

# Adverse Childhood Experiences

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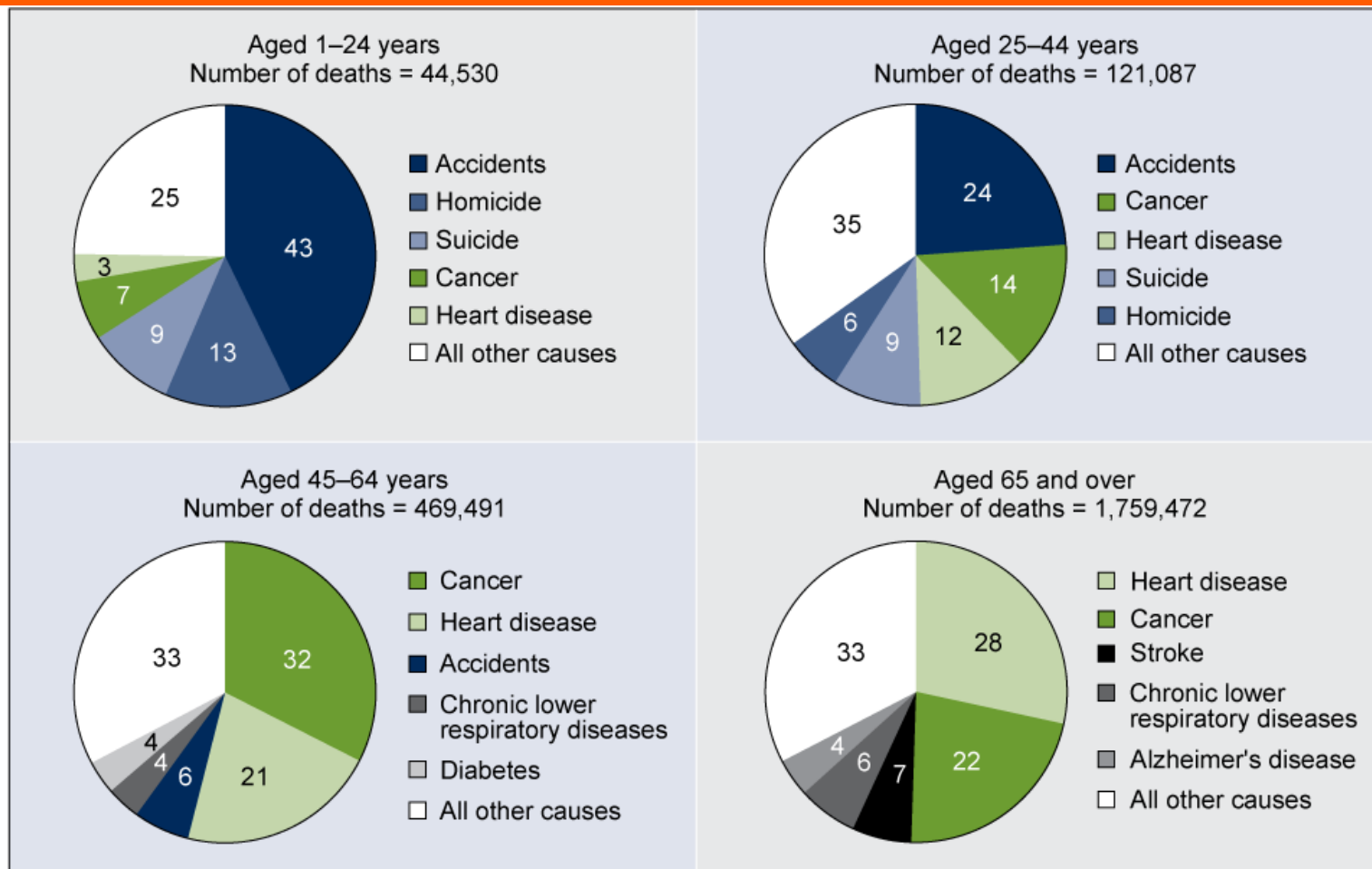
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# Objectives

- Understand Adverse Childhood Experiences and Health
- Understand Adverse Childhood Experiences in Oklahoma
- Understand the intergenerational transmission of trauma



# Percent Distribution of Five Leading Causes of Death, by Age Group: United States, 2007



SOURCE: National Vital Statistics System, Mortality.



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# Leading Causes of Death

- Suicide
- Homicide
- Cancer
- Heart Disease
- Diabetes



Common Thread?

# Behavior



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# 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

**Background:** The relationship of health risk behavior and disease in adulthood to the breadth of exposure to childhood emotional, physical, or sexual abuse, and household dysfunction during childhood has not previously been described.

**Methods:** A questionnaire about adverse childhood experiences was mailed to 13,494 adults who had completed a standardized medical evaluation at a large HMO; 9,508 (70.5%) responded. Seven categories of adverse childhood experiences were studied: psychological, physical, or sexual abuse; violence against mother; or living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned. The number of categories of these adverse childhood experiences was then compared to measures of adult risk behavior, health status, and disease. Logistic regression was used to adjust for effects of demographic factors on the association between the cumulative number of categories of childhood exposures (range: 0–7) and risk factors for the leading causes of death in adult life.

**Results:** More than half of respondents reported at least one, and one-fourth reported  $\geq 2$  categories of childhood exposures. We found a graded relationship between the number of categories of childhood exposure and each of the adult health risk behaviors and diseases that were studied ( $P < .001$ ). Persons who had experienced four or more categories of childhood exposure, compared to those who had experienced none, had 4- to 12-fold increased health risks for alcoholism, drug abuse, depression, and suicide attempt; a 2- to 4-fold increase in smoking, poor self-rated health,  $\geq 50$  sexual intercourse partners, and sexually transmitted disease; and a 1.4- to 1.6-fold increase in physical inactivity and severe obesity. The number of categories of adverse childhood exposures showed a graded relationship to the presence of adult diseases including ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease. The seven categories of adverse childhood experiences were strongly interrelated and persons with multiple categories of childhood exposure were likely to have multiple health risk factors later in life.

**Conclusions:** We found a strong graded relationship between the breadth of exposure to abuse or household dysfunction during childhood and multiple risk factors for several of the leading causes of death in adults.

**Medical Subject Headings (MeSH):** child abuse, sexual, domestic violence, spouse abuse, children of impaired parents, substance abuse, alcoholism, smoking, obesity, physical activity, depression, suicide, sexual behavior, sexually transmitted diseases, chronic obstructive pulmonary disease, ischemic heart disease. (Am J Prev Med 1998;14:245–258) © 1998 American Journal of Preventive Medicine

Department of Preventive Medicine, Southern California Permanente Medical Group (Kaiser Permanente), (Felitti) San Diego, California 92111. National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, (Anda, Williamson, Spitz, Edwards, Marks) Atlanta, Georgia 30333. Department of Pediatrics, Emory University School Medicine, (Nor-

denberg) Atlanta, Georgia 30333. Department of Family and Community Medicine, University of Arizona Health Sciences Center, (Koss) Tucson, Arizona 85727.

Address correspondence to: Vincent J. Felitti, MD, Kaiser Permanente, Department of Preventive Medicine, 7060 Clairemont Mesa Boulevard, San Diego, California 92111.

**Conclusions:** We found a strong graded relationship between the breadth of exposure to abuse or household dysfunction during childhood and multiple risk factors for several of the leading causes of death in adults.



# The Original ACEs Study

- Kaiser Permanente and CDC
- Subjects recruited between 1995-1997
- Initiated out of the observation that patients dropping out of a weight loss clinic had higher rates of sexual abuse

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# The Original ACEs Study

- Looked at individual abuse
- Added household dysfunction
- Surveyed 9,508 patients (70.5% response rate)

Felitti, Vincent, Anda, Robert F., et al. Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults.



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# ACEs Questionnaire

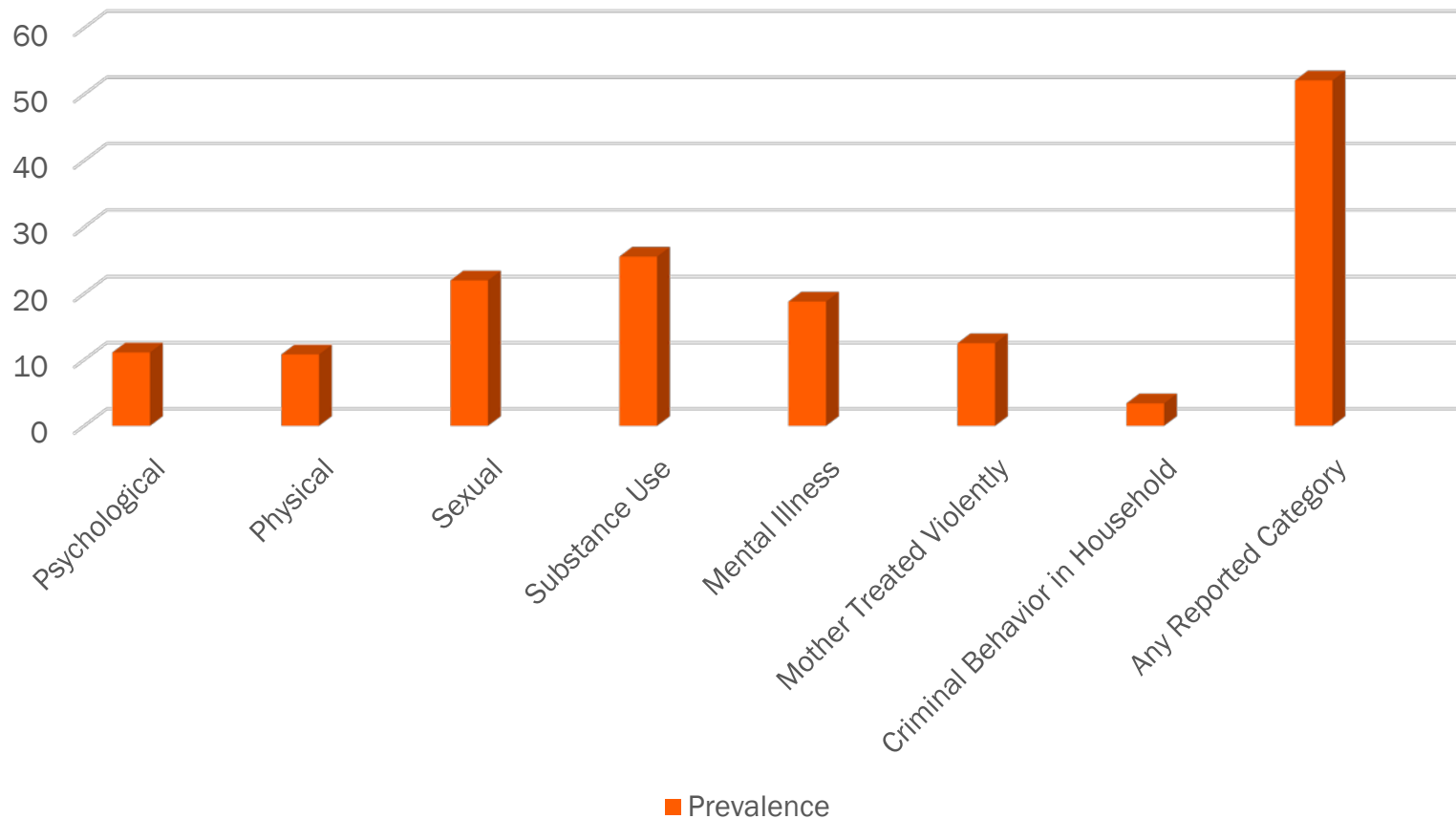
Category	Question	Prevalence
<b>Psychological Abuse</b>	<b>Did a parent or other adult in the household...</b>	
	Often or very often swear at, insult, or put you down?	10.0%
	Often or very often act in a way that made you afraid that you would be physically hurt?	4.8%
<b>Physical Abuse</b>	<b>Did a parent or other adult in the household...</b>	
	Often or very often push, grab, shove, or slap you?	4.9%
	Often or very often hit you so hard that you had marks or were injured?	9.6%
<b>Sexual Abuse</b>	<b>Did a parent or person at least 5 years older ever...</b>	
	Touch or fondle you in a sexual way?	19.3%
	Have you touch their body in a sexual way?	8.7%
	Attempt oral, anal, or vaginal intercourse with you?	8.9%
	Actually have oral, anal, or vaginal intercourse with you?	6.9%
<b>Substance Household Dysfunction</b>	Live with anyone who was a problem drinker or alcoholic?	23.5%
	Live with anyone who used street drugs?	4.9%

# ACEs Questionnaire

Category	Question	Prevalence
<b>Mental Illness Household Dysfunction</b>	Was a household member depressed or mentally ill?	17.5%
<b>Mother Treated Violently Household Dysfunction</b>	<b>Was you mother (or stepmother) ...</b>	
	Sometimes, often, or very often pushed, grabbed, slapped, or had something thrown at her?	11.9%
	Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard?	6.3%
	Ever repeatedly hit over at least a few minutes?	6.6%
	Ever Threatened with, or hurt by, a knife or gun?	3.0%
<b>Criminal Behavior in Household</b>	Did a household member go to prison?	3.4%

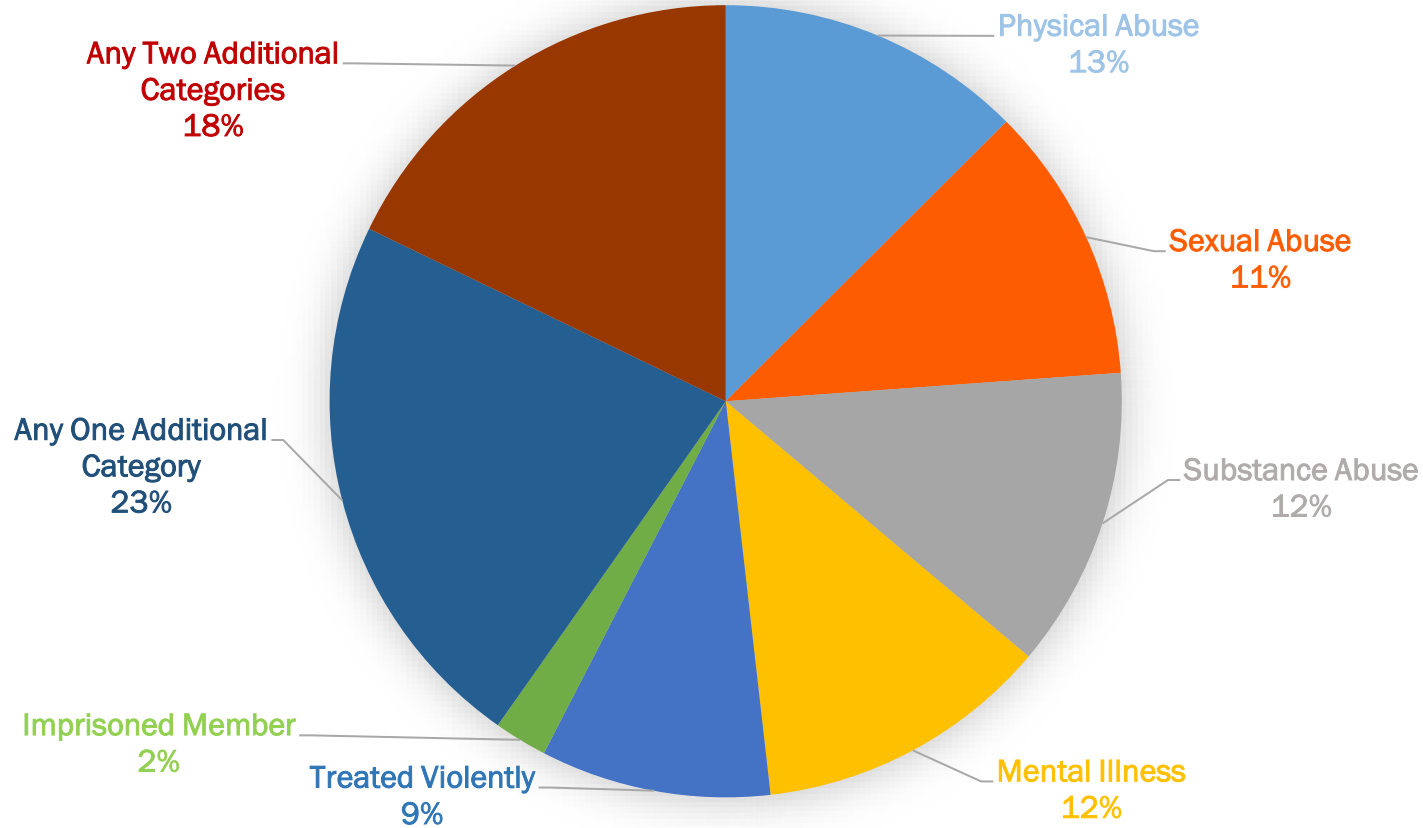


# Prevalence of Childhood Exposure to Abuse and Household Dysfunction



# Psychological Abuse

Percentage Exposed to Another Category

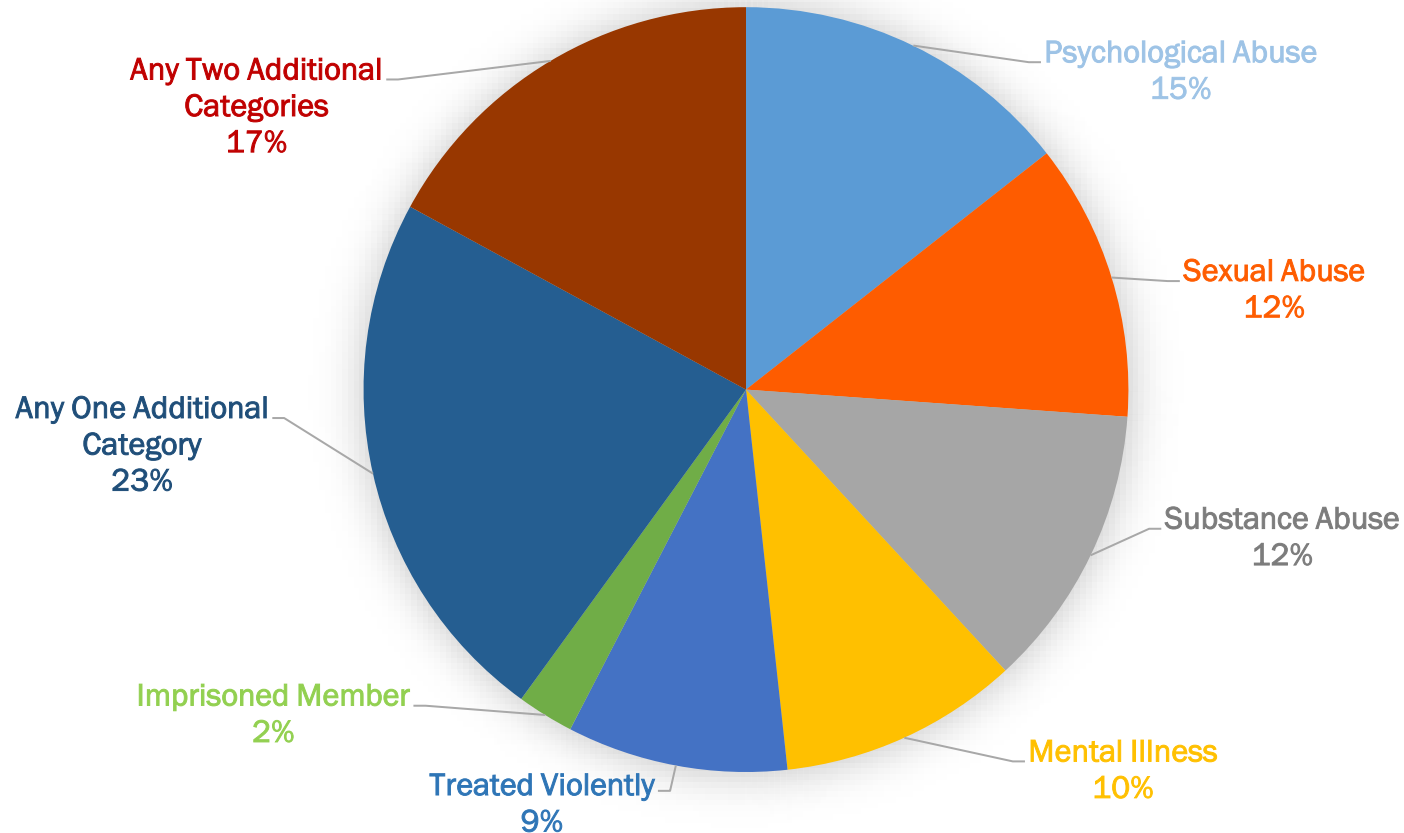


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# Physical Abuse

Percentage Exposed to Another Category

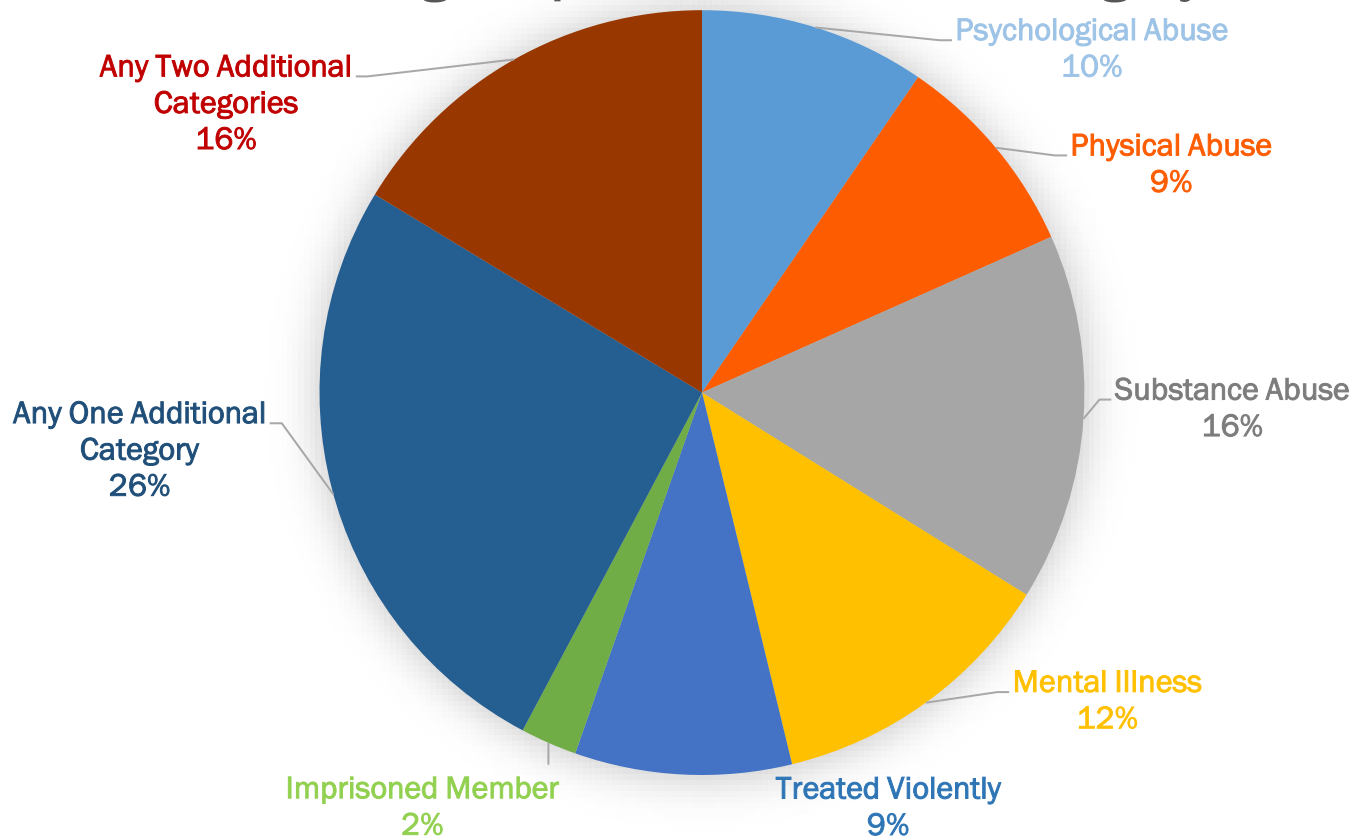


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# Sexual Abuse

Percentage Exposed to Another Category

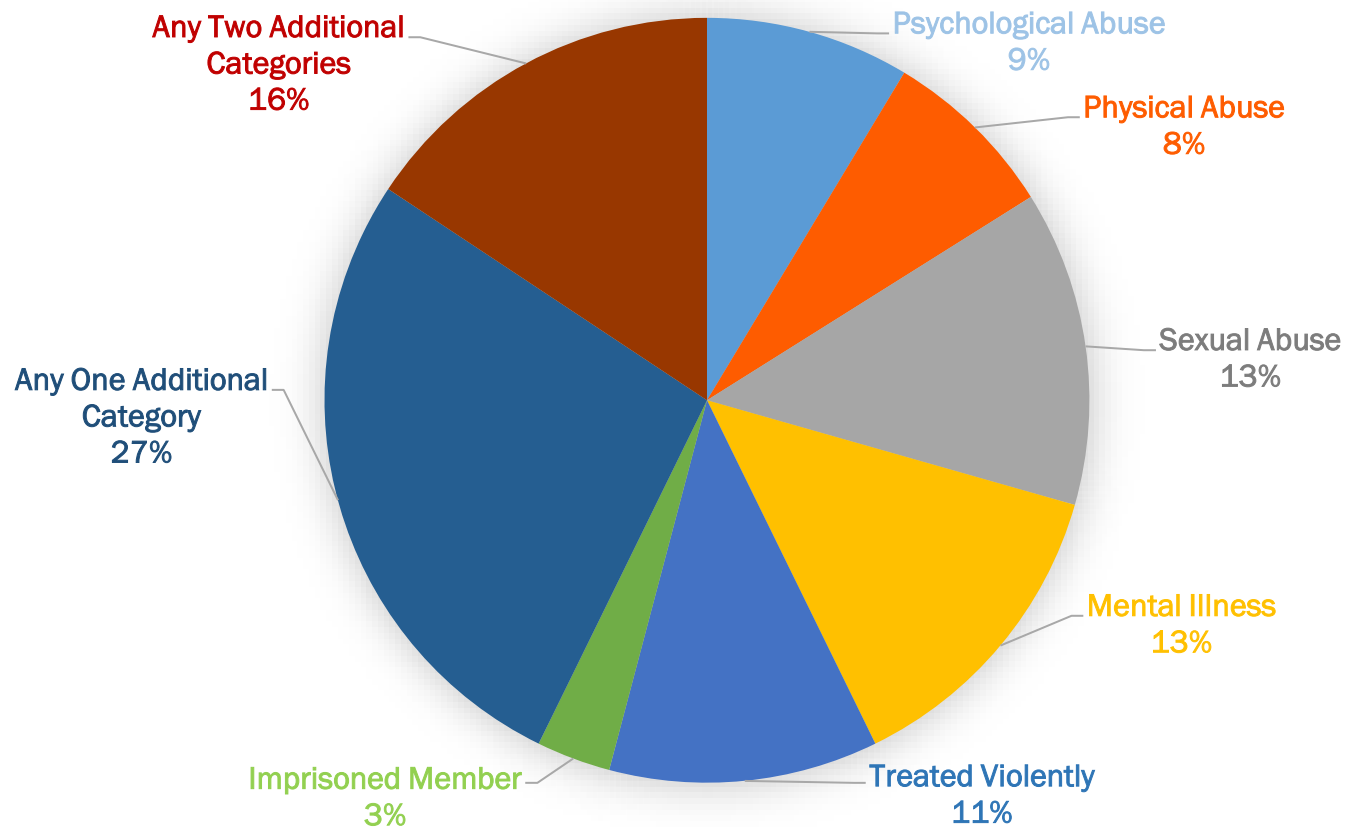


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# Substance Abuse

## Percentage Exposed to Another Category



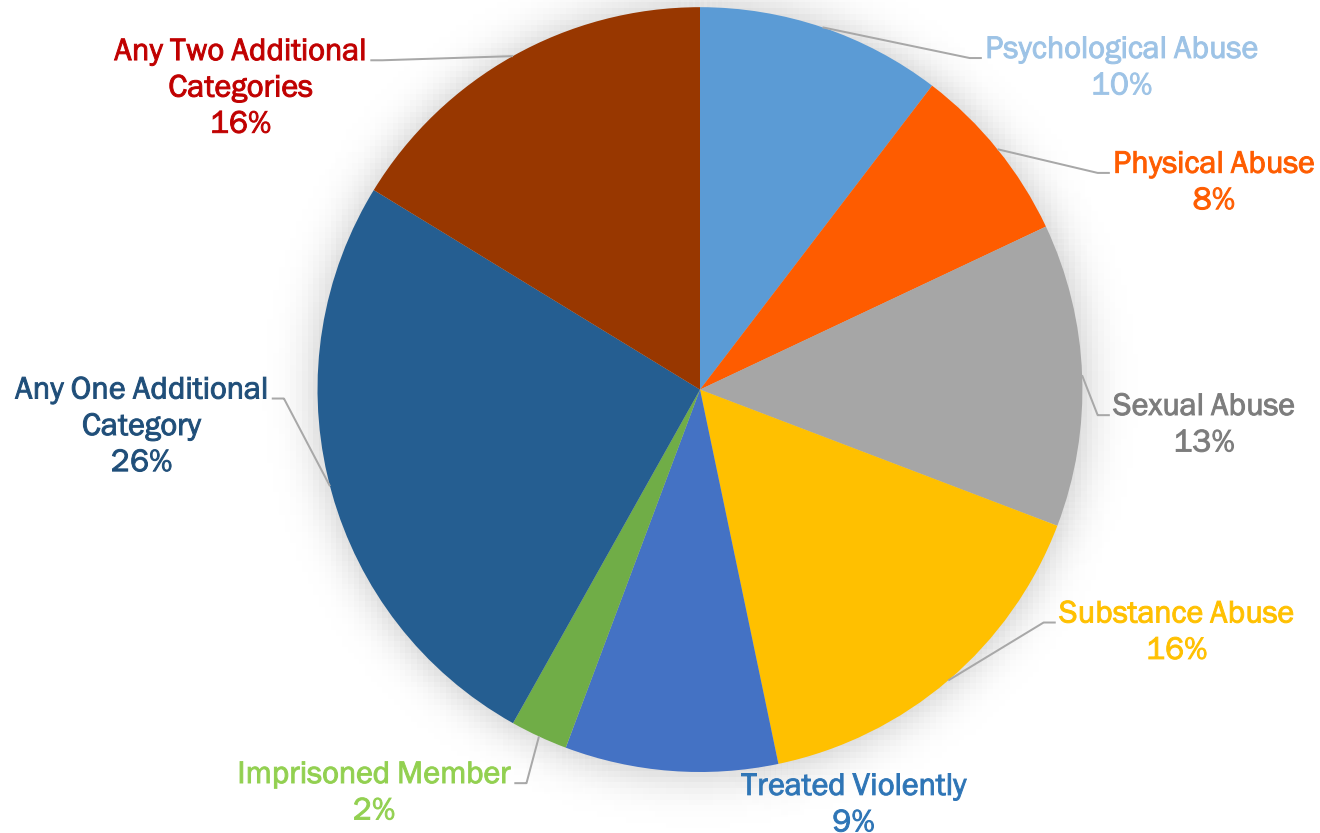
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# Mental Illness

## Percentage Exposed to Another Category

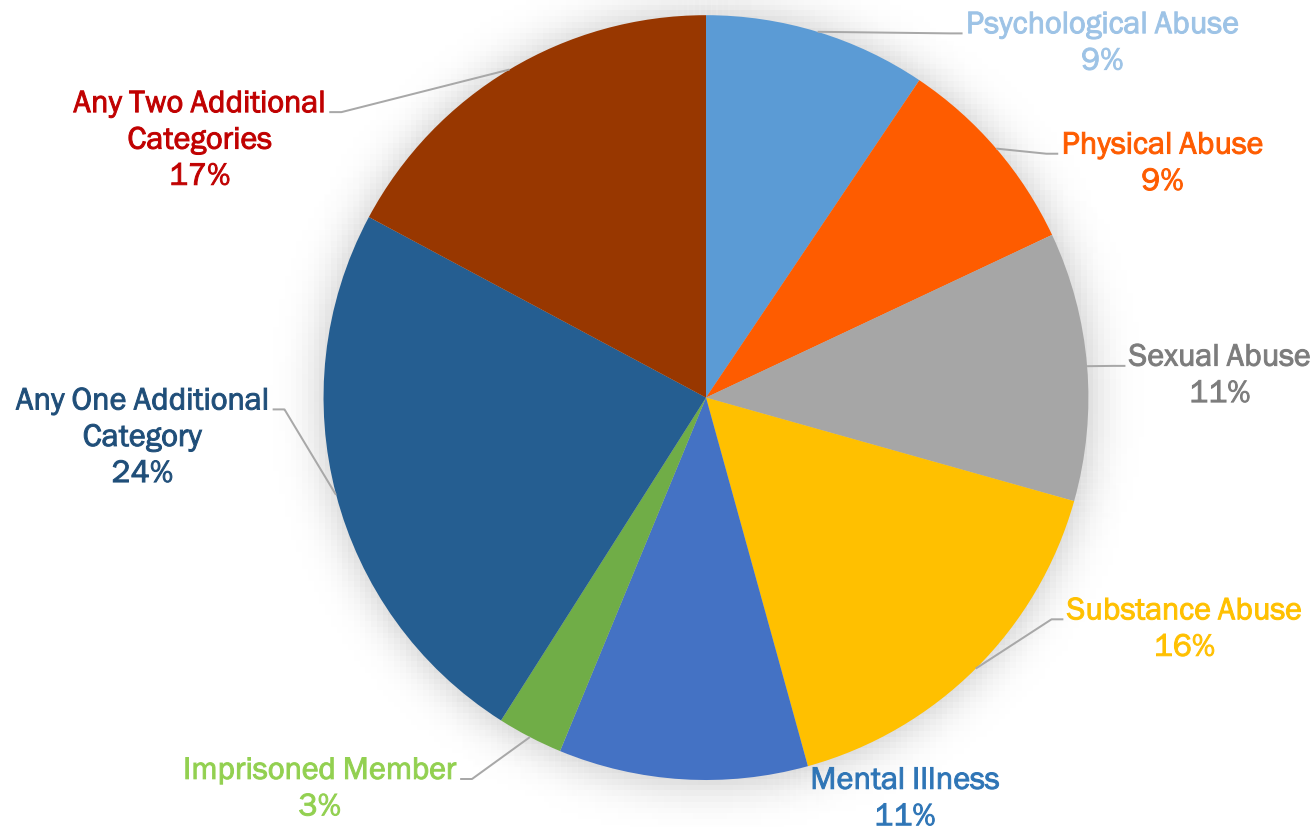


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# Mother Treated Violently

Percentage Exposed to Another Category

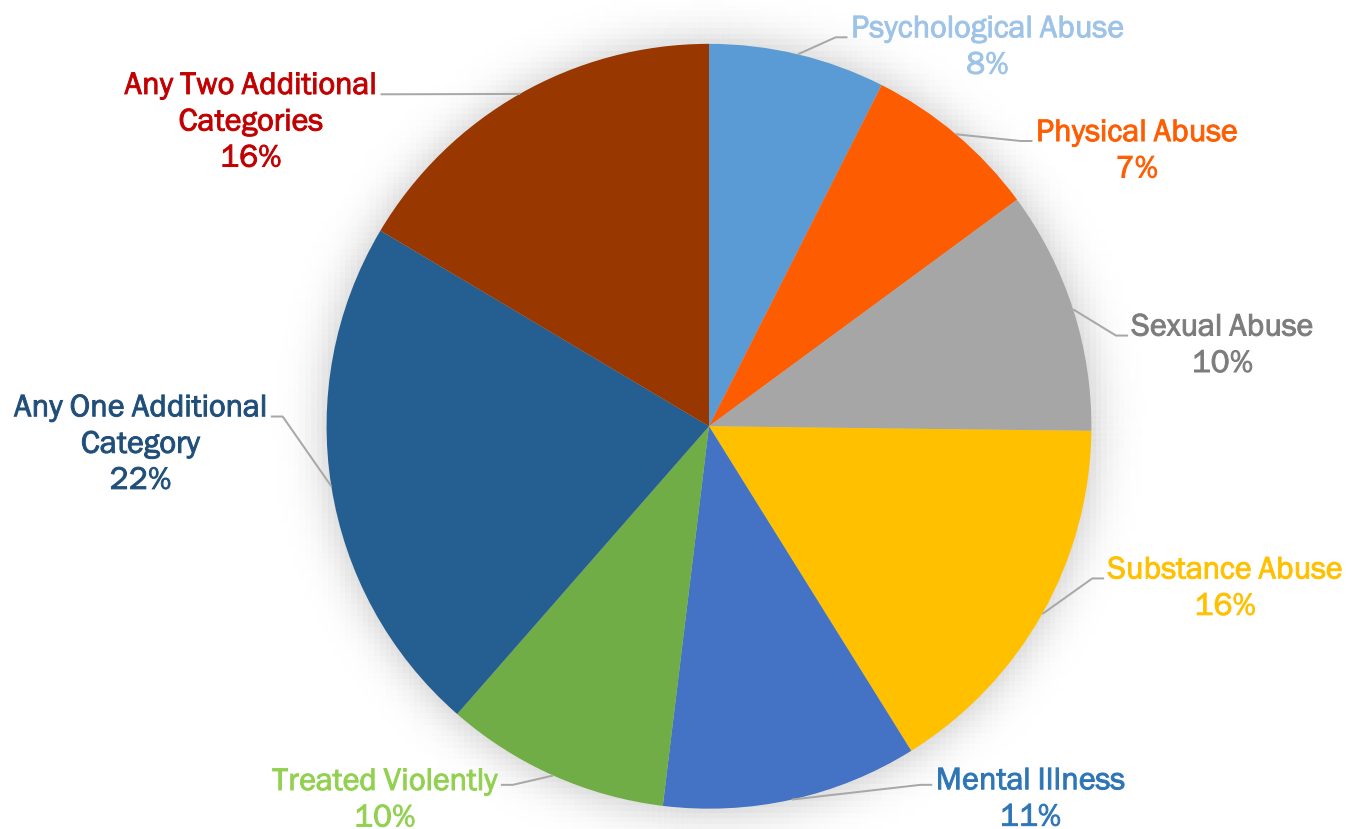


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# Imprisoned Member

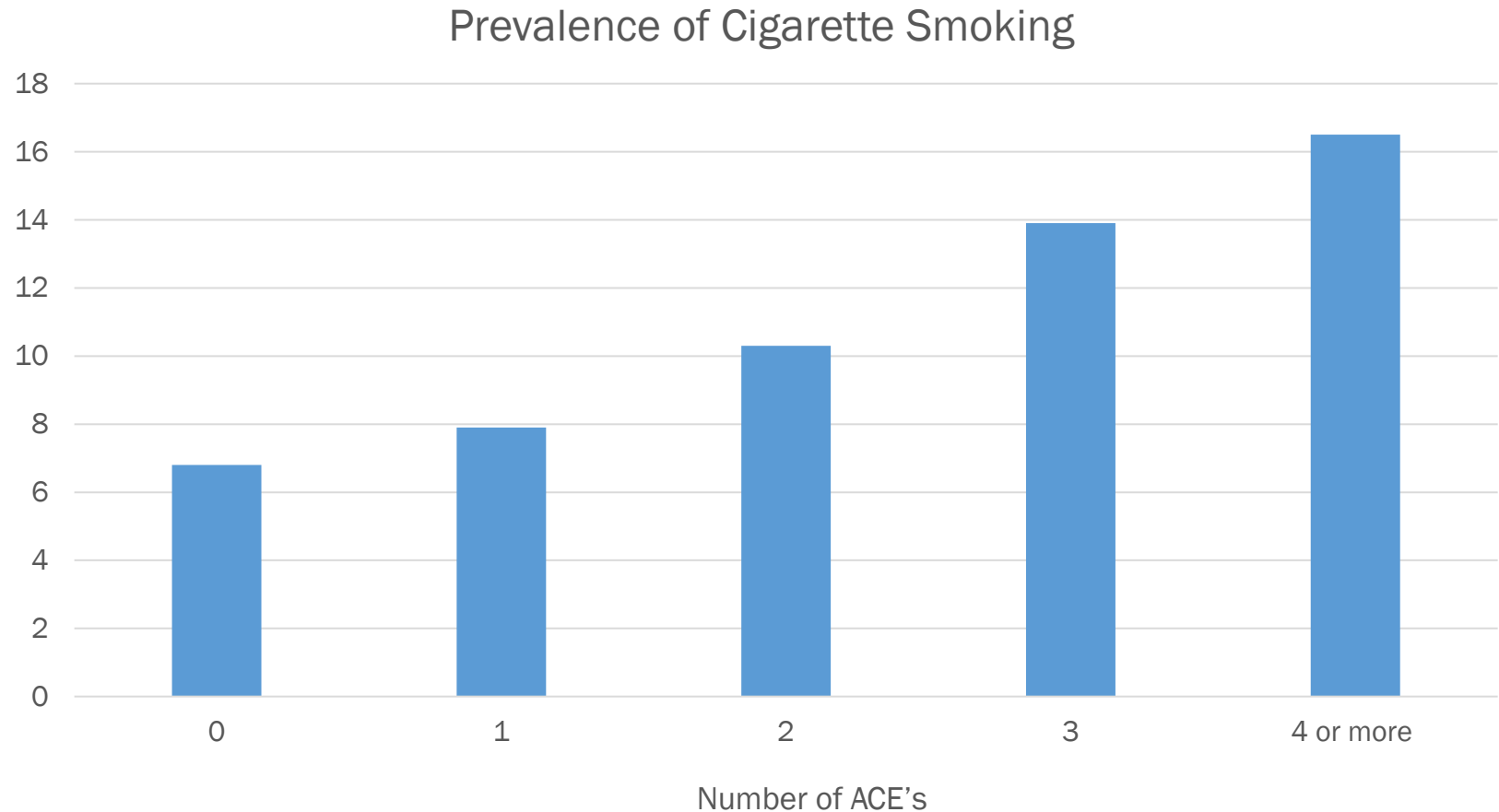
## Percentage Exposed to Another Category



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# The Original ACEs Study -Results

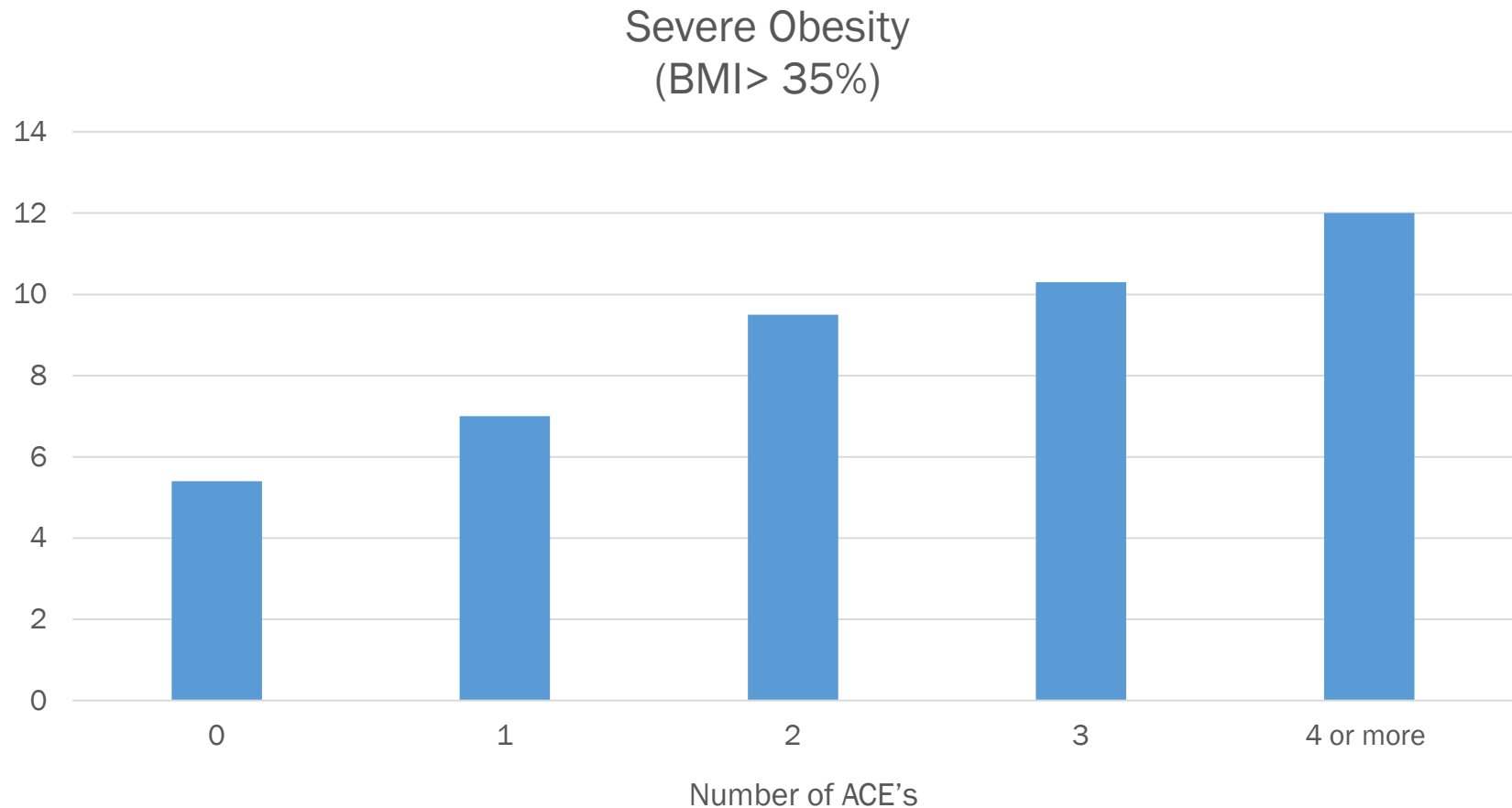


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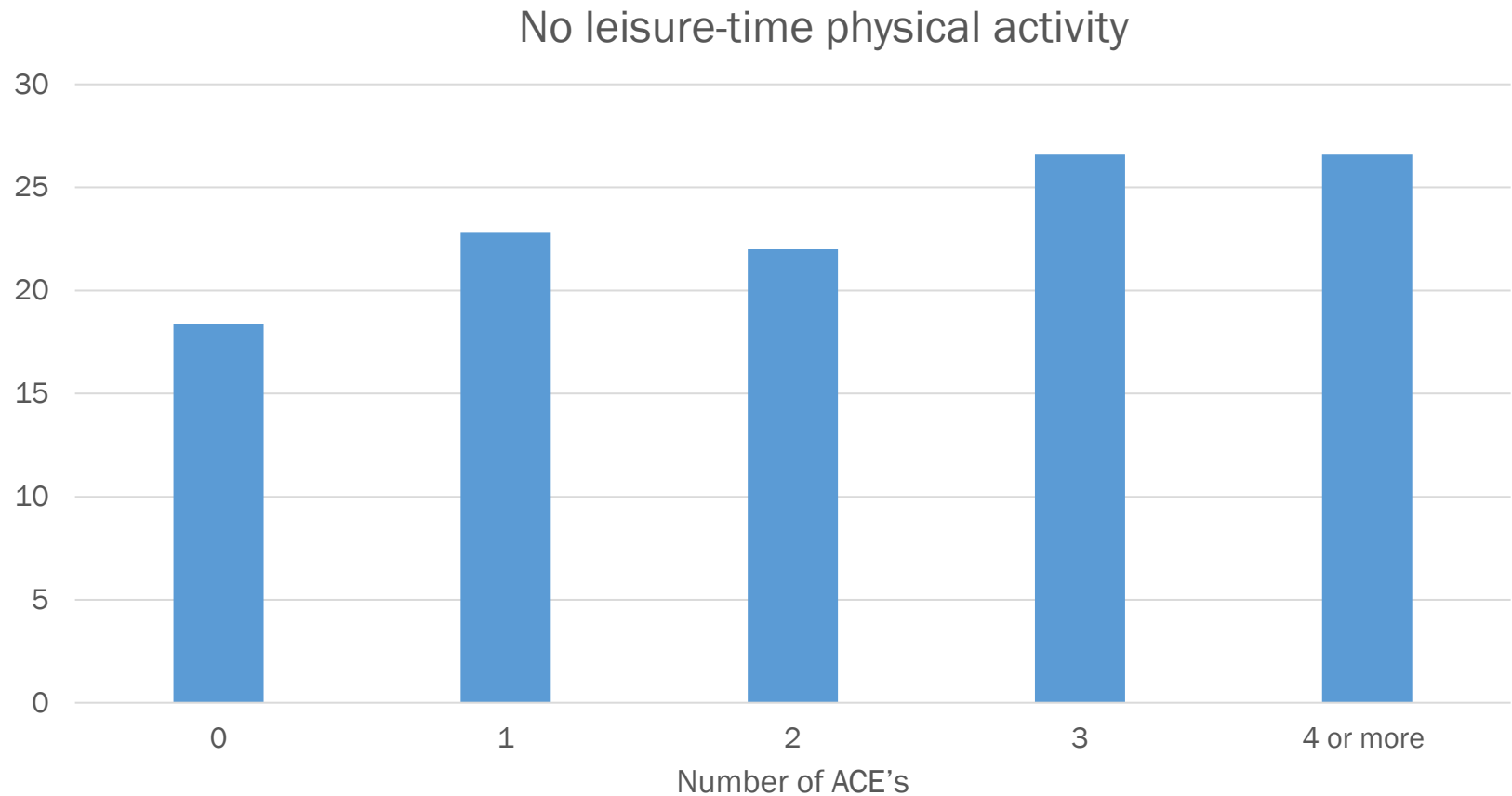


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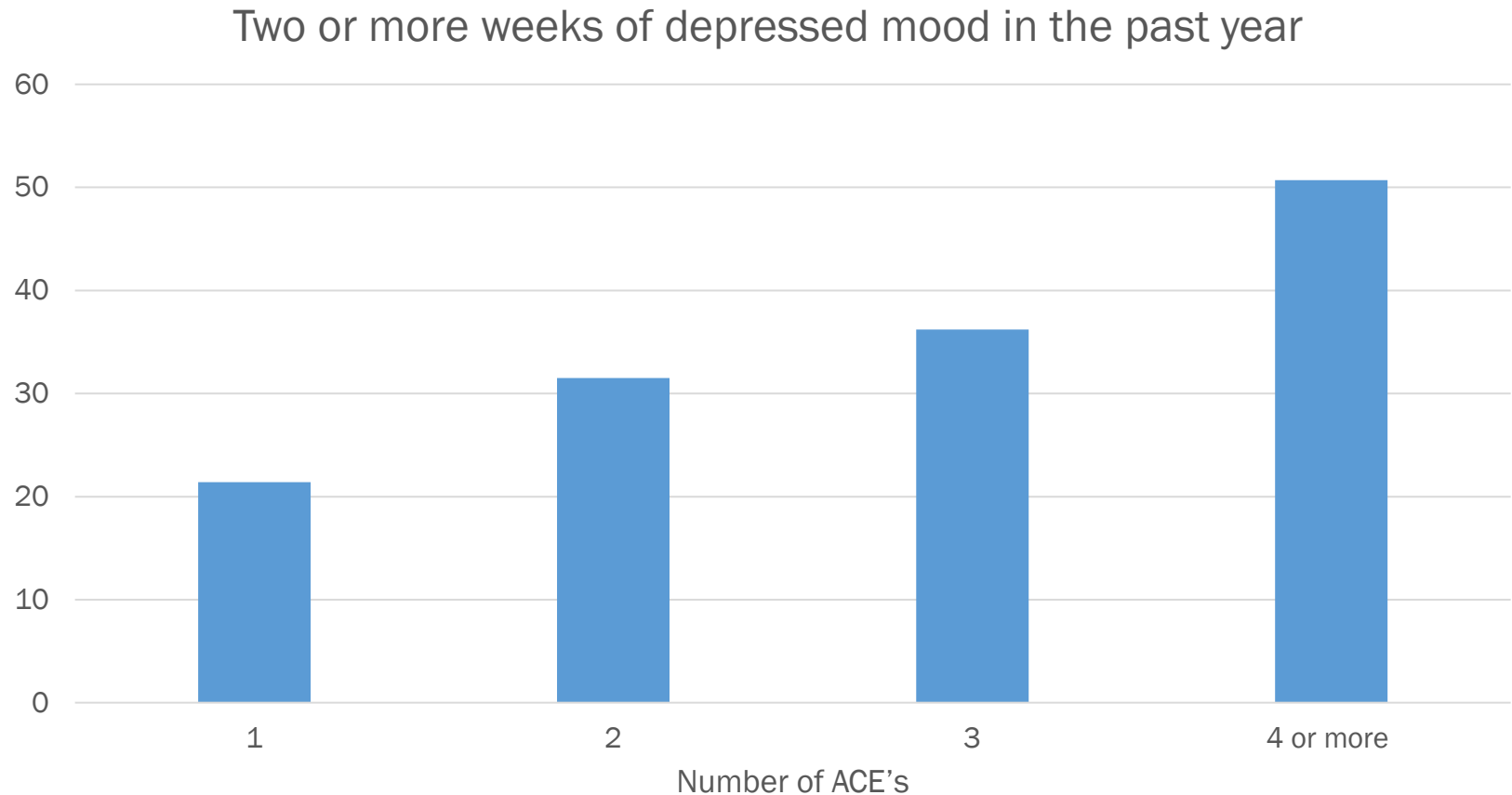


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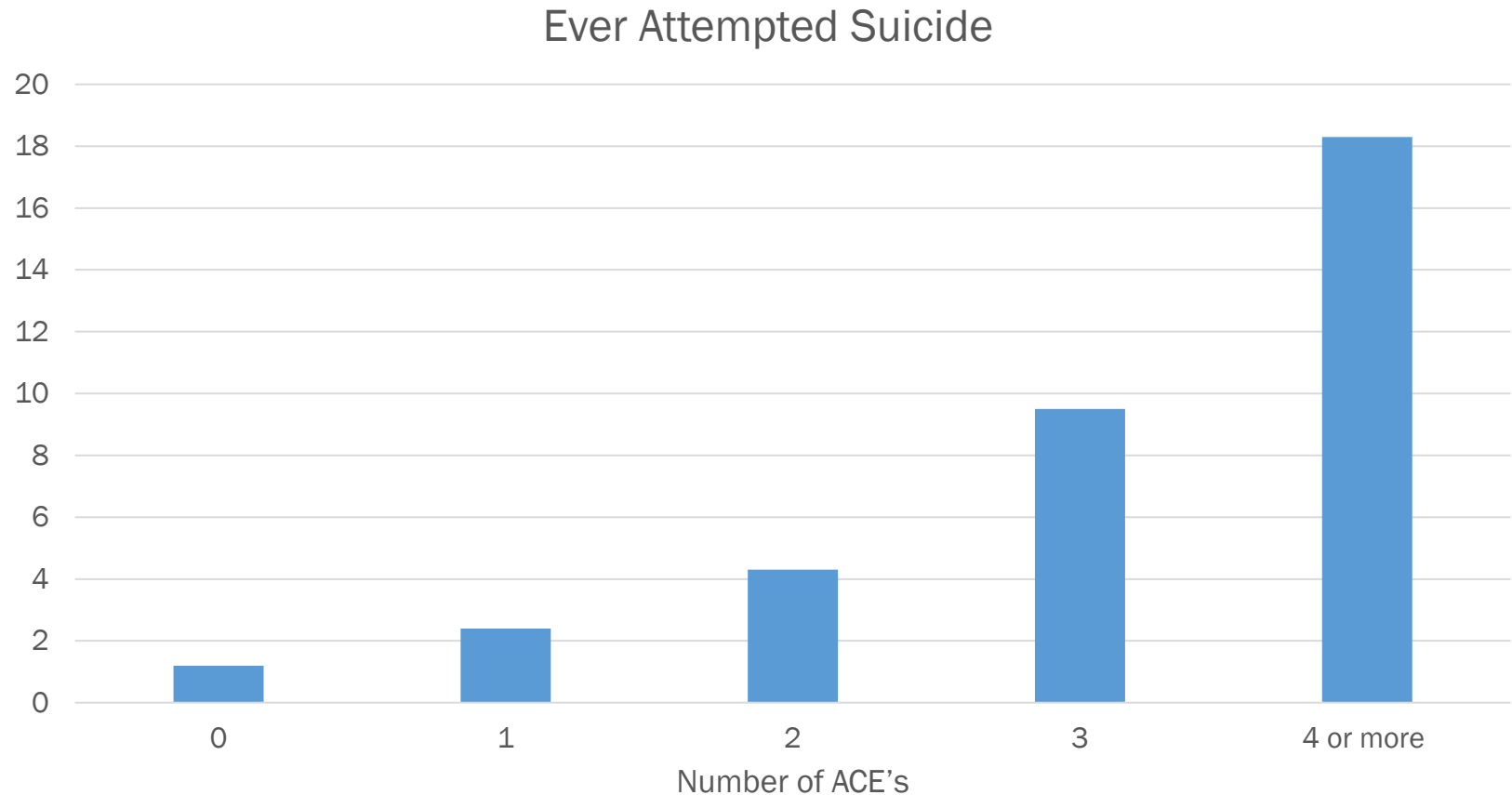


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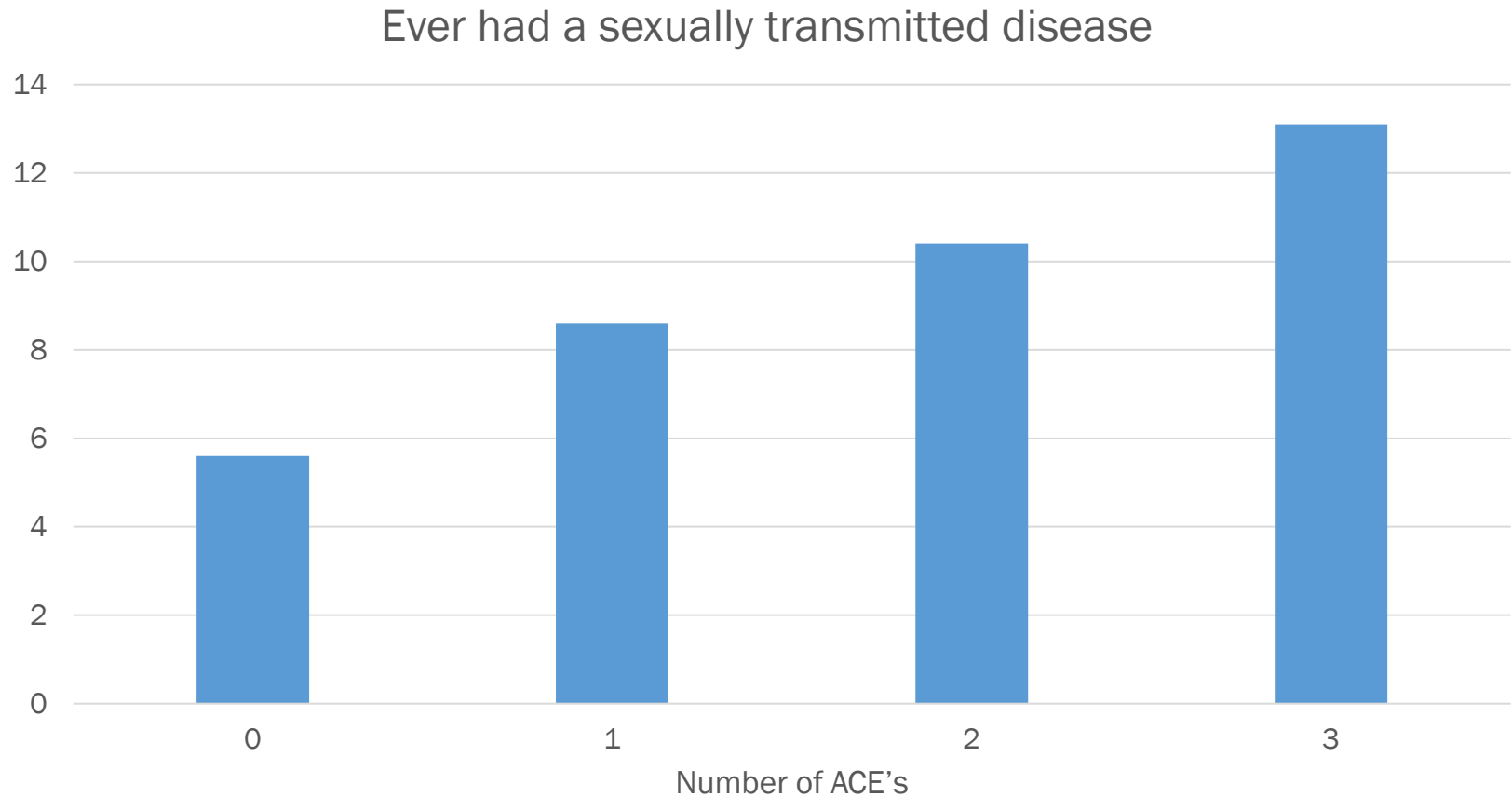
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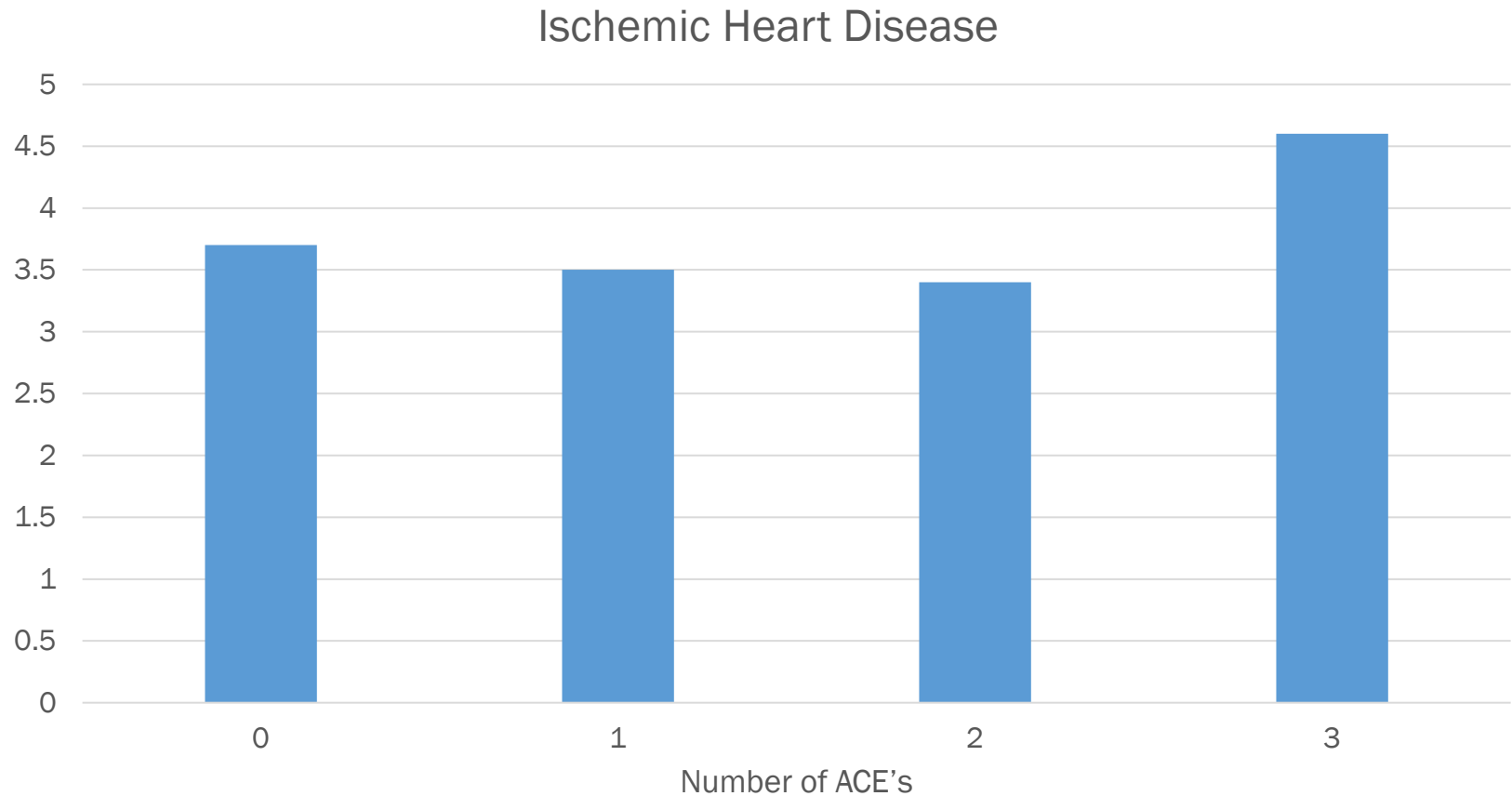


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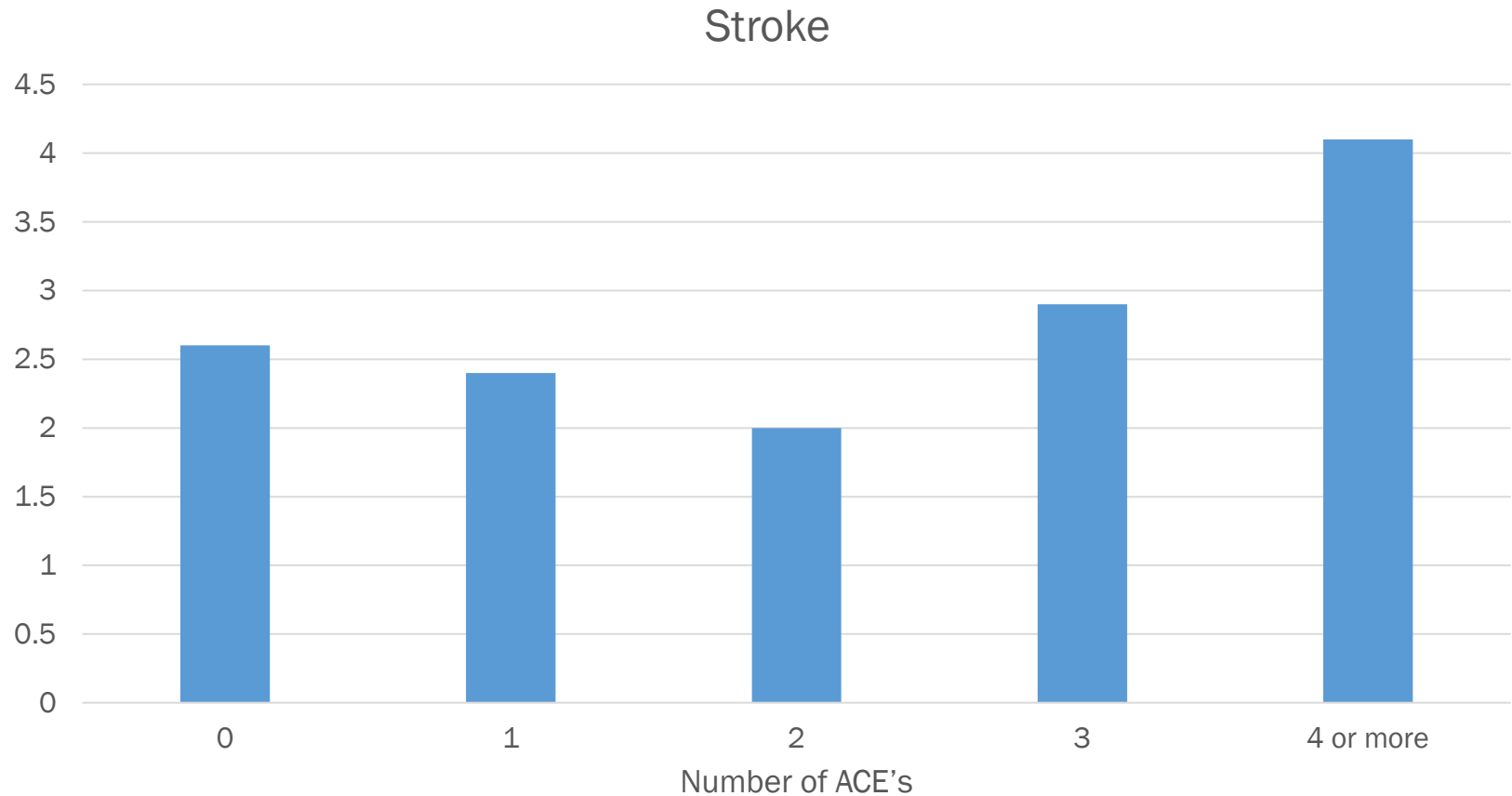


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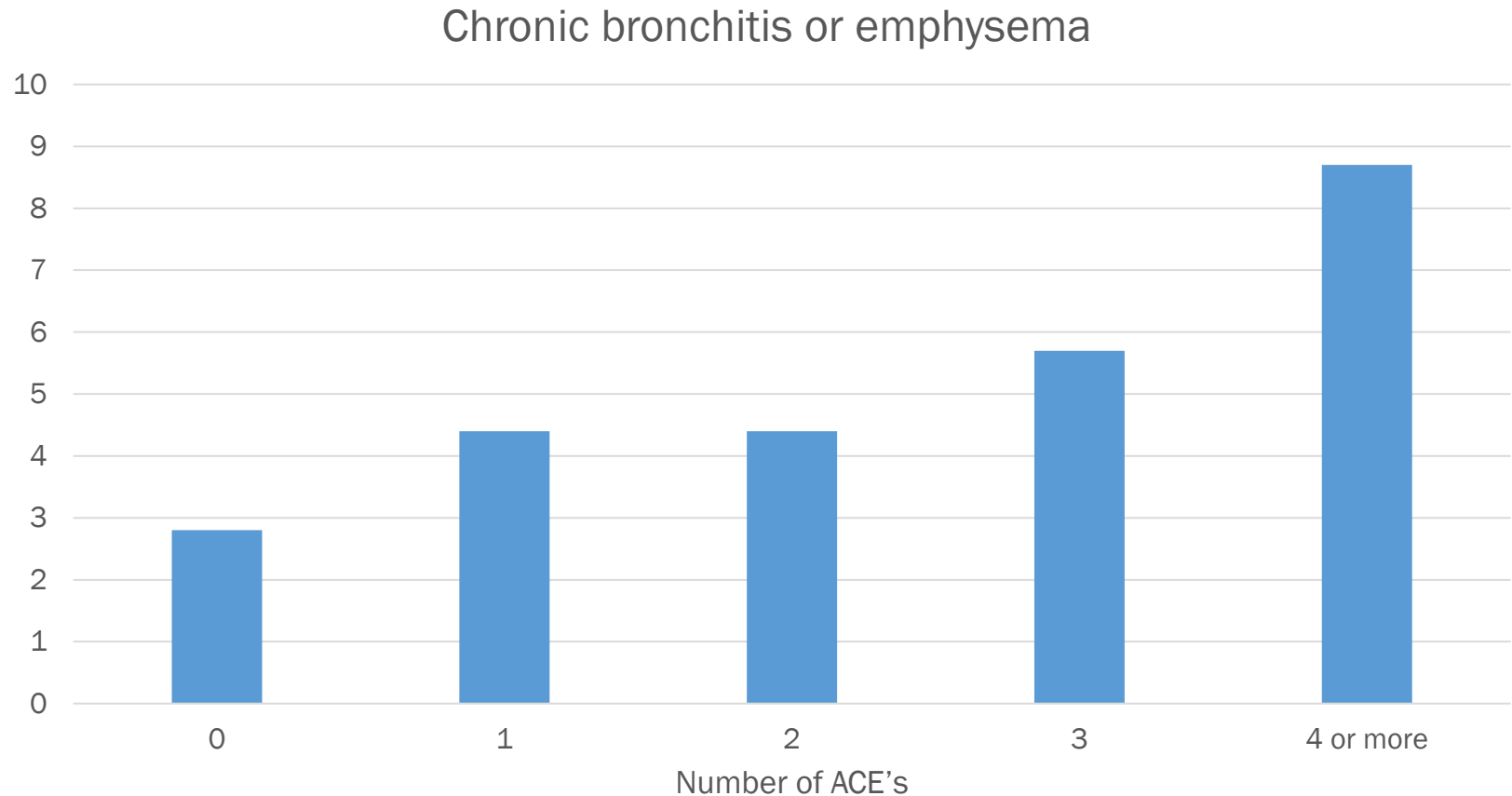


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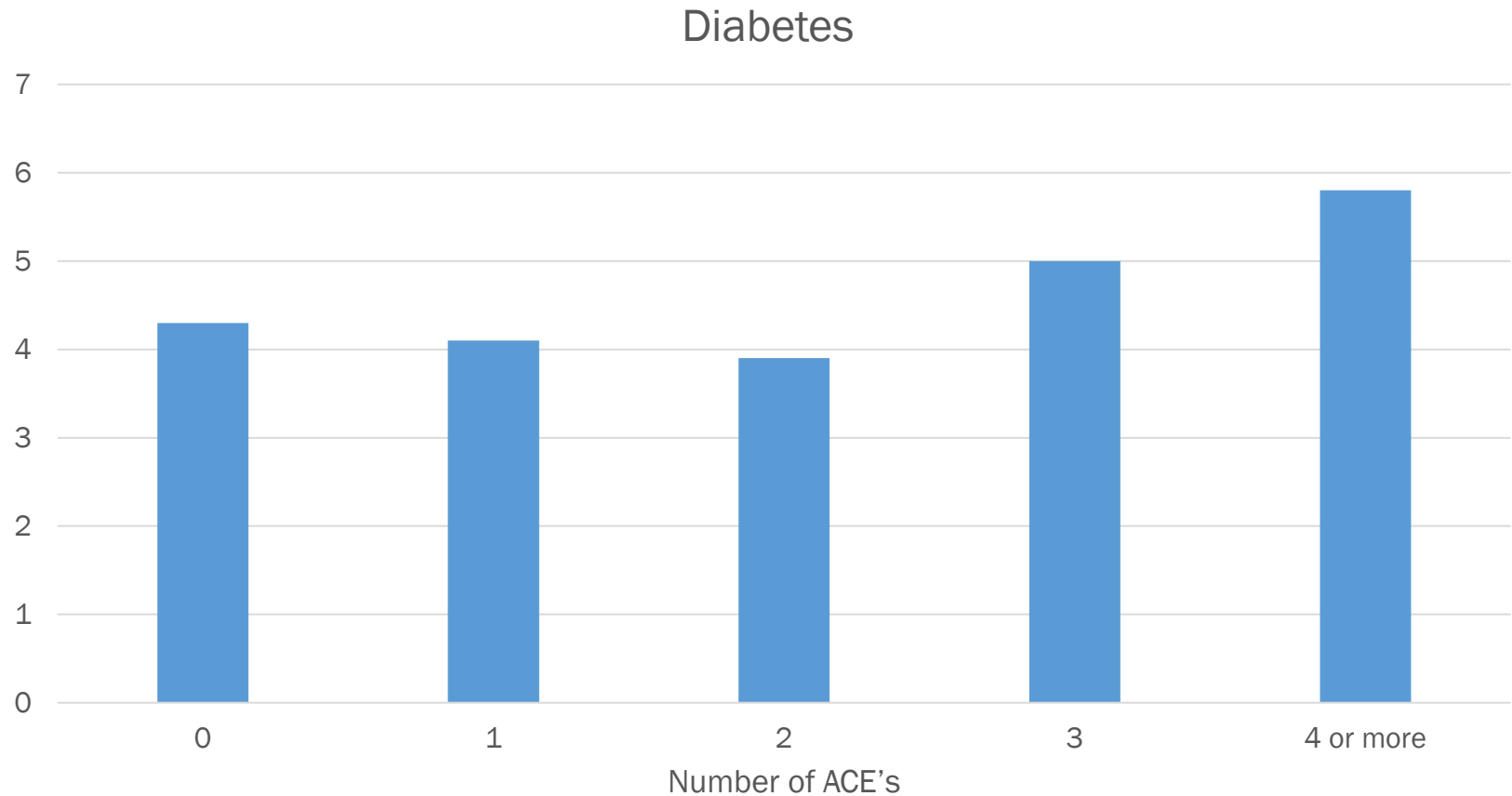


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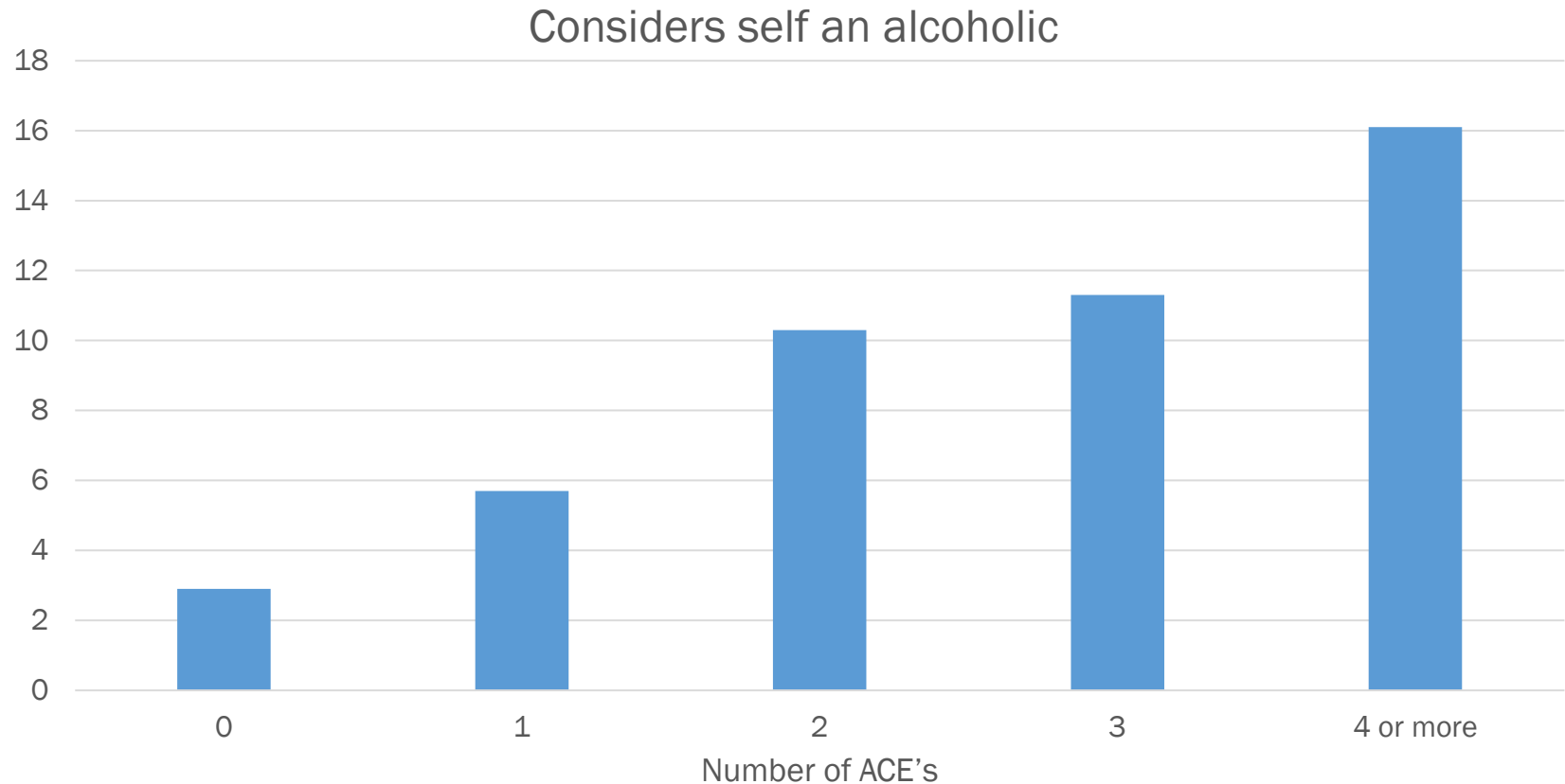
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# ACEs and Addiction

## -The Original Ace's Study



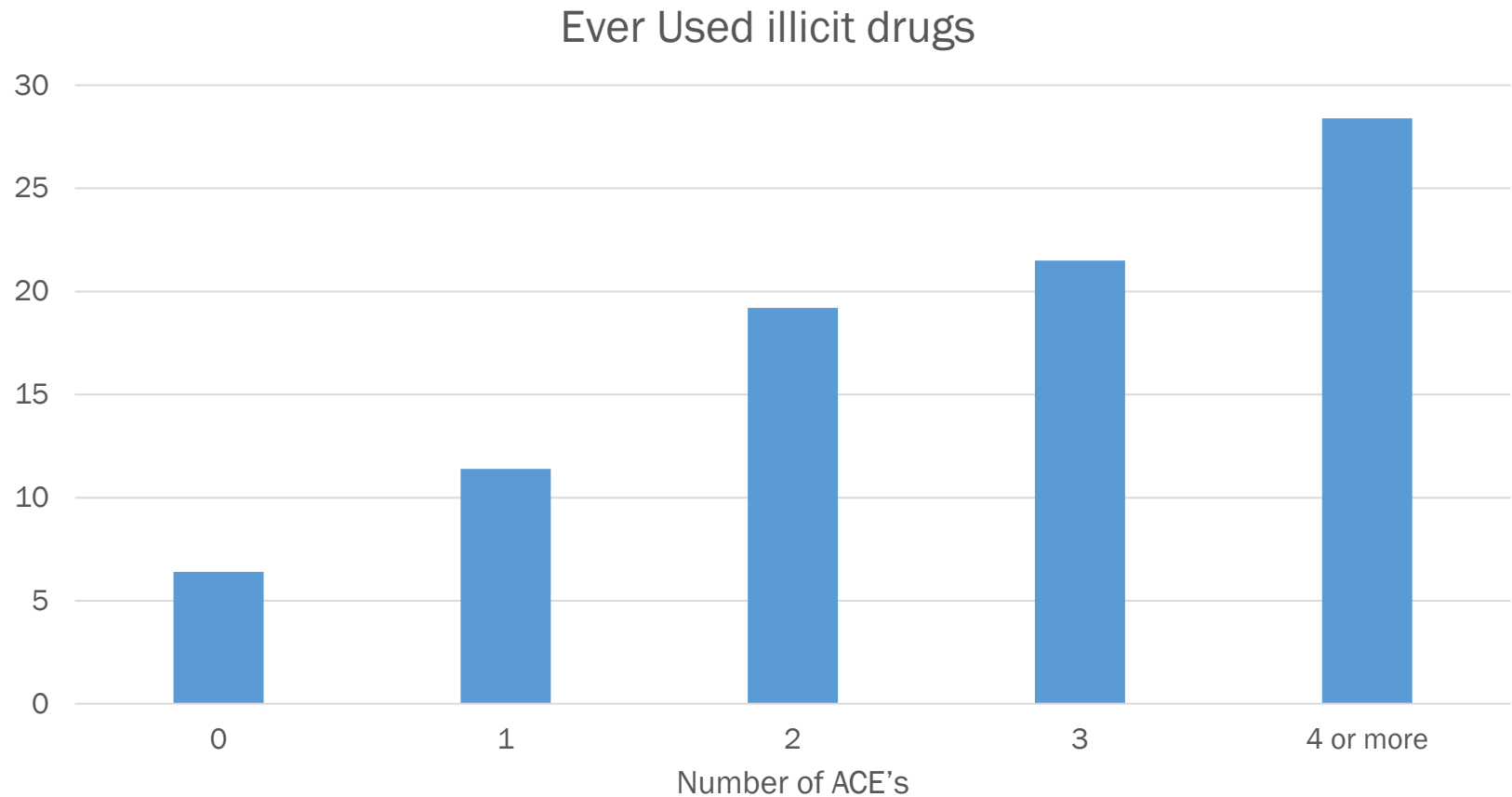
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# ACEs and Addiction

## -The Original Ace's Study



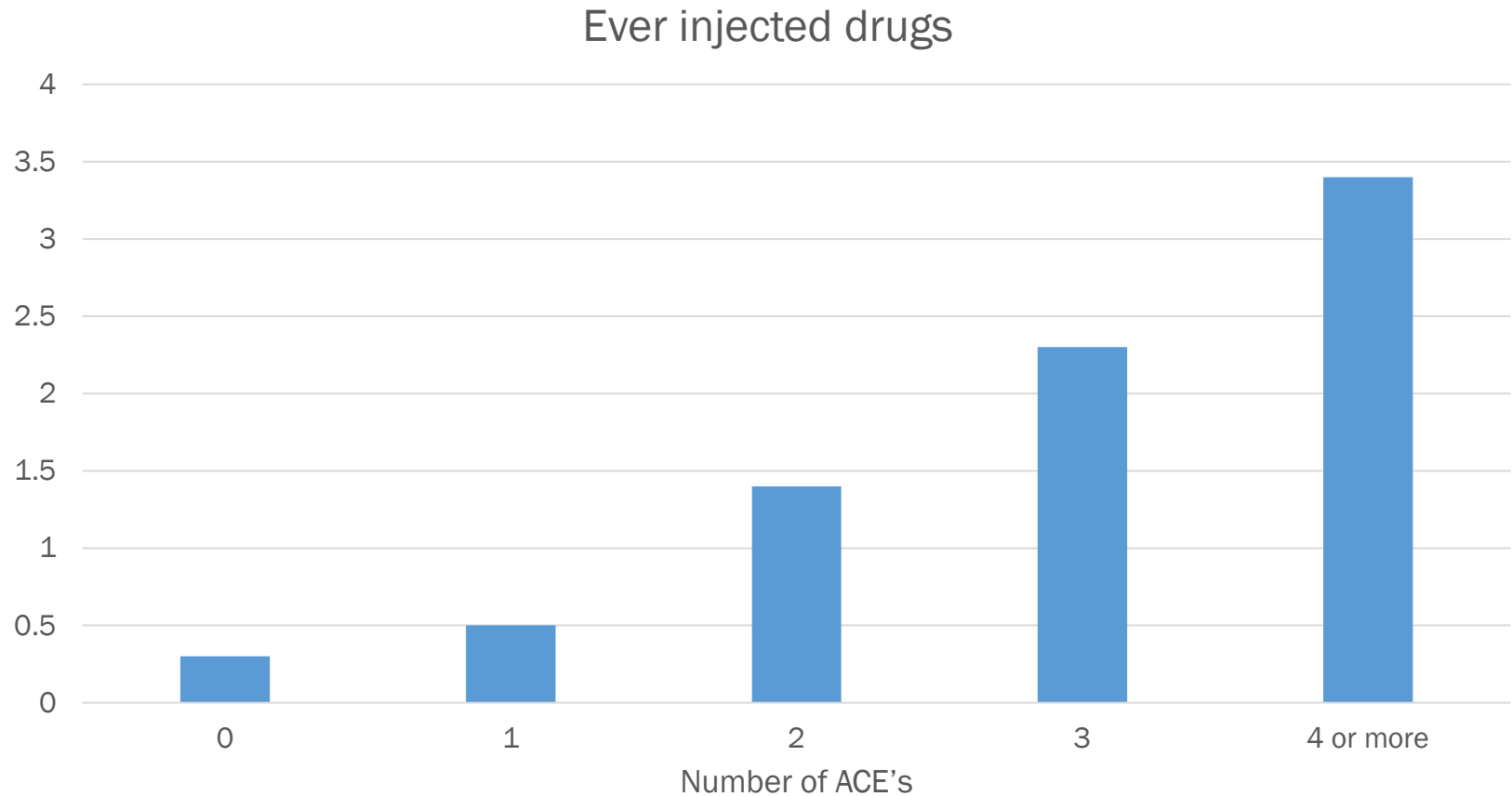
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# Special Report: Oklahoma leads the nation in childhood trauma. How does this affect our state and what can we do?

Jul 8, 2019 Updated Dec 1, 2020  0



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# Counties in Oklahoma with the Best ACE Rank

County	ACE Rank
Cimarron	1
Kingfisher	2
Beaver	3
Grant	3
Logan	5
Roger Mills	6
Texas	7
Lincoln	8
Major	9
Osage	10

## Counties in Oklahoma with the Worst ACE Rank

County	ACE Rank
Coal	77
Pushmataha	76
Choctaw	75
Pittsburg	74
Adair	73
Bryan	72
Garvin	71
McCurtain	70
Atoka	69
Woodward	68



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# What Causes ACEs?

- Individual trauma
- Generational trauma
- Epigenetics

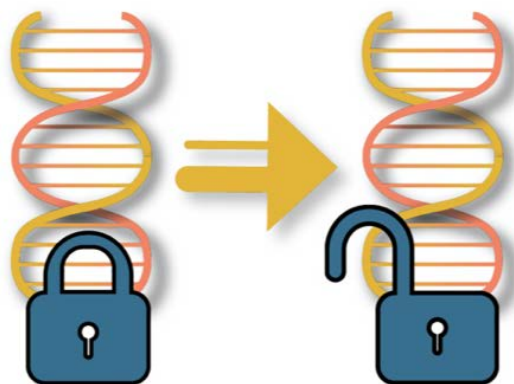


# What is Epigenetics?

“Epigenetics” is an emerging area of scientific research that shows how environmental influences—children’s experiences—actually affect the expression of their genes.



# What is Epigenetics?



This means the old idea that genes are “set in stone” has been disproven. Nature vs. Nurture is no longer a debate. It’s nearly always both!

# What is Epigenetics?

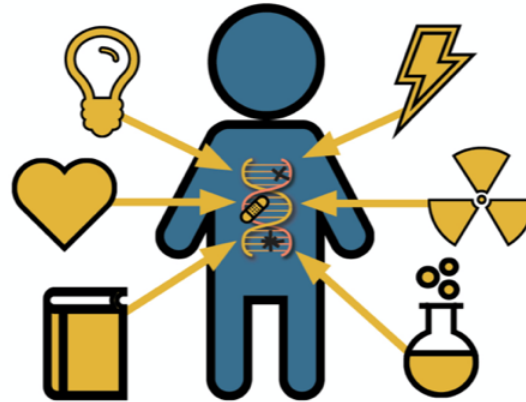
During development, the DNA that makes up our genes accumulates chemical marks that determine how much or little of the genes is expressed. This collection of chemical marks is known as the “epigenome.” The different experiences children have rearrange those chemical marks. This explains why genetically identical twins can exhibit different behaviors, skills, health, and achievement.





# What is Epigenetics?

Thus, the epigenome can be affected by positive experiences, such as supportive relationships and opportunities for learning...



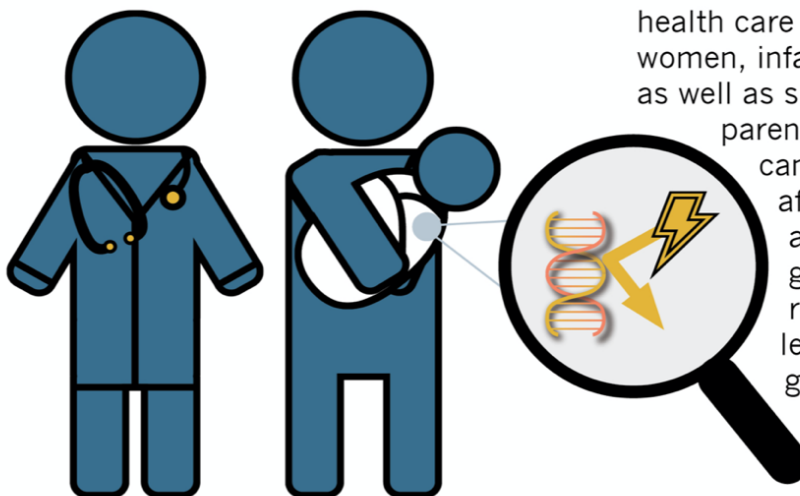
... or negative influences, such as environmental toxins or stressful life circumstances ...

... which leave a unique epigenetic “signature” on the genes. These signatures can be temporary or permanent and both types affect how easily the genes are switched on or off. Recent research demonstrates that there may be ways to reverse certain negative changes and restore healthy functioning. But the very best strategy is to support responsive relationships and reduce stress to build strong brains from the beginning.

# What is Epigenetics?

## YOUNG BRAINS ARE PARTICULARLY SENSITIVE TO EPIGENETIC CHANGES.

Experiences very early in life, when the brain is developing most rapidly, cause epigenetic adaptations that influence whether, when, and how genes release their instructions for building future capacity for health, skills, and resilience. That's why it's crucial to provide supportive and nurturing experiences for young children in the earliest years.



Services such as high-quality health care for all pregnant women, infants, and toddlers, as well as support for new parents and caregivers can—quite literally—affect the chemistry around children's genes. Supportive relationships and rich learning experiences generate positive epigenetic signatures that *activate* genetic potential.

# Epigenetic Mechanisms

- DNA Methylation
  - Linked to gene silencing
  - Repressive effect on gene transcription
- Histone acetylation
  - DNA is wrapped around Histones
  - Acetylation of Histones in promotor regions correlatis with enhanced gene activity

# Epigenetic Changes in Addiction

Drug of abuse	Brain region	Epigenetic mechanism	Residues	Implication
Ethanol	AMY	Methylation	H3K27/H3K4	Susceptibility to alcohol dependence
	AMY	Acetylation	H3K9	Susceptibility to alcohol dependence
	VTA	Acetylation	H3K9	Ethanol withdrawal
	NAc	Acetylation	H4K12	Persistence of ethanol-related behaviours
Cocaine	NAc	Acetylation	Gen H3	Cocaine addiction-related behaviours
	VTA	Acetylation	Gen H3	Motivation for drug reinforcement
	NAc	Acetylation	H3K14/H4K12	Cocaine addiction-related behaviours
	NAc	Methylation	H3K9	Cocaine addiction-related behaviours
	NAc	Acetylation	Gen H4	Motivation for drug reinforcement

*AMY* amygdala, *VTA* ventral tegmental area, *NAc* nucleus accumbens, *DG/Hipp* dentate gyrus/Hippocampus

# Historical Trauma

- The theory of **historical trauma** was developed to explain the current problems facing many Native Americans
- Historical trauma** purports that some individuals are experiencing historical loss symptoms as a result of the cross-generational transmission of trauma from historical losses (e.g., loss of population, land, and culture)



# Historical Trauma in Oklahoma

- Native American removals and other tragedies
- Tulsa Race Massacre of 1921
- Great Depression



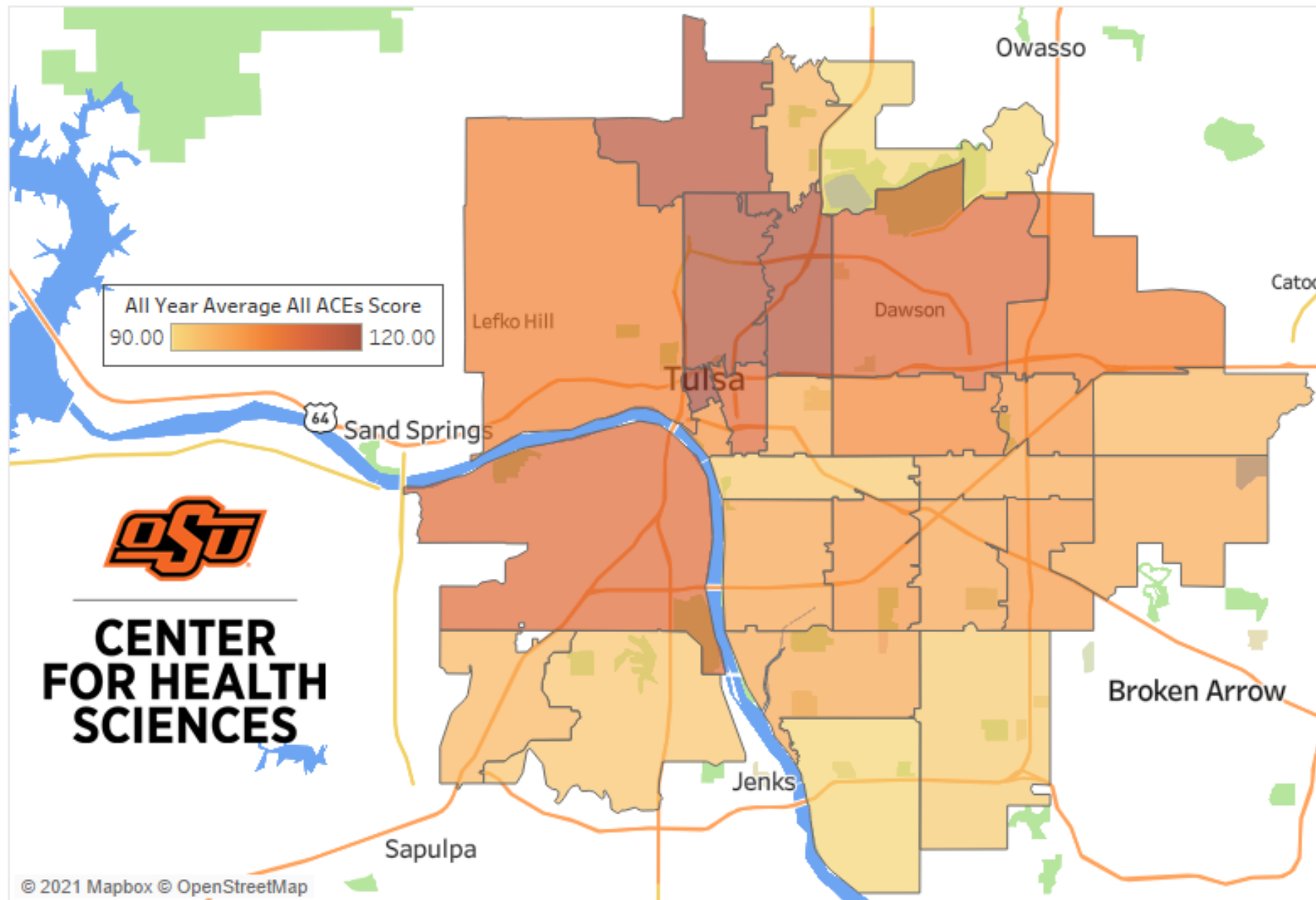
# Tulsa Race Massacre



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## All Year All ACEs Score Tulsa ZIP Codes





## Conclusion

- ACE's could be the missing link to solving “behavior” in medicine
- Oklahoma has high number of ACE's
- ACE's play an integral role in addictive behavior



# Questions

**Questions?**

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