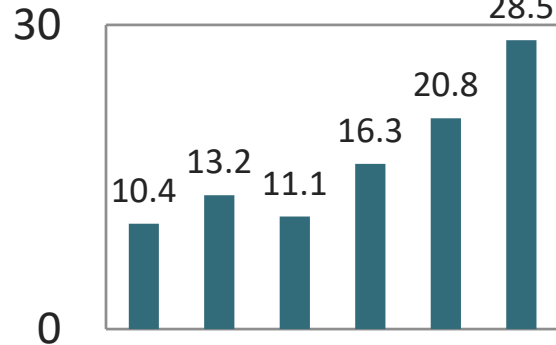




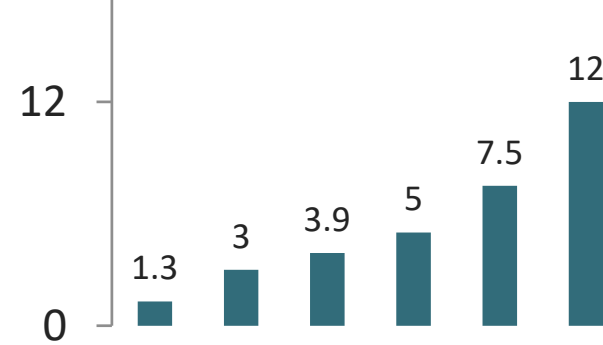
### Anxiety



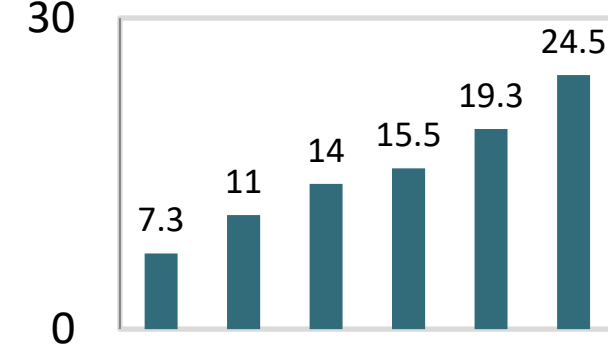
### Smoking



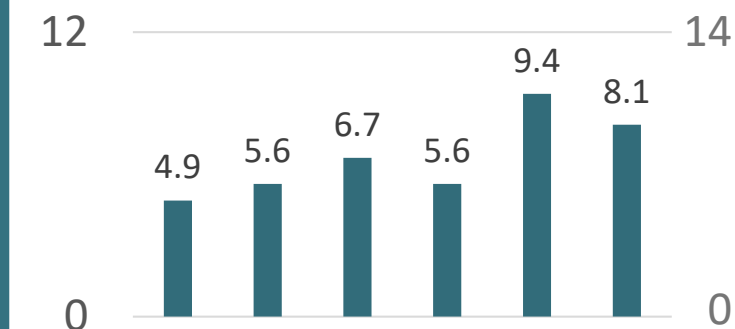
### Drug Problem



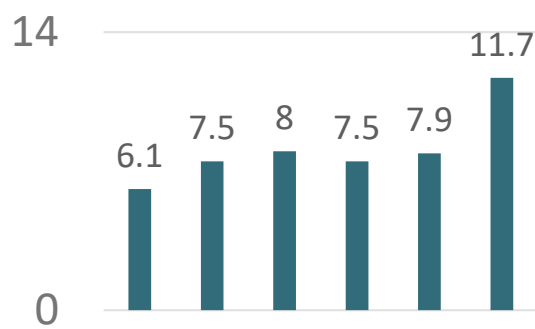
### MH Treatment



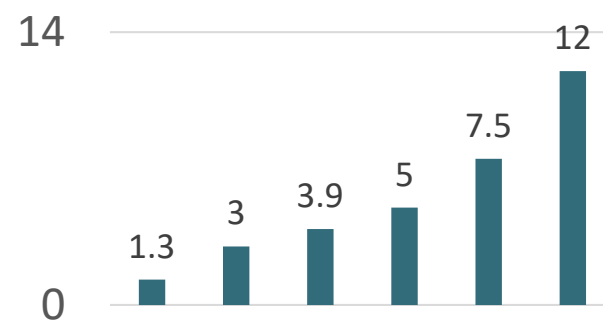
### Cardio Vascular Disease



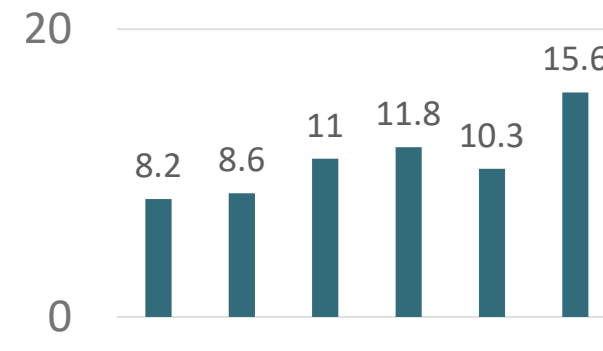
### Diabetes



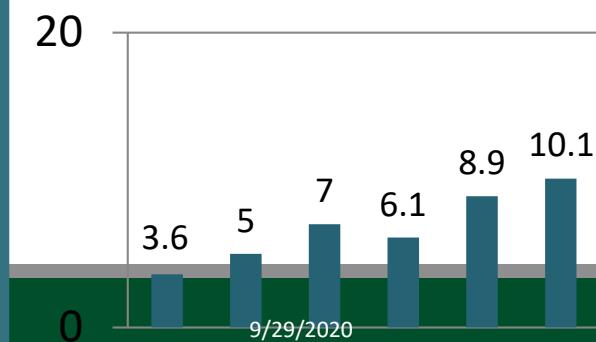
### Asthma



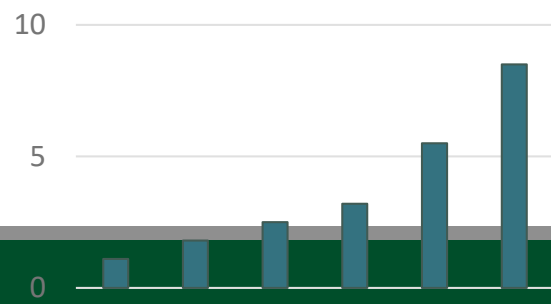
### Cancer



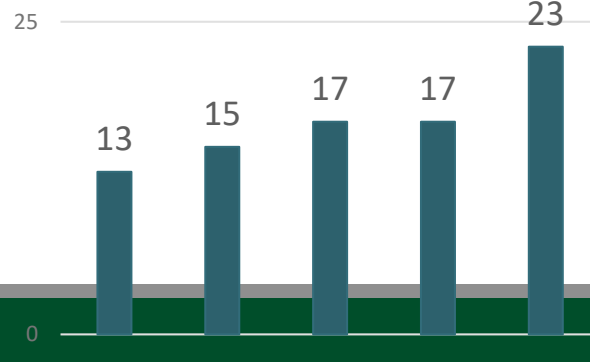
### Work Injury/Illness



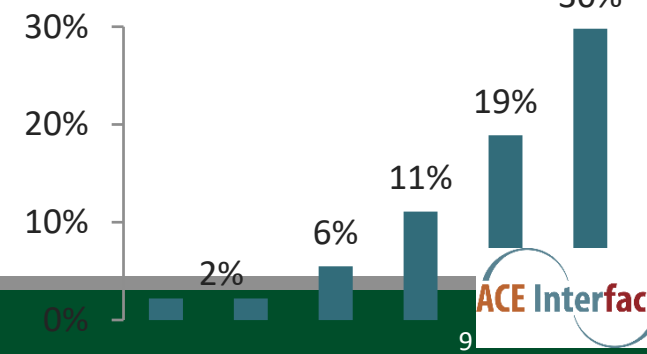
### Missed 15 of 30 Work Days (MH)



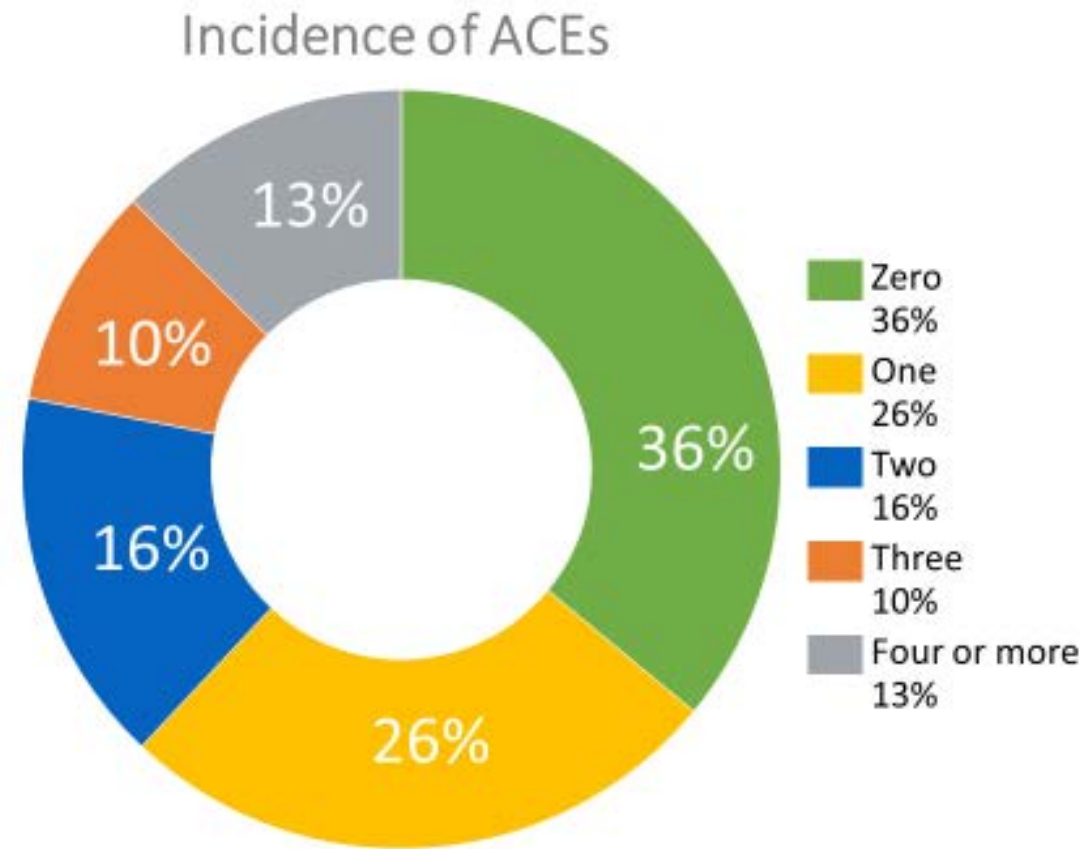
### Unemployed



### Homeless



Almost  $\frac{2}{3}$  of adults surveyed reported **at least one** Adverse Childhood Experience. Where one ACE occurs, there are usually others—they are **highly interrelated**.



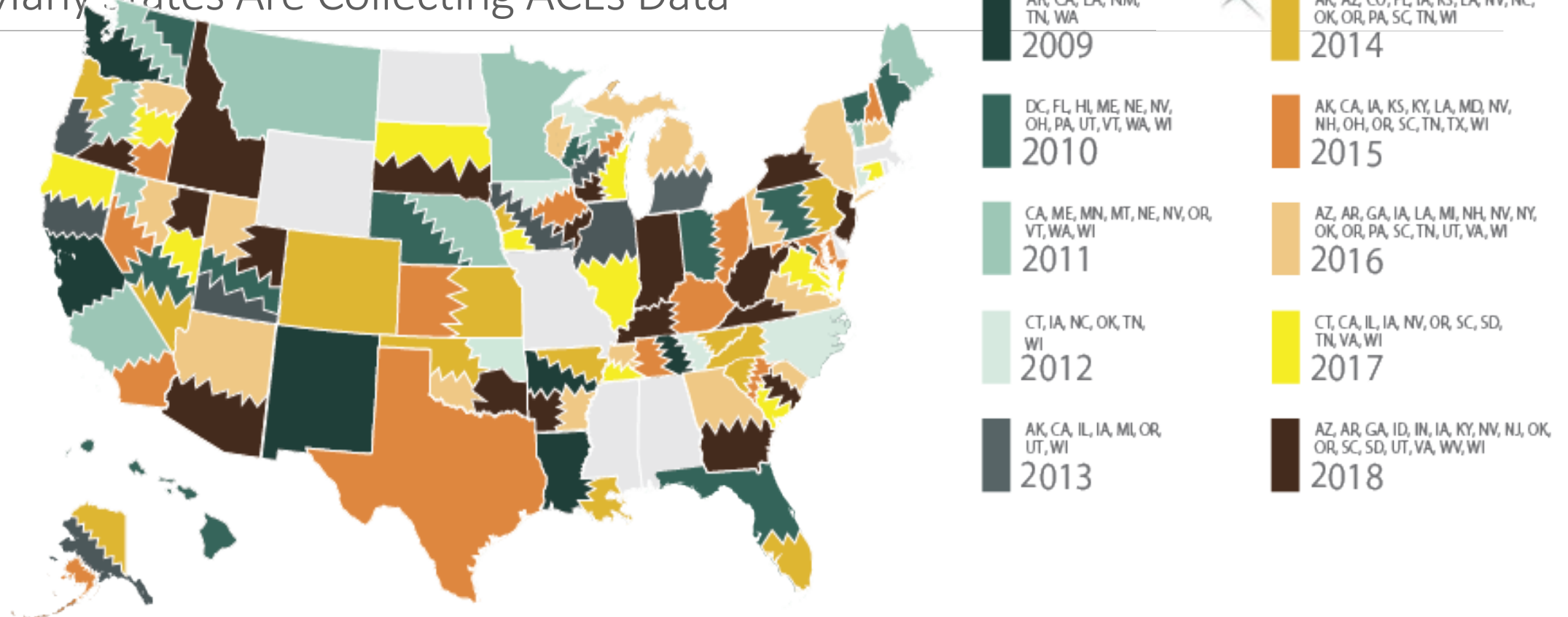


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Collecting BRFSS ACE Data by Year, 2009-2018

### Many States Are Collecting ACEs Data

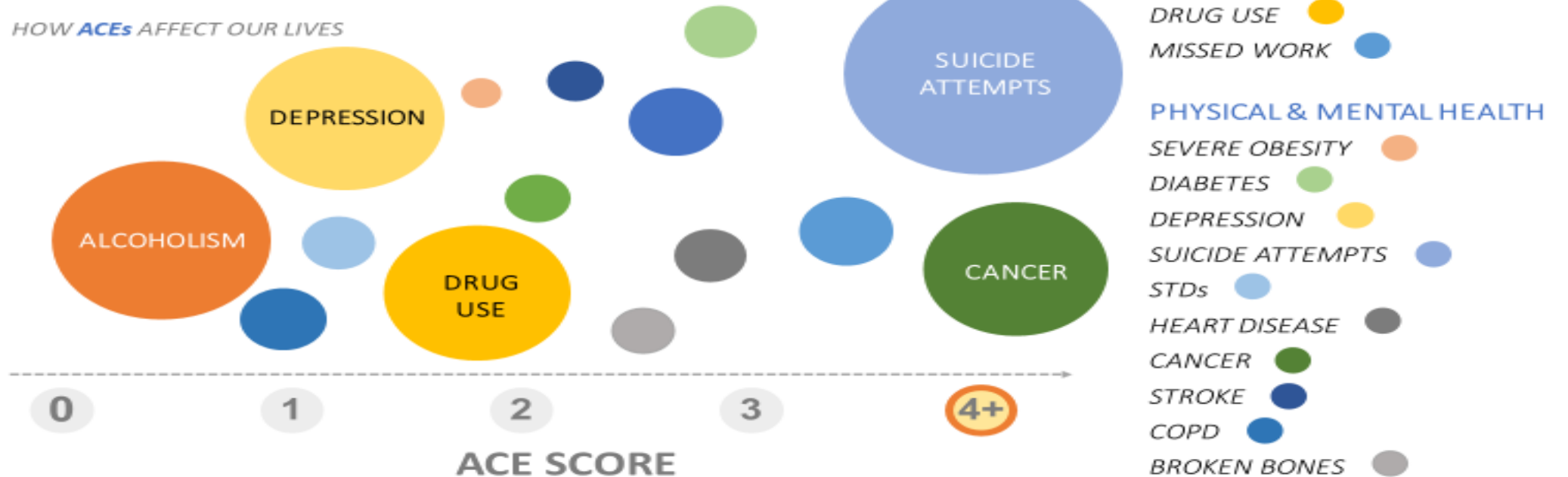


Source: Centers for Disease Control and Prevention. *Behavioral Risk Factor Surveillance System Survey ACE Data, 2009-2018*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2019.



# ACEs CAN HAVE LASTING EFFECTS ON BEHAVIOR & HEALTH

HOW **ACEs** AFFECT OUR LIVES



# ADVERSE CHILDHOOD EXPERIENCES

## The Most Powerful Determinate of the Public's Health

- *ACE score of >4 is 460% more likely to suffer from depression*
- *ACE score of >6 is 250% more likely to smoke*
- *ACE score of >4 is 260% more likely to have COPD*
- *ACE score of >7 as an adult would have 30 fold more likelihood of suicide, 3000%*
- *ACE score of >7 as child would have 51-fold more likelihood of attempted suicide, 5100%*
- *ACE score of >4 for women has a 500% more likelihood of becoming victim to domestic abuse and a 900% more likelihood to be a victim of Rape.*



## Health Outcomes Most Closely Associated with ACEs

Condition	Pearson Chi-square*	Risk of Condition**	95% Confidence Interval
Diagnosed depression	Significant (<0.01)	2.41	2.40 to 2.42
Chronic obstructive pulmonary disease (COPD)	Significant (<0.01)	1.83	1.82 to 1.84
Poor mental health more than half of last month	Significant (<0.01)	1.82	1.81 to 1.82
Ever told asthma	Significant (<0.01)	1.69	1.68 to 1.69
General health status (poor)	Significant (<0.01)	1.64	1.64 to 1.65
Current asthma	Significant (<0.01)	1.57	1.56 to 1.58
Poor physical health more than half of last month	Significant (<0.01)	1.31	1.30 to 1.31
Cancer	Significant (<0.01)	1.06	1.06 to 1.07
Cardiovascular disease	Significant (<0.01)	1.03	1.03 to 1.03
Arthritis	Significant (<0.01)	1.00	1.00 to 1.01
Diabetes	Significant (<0.01)	0.98	0.98 to 0.99
Stroke	Significant (<0.01)	0.91	0.90 to 0.92
Coronary heart disease	Significant (<0.01)	0.85	0.84 to 0.85
Heart attack	Significant (<0.01)	0.72	0.71 to 0.72

\*Alpha level set at 0.05 prior to analysis \*\*The prevalence of the condition among those with one or more ACE compared to the prevalence among those with zero ACEs.

Analysis by Public Sector Consultants based on weighted prevalence estimates among Michigan's adult population provided by the Michigan Department of Health and Human Services.

Source: Murad A. *et al.* 2016. *Michigan Behavioral Risk Factor Surveillance System Survey Data*. Lansing: Michigan Department of Health and Human Services, Lifecourse Epidemiology and Genomics Division.

# ACEs Related Illnesses & Social Problems

Alcoholism & Alcohol Abuse

Chronic Obstructive  
Pulmonary Disease

Coronary Heart Disease

Depression

Drug Abuse & Illicit Drug Use

Fetal Death

Intimate Partner Violence

Liver Disease

Mental Health Problems

Obesity

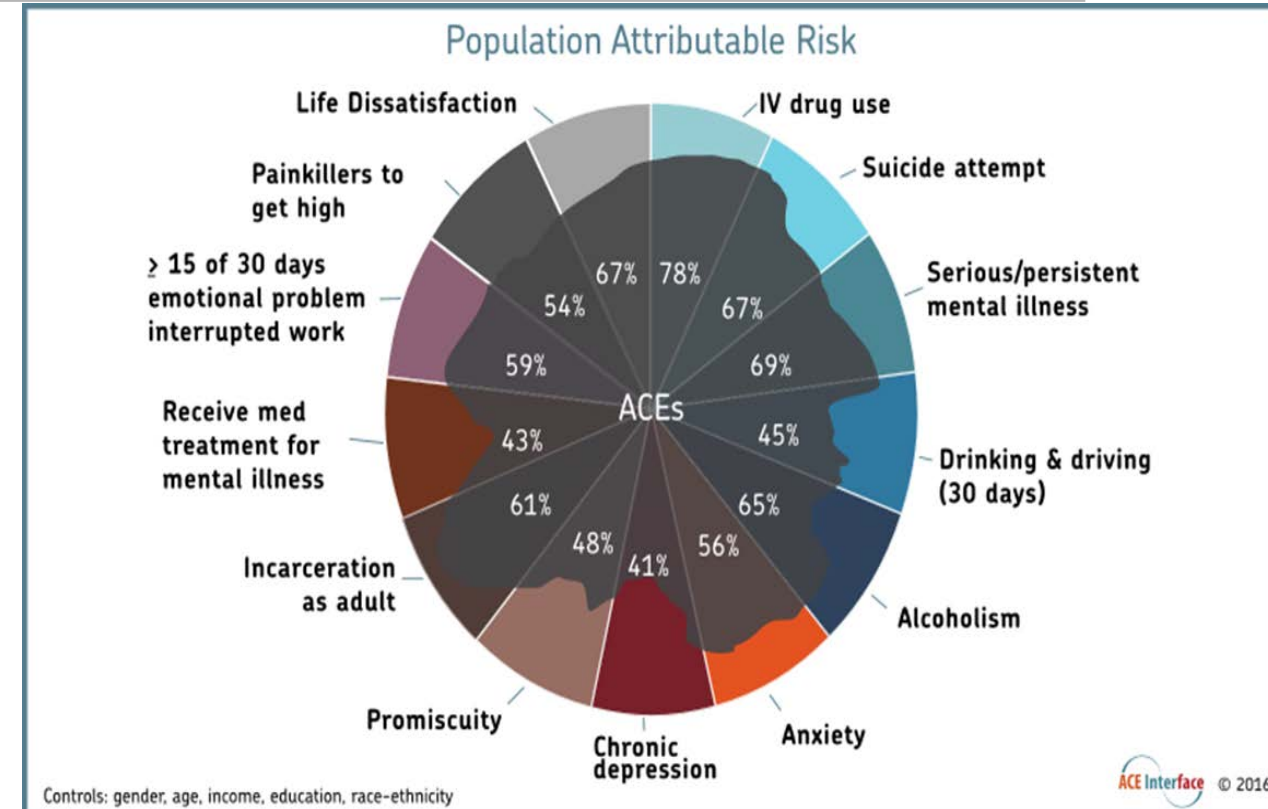
Sexual Behavior Problems

Smoking

Unintended Pregnancy

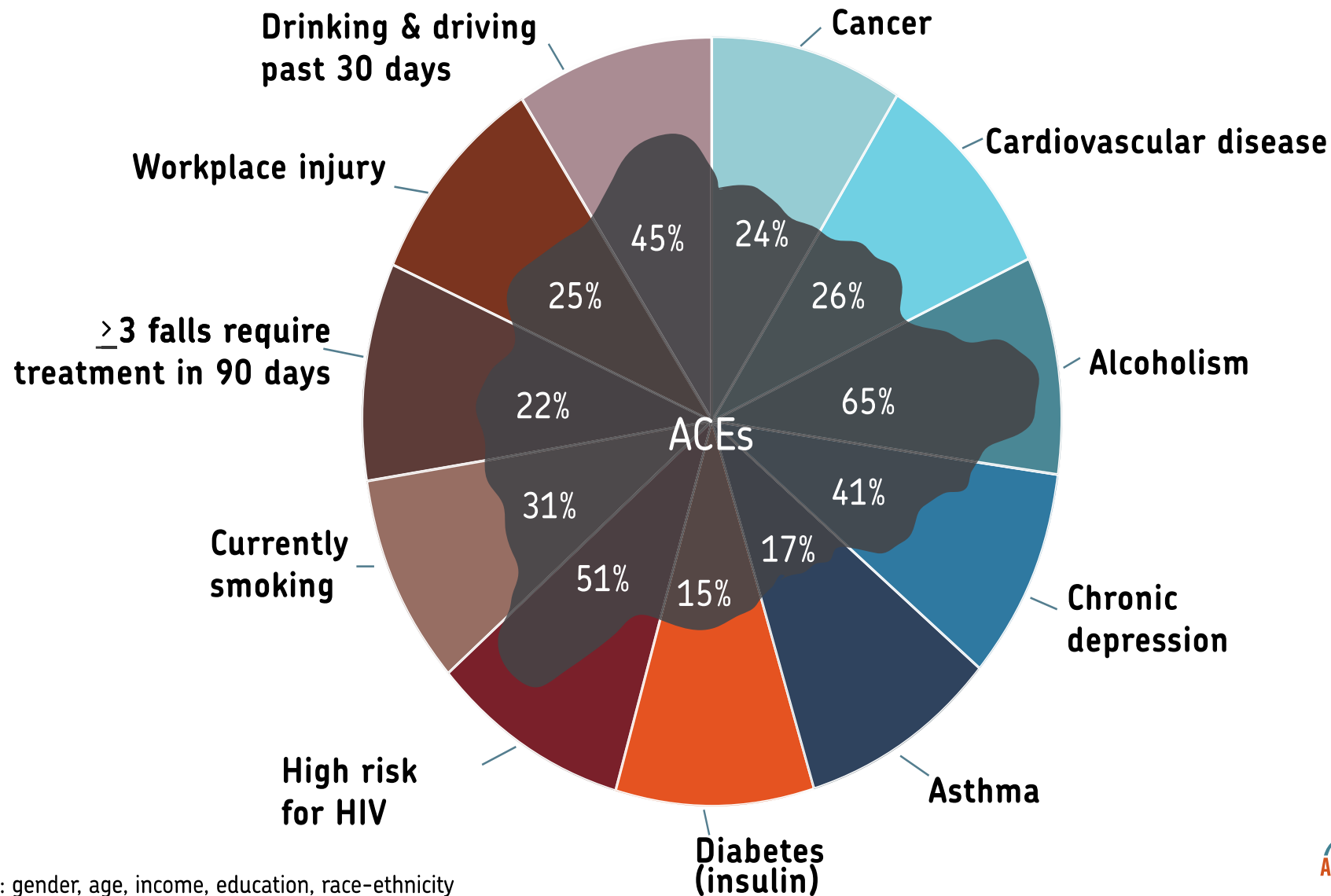
Violence

Workplace Problems





# Population Attributable Risk



# Economic Impact of health care: Using Michigan As Example



***FACT: Nearly \$80 Billion -- estimated health care expenditures in Michigan, including out of pocket expenses—Much of this is paying for utilization of health care that has ACE as its “Root”. Failure to address the “root” cause:***

Taxpayers have huge responsibility:

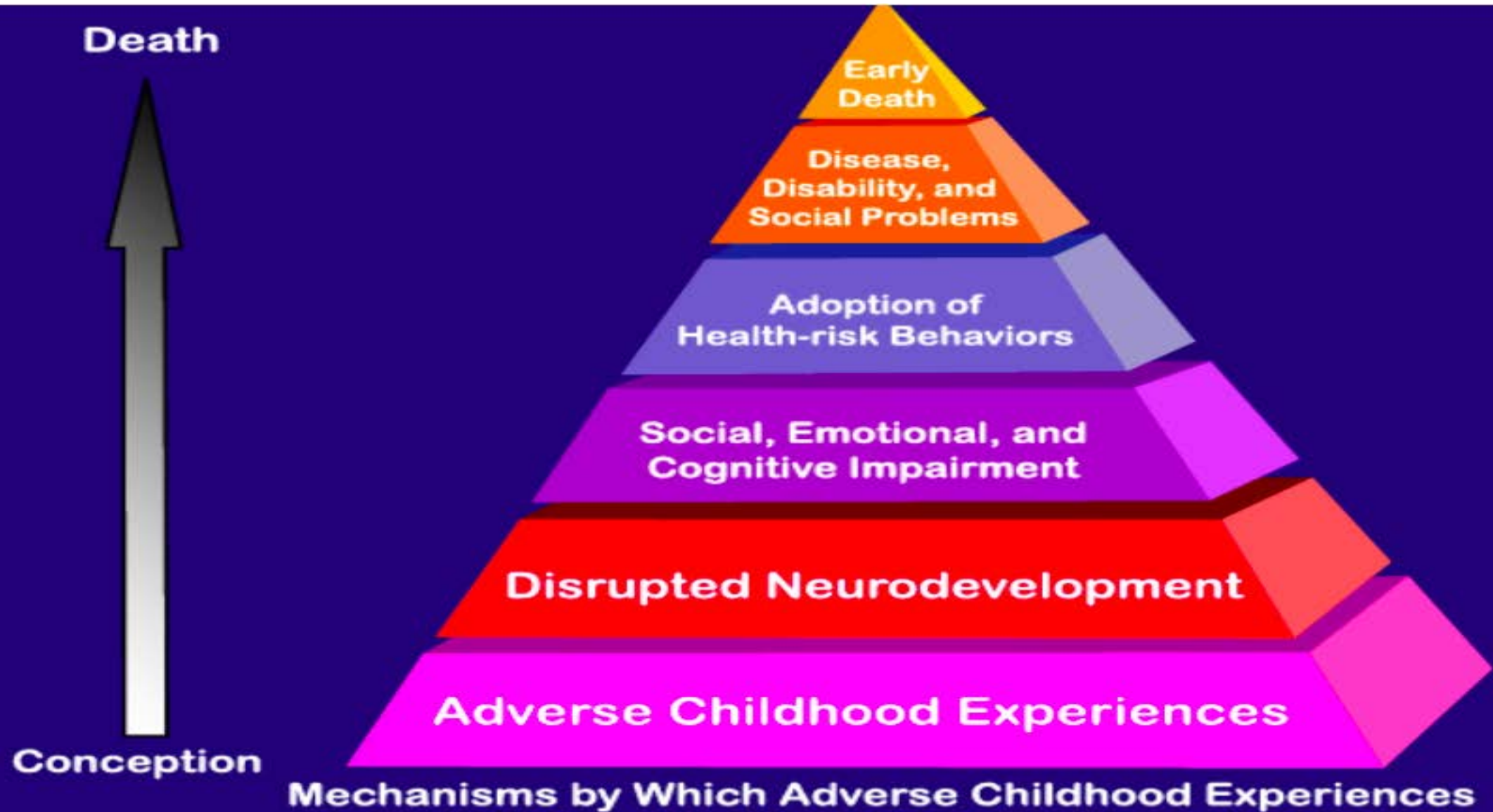
- Nearly one quarter of Michigan’s Citizens are on Medicaid
- Nearly 18% are on Medicare

State Budget Health Expenditures are Stretched

- Medicaid
- State Employees and Retirees

Other Programs go unfunded/underfunded

# | The Impact of Toxic Stress



# Traumatized people...



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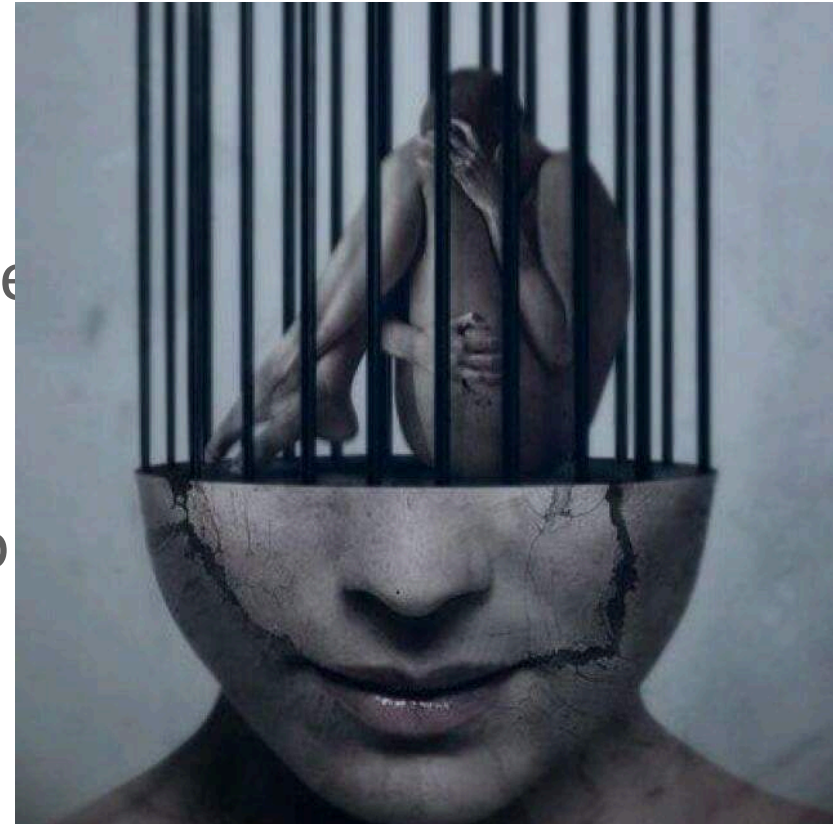
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do not feel safe in their own  
bodies

view life through the lens of fear

may be a thing of the past but the  
body keeps reacting as if you are  
in imminent danger

frequent use of drugs and alcohol  
to dull the pain



Source: Bessel van der Kolk, M.D.

# Impact of Unresolved Trauma



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Impaired ability to self-regulate

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Impulsive/reactive behavior

Intense emotions drive  
behavior

Diminished capacity to reason

General sense of trouble



Source: Ross, G. 2007 Beyond the Trauma Vortex into the Healing Vortex,  
International Trauma Healing Institute

# Another way to think about trauma is that it acts against all the factors that correlate with resilience.

Resiliency skills as the **THREADS** of childhood:

Thinking and learning brain – **shuts down**

Hope – **to deal with present danger, looking ahead shut down**

Regulation or self control – **shuts down, need impulses to deal with threat**

Efficacy – **lost – reacting to situation, not controlling it**

Attachment – **acting alone, not available in toxic stress**

Developmental skill mastery – **learning shut down**

Social connectedness – **alone with threat**

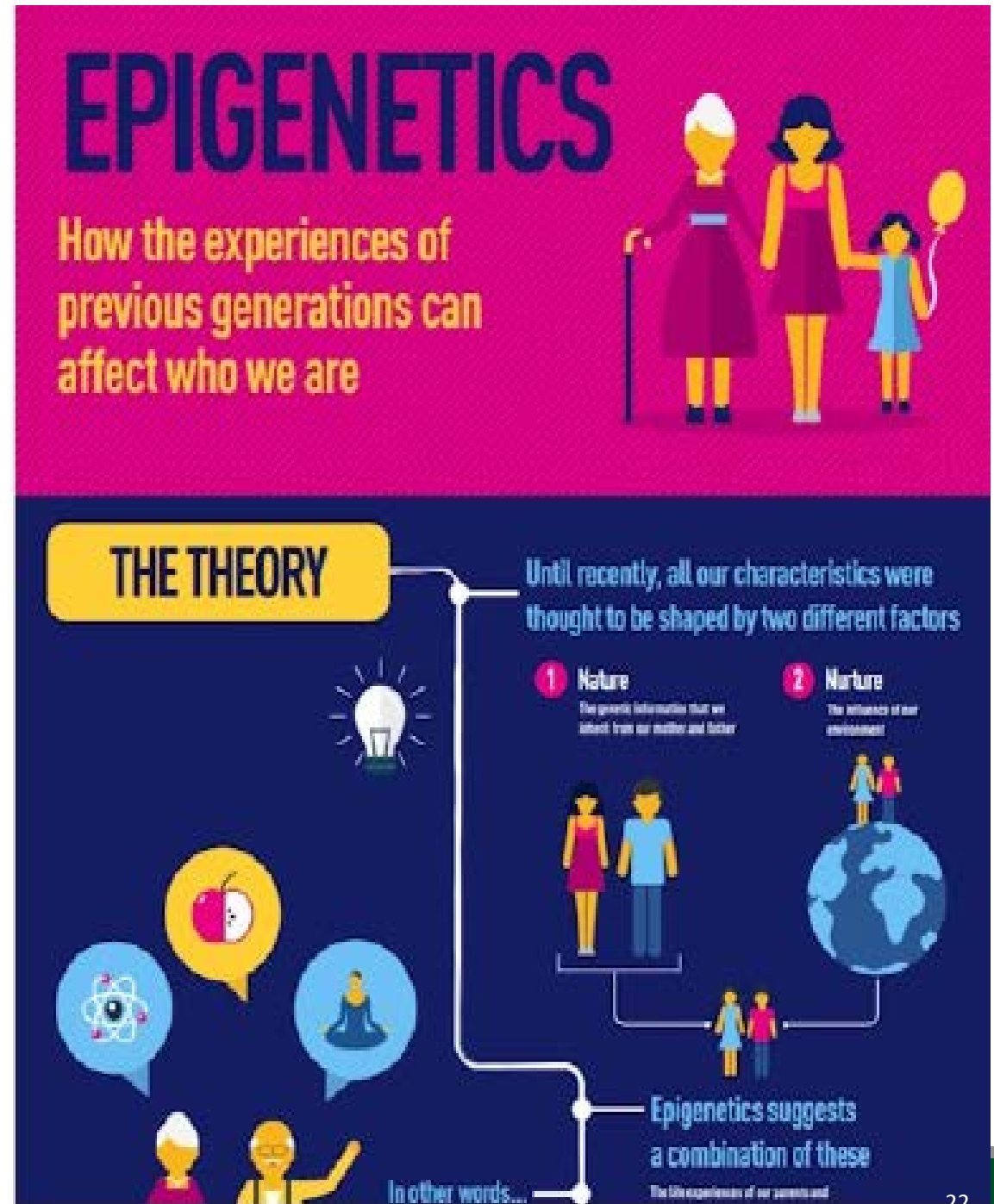


American Academy of Pediatrics  
DEDICATED TO THE HEALTH OF ALL CHILDREN®



# Definition of Epigenetics

“The long-term or stable regulation of gene expression and function induced by environmental factors without a change in DNA sequence.” (Wang, Liu, & Sun, 2017)

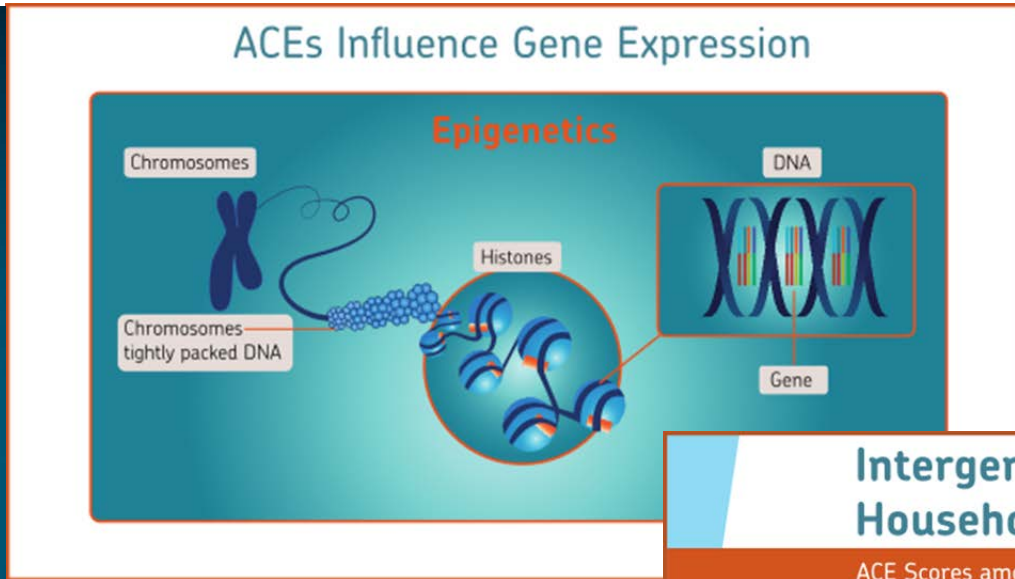




# Epigenetics and Intergenerational Trauma

Teresa Holtrop MD

# Responses to Stress May Pass from One Generation to the Next



Biologically predisposed to more physiologic stress

Brain structures that modulate this stress mature later

Young children need safe, stable, and nurturing relationships to assist them in regulating their stress

### Intergenerational Transmission of Household Dysfunction ACEs

ACE Scores among adults reliably predict higher rates of the challenges below. When parents experience these, they become ACEs for the next generation.

- Drug addicted or alcoholic
- Domestic violence
- Mentally ill, depressed or suicidal
- Parental discord – indicated by divorce, separation, abandonment
- Incarceration

Foundation for healthy generations

ACE Interface © 2015

# Intergenerational Transmission of Household Dysfunction ACEs

challenges below. When parents experience these, they become ACEs for the next generation.

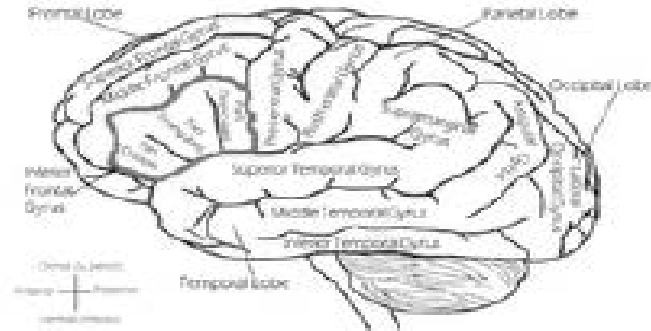


- Mentally ill, depressed or suicidal

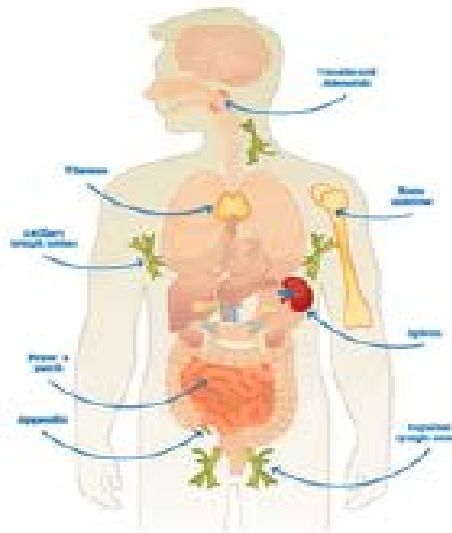


# Toxic stress triggers potentially permanent changes thru 3 mechanisms

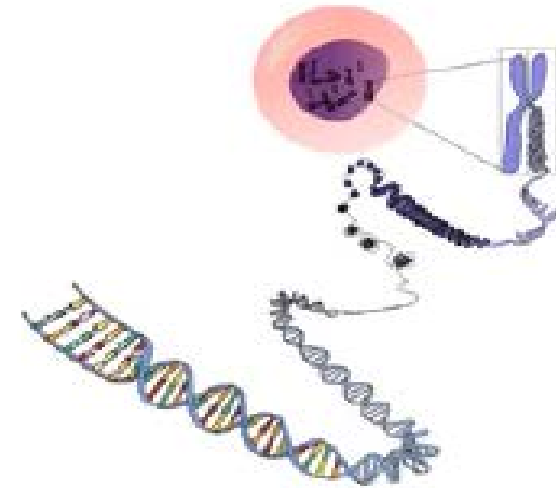
Brain connectivity



Immune function



Epigenetics

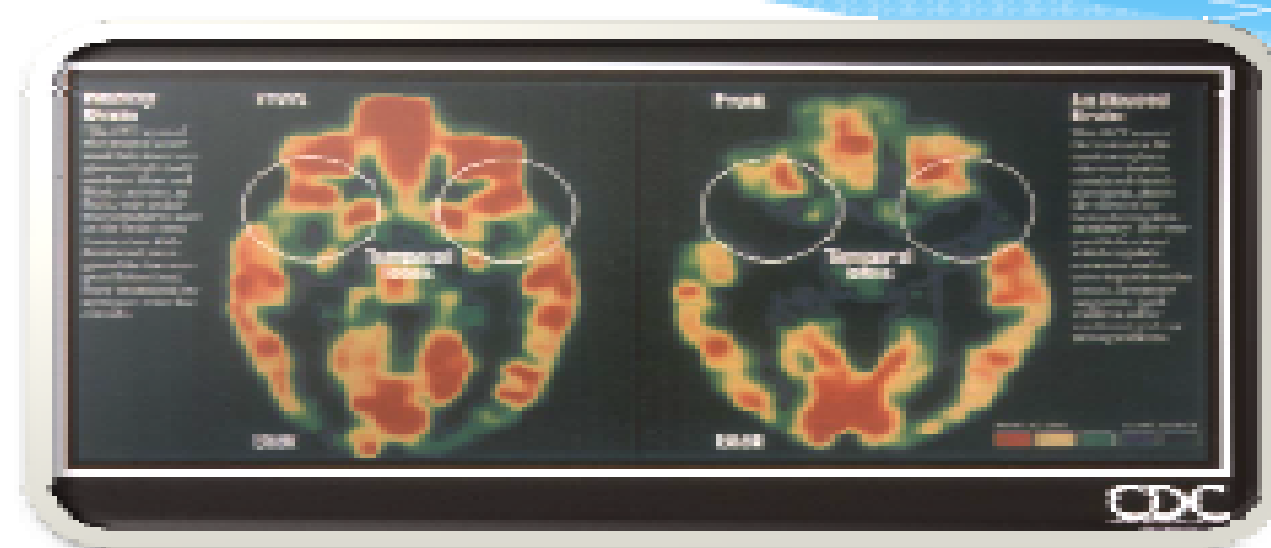


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## Disrupted Neural Development



**PET  
Scans**  
Healthy brain  
vs.  
the effects of  
extreme  
deprivation  
beginning at  
infancy

See also the work of Dr. Bruce Perry at [www.childtrauma.org](http://www.childtrauma.org)

## Why worry about whether its due to epigenetics vs learned behavior?

- *Children who are adopted as infants may need different interventions if they have a biologic family history of trauma that was passed down to them through epigenetic changes.*
- *Adoptive parents may need trauma-focused support for their children (even if child was adopted as a newborn) if there was a history of trauma in the biologic family that was passed on through epigenetic changes.*



Countless nonprofit, business & government organizations  
each work to address social problems independently.

# Moving from Isolated Impact...

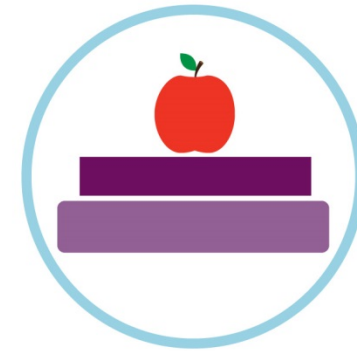
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Government



Businesses and  
the private sector



Education system



Nonprofit organizations



Medical community

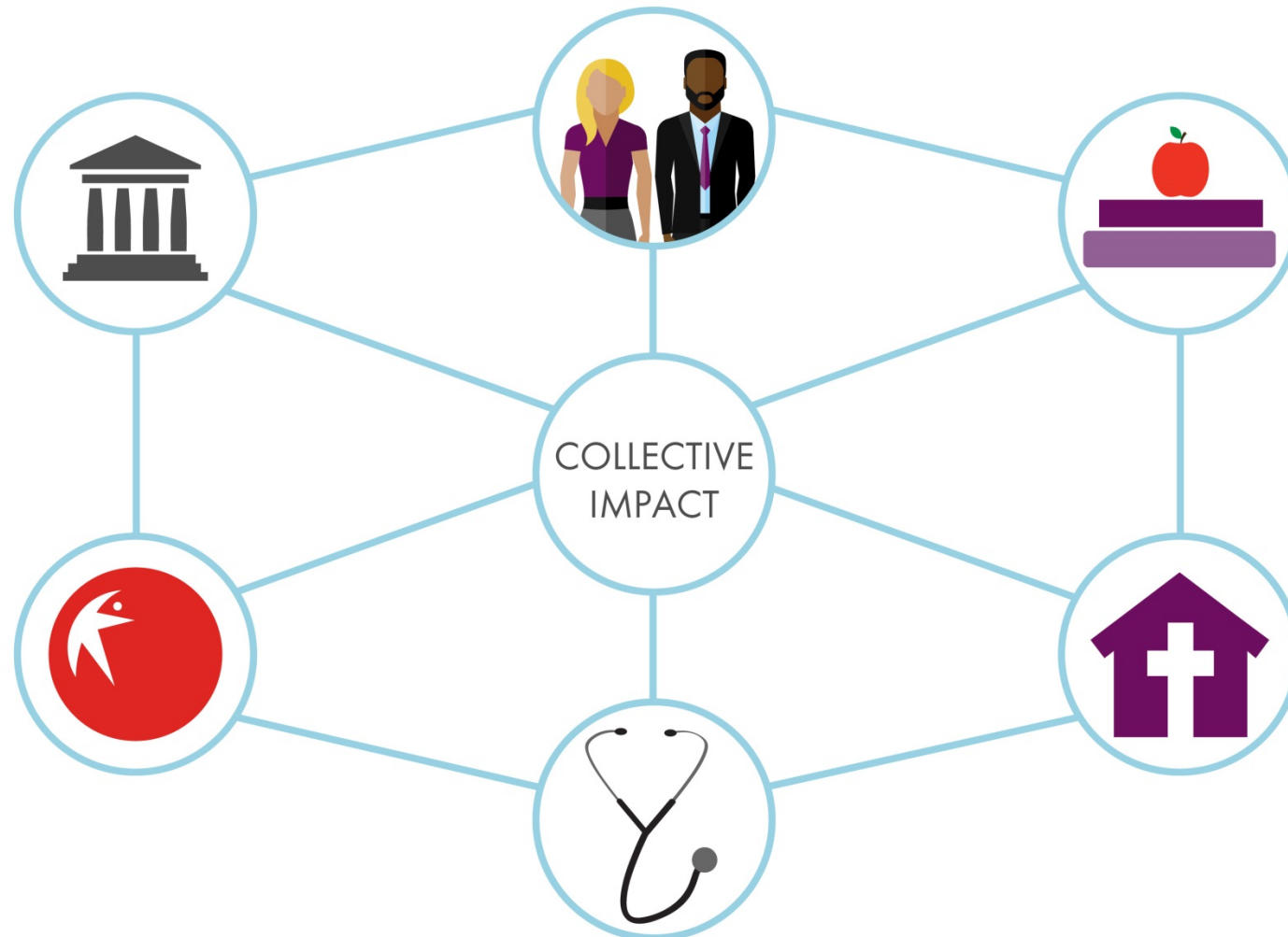


Faith-based organizations  
and churches

# ...to Collective Impact!

Fundamentally different, **Collective Impact** is a more disciplined, highly structured & higher performing approach to large-scale social impact than other types of collaboration.

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## ADVERSE CHILDHOOD EXPERIENCES

AMONG MICHIGAN ADULTS (2016)

### What Are Adverse Childhood Experiences and How Prevalent Are They?

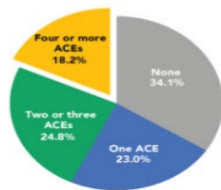
The Centers for Disease Control and Prevention defines adverse childhood experiences (ACEs) as "all types of abuse, neglect, and other potentially traumatic experiences that occur to people under the age of 18." In Michigan, eight specific ACEs are tracked through an annual state-level telephone survey of adults known as the Behavioral Risk Factor Survey. In 2016, two-thirds of Michigan adults (66%) reported having one or more ACEs.



**Two-thirds of Michigan adults (66%) reported having one or more ACEs.**

### ACEs Load Matters.

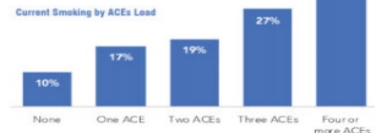
Generally speaking, the higher a person's ACEs load (the number of ACEs they have), the greater their likelihood of exhibiting risky health behaviors and experiencing poorer health outcomes. In 2016, nearly a quarter of Michigan adults reported experiencing at least one ACE, a quarter reported experiencing two to three ACEs, and nearly one in five experienced four or more.



### ACEs Are Strongly Associated with Health Risk Behaviors and Poor Health Outcomes.

In 2016, 44% of Michigan adults with four or more ACEs had been diagnosed with depression, compared to only 12% with no ACEs. This trend was similar for those with chronic obstructive pulmonary disease (COPD), asthma, poor mental health, poor physical health, and poor overall health.

### 37% of Michigan adults with four or more ACEs reported currently smoking.



**2.7M**

adults (39%) reported being verbally abused one or more times as a child.

**1.9M**

adults (27%) reported having separated or divorced parents.

**1.4M**

adults (19%) reported physical violence between adults in their household.

**2.1M**

adults (29%) reported substance abuse in their household.

**1.4M**

adults (20%) reported mental illness in their household.

**1.3M**

adults (18%) reported that they were physically abused one or more times as a child.

**1.1M**

adults (16%) reported being sexually abused one or more times as a child.

**0.6M**

adults (9%) reported having an incarcerated household member.

**46%**

greater risk of binge drinking for adults with one or more ACEs compared to those with no ACEs.

**82%**

greater risk of poor mental health for adults with one or more ACEs compared to those with no ACEs.

**83%**

greater risk of diagnosed COPD for adults with one or more ACEs compared to those with no ACEs.

**69%**

greater risk of lifetime asthma for adults with one or more ACEs compared to those with no ACEs.

**57%**

greater risk of current asthma for adults with one or more ACEs compared to those with no ACEs.

**64%**

greater risk of fair or poor general health for adults with one or more ACEs compared to those with no ACEs.

**141%**

greater risk of depression for adults with one or more ACEs compared to those with no ACEs.

Diagnosed Depression by ACEs Load



### There Is Hope

Social support from friends, family, and the community can help buffer the negative effects of ACEs. In Michigan, adults with high levels of social support were 7% to 29% less likely to report negative health outcomes compared to those with low social support.

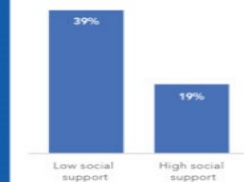
### We Can Overcome ACEs

As a supportive adult, you can help buffer the effects of ACEs by helping to build resilience in others. Resilience means that, in the face of adversity, people can navigate life well and actively participate in preventing ACEs in the next generation.

Find out more at [Michigan.gov/TraumaToxicStress](https://Michigan.gov/TraumaToxicStress)

**Michigan adults with four or more ACEs and high social support had a lower risk of poor physical health.**

Poor Physical Health by Level of Social Support



Risk was calculated using a ratio comparing the prevalence of the behavior or condition among those with one or more ACE compared to the prevalence among those with zero ACEs.

### REFERENCES

Centers for Disease Control and Prevention. April 9, 2019. "About Adverse Childhood Experiences." Centers for Disease Control and Prevention. Accessed July 22, 2019. <https://www.cdc.gov/ncjrs/cpr/2019/childabuseandneglect/acesstudy/aboutaces.html>

Murad, A. and O. Barth. 2016. Michigan Behavioral Risk Factor Surveillance System Survey Data. Lansing: Michigan Department of Health and Human Services, Lifecourse Epidemiology and Genomics Division.

Data analysis and infographic design by Public Sector Consultants based on weighted prevalence estimates among Michigan's adult population provided by the Michigan Department of Health and Human Services, Lifecourse Epidemiology and Genomics Division.

Analysis and graphic design by Public Sector Consultants based on weighted prevalence estimates among Michigan's adult population provided by the Michigan Department of Health and Human Services.

Source: Murad A. and O. Barth. 2016. *Michigan Behavioral Risk Factor Surveillance System Survey Data*. Lansing: Michigan Department of Health and Human Services, Lifecourse Epidemiology and Genomics Division.

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Respondents with high social support exhibited a **7 to 29 percent** lower prevalence of negative health outcomes than respondents with low social support, depending on health outcome and ACEs load.

Analysis by Public Sector Consultants based on weighted prevalence estimates among Michigan's adult population provided by the Michigan Department of Health and Human Services.

Source: Murad A. and O. Barth. 2016. *Michigan Behavioral Risk Factor Surveillance System Survey Data*. Lansing: Michigan Department of Health and Human Services, Lifecourse Epidemiology and Genomics Division.





## Four Resilience Factors that Make a Difference They are even more powerful when we Layer Up...

1. Feeling social/emotional support and hope
2. Having 2 or More People Who Help (two or more people who give concrete help when needed)
3. Community reciprocity in watching out for children, intervening when they are in trouble, doing favors for one another
4. Social Bridging – People reach outside their social circle to get help for their family and friends

# What Do We Do as Individuals?



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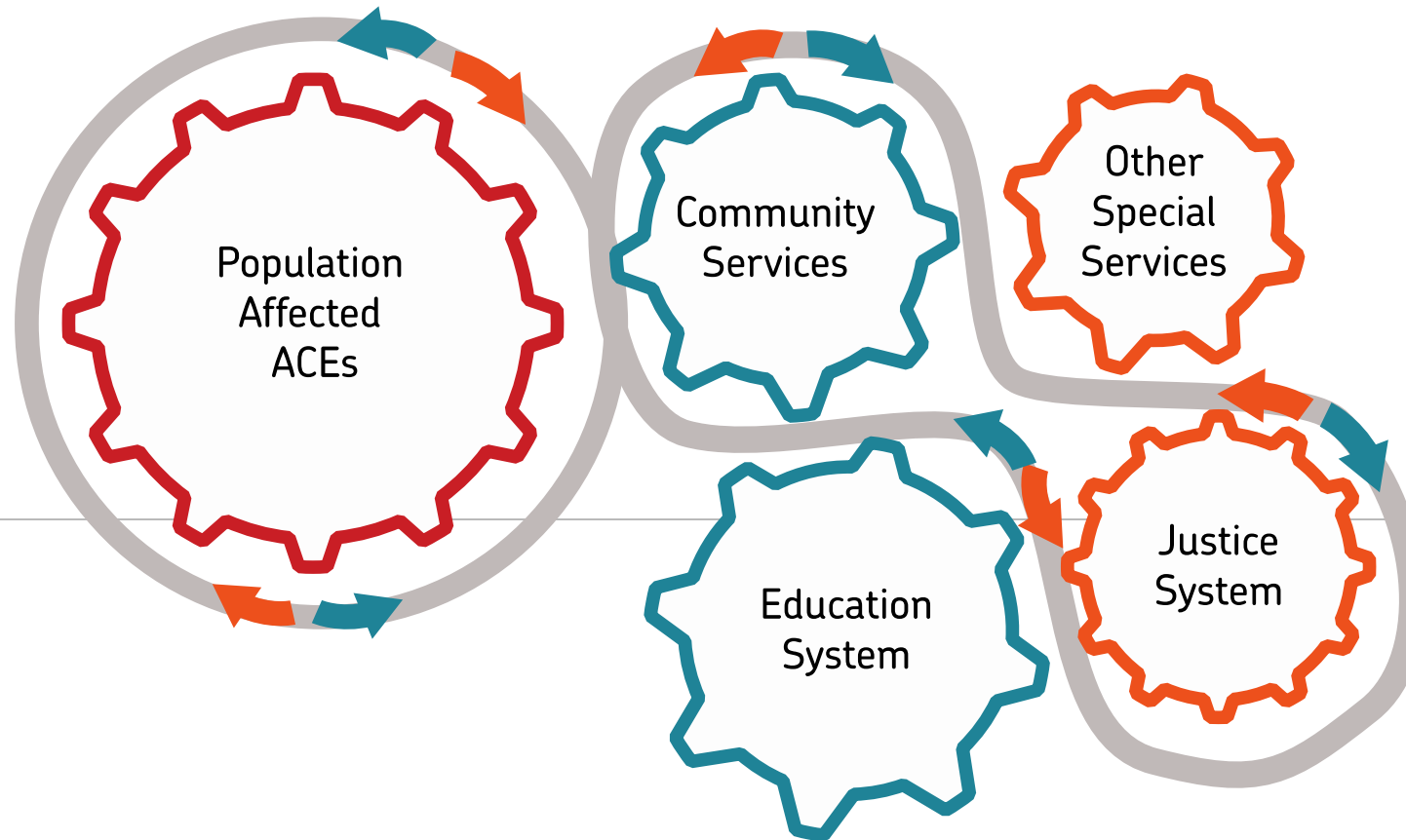
Break societal silence and end the isolation of the child.

Ask “what happened” vs what's wrong with you.

Listen. Pay attention. Believe. Respond with compassion. Be a safe place for the child.



# Building Self-Healing Communities





# ACE and Other States (Michigan is not alone)



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17 states have introduced or enacted legislation or Resolutions

- Study Groups and Task Force Creation
- Interagency Coordination and Recommended strategies
- Research
- EPSDT Inclusion
- Professional Development Topic
- Review of policies and protocols using context of ACE

32 States have done one or more ACE Survey as part of BRFSS

<https://acestoohigh.com/2017/10/01/wisconsin-aims-to-be-first-trauma-informed-state-seven-state-agencies-lead-the-way/>

# ACEs Are Not Destiny

People affected by ACEs are becoming the leaders of  
**S e l f - H e a l i n g   C o m m u n i t i e s**



# Resource URLs

## ACES

- TED Talk [www.ted.com/talks/nadine\\_burke\\_harris\\_how\\_childhood\\_trauma\\_affects\\_health\\_across\\_a\\_lifetime](http://www.ted.com/talks/nadine_burke_harris_how_childhood_trauma_affects_health_across_a_lifetime)
- CDC [www.cdc.gov/violenceprevention/acestudy/index.html](http://www.cdc.gov/violenceprevention/acestudy/index.html)
- Academy on Violence and Abuse [www.avahealth.org/aces\\_best\\_practices/](http://www.avahealth.org/aces_best_practices/)

## Evidence Based Treatment & Prevention

- NCTSN [www.nctsn.org](http://www.nctsn.org)
- ISTSS <https://www.istss.org/>
- Children's Bureau <http://www.acf.hhs.gov/programs/cb>
- SAMHSA <http://www.samhsa.gov/ebp-web-guide>
- Maternal Depression <http://www.movingbeyonddepression.org/>

## Advocacy & Policy

- AAP [www.aap.org/en-us/Pages/Default.aspx](http://www.aap.org/en-us/Pages/Default.aspx)
- APAs [www.apa.org](http://www.apa.org) & [www.psychiatry.org](http://www.psychiatry.org)
- AACAP [www.aacap.org](http://www.aacap.org)

# Adverse Childhood Experiences: Opportunity for Integrating ACES into Genetic Conversations



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## Presentation for the Midwest Genetics Network

September 29

## QUESTIONS?

Richard Murdock, Michigan ACE Initiative Coordinator

[richardbrucemurdock@gmail.com](mailto:richardbrucemurdock@gmail.com)

Miace.org