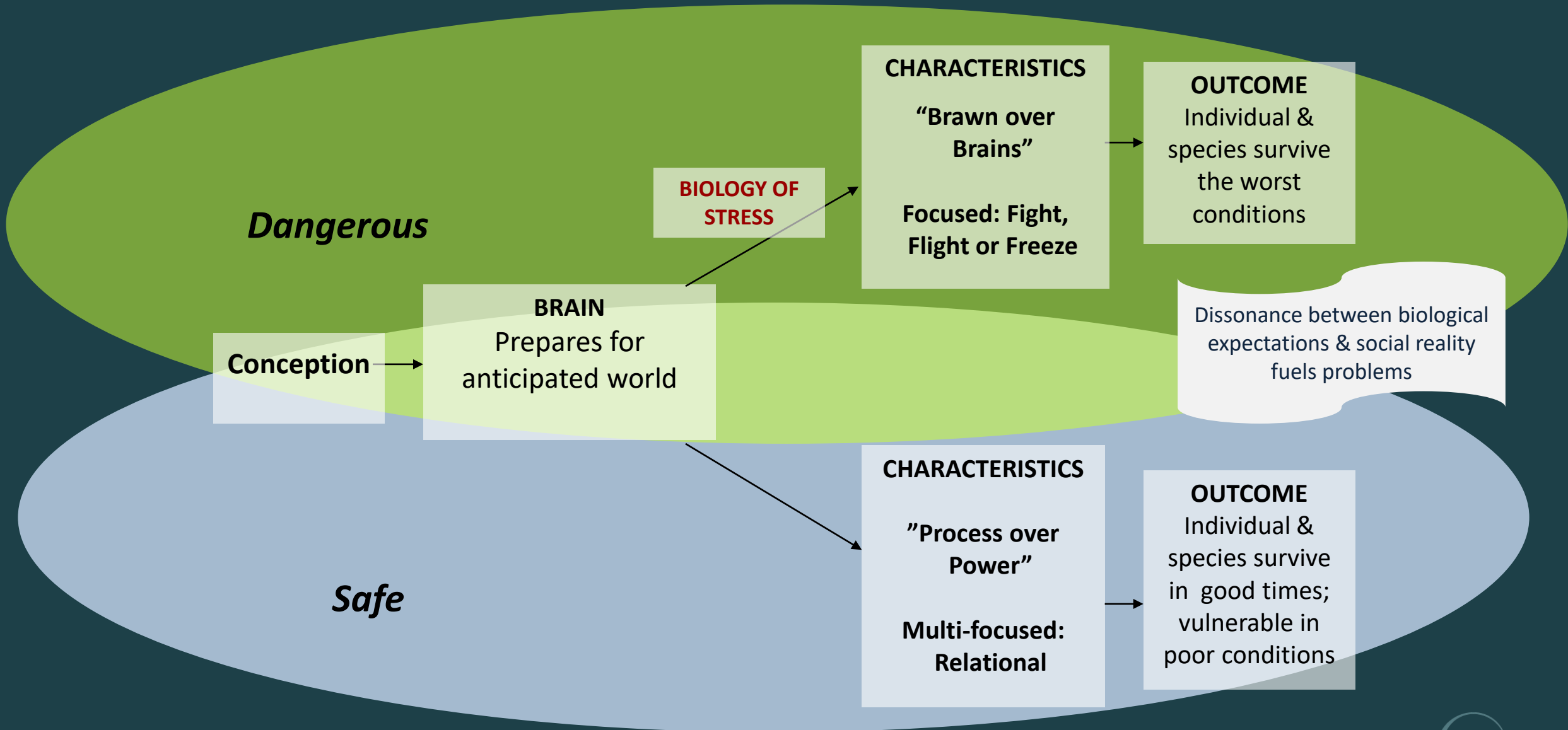


# N.E.A.R.

Neuroscience, Epigenetics, ACEs, Resilience



# Preparing for Anticipated World

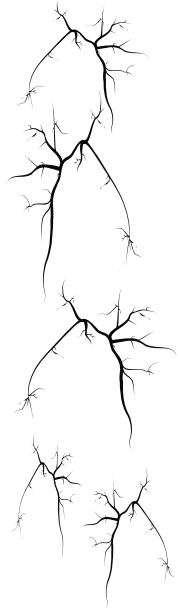


# Brain Development is Experience-Dependent

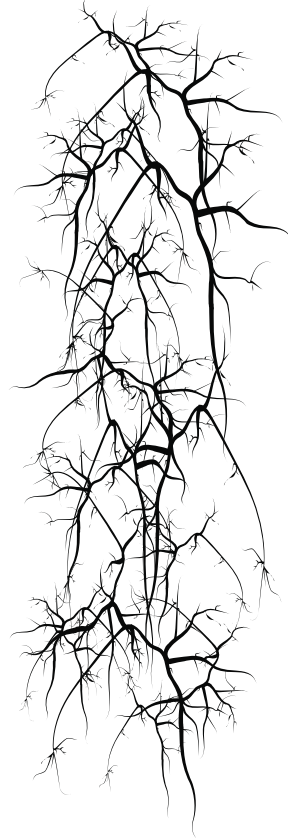
What Fires Together Wires Together

# SYNAPTIC DENSITY

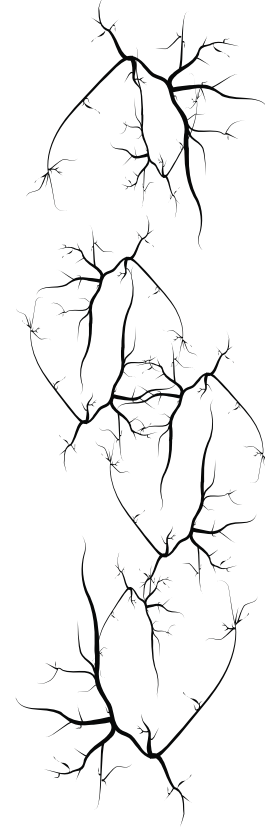
AGE  
EXPERIENCE  
GENDER



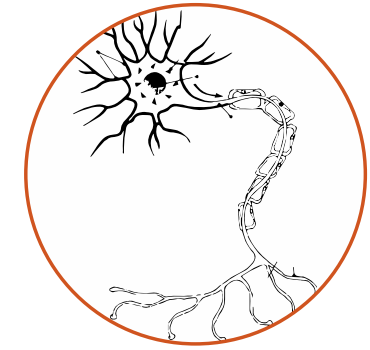
At Birth



Elementary Age



Puberty



Single  
Neuron

# Age of Experience Matters

(examples, not a comprehensive list)

Fetal exposure to stress chemicals

Low birth weight, cardio vascular, diabetes

Maltreatment in:

First few months

Anticipate pleasure, attach & belong

First 5 years

Emotional regulation, fear, panic

Middle childhood

Suicide risk, executive dysfunction, social cues

Pre-puberty

Navigate physical space, mental illness,

Adolescence

Risk behaviors, long term memory

# STRESS

Interpretations Can Differ

set points in place by  
EARLY ADULTHOOD



At Birth

SYNAPTIC DENSITY

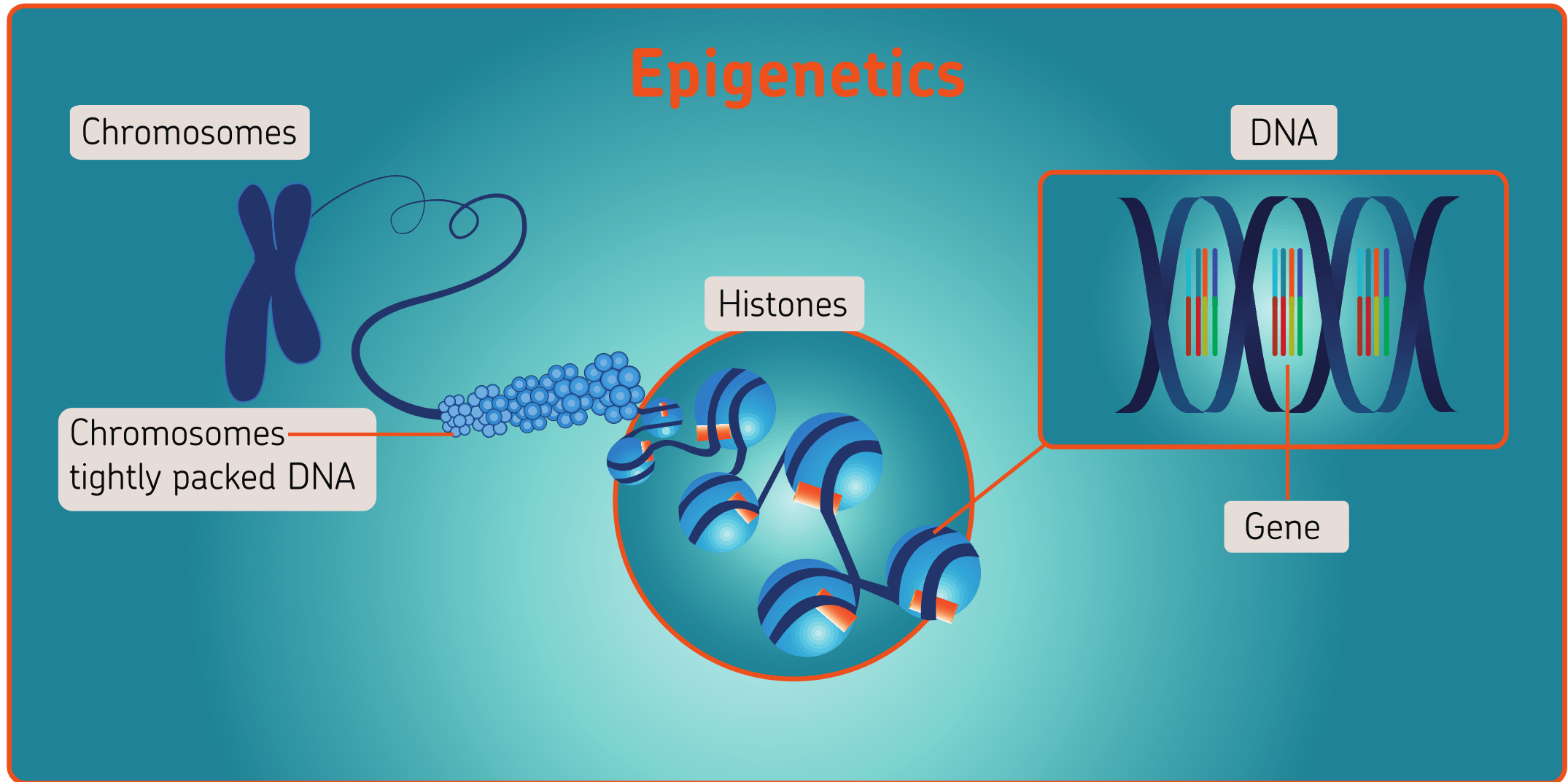


Elementary Age





# ACEs Influence Gene Expression

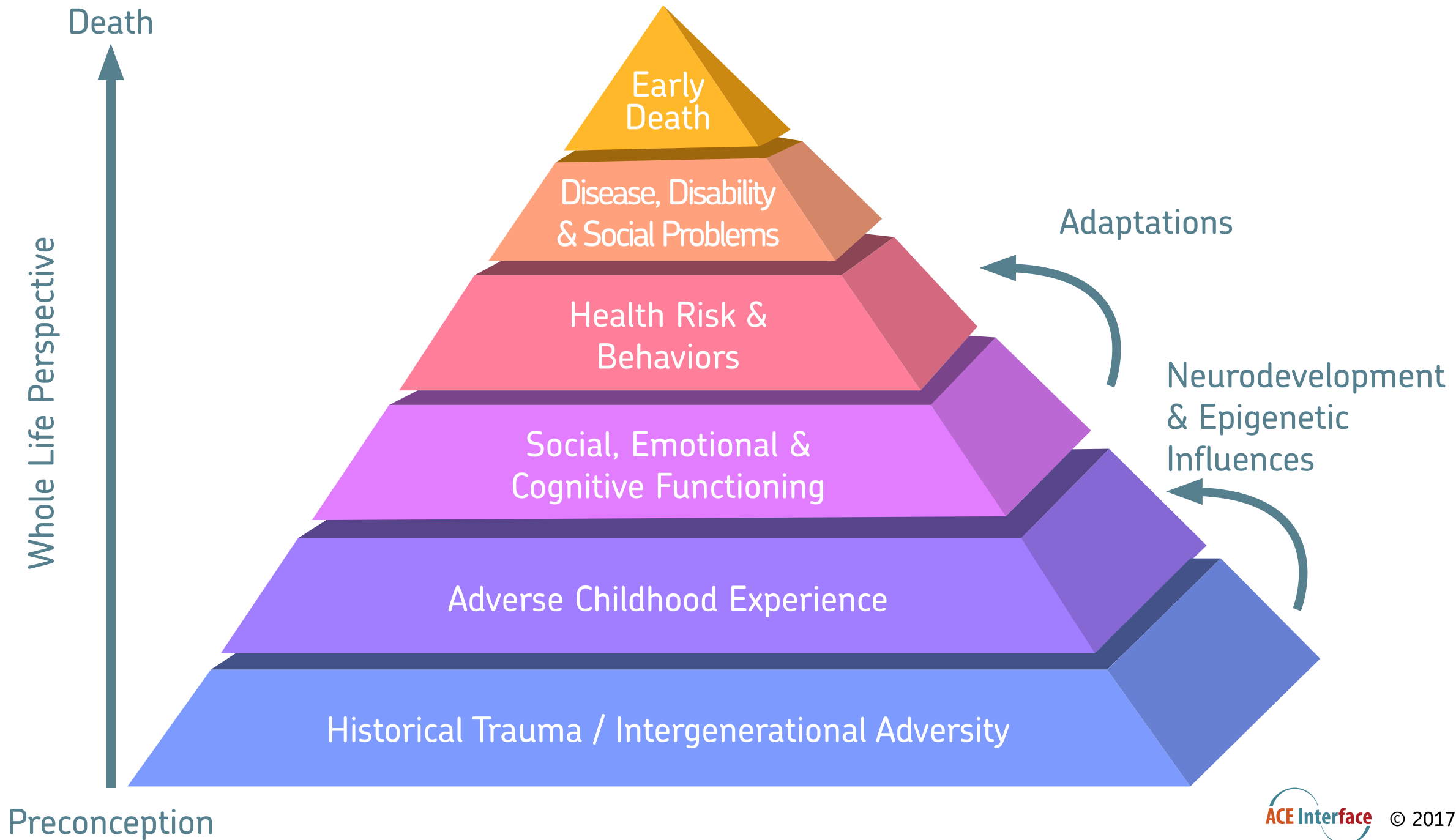


# Epigenetics



*“Parents with their own genetic vulnerabilities can pass on protection to the next generation provided that they are given the right support.”*





# Adverse Childhood Experiences **ARE COMMON**

## Household Dysfunction

Substance Abuse	27%
Parental Sep/Divorce	23%
Mental Illness	17%
Battered Mothers	13%
Criminal Behavior	6%

## Neglect

Emotional	15%
Physical	10%

## Abuse

Emotional	11%
Physical	28%
Sexual	21%

5

2

3

TOTAL 10 ACEs

# ACEs are Highly Interrelated

## Indicators of Family Dysfunction

1. Mentally ill, depressed or suicidal person in home
2. Family member with drug or alcohol addiction
3. Parental discord – indicated by divorce, separation
4. Exposed to family violence
5. Incarceration of any family member

## Abuse

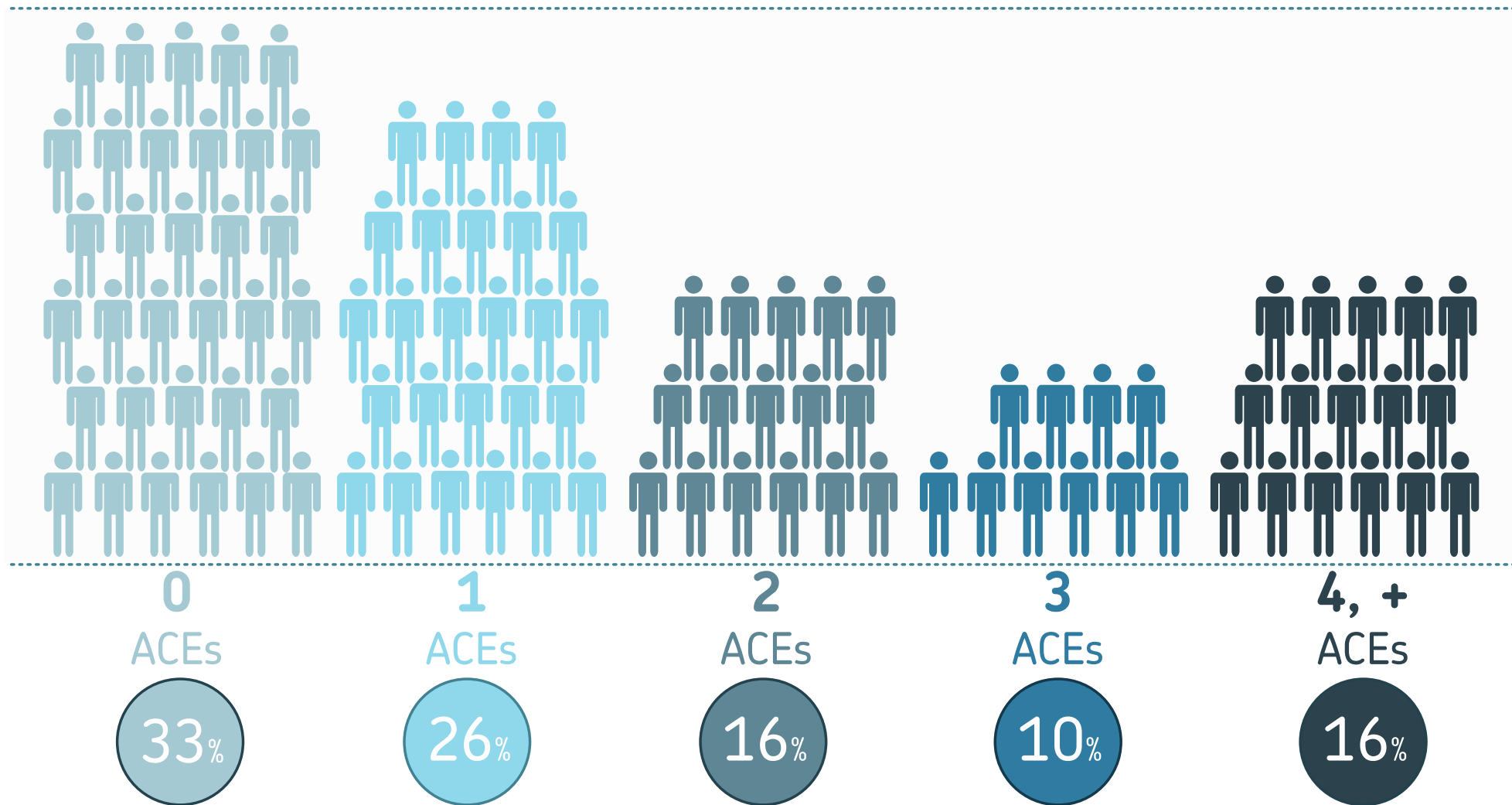
6. Child physical abuse
7. Child sexual abuse
8. Child emotional abuse

## Neglect

9. Physical Neglect
10. Emotional Neglect



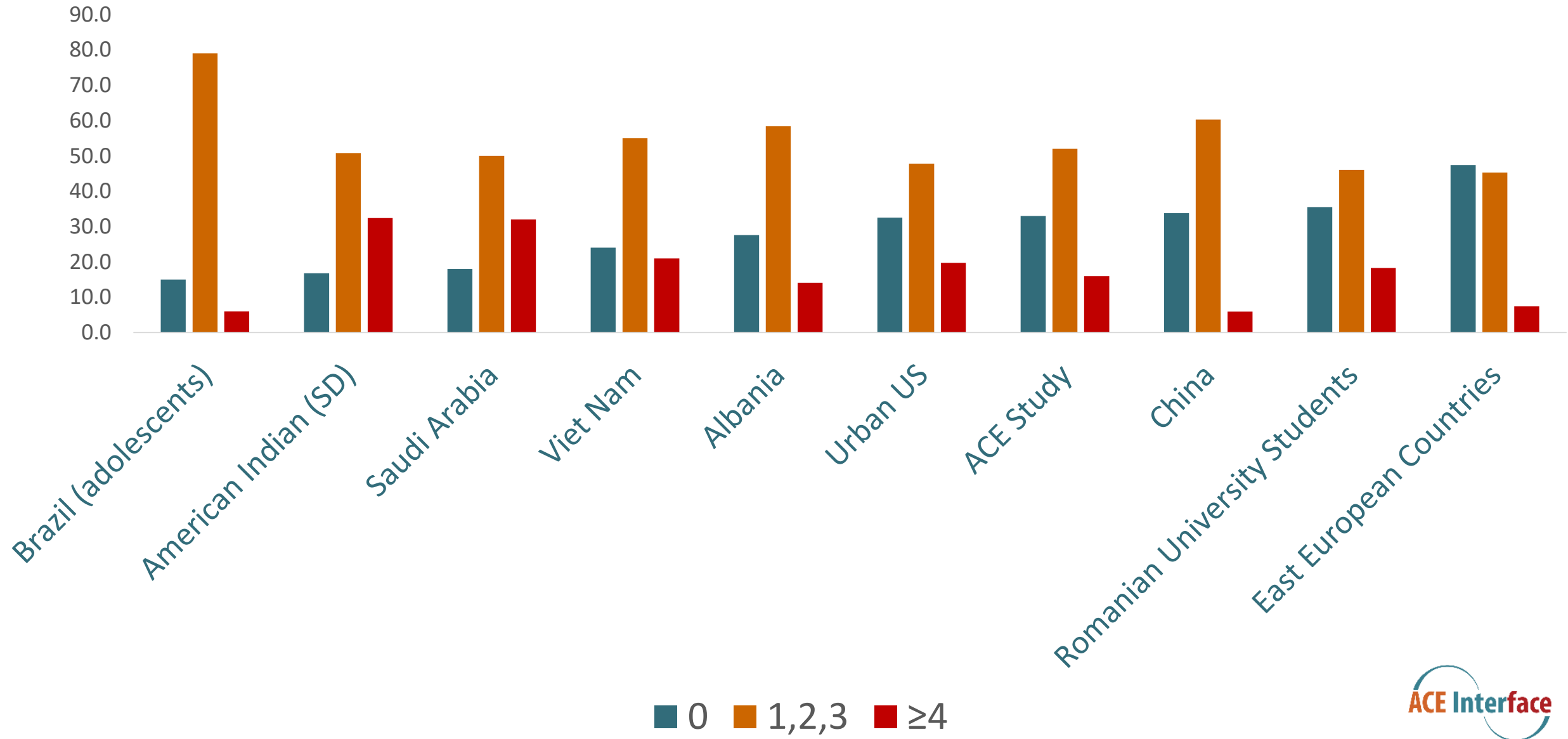
# ACE Score = Number of ACE Categories



ACE Scores Reliably Predict Challenges During the Life Course

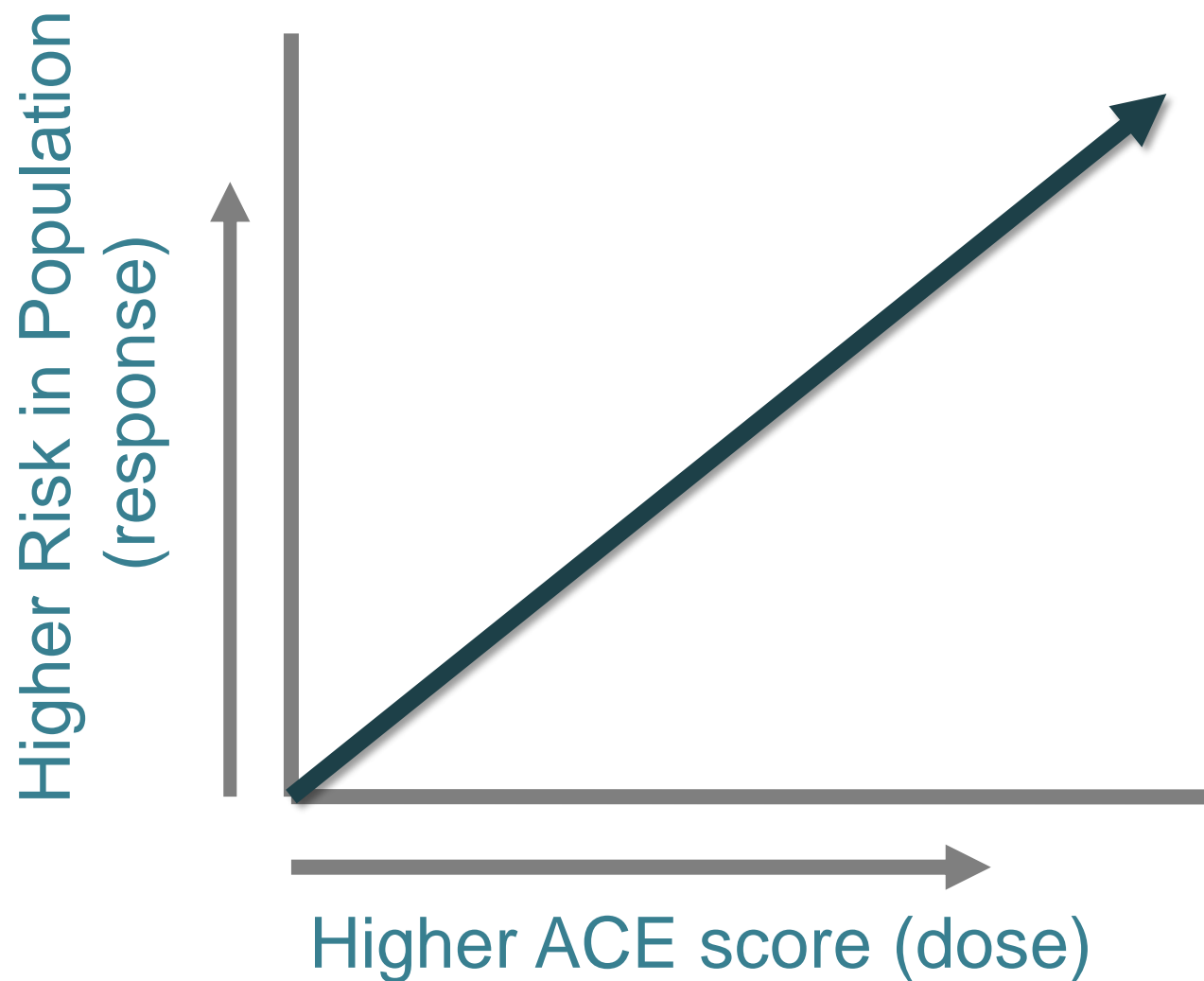
# ACEs are Common Across the Globe

1-3 range: 45-79%;  $\geq 4$  range: 6-32%



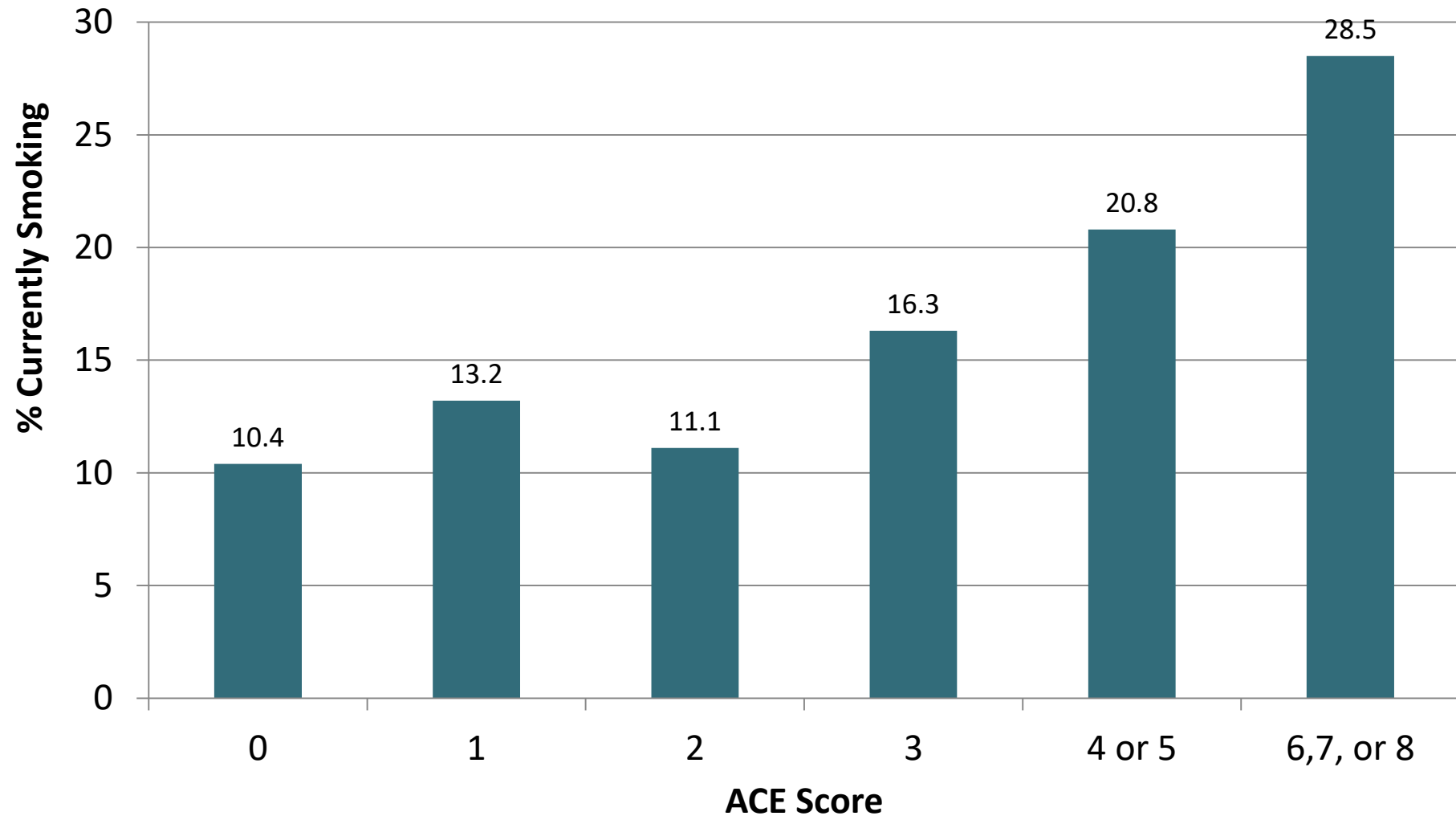


# ACEs Have a Cumulative Effect

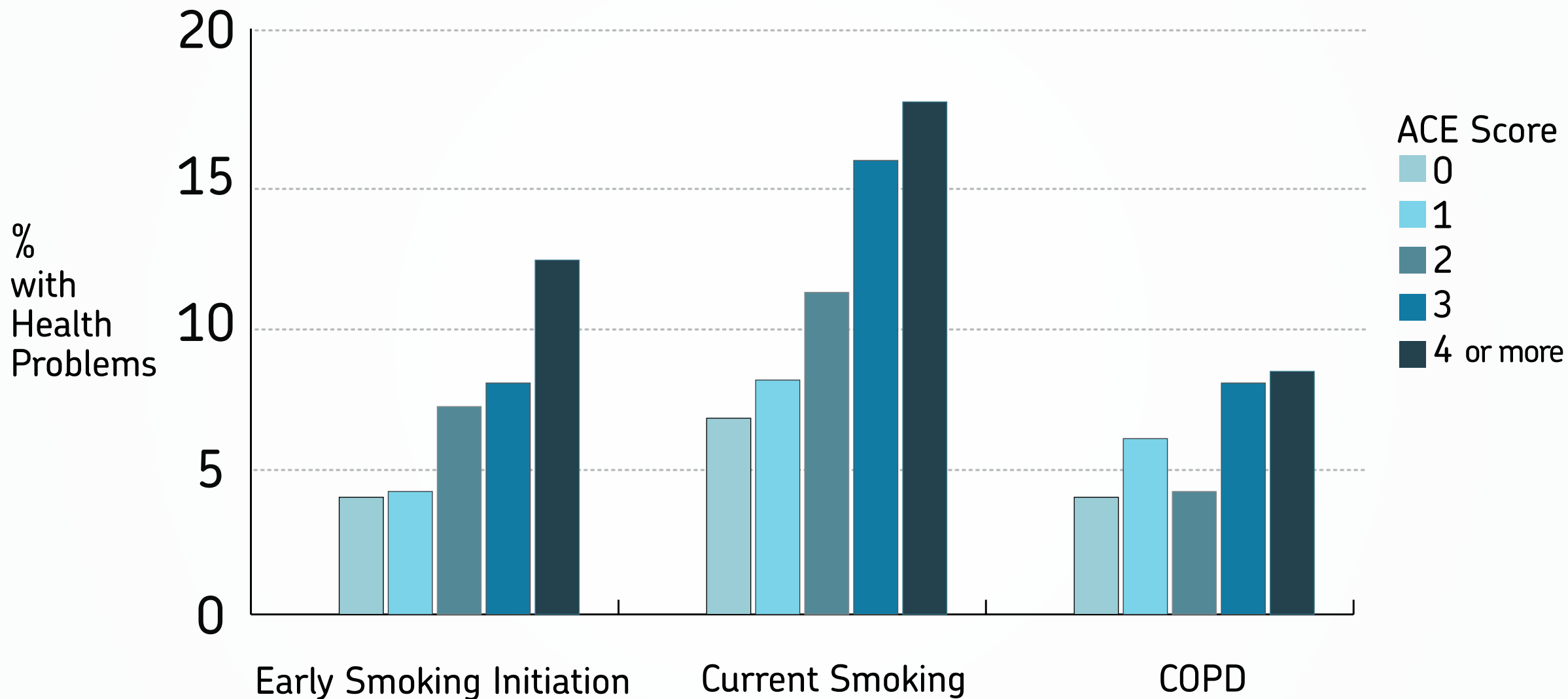


Dose-response  
is a direct  
measure of  
cause and  
effect.

# Smoking

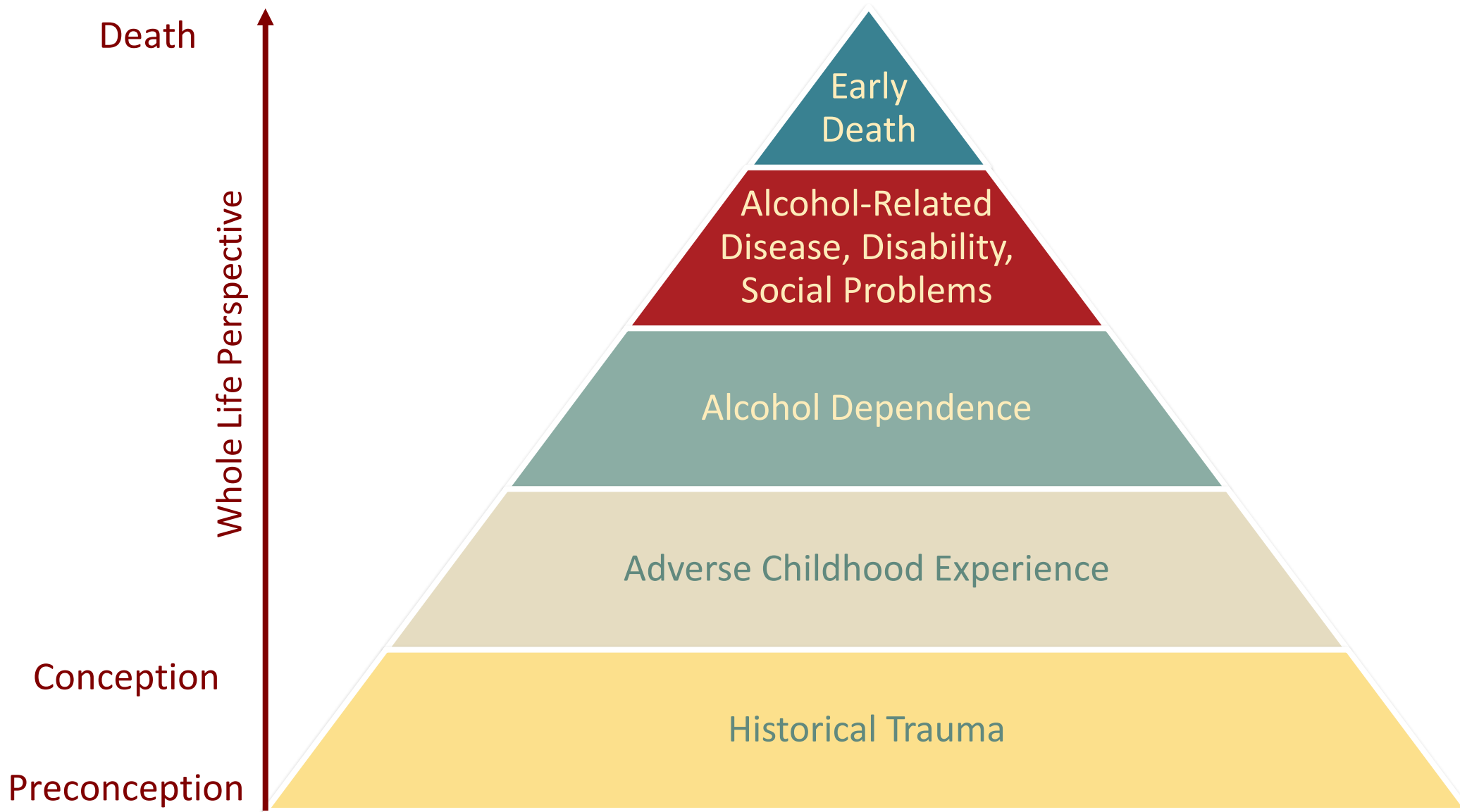


# ACEs, Smoking and Lung Disease



# **Adverse Childhood Exposures and Alcohol Dependence Among Seven Tribes**

*American Journal of Preventative Medicine*, 2003, pp.  
238-244; Koss, M., Polacca, M., Yuan N., et al



*Adverse Childhood Exposures and Alcohol Dependence Among Seven Tribes*



# Adverse Childhood Exposures

Analysis from “The Ten Tribes Study”

## ABUSE AND NEGLECT

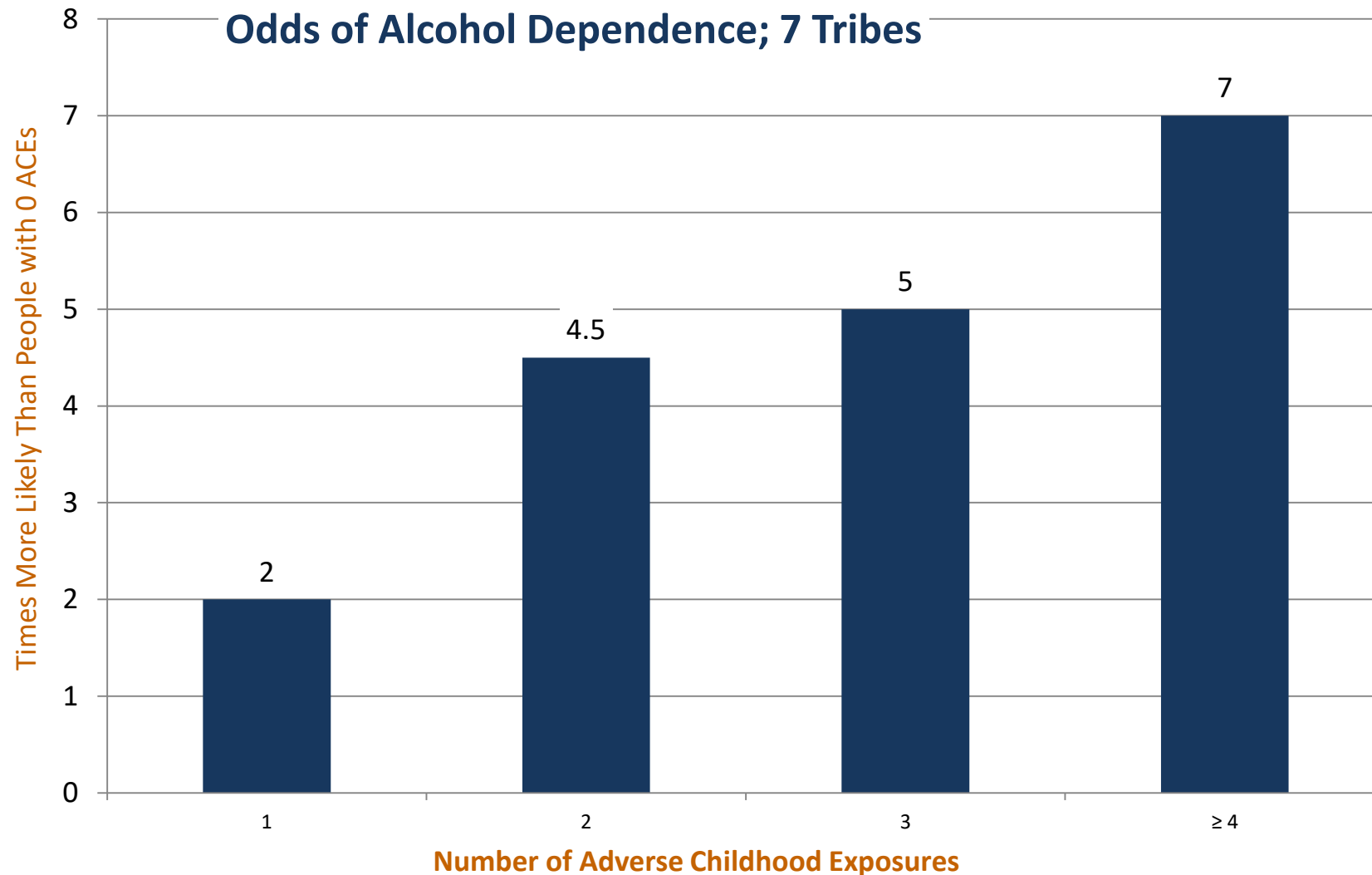
1. Physical abuse (men: 40%; women: 42%)
2. Sexual Abuse (men: 26%; women: 31%)
3. Emotional abuse (men: 26.5%; women: 36.4%)
4. Physical neglect (men: 45%; women: 43%)
5. Emotional neglect (men: 20%; women: 23%)

86% participants experienced one or more categories

33% reported four or more categories.

## FAMILY/CONTEXT

6. Boarding school placement (25%)
7. Foster care placement, (men: 10%; women: 14.5%)
8. Adoption (5%)
9. Having an alcoholic parent(s) (men: 66%; women: 66.5%)



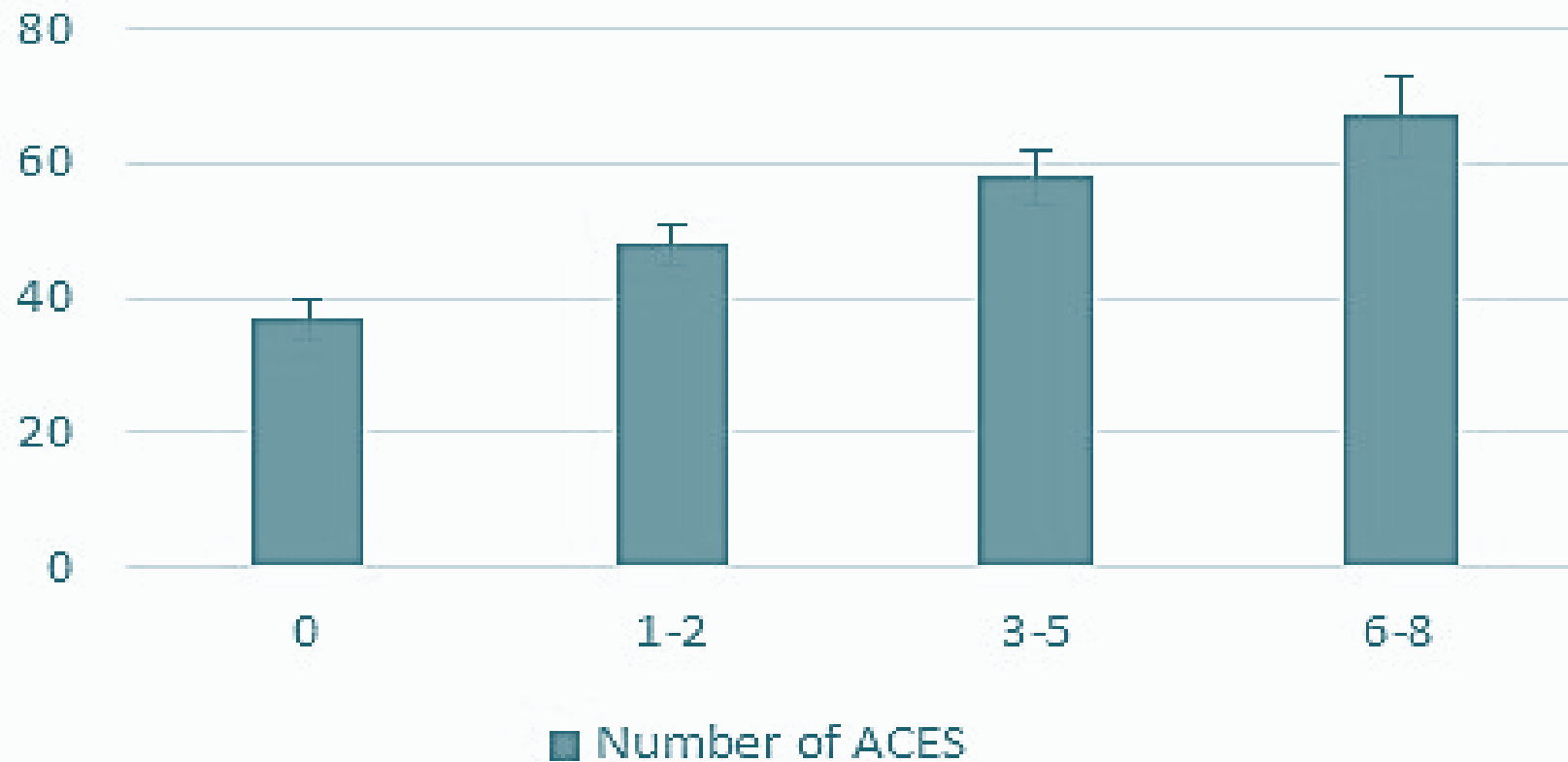
- Combined sexual and physical abuse increased alcohol dependence for men.

- Combined sexual abuse and boarding school attendance were significant for women.

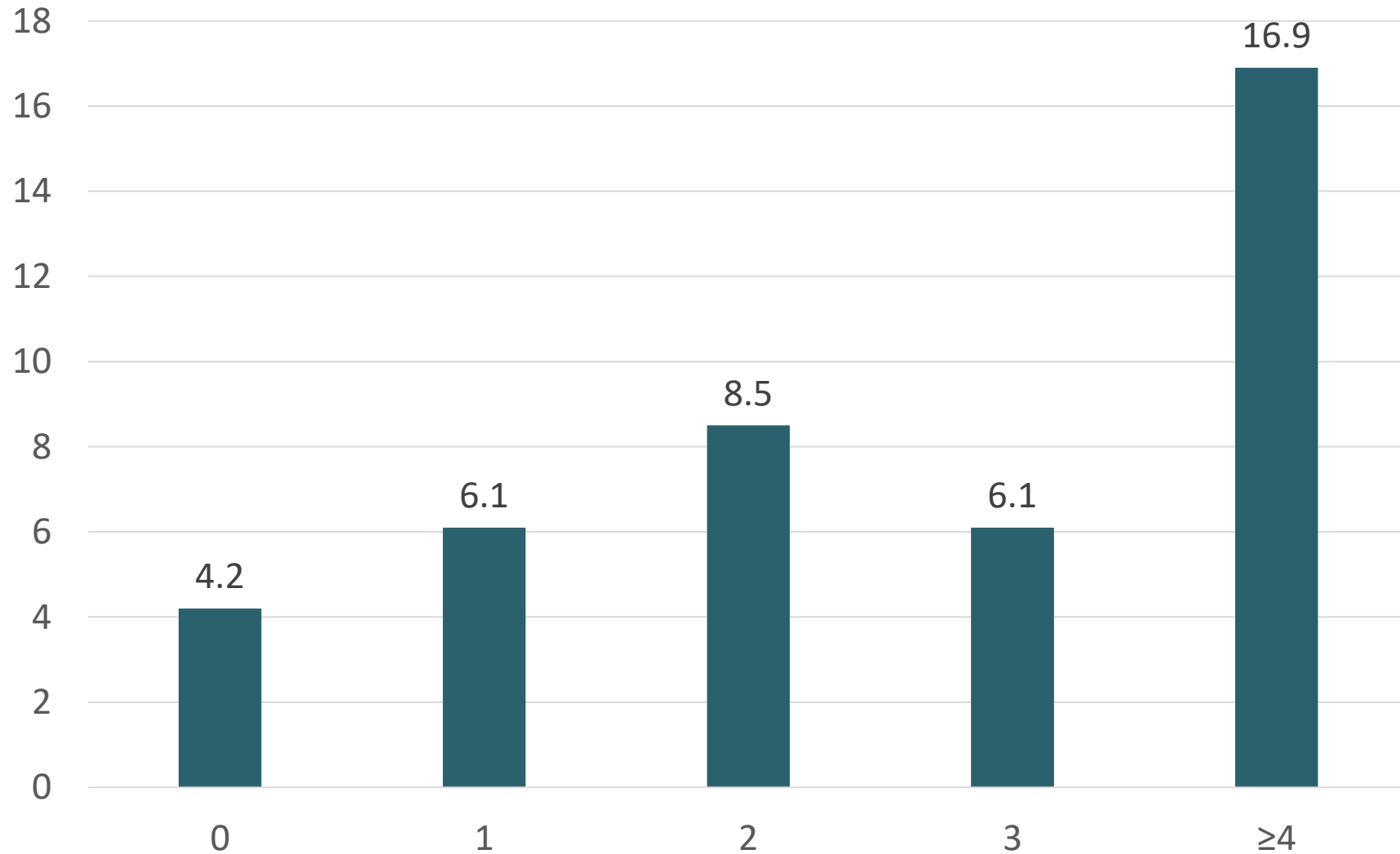
*“Self regulation depends on having a friendly relationship with your body. Without it you have to rely on external regulation – from medication, drugs like alcohol, constant reassurance, or compulsive compliance with the wishes of others.”*

# Sleep

Did Not Get Enough Sleep 7 Days or More in Past Month, Ages 18-44



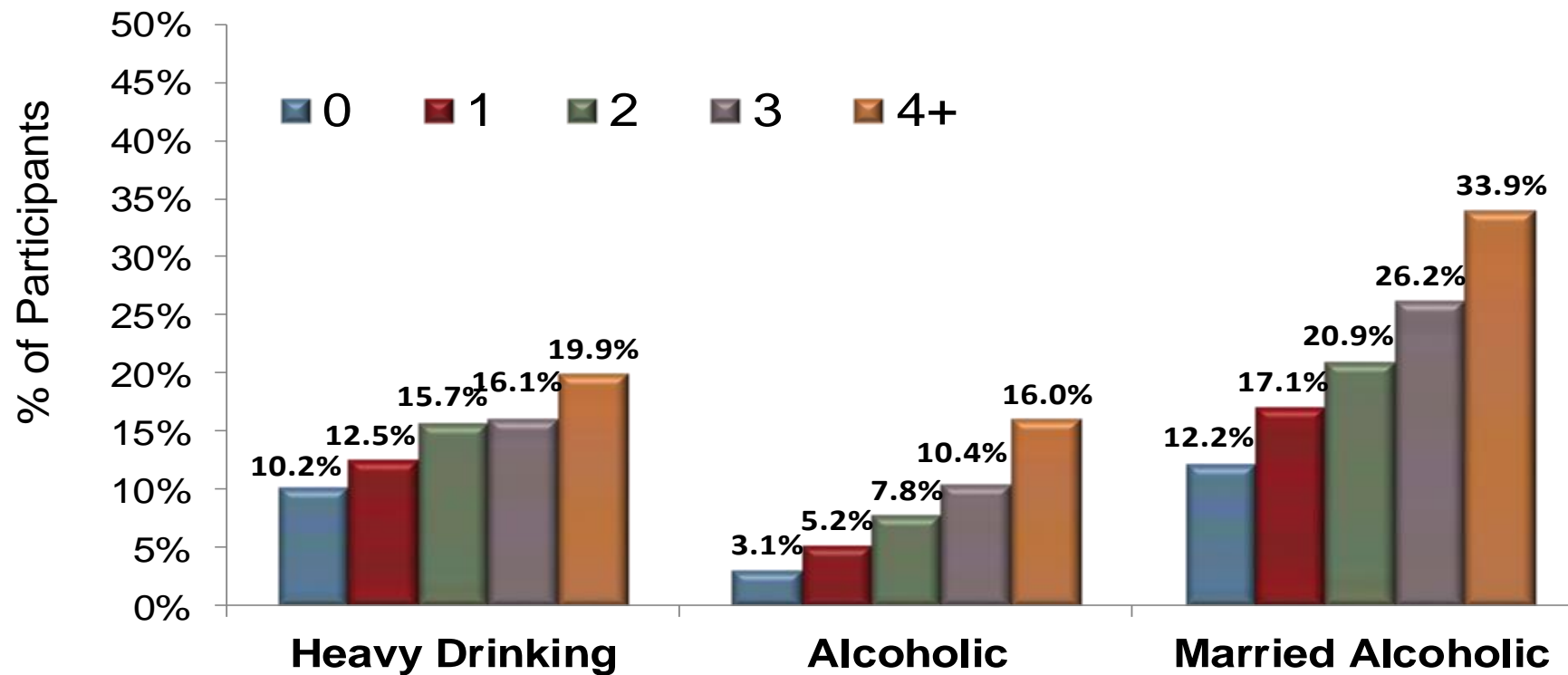
# Started Drinking Alcohol Prior to Age 15



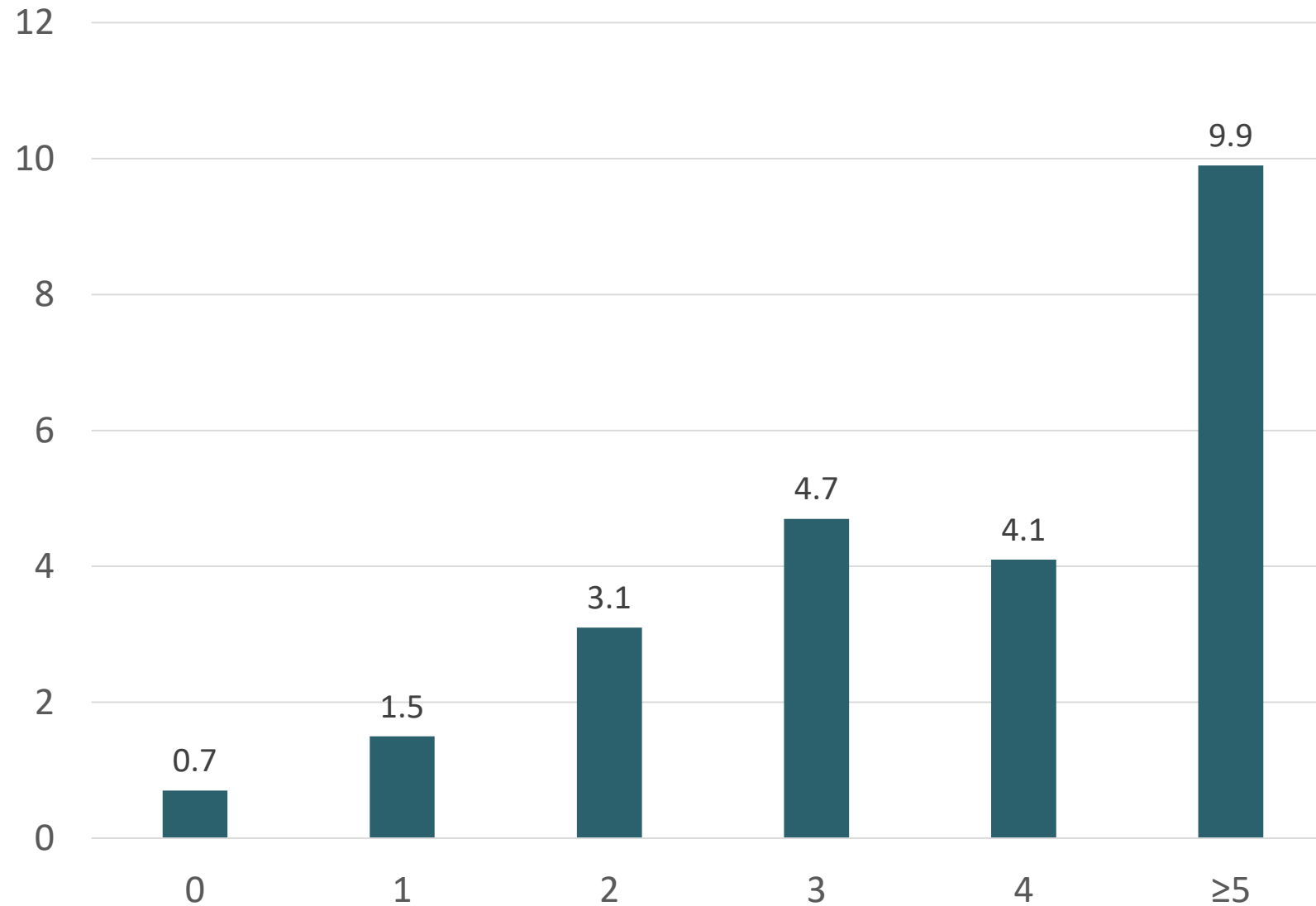


# Adult Alcohol Use

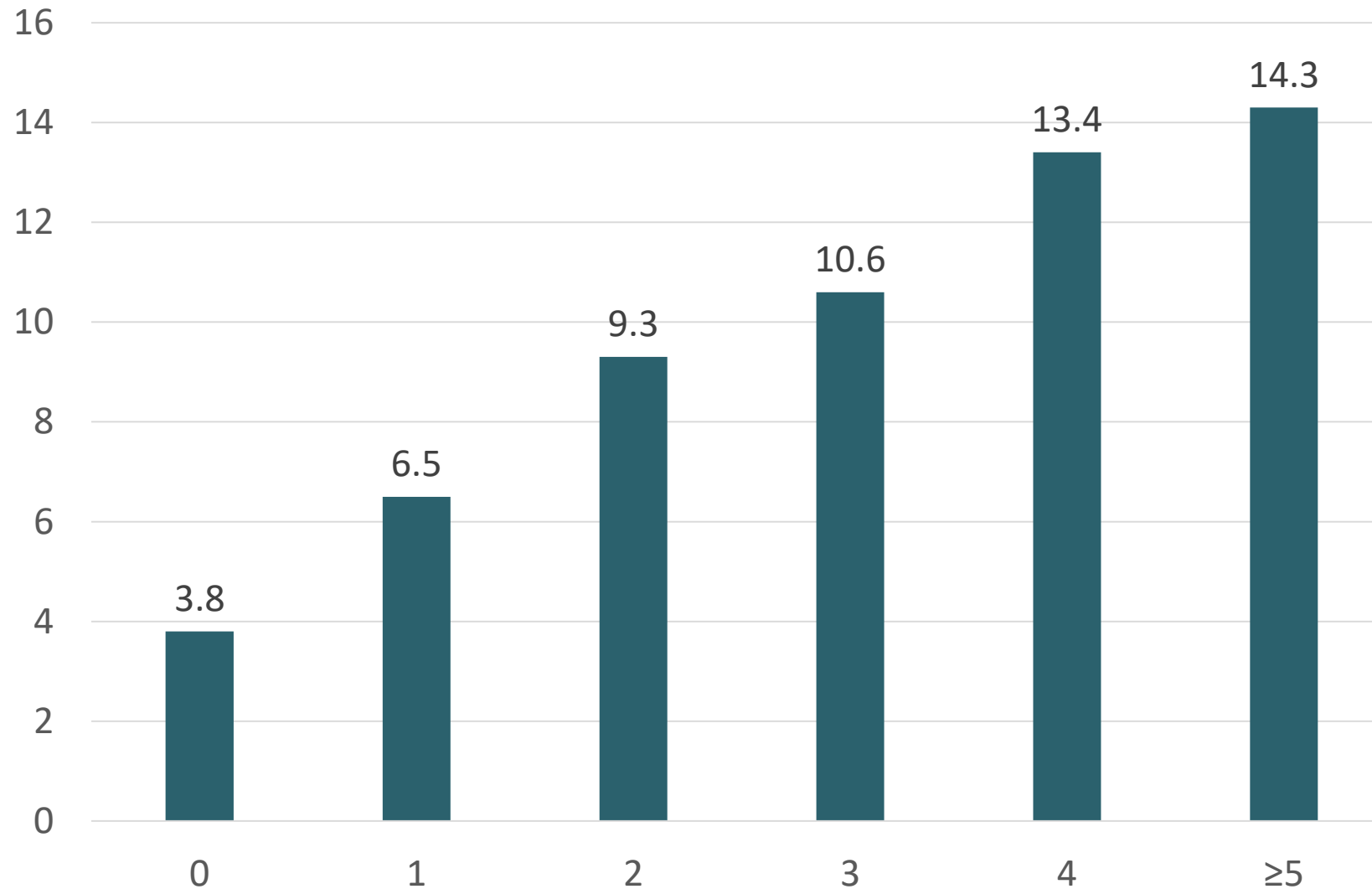
Percentage of Participants' reported Heavy Drinking, Alcoholism, and Marrying an Alcoholic by ACE score



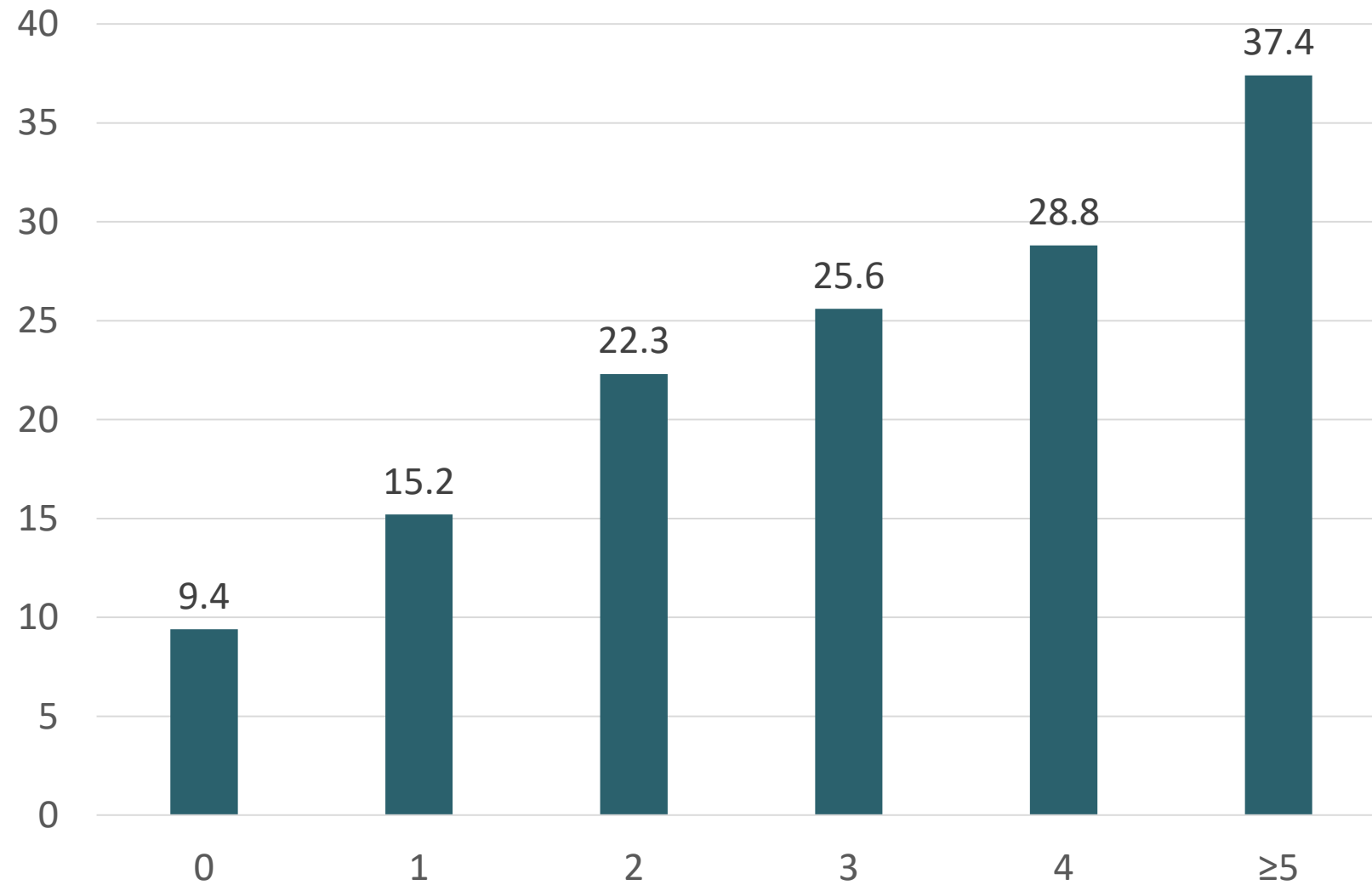
# Illicit Drug Use Before Age 15



# Illicit Drug Use Started Between Ages 15 & 18



# Illicit Drug Use as an Adult



# What Helps Individuals Self-regulate?

## Activate Social Engagement:

1. Healing Power of Community Expressed in Music, Rhythm, Theatre
2. Exercise & Play
3. Practicing Connection

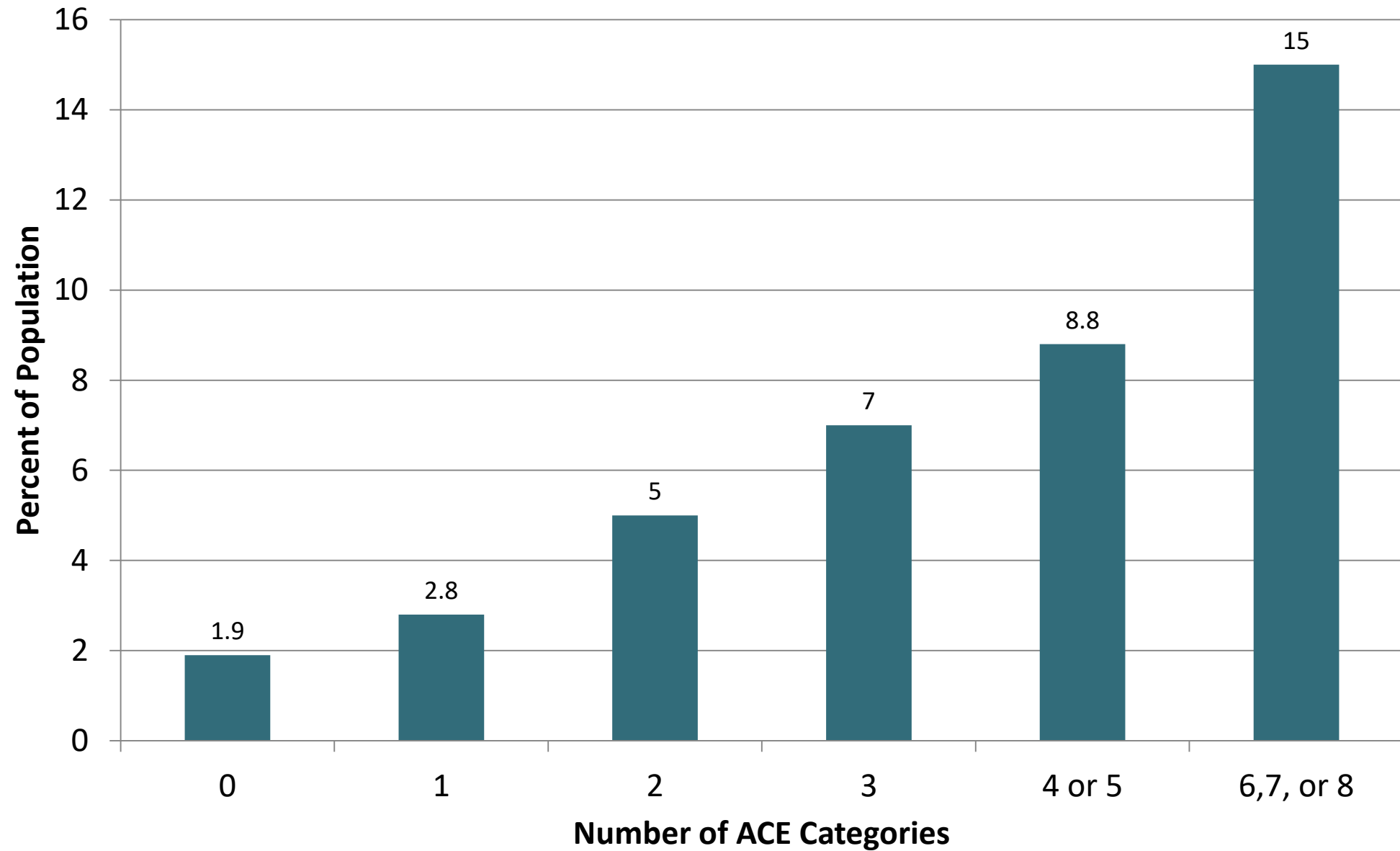
## Calm Physical Tensions in Body:

1. Massage, Movement, Breathing
2. Mindfulness, Reflection, Yoga
3. Tapping Acupressure Points
4. Biofeedback, Neurofeedback
5. Eye Movement Desensitization & Reprocessing

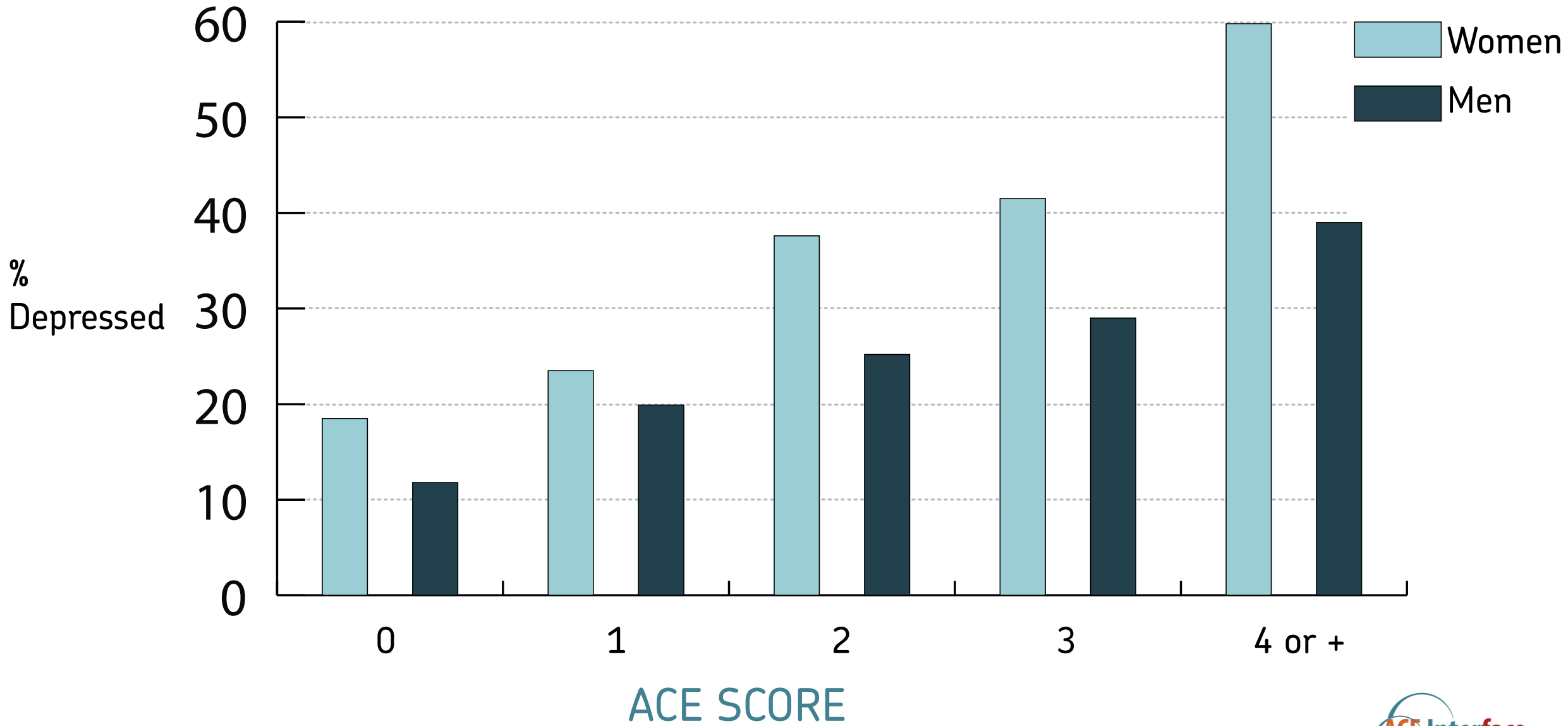




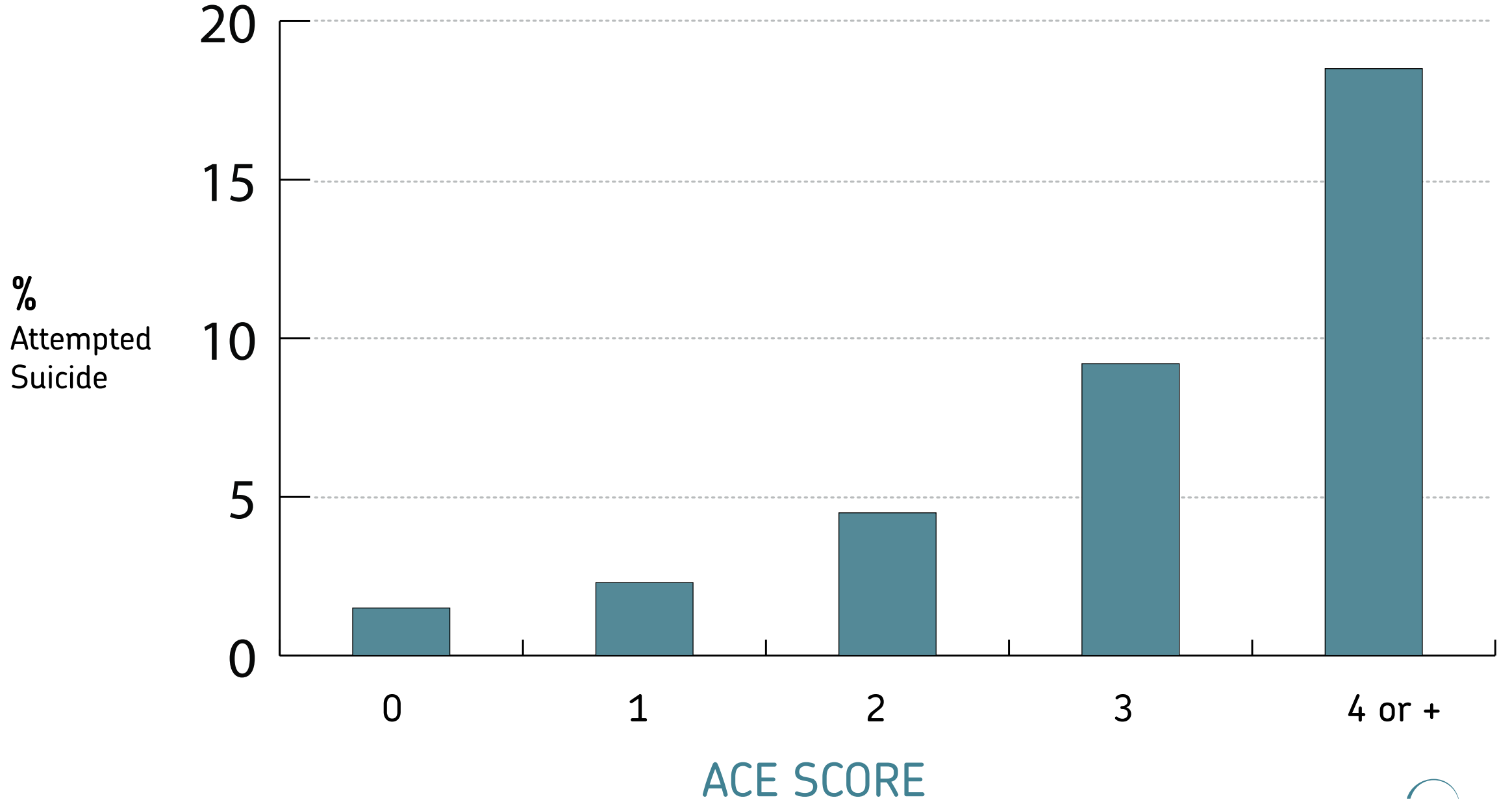
# Anxiety



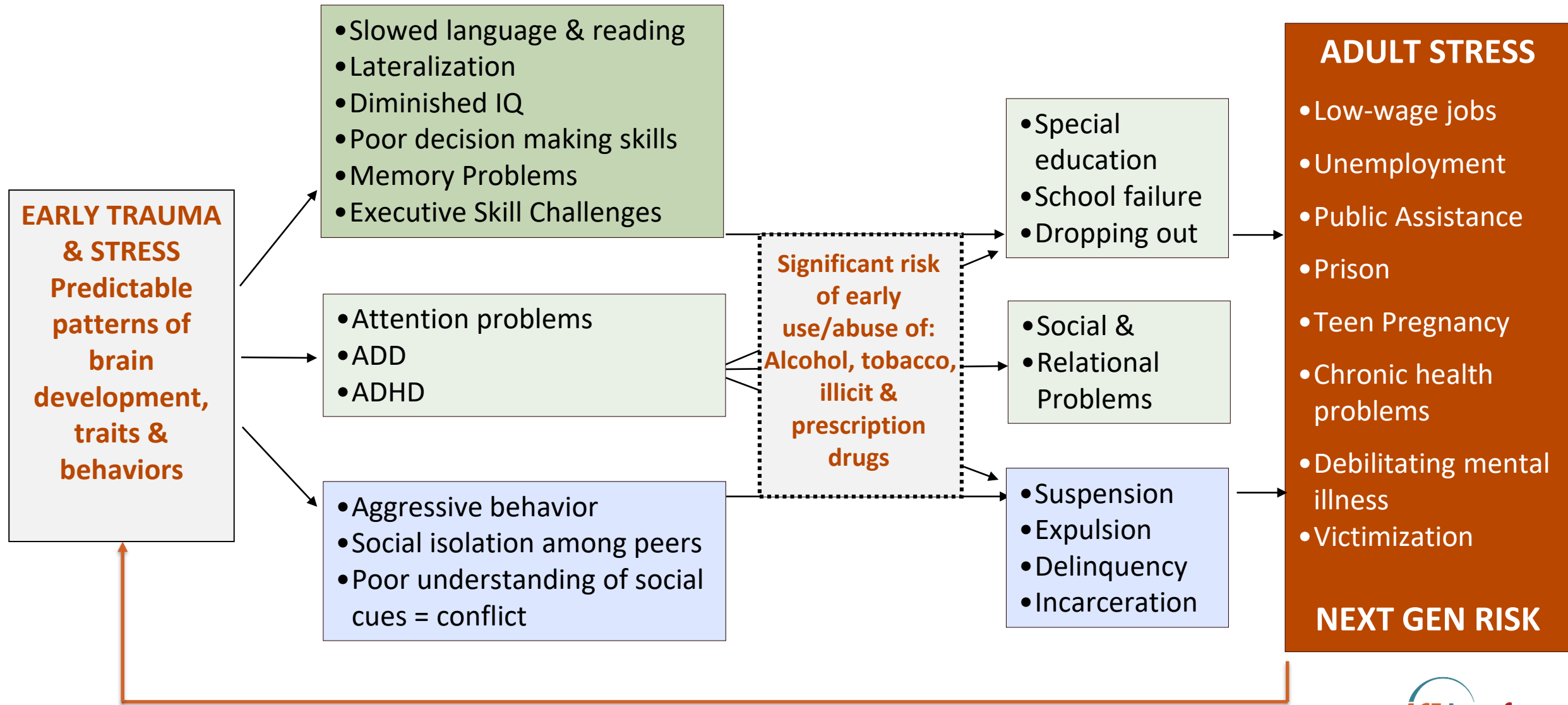
## ACEs & Depression



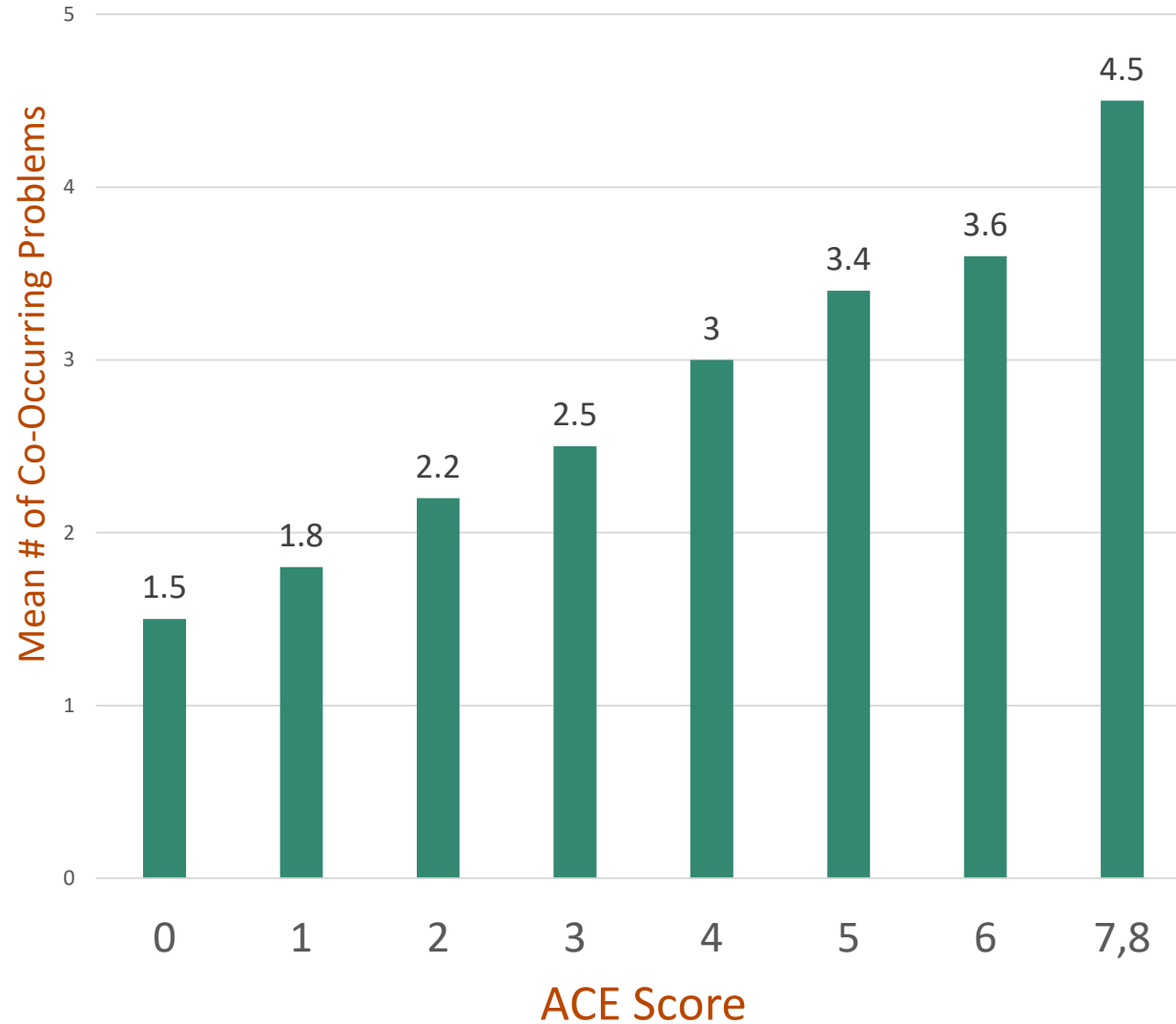
## ACEs & Suicide Attempt



# Progressive Nature of Adversity



# ACEs and Co-Occurring Problems



## Health & Social Problems

1. Panic Reactions
2. Depression
3. Anxiety
4. Hallucinations
5. Sleep Disturbances
6. Severe Obesity
7. Pain
8. Smoking
9. Alcoholism
10. Illicit Drug Use
11. IV Drug Use
12. Early Intercourse
13. Promiscuity
14. Sexual Dissatisfaction
15. Amnesia (Childhood)
16. Problems with Anger
17. Perpetration of Family Violence

Affect Regulation

Somatic Issues

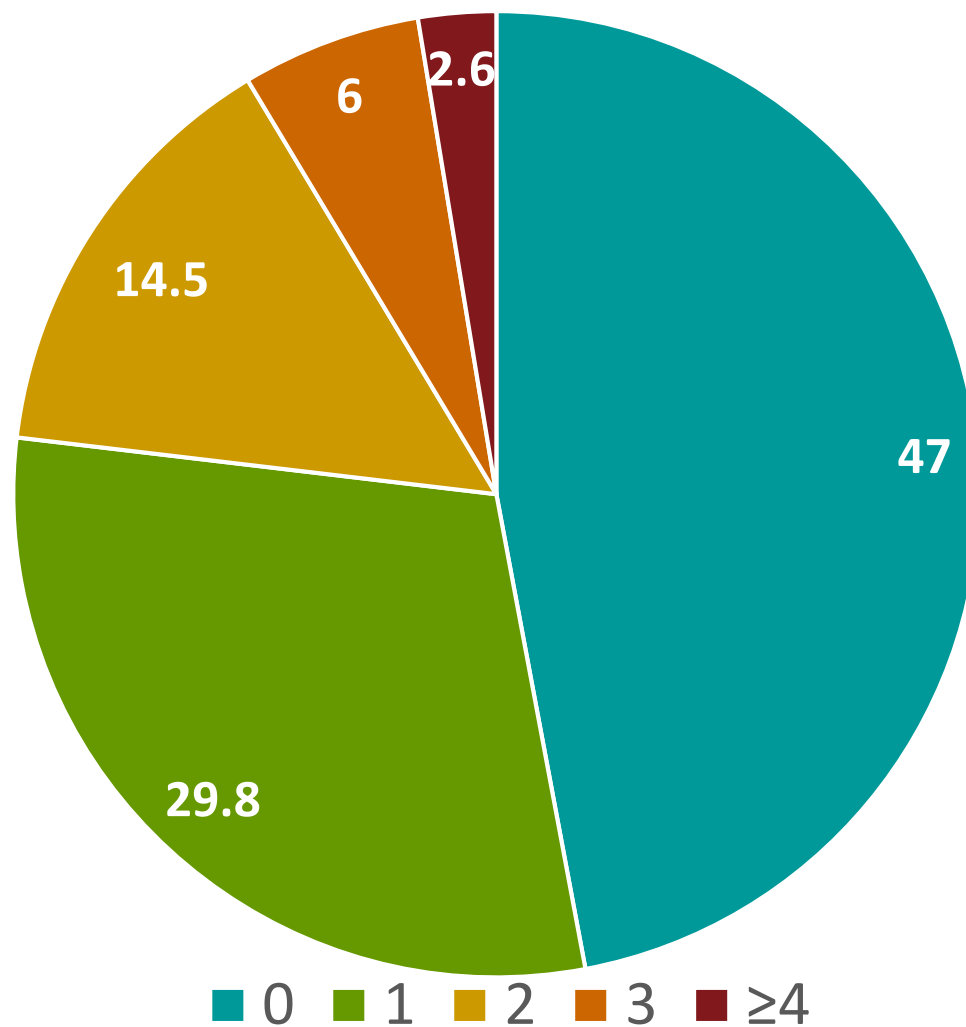
Substance Use

Sexuality

Memory

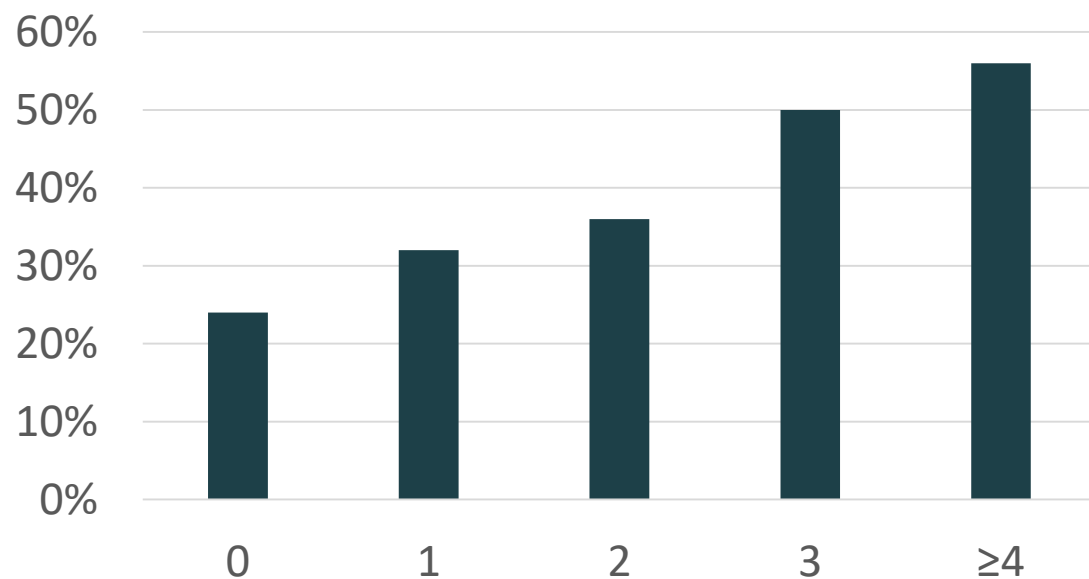
Arousal

# ACE Scores Among New Zealand Children Age 4 ½

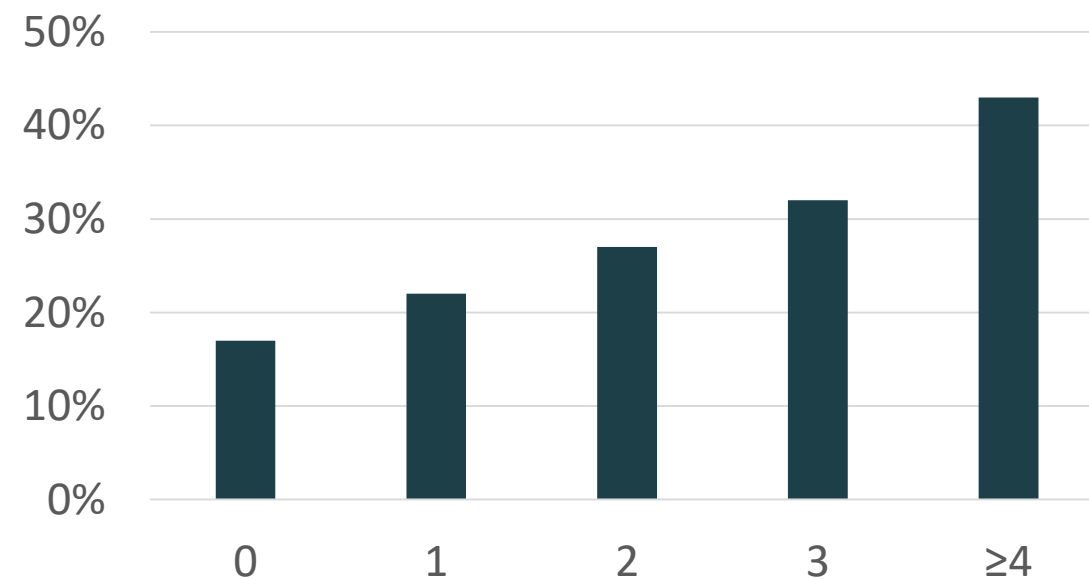


# ACEs and School Readiness, New Zealand Children Age 4 ½

## Letter Naming Fluency



## Counting to 10



N=5,562

Walsh M.C. et. al. (2019) Adverse Childhood Experiences and School Readiness from the Growing Up in New Zealand Study; Ministry of Social Development

# What Protects Young Children from Adverse Childhood Experiences?

## 1. Quality of the Mother-Partner Relationship

(warmth, count on one another, experience low levels of arguments, anger, worry about family members not getting along)

## 2. Parent Health and Wellness

(self-reported happiness and good health, low levels of stress, nervousness and anger, rarely feel that difficulties are too difficult to overcome)



Early maternal caregiving of infants develops child capacity for O & D responsiveness once child becomes a parent.

### Infant Social Cues

Communicating with vocalization & eye contact, suckling, skin-to-skin contact

### Mom's Oxytocin

Social & special memories, relationship connection, emotional regulation

### Mom's Dopamine

Anticipation of pleasure, preference to infant social cues, decision making with preference for infant care

### Ease with Caregiving

### Attachment

Disruption of these systems reduces activation of O & D, and creates risk for neglect, which, in turn, disrupts the systems in the next generation, which may enhance sensitivity to drugs that activate dopaminergic neurons (opioids, alcohol, marijuana, meth, cocaine)

# What Helps Dopamine & Noradrenalin

- Safety
- Laughter
- Diet: D, B, Omega 3, spice, chocolate
- Exercise & Mindful Movement: yoga, chi-gong, meditation
- Connecting with others – esp. helping
- Calming: breathing, aromatherapy
- Executive Skills practice
- Correcting Narrative: naming emotion, reducing shame/blame, tempering mastery

Noradrenalin (or norepinephrine) is a chemical that regulates nervous activity to help us focus, make meaning from stressful events, & activate executive function skills.

# Core Protective Systems

Capabilities

Attachment  
&  
Belonging

Community  
Culture  
Spirituality

**“Nurturing the healthy development of these protective systems affords the most important preparation or ‘inoculation’ for overcoming potential threats and adversities in human development. Similarly, damage or destruction of these systems has dire consequences for the positive adaptive capacity of individuals.”**

*Ann Masten, 2009*



Protection

Nourishment

Growth

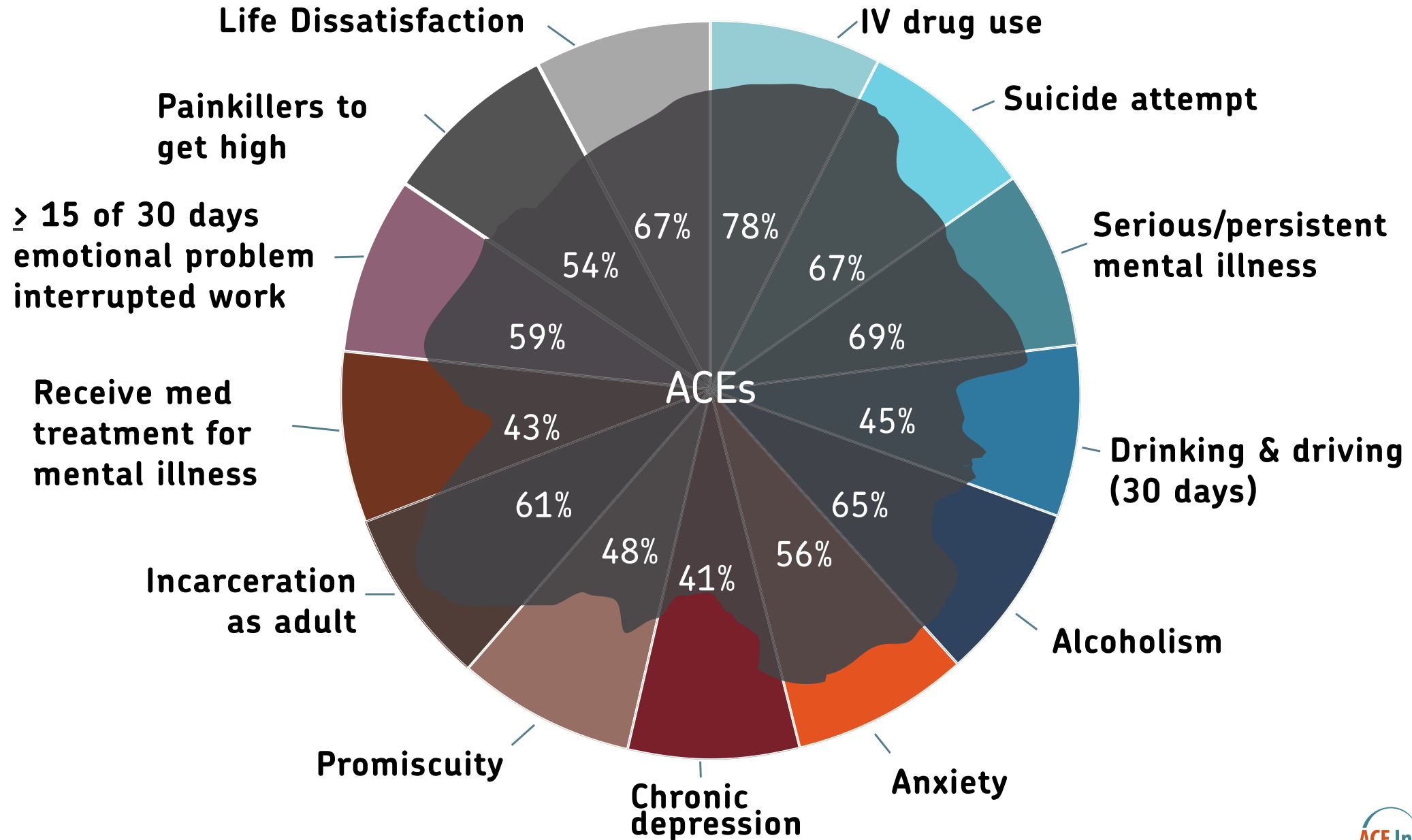
Wholeness

**Resilience** is a developmental process that occurs in the context of family, friends & neighbors, colleagues, community, culture & place.

Unless one understands the world view of a people, we are unlikely to be able to understand resilience in the lives of those people.



# Population Attributable Risk



Controls: gender, age, income, education, race-ethnicity

# Building Self-Healing Communities

