Adolescent Substance Use and Co-Occurring Mental Health

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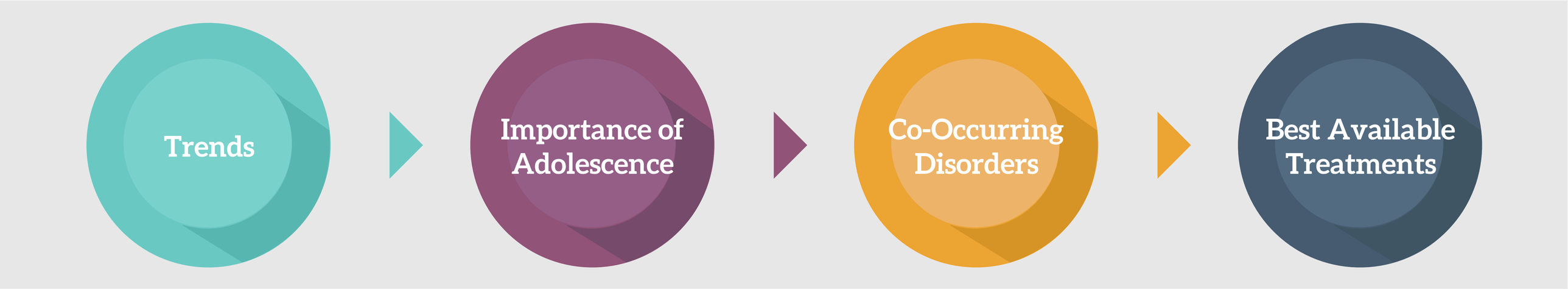
Conflicts of Interest: None

Overview



Detail the scope of the problem

Describe why adolescence is a key period in the pathogenesis of addiction

Explain the prevalence and clinical importance of co-occurring disorders

Review evidence-based interventions & recommendations for improving treatment

Learning objectives

The essential learning objectives for this presentation are **threefold**. Upon completion of this workshop, participants should be able to:

Summarize the latest adolescents drug use trends

Explain why adolescence is a critical period for the development of addiction

Describe key features of the best available interventions for adolescents

Adolescence is the peak period for initiation of substance use

- Levels and frequency of substance use begin to increase in mid-adolescence and peak in very early adulthood.
- Age of onset is strikingly similar across high-income countries.
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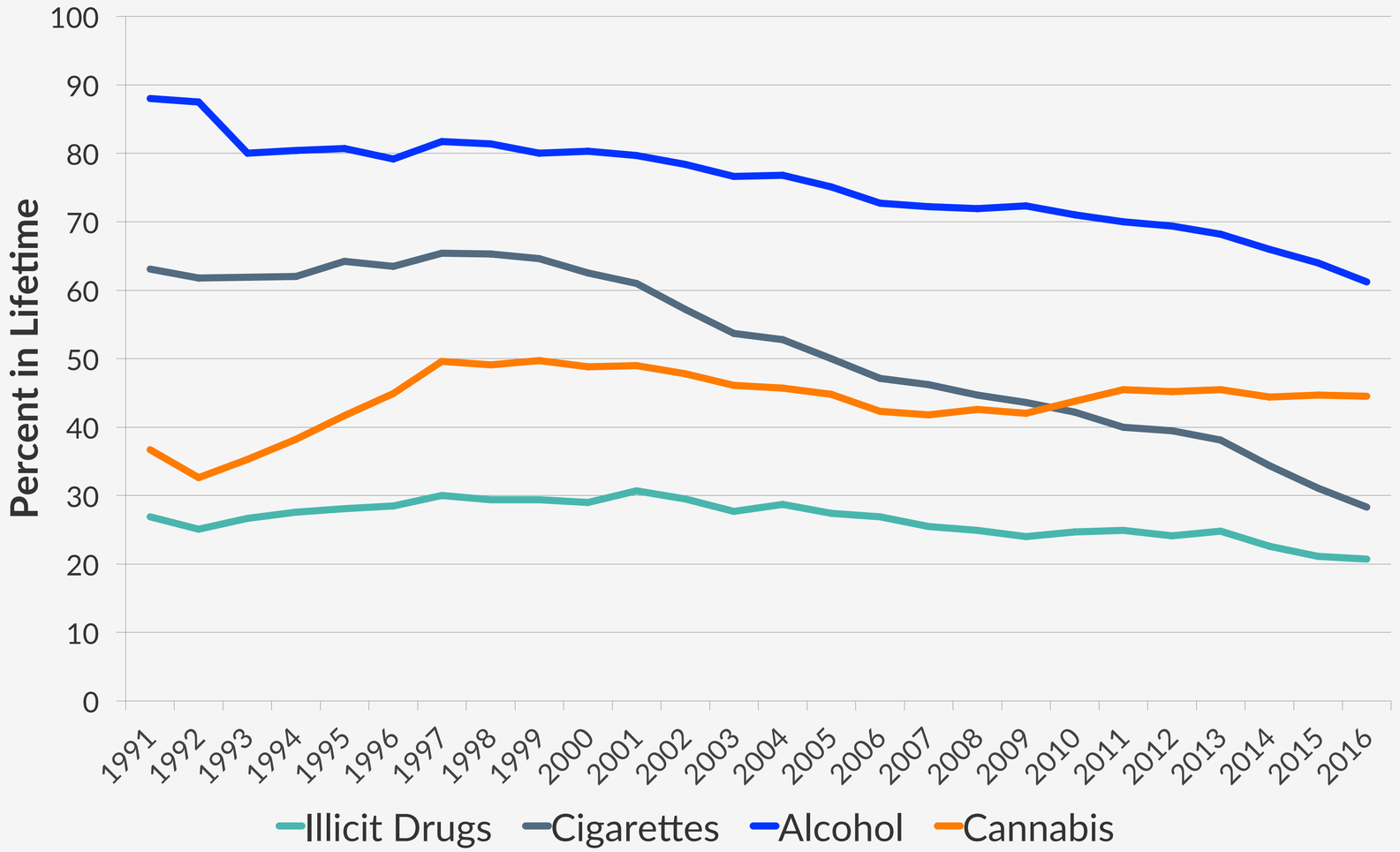
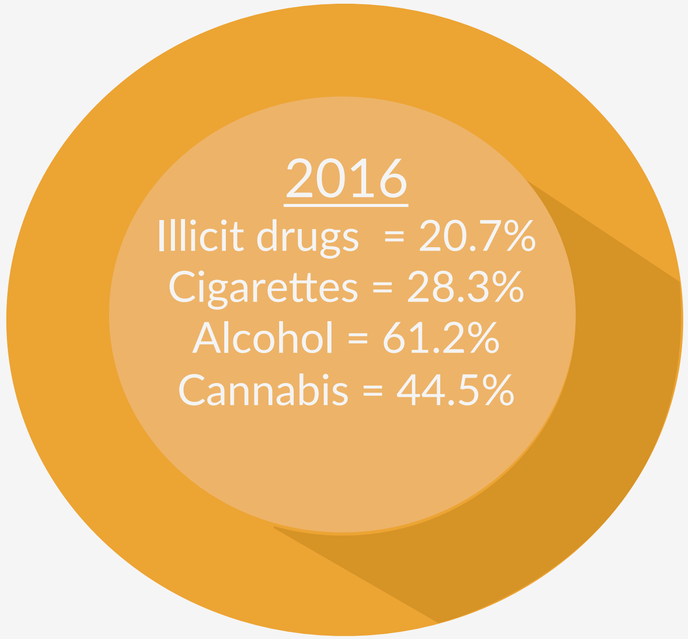
- Age of onset is strikingly similar across high-income countries.

Degenhardt et al., 2016, *Lancet*

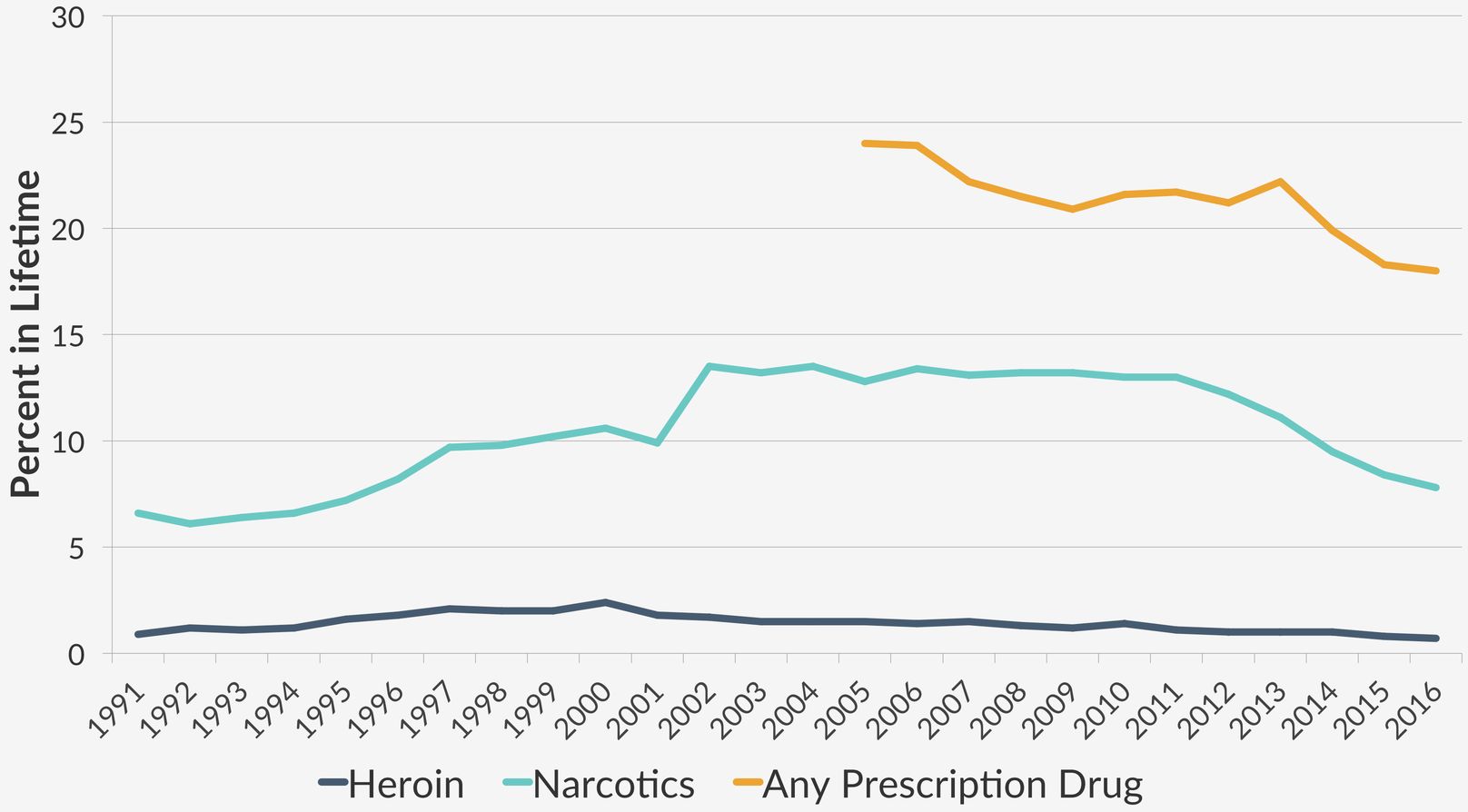
Trends in lifetime substance use among 12th graders (1991 – 2016)

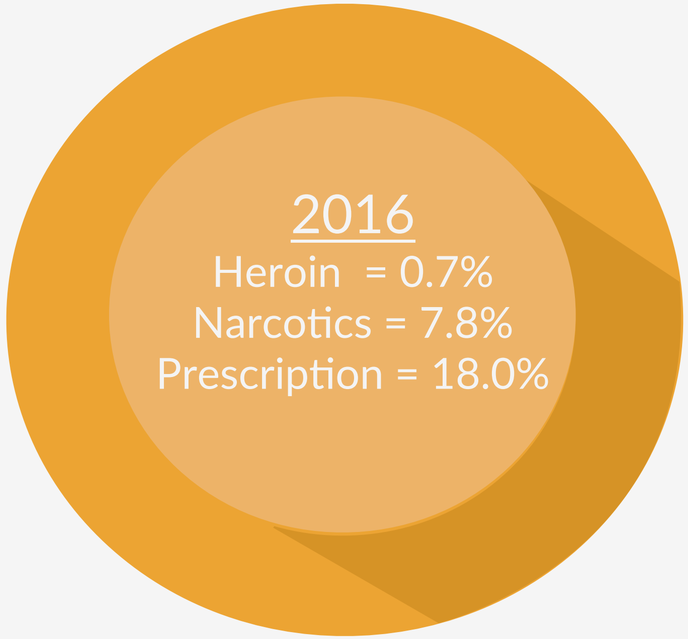




National Institute on Drug Abuse, 2016

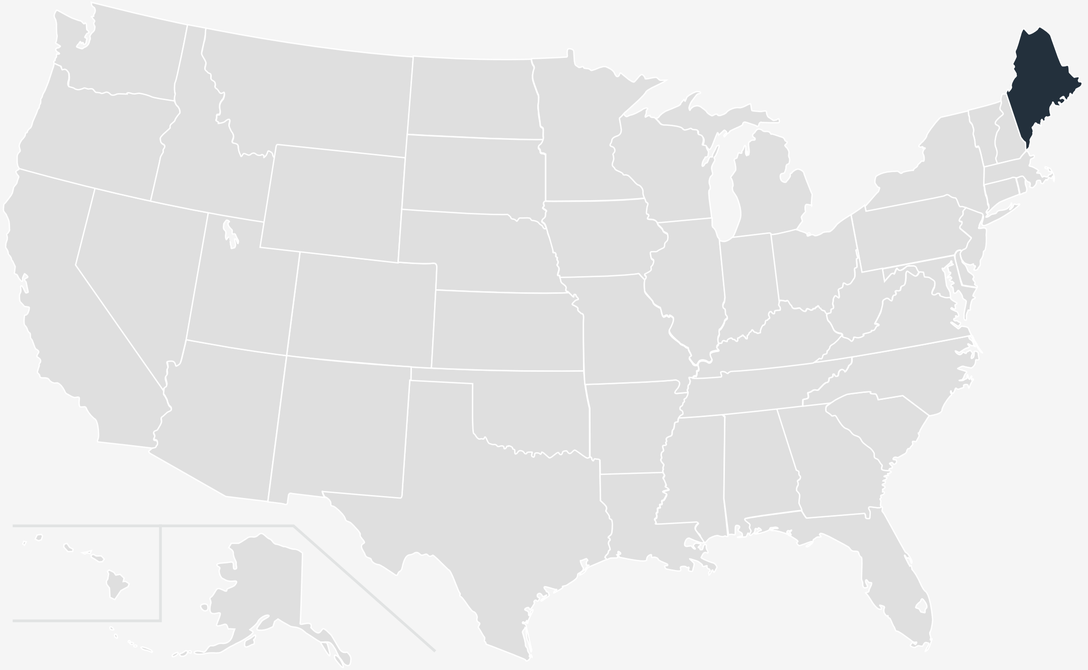
Trends in lifetime opiate and prescription drug use among 12th graders (1991 – 2016)

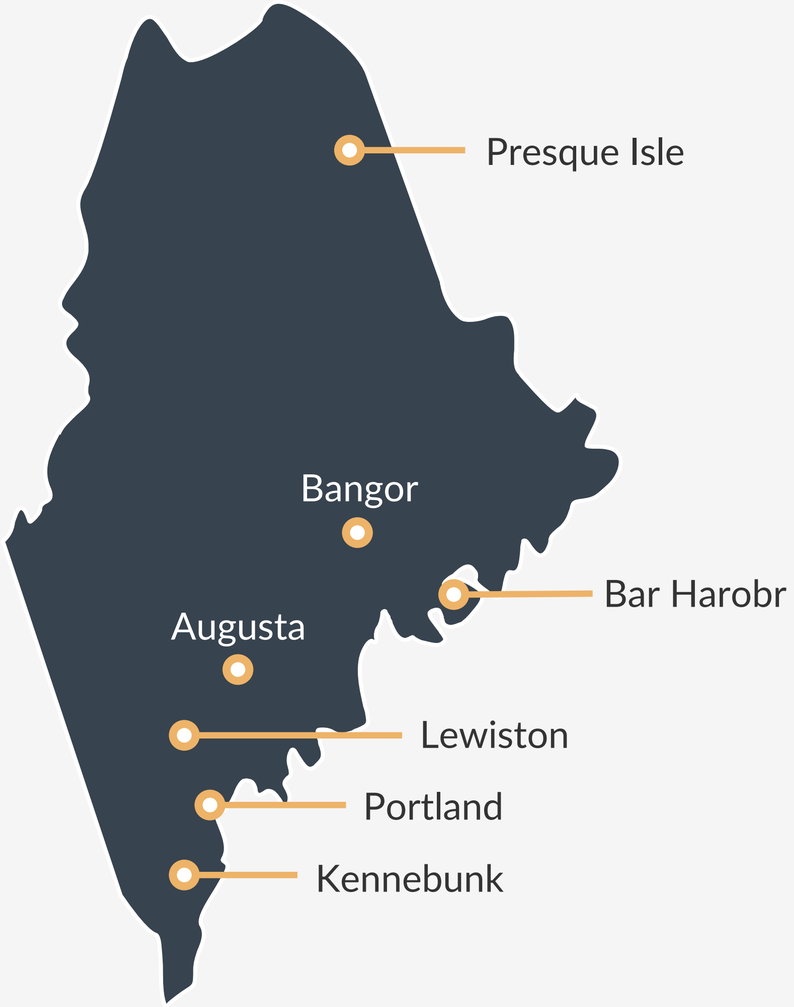




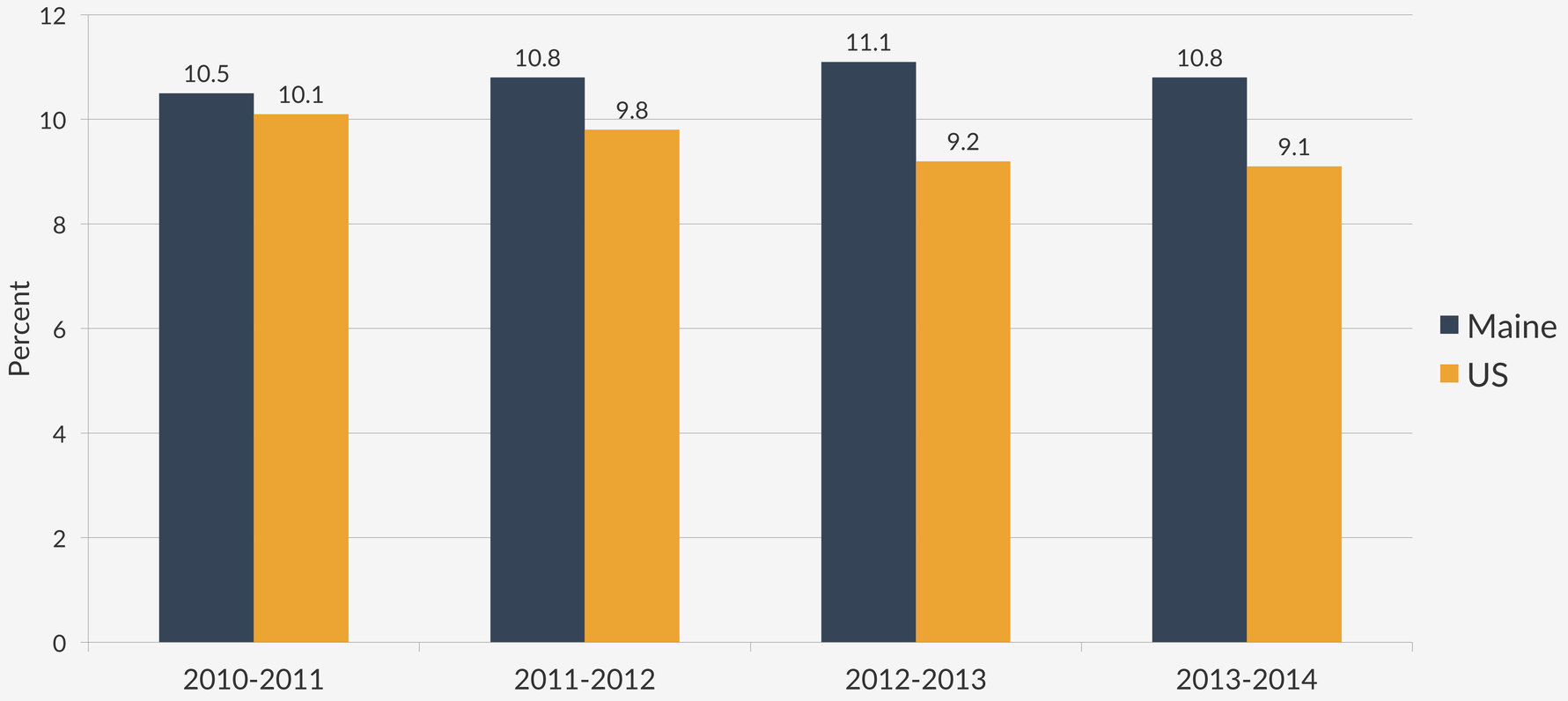
National Institute on Drug Abuse, 2016

How do youth in Maine compare to adolescents across the US?





Past month illicit drug use (12 – 17 year olds)

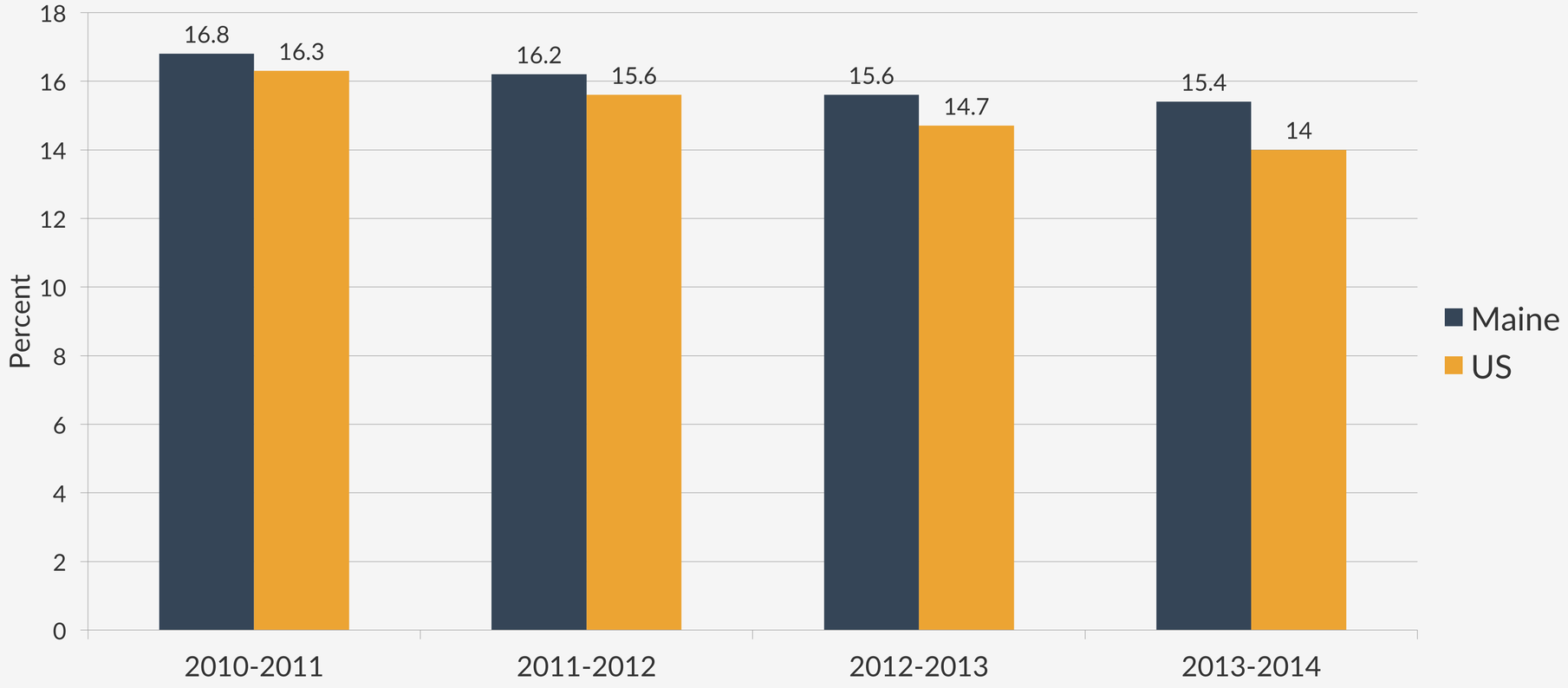


Key points

- In 2013-2014, about **10,000** adolescents in Maine reported using illicit drugs within the past month.
- This percentage did not change significantly from 2010 to 2014.

SAMHSA (2015)

Past month binge drinking (12 – 20 year olds)

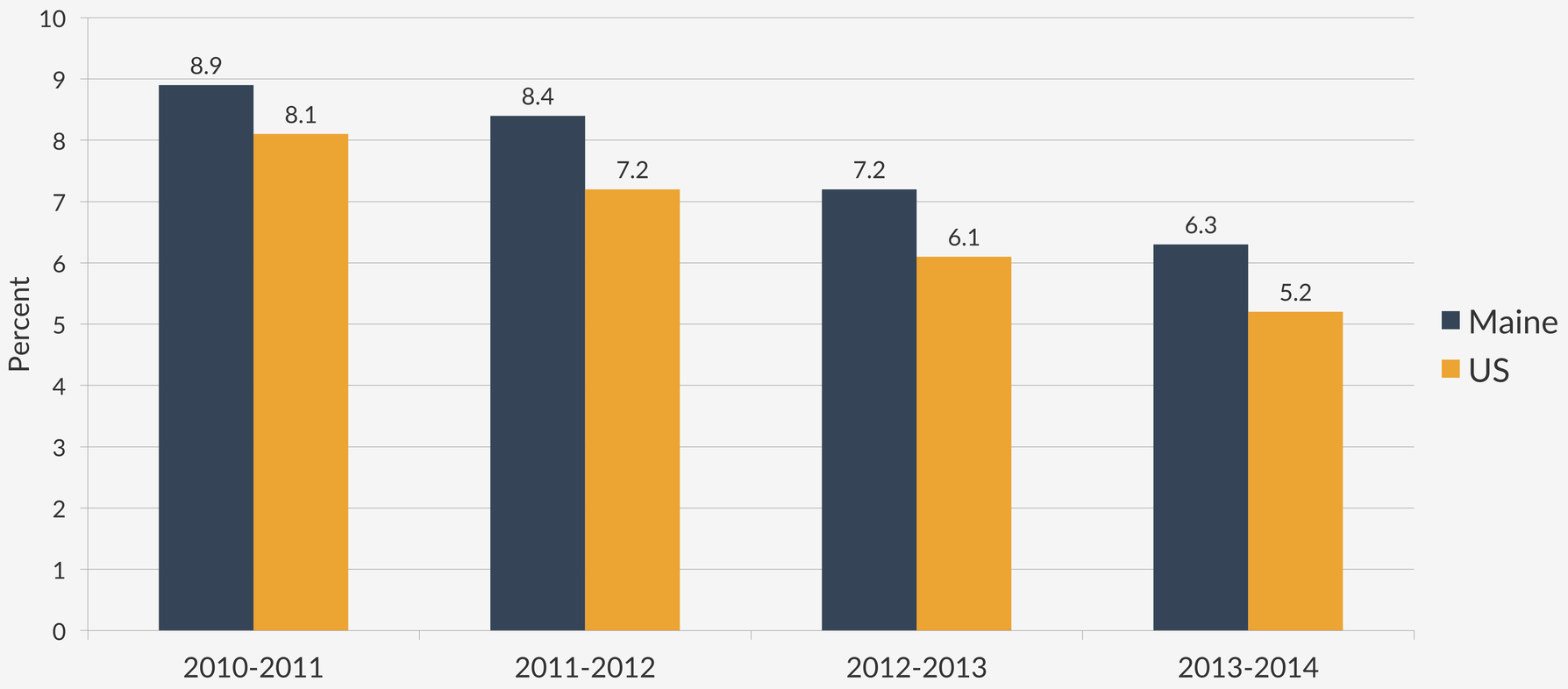


Key points

- In 2013-2014, about **22,000** youths reported binge drinking within the past month.
- This percentage did not change significantly from 2010 to 2014.

SAMHSA (2015)

Past month cigarette use (12 – 17 year olds)

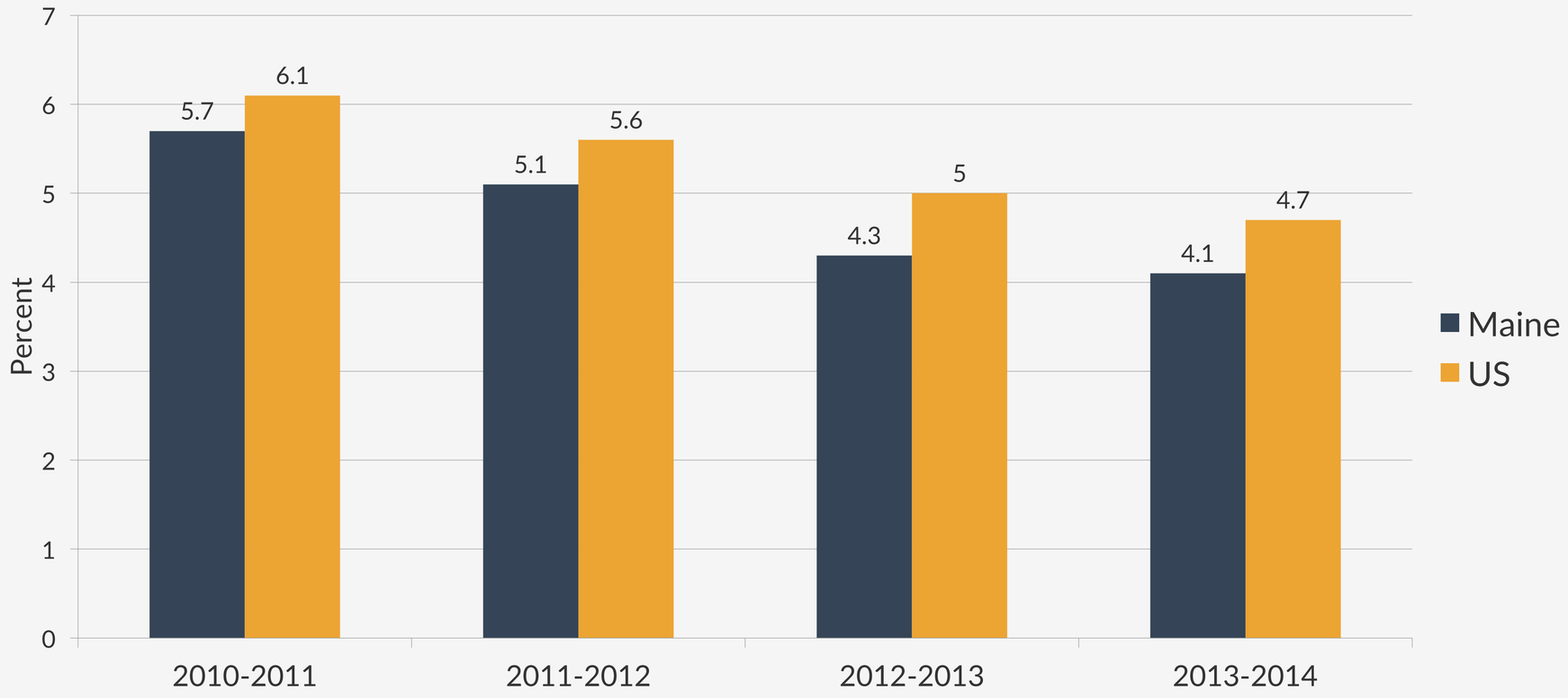


Key points

- In 2013-2014, about **6,000** adolescents reported using cigarettes within the past month.
- This percentage **decreased** from 2010 to 2014.

SAMHSA (2015)

Past month nonmedical use of pain relievers (12 – 17 year olds)



Key points

- In 2013-2014, about **4,000** adolescents reported nonmedical use of pain relievers in the past month.
- This percentage did not change significantly from 2010 to 2014.

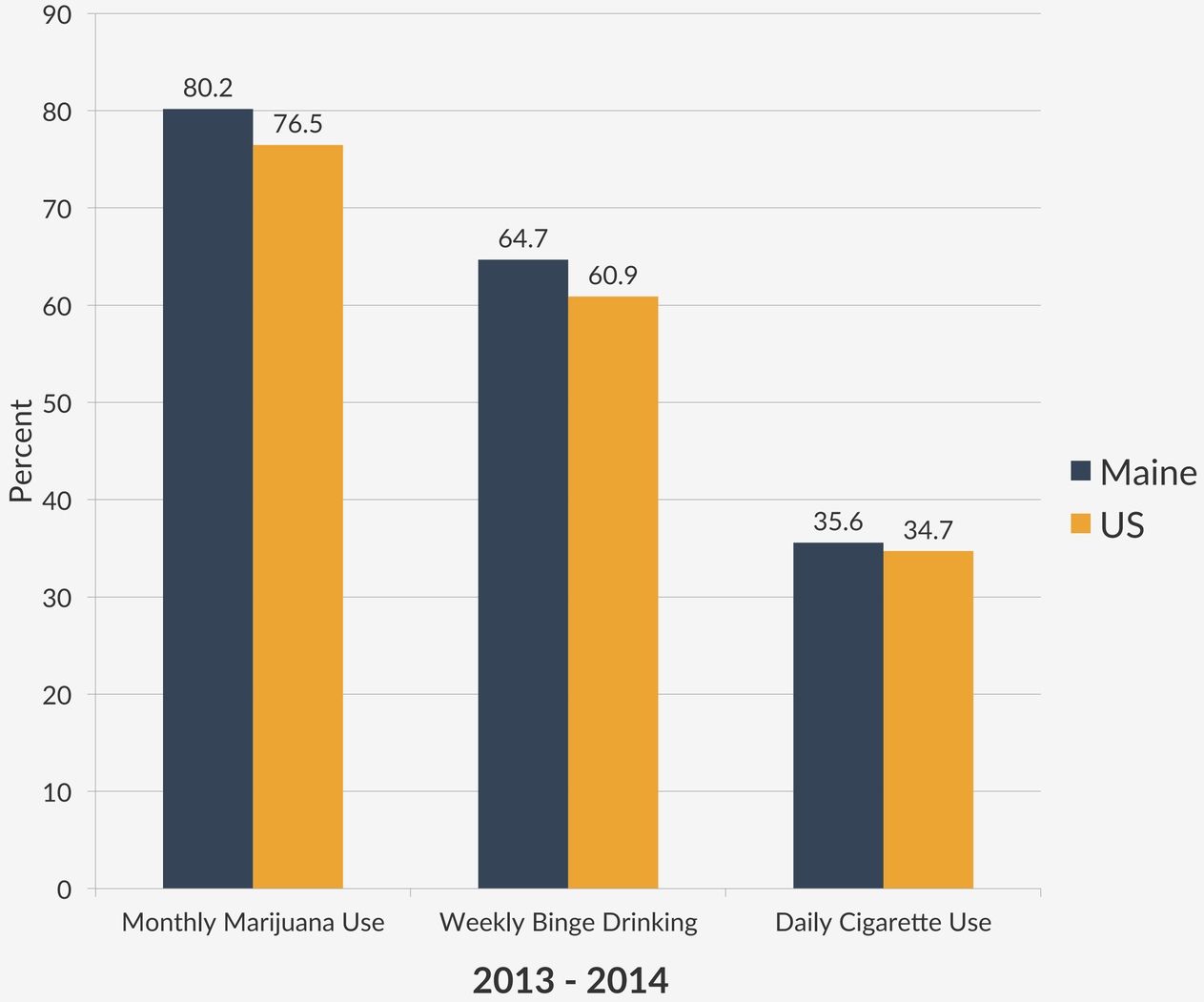
SAMHSA (2015)

Perceived risk (12 – 17 year olds)

About 8 in 10 perceived no great risk from using marijuana once a month

About 2 in 3 perceived no great risk from binge drinking once or twice weekly

About 1 in 3 perceived no great risk from smoking one or more packs of cigarettes per day



SAMHSA (2015)

Is adolescent substance use benign?

Harmful consequences of adolescent substance use

Educational attainment **(reciprocally related)**
- Lower educational attainment
- Poor school performance and dropout

Legal burden
- Drug trafficking
- Violence-related crimes

Health burden
- Number one cause of disease burden in adolescents, especially for males
- Directly linked with the three leading causes of death among youth (i.e., accidents, homicide, suicide)
- Compromise executive functions and decision-making
- Potentially irreversible brain damage
- Risky sexual behaviors leading to HIV and other infectious disease
- Persistence of use and progression to developing a substance use disorder

Key point

Substance use among adolescents is associated with myriad **short- and long-term adverse effects**, and the estimated economic impact of substance misuse in the U.S. is **$442 billion** annually.

How do we define a substance use disorder?

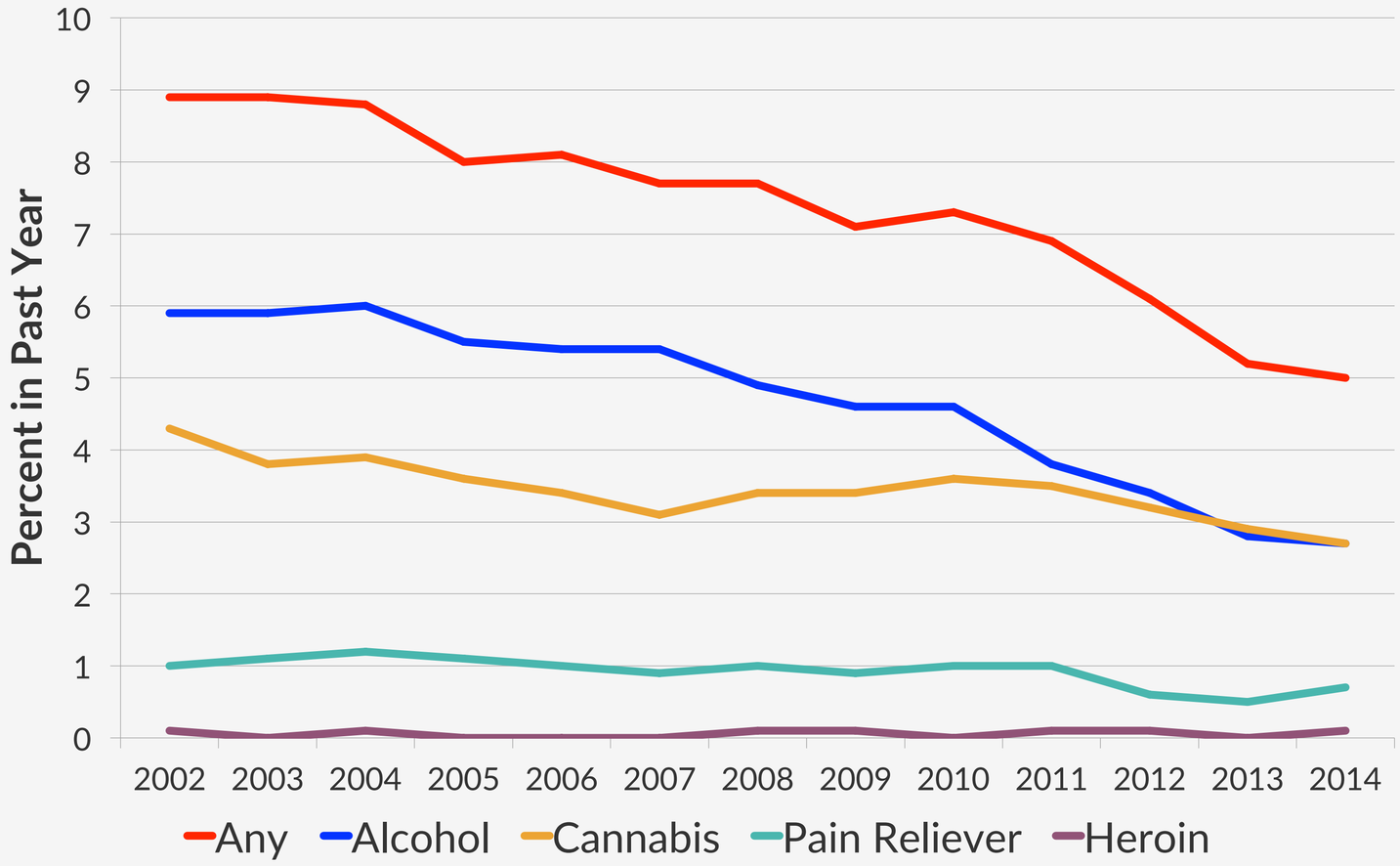
A problematic pattern of use leading to **clinically significant impairment or distress**, as manifested by at least two of the following, occurring within a 12-month period:

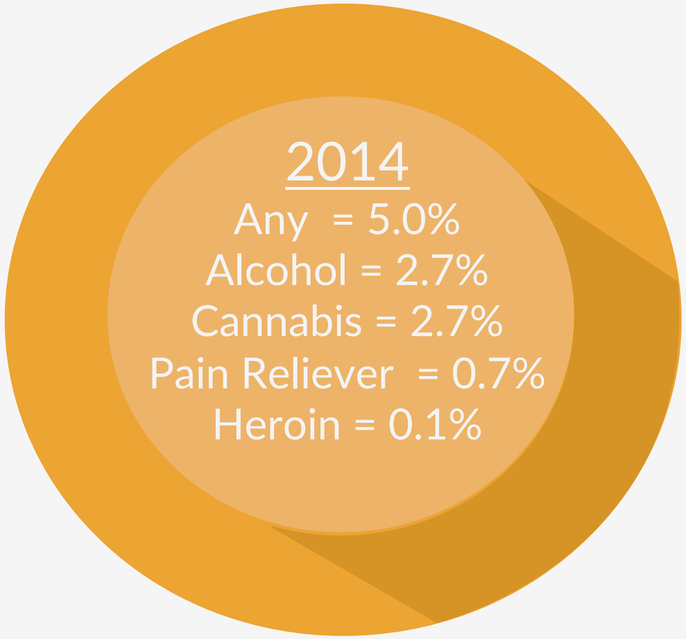
- Often taken in larger amounts or over a longer period than intended
- Persistent desire or unsuccessful efforts to cut down or control use
- Great deal of time spent obtaining, using, or recovering
- Craving, or a strong desire or urge to use
- Failure to fulfill major role obligations (i.e., work, school, home)
- Persistent or recurrent social or interpersonal problems
- Important activities given up or reduced (e.g., social, occupational, recreational)
- Recurrent use in situations in which it is physically hazardous
- Use despite knowledge of physical or psychological problems due to use
- Tolerance
- Withdrawal

Severity:

- Mild: 2 – 3 symptoms
- Moderate: 4 – 5 symptoms
- Severe: 6 – 11 symptoms

Trends in past year substance use disorders among 12 – 17 year olds (2002 – 2014)





SAMHSA (2015)

So, what's the scope of the problem?

Any Use

61%
12th graders

Lifetime prevalence of alcohol use

45%
12th graders

Lifetime prevalence of cannabis use

5-15
Students

Number of students in every US high school class who have used alcohol or illicit drugs.

Problem Use

5%
12-17 Year-Olds

Prevalence of substance use disorders among 12-17 year olds in the US, which amounts to 1.3 million adolescents

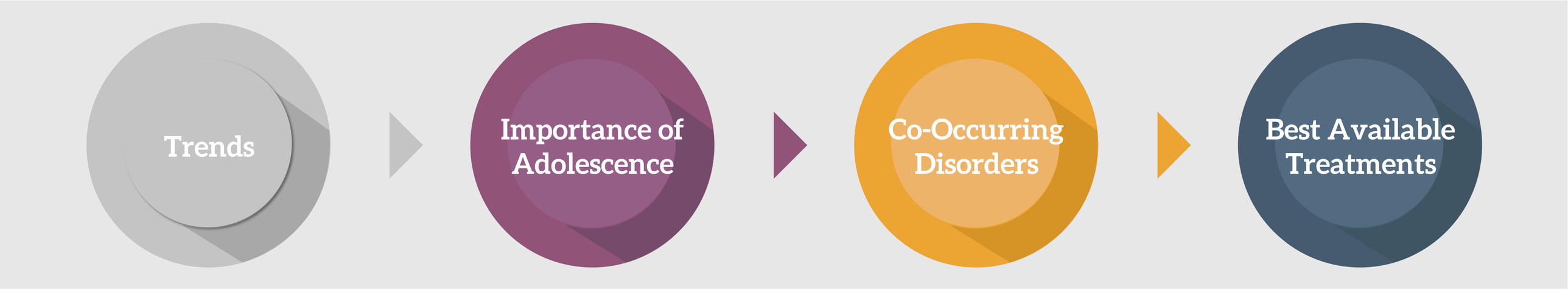
90%
Untreated

Percent of 12- to 17-year-olds needing substance abuse treatment who do not actually receive any services.

1-2
Students

Number of students in every US high school class with a substance use disorder

Overview



Detail the scope of the problem

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Developmental Perspective on Addiction

Biological

Brain changes
Sleep changes
Emotional & behavioral regulation

Social Emotional

Family relationships
Peer relationships
Romantic relationships & sexuality

Cognitive

Decision-making
Working memory
Executive functions

Transitions

Living arrangements
Educational settings
Work settings

Brain disease model of addiction

- All addictive drugs activate the brain's reward system by causing sharp increases in **dopamine**
- **Associative learning** links drug-induced reward with environmental cues
- **Reward shifts** from actual use to environmental drug cues
- Over time, the brain becomes much **less sensitive to non-drug related rewards**
- **Undermines motivation** for everyday activities (e.g., relationships, goals).
- **Compromises the frontal cortex**, which governs executive functions (e.g., self-regulation, decision-making)
- **Weakens ability to resist strong urges** or to follow through on decisions to stop using

Why is the adolescent brain especially vulnerable?

Key neuronal changes	
•	Dynamic changes in various brain regions
•	Decreases in gray matter and increases in white matter drive enhanced information processing
•	Imbalance in brain maturation, with reward systems maturing before cognitive control areas
•	Heightened vulnerability to risk taking and poor inhibitory control
•	Vulnerable to the potentially persistent effects of neural insults, including excessive alcohol and drug use

Squeglia & Gray, 2016, *Curr. Psychiatry Rep.*
Genetic Science Learning Center. (2015)

Does the brain disease model apply to youth?

The acute effects of alcohol and other drugs are almost never studied in human adolescents due to important ethical and legal restrictions.

Compared to adult rats and mice, adolescent animals:

- Drink 2-3 times more alcohol
- Less sensitive to the aversive, sedative, and motor impairing effects of alcohol
- More sensitive to alcohol's stimulatory and social-facilitating effects

Does the brain disease model apply to youth?

The acute effects of alcohol and other drugs are almost never studied in human adolescents due to important ethical and legal restrictions.

Compared to adult r
animals:

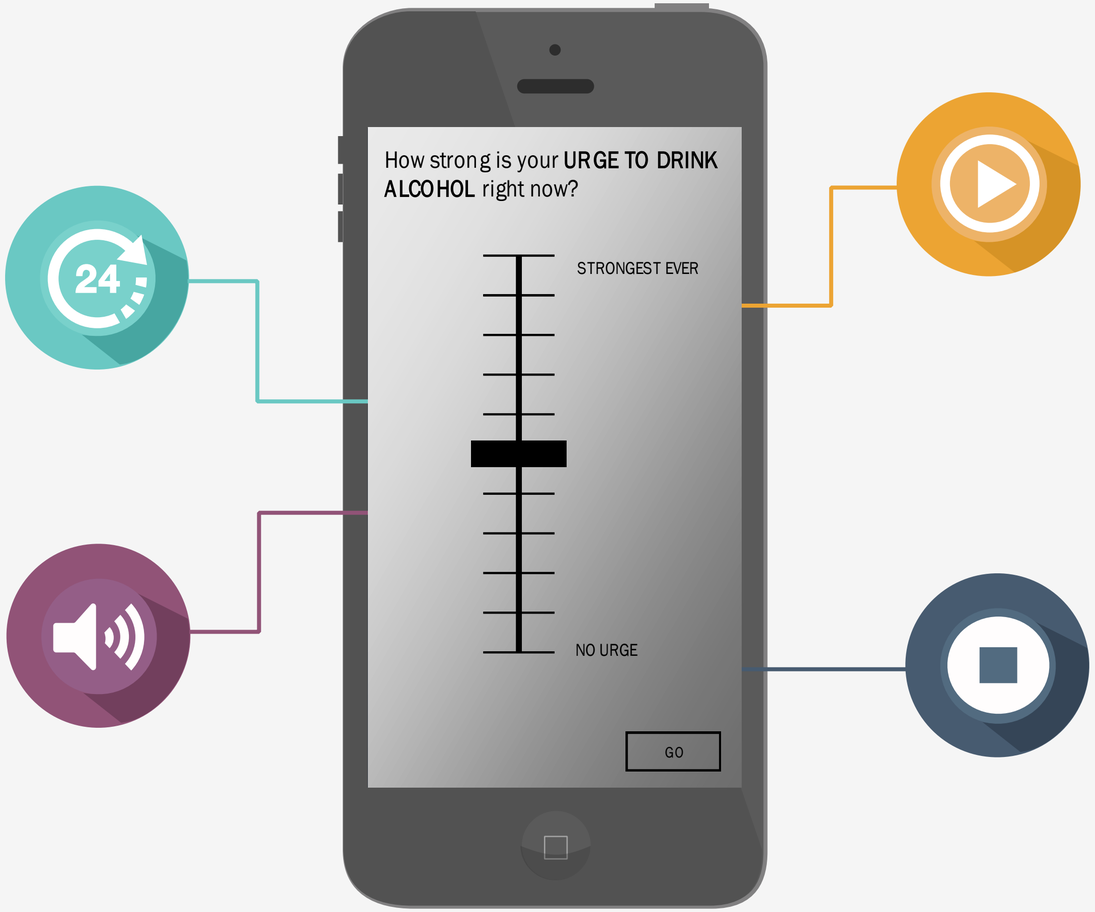
Drink 2-

Less sensitive to the aversive, sedative, and motor impairing effects of alcohol

More sensitive to alcohol's stimulatory and social-facilitating effects

But, do animal findings apply to human adolescents?

Ecological assessment of adolescent substance use: Application overview



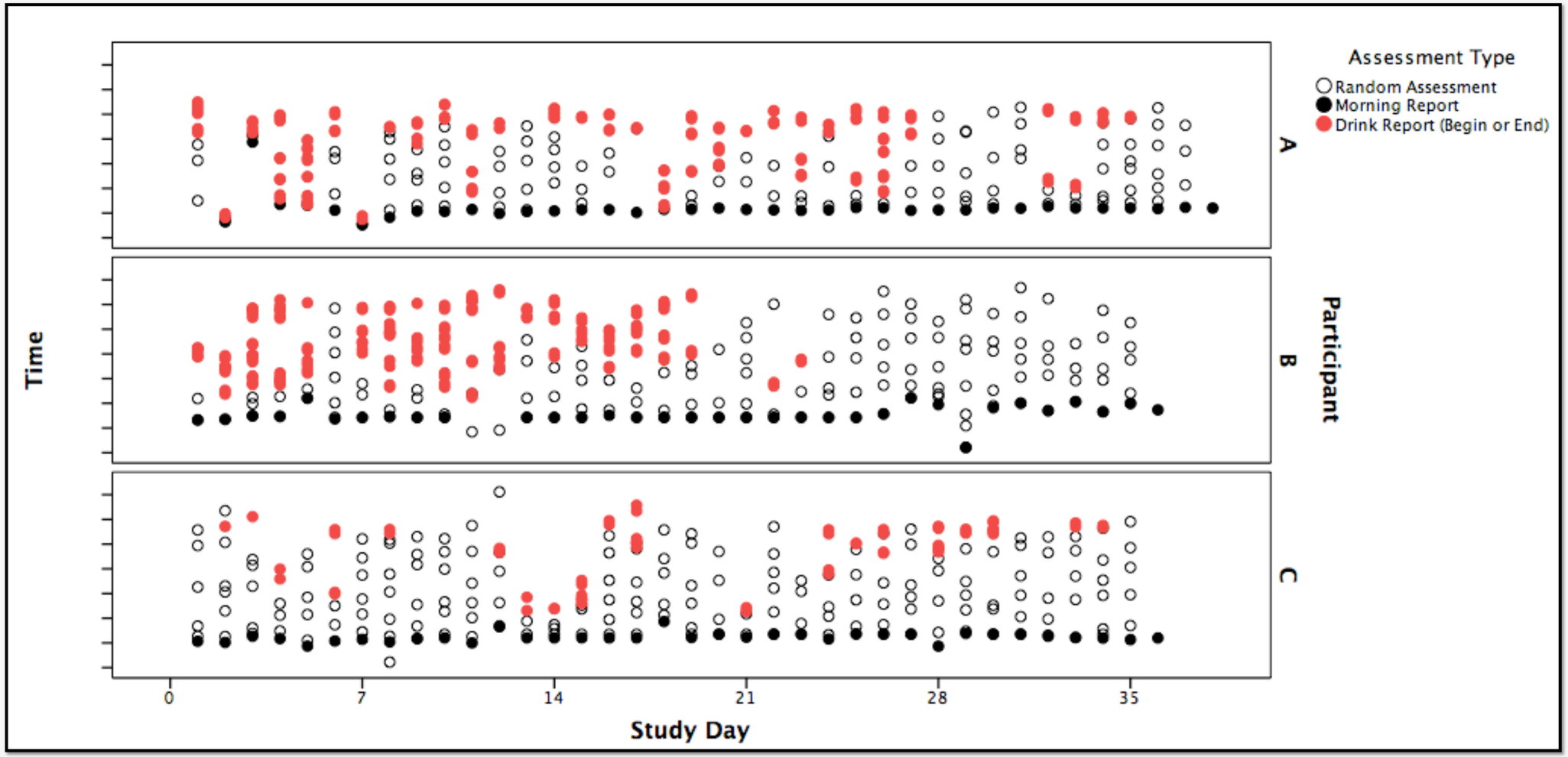
Morning Reports are completed each morning upon waking

Random Assessment Reports are completed every 3 to 6 hours

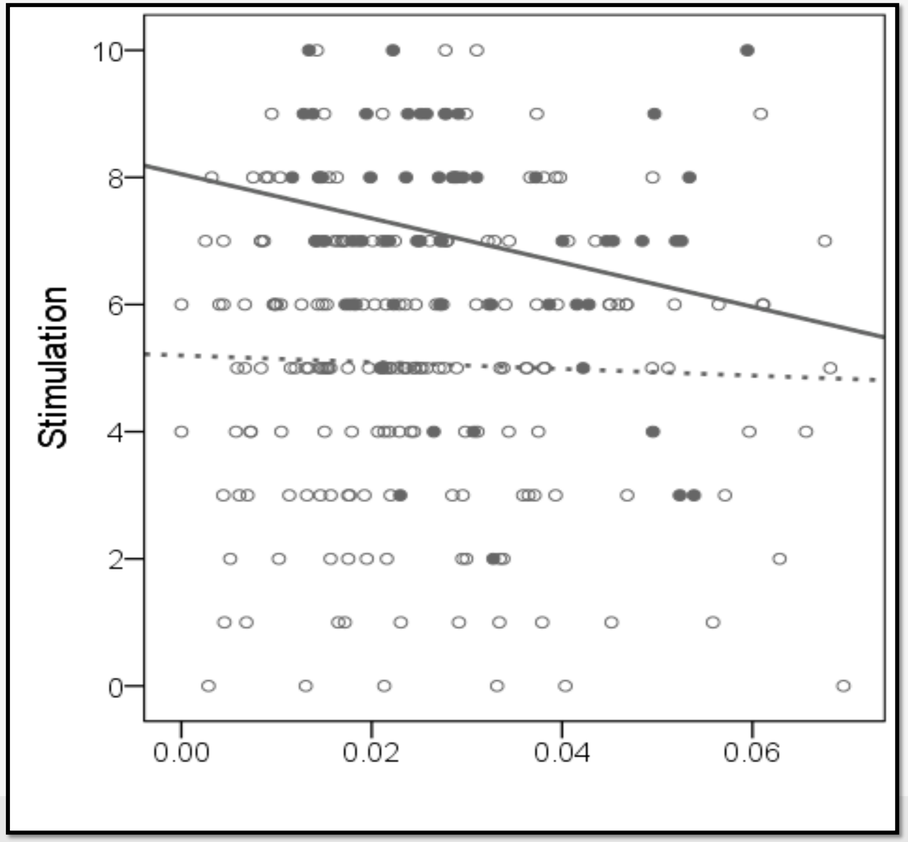
Begin Substance Use Reports are completed just before the onset of substance use

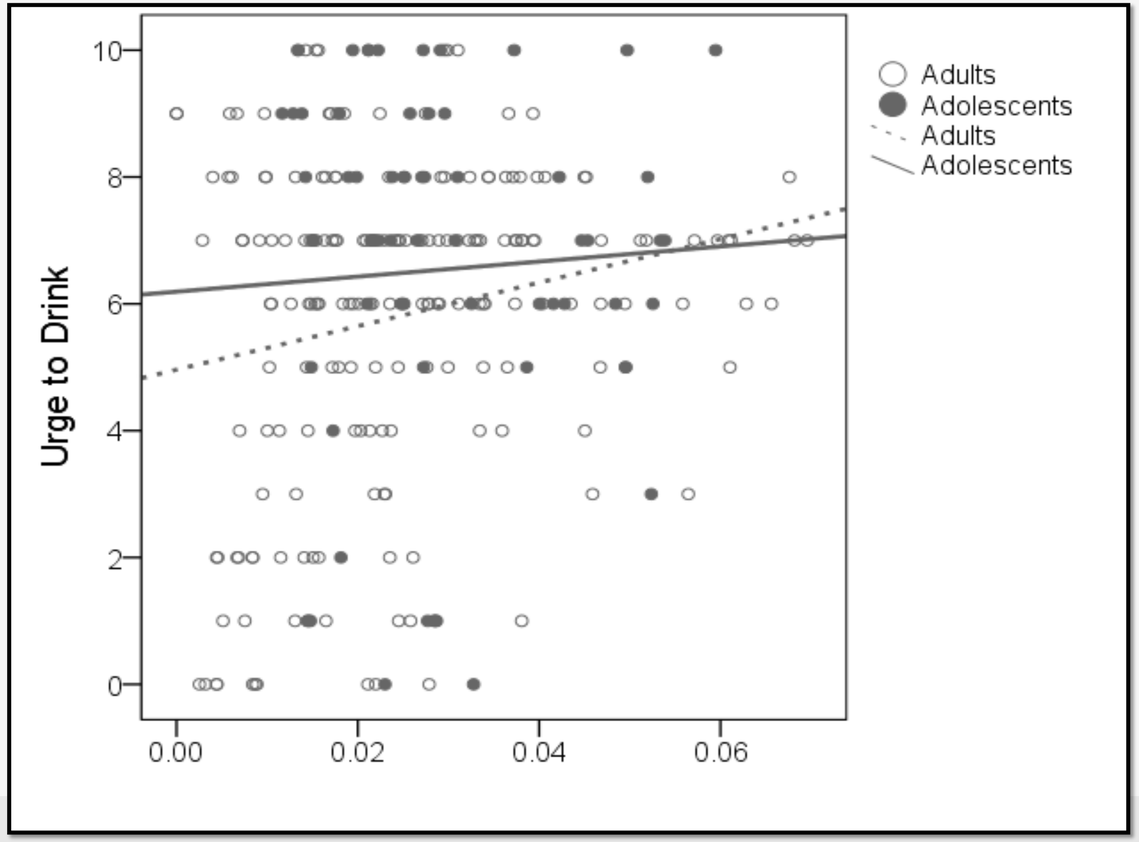
End Substance Use Reports Reports are completed after substance use

Ecological momentary assessment data streams from three research participants



Characterizing alcohol's effects in adolescents





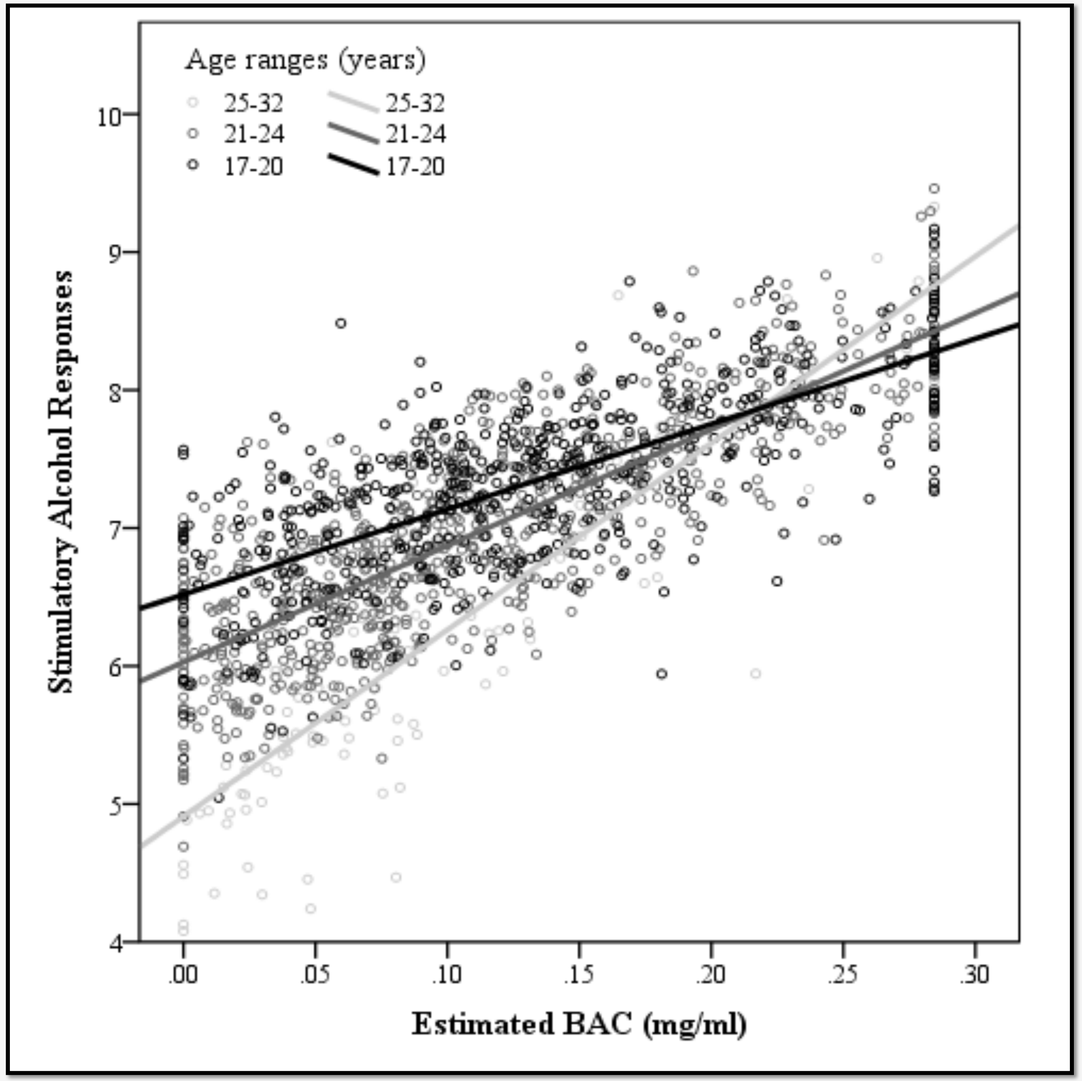
Key findings

- Adolescents were more sensitive to the stimulant effects (and to craving to some degree) than adults.
- Higher craving after the first few drinks predicted higher alcohol consumption during the drinking episode.
- Stimulation had no effect of subsequent drinking.

Miranda et al., 2014, *J Abnorm Psychol*

Characterizing alcohol's effects in adolescents:

"Catching the buzz"



Key Findings

- Younger individuals reported increased stimulation relative to older individuals
- Age related differences become less pronounced at higher blood alcohol concentrations

Treloar et al., 2016, *Drug Alcohol Depend*

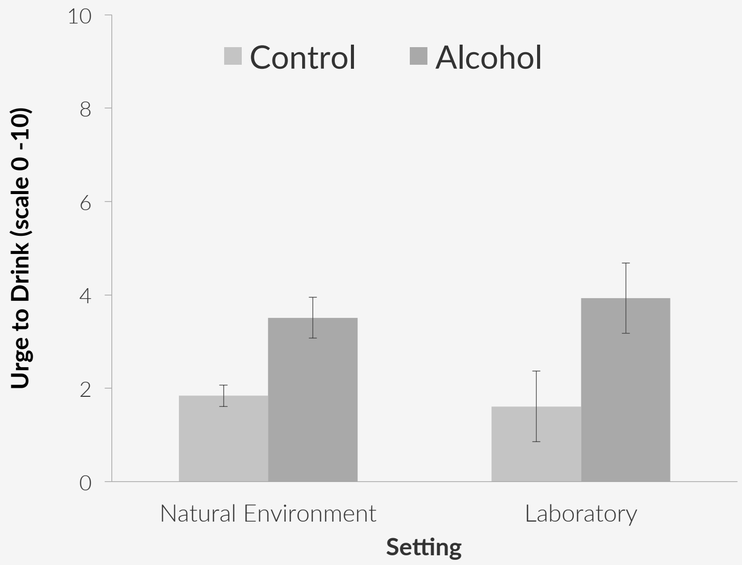
How about alcohol and drug cues? Are they relevant for youth?

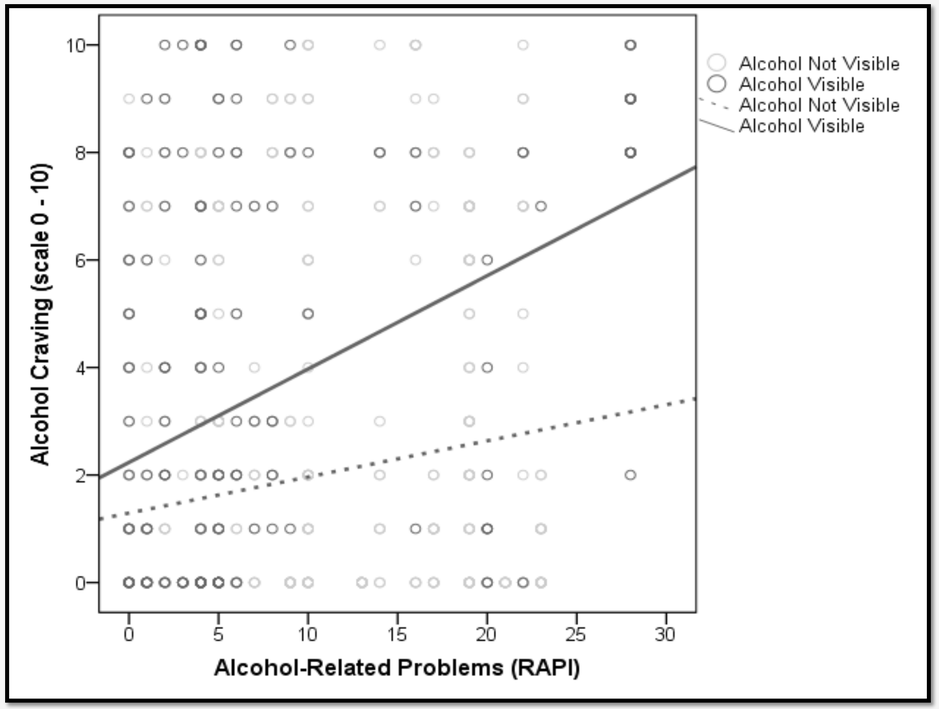
Craving matters

Craving is a chief motivational determinant of alcohol and drug use in most contemporary theoretical models of addiction.

Alcohol Craving in Adolescent Problem Drinkers

Bridging the Laboratory and Natural Environment



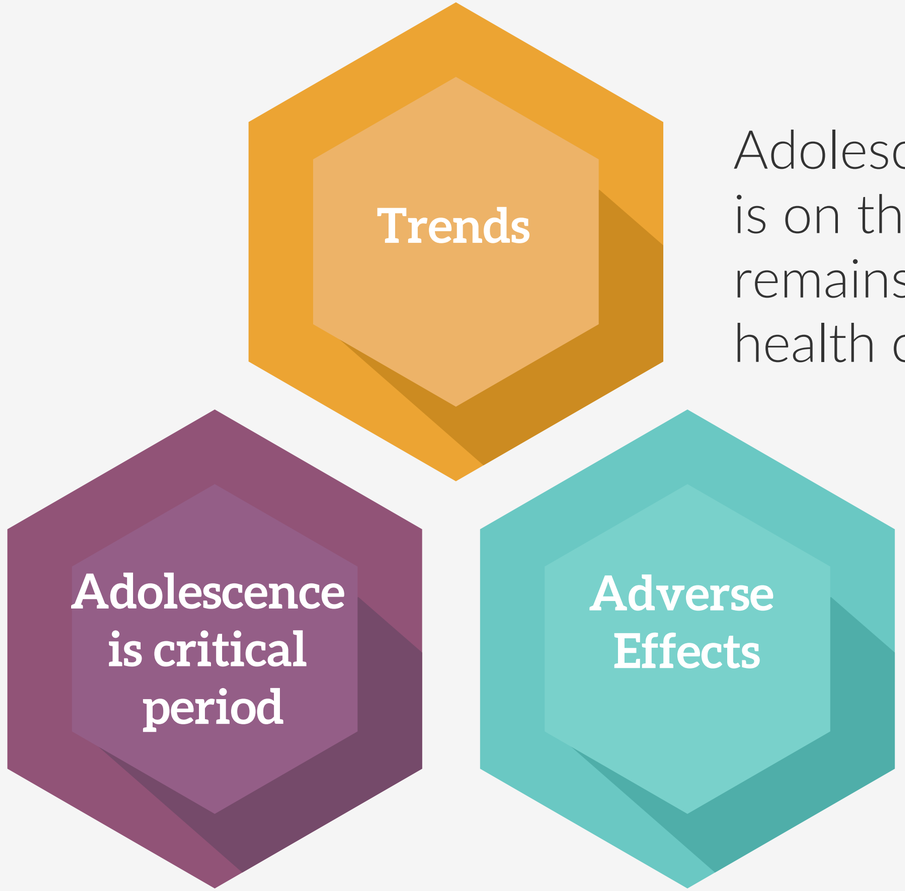


Key findings

- Adolescents' hypersensitivity to the rewarding effects of alcohol appear to promote associative learning that links substance use and drug-related cues

Ramirez & Miranda, 2014, *Psychopharmacology*

Summary of key points

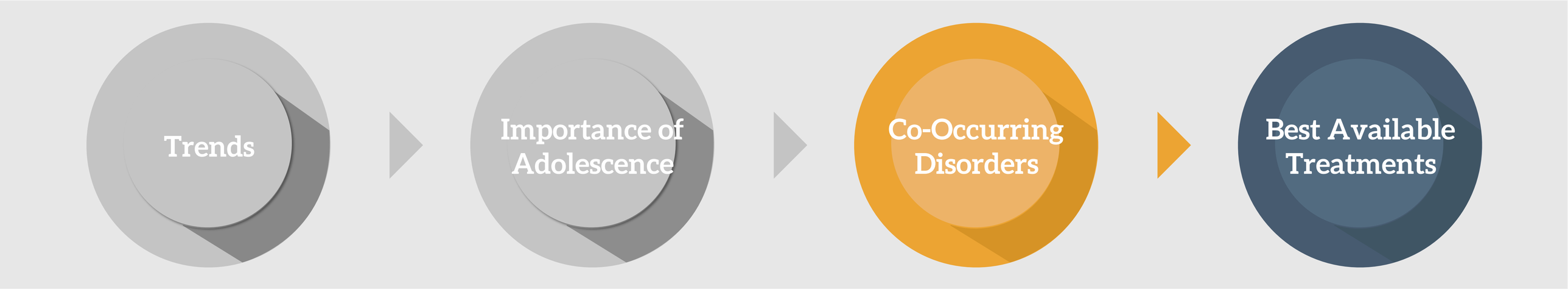


Adolescent substance use is on the decline but remains a major public health concern

Confluence of risk factors appears to be the “perfect storm” for the onset and rapid progression of substance misuse during adolescence

Adolescent substance use is associated with a host of acute and long-term adverse effects

Overview



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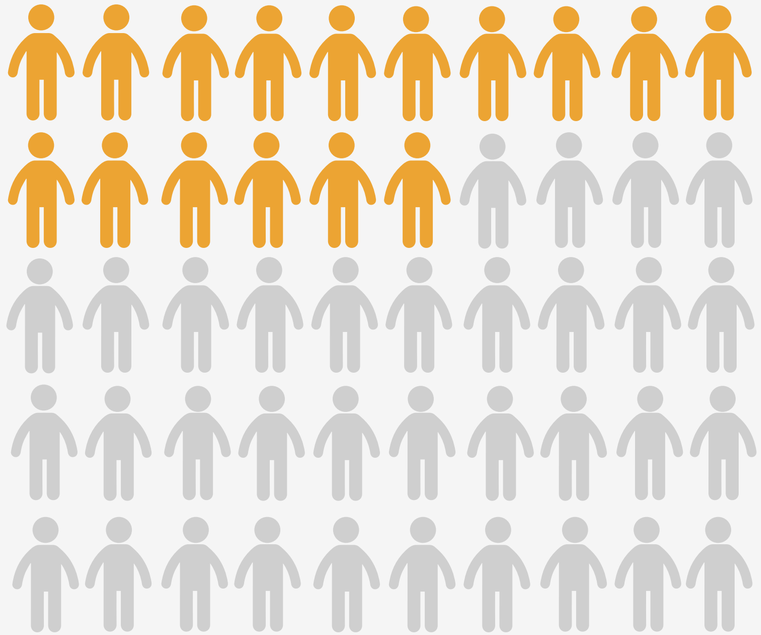
Co-occurring psychiatric and substance use disorders



32% of teens with an SUD

Nearly 1/3 of teens with an SUD meet criteria for a non-substance psychiatric disorder

80% of teens referred for SUD treatment

Nearly all teens referred for SUD treatment meet criteria for non-substance psychiatric disorder

Robinson & Riggs, 2016, *Child Adol Psych Cl*

What's the association?

Childhood-onset psychiatric disorders increase risk for adolescent-onset or adult-substance use disorders

- Depression (Groenman et al., 2017)
- ADHD (Charach et al., 2011; Groenman et al., 2017; Lee et al., 2011)
- ODD (Groenman et al., 2017)
- Conduct disorder (Groenman et al., 2017)
- PTSD
- Bipolar disorder (Wilens et al., 2008; Goldstein et al., 2008, 2013)
- Anxiety (Groenman et al., 2017)

All conferred risk for alcohol, nicotine, drug-related, and any substance use disorder except for anxiety, which was only associated with drug-related disorder (Groenman et al., 2017)

Adolescent substance abuse increases risk or mental health problems

- Executive function deficits
- Cannabis
  - persistent neurocognitive deficits
  - quadruples risk for psychosis
  - doubles risk for depression & anxiety
- Suicidal thoughts & attempts
- Antisocial behavior
- Binge – purge eating behaviors
- PTSD (Giaconia et al., 2000)

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- PTSD (Giaconia et al., 2000)

Association ≠ Causation

Possible explanations for the link between substance abuse and mental health issues

Vulnerable developmental period

- Onset (50% & 75% of psychiatric disorders begin before age 15 and 24, respectively)
- Implicates common brain regions and neural circuits (e.g., executive functions & decision making)
- Repeated alcohol and other drug use may alter gene expression and transcription

Shared genetic factors

- Genetic factors account for approximately 50% of risk for addiction
- Growing evidence that suggests shared genetic vulnerability

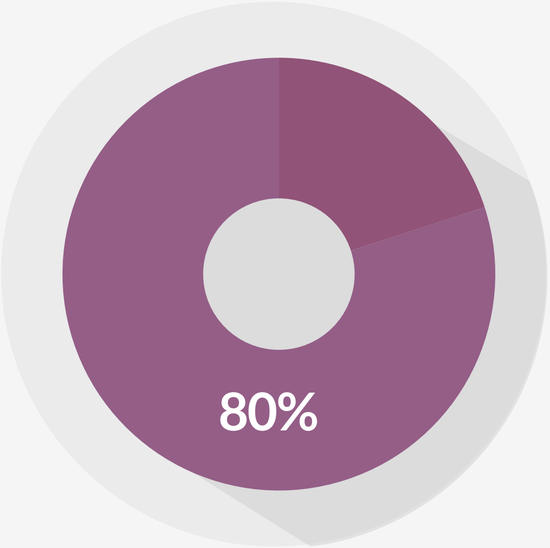
Shared environmental factors

- Chronic maltreatment, trauma, violence, etc.

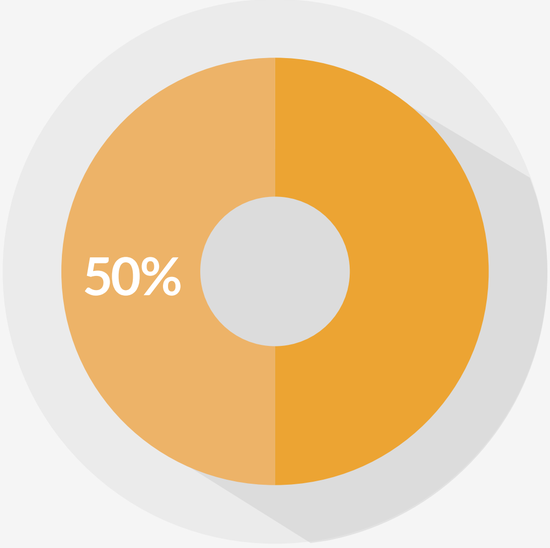
Key point

The high prevalence of co-occurring substance use disorders and non-substance psychiatric disorders is well-established, and adolescence is a time of heightened vulnerability for the onset of both.

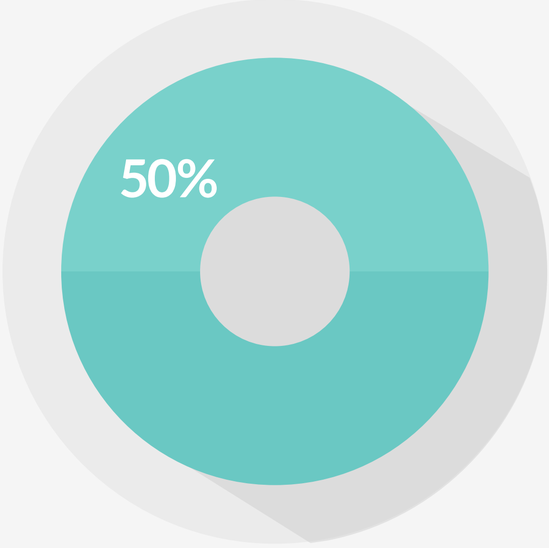
Among adolescents referred for substance abuse treatment…



60% to 80% meet criteria for comorbid **conduct disorder**



30% to 50% meet criteria for **attention-deficit/ hyperactivity disorder**



24% to 50% meet criteria for **major depressive disorder**

What is the clinical importance of this association?

Complicated clinical profile

- Early drug use, heavier use, and higher likelihood of dependence (Rowe et al., 2004; Shane et al., 2003)
- Greater family dysfunction, worse school engagement, and more legal problems (Grella et al., 2001; Horigian et al., 2013)
- Younger adolescents are even more likely to have a co-occurring psychiatric disorder (Wu et al., 201)

Poorer treatment outcomes

- Worse withdrawal, earlier relapse, greater utilization of outpatient & inpatient treatment (Tomlinson et al., 2004)

Integrated treatment is key

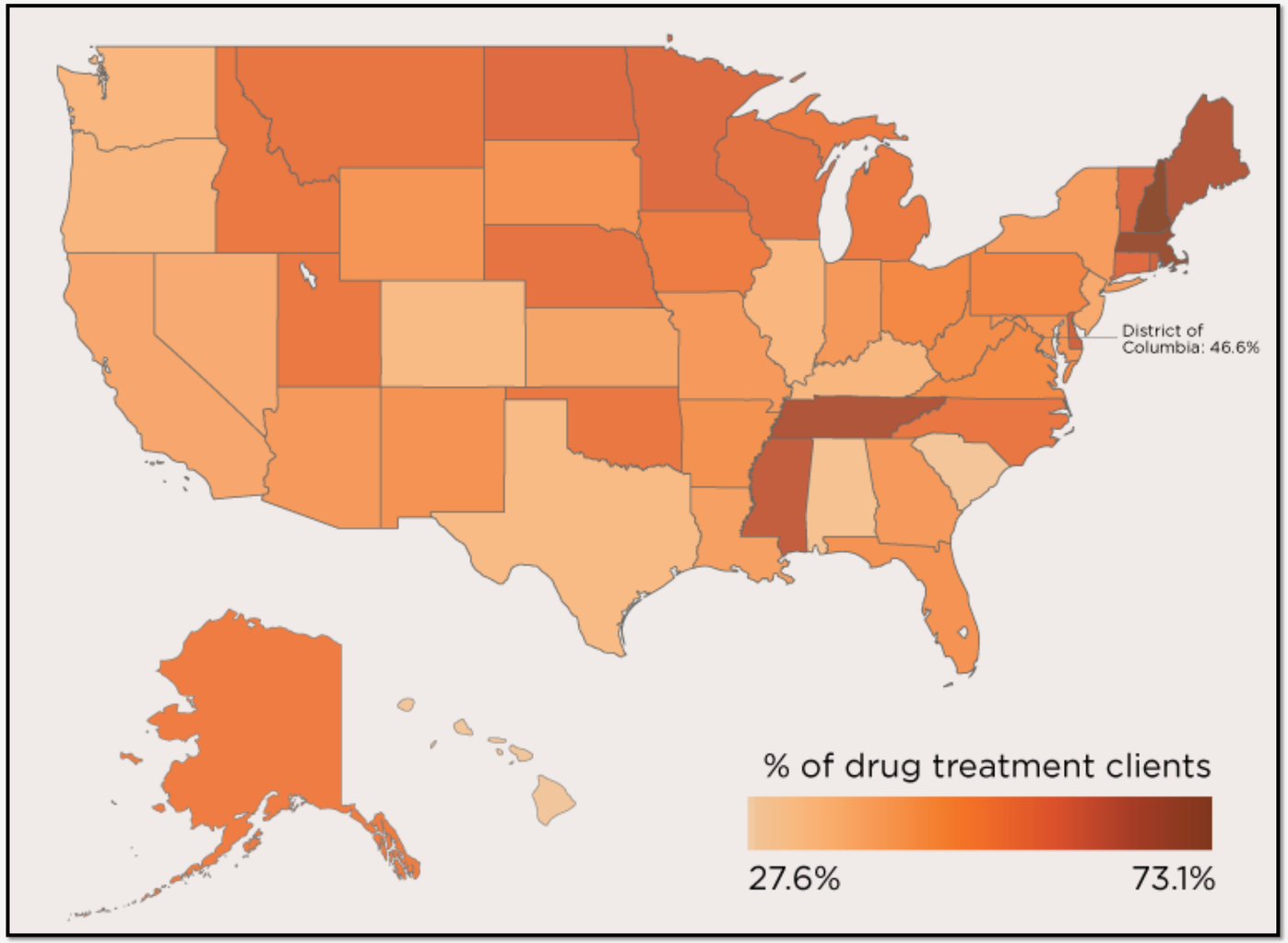
- Integrated treatments yield better outcomes for youth (Ramchand et al., 2015; Sterling et al., 2005)
- Most treatment programs (92%) accept teens with comorbidity yet only half address mental health (Mark et al., 2006)

Key point

The high prevalence of co-occurring substance use disorders and non-substance psychiatric disorders is well-established, and adolescence is a time of heightened vulnerability for the onset of both.

Percent of drug treatment clients with co-occurring disorders

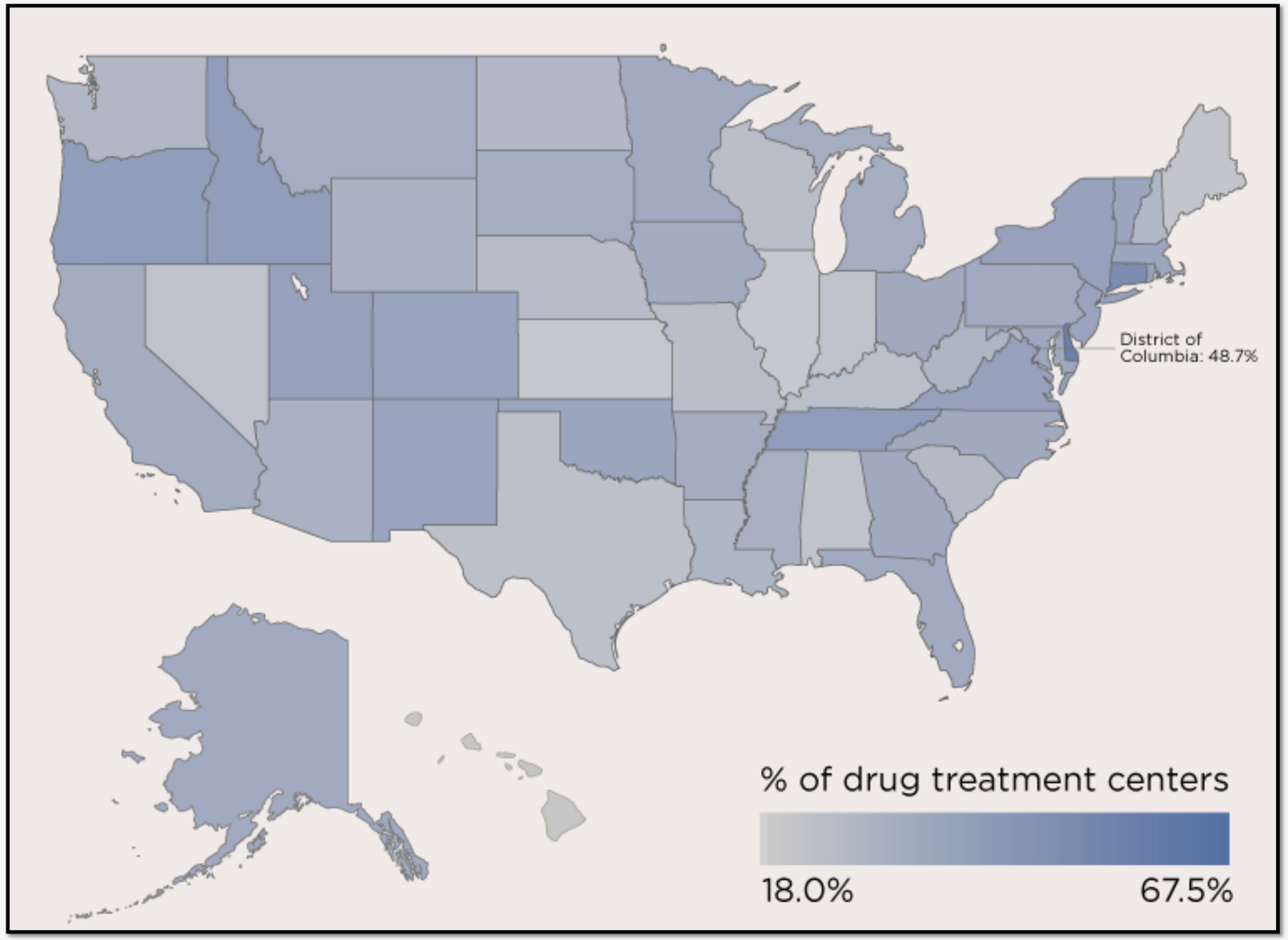
Co-occurring disorders include substance abuse and at least one other non-substance mental illness



Source: MentalHelp.net; SAMSHA 2012 N-SSATS State Profiles

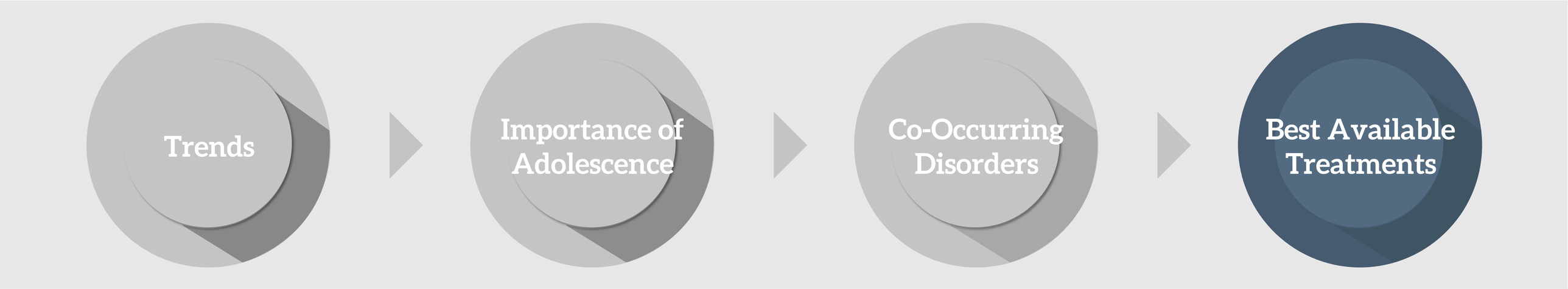
Percent of treatment centers treating co-occurring disorders

Co-occurring disorders include substance abuse and at least one other non-substance mental illness



Source: MentalHelp.net; SAMSHA 2012 N-SSATS State Profiles

Overview



Detail the scope of the problem

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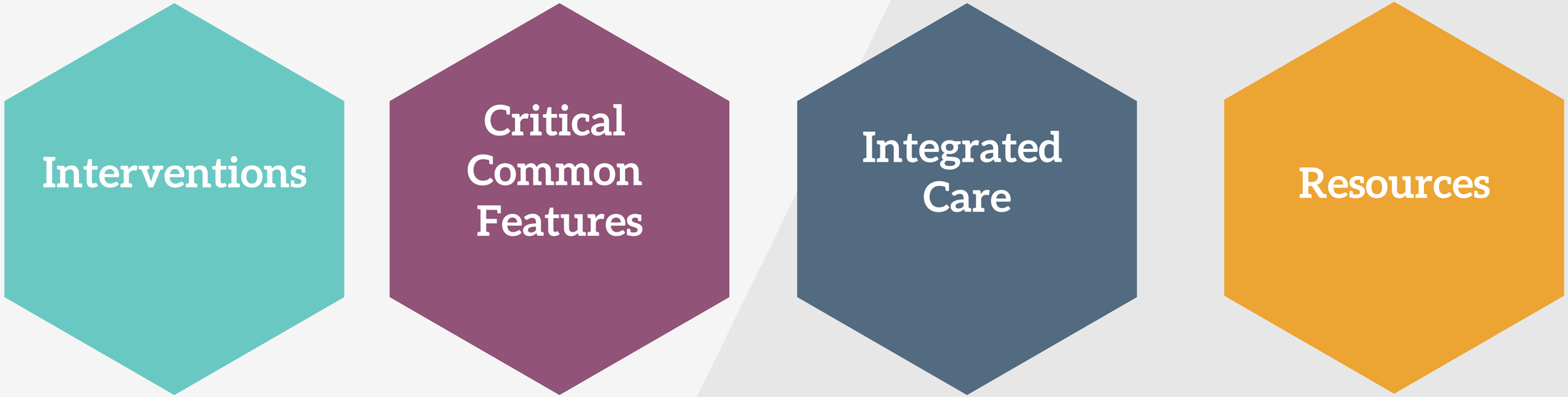
What can we do?



Spectrum of interventions for adolescent substance use

Prevention

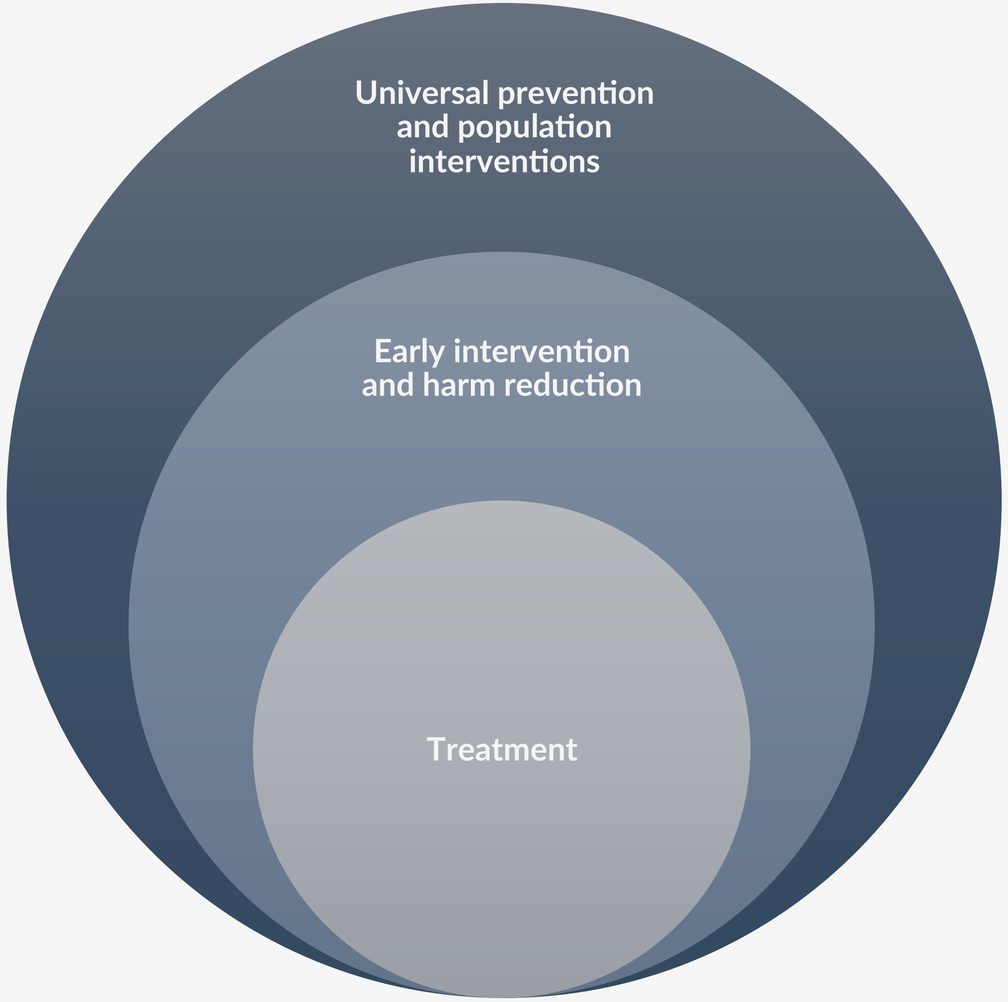
- Structural (e.g., laws, policies, taxation)
- School based
- Family based

Early Intervention

- Selective prevention
- Indicated prevention
- Screening & Brief Intervention
- Harm reduction

Treatment

- Peer-based self-help organizations
- Psychosocial approaches
- Pharmacotherapy
- Family-based and multisystemic therapy
- Specialized treatment services



Stockings et al., 2016, *Lancet*

Evidence-based interventions: Four key questions

General Effects (1) — Does treatment work?

Specificity (2) — What is the comparative effectiveness of different types of treatment?

Magnitude (3) — How effective are the best available interventions?

Precision (4) — How do effective interventions exert their beneficial effects and for whom do they work best?

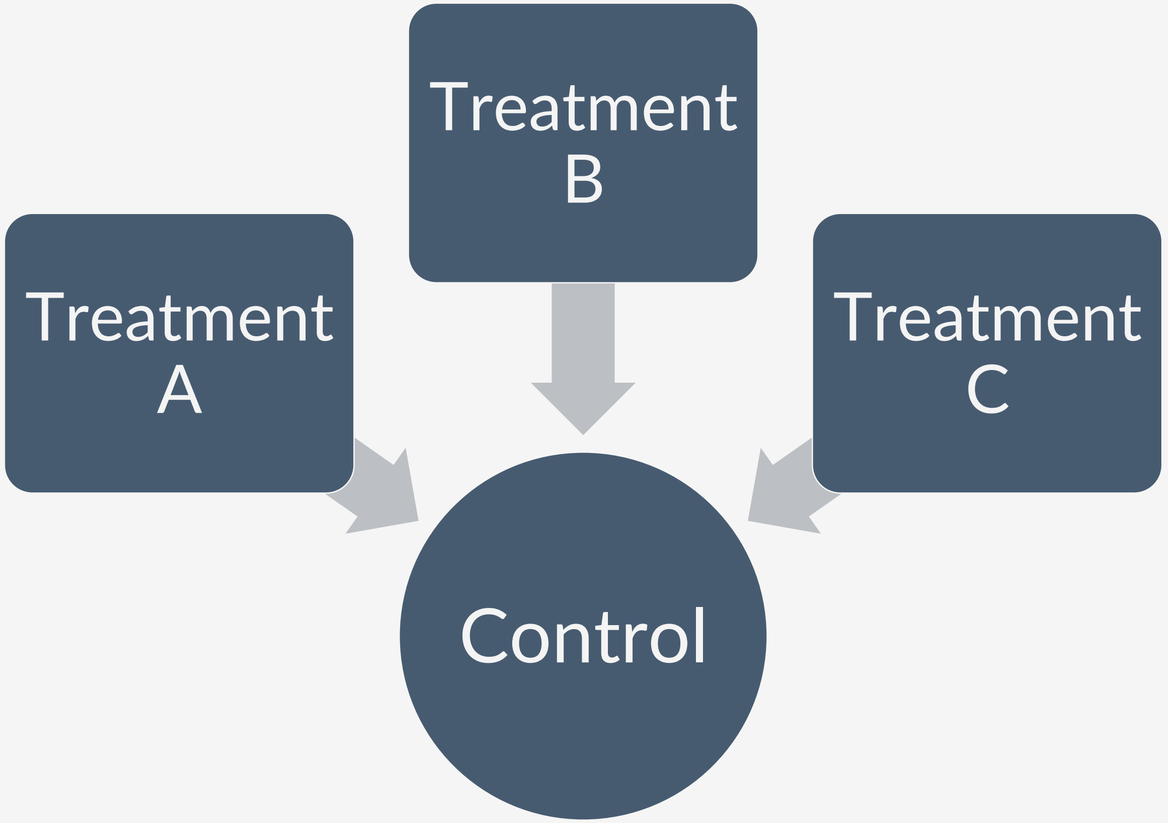
Evidence-based interventions: What works?

Key findings

- On the whole, treatment is better than no treatment.
- All but one treatment type (i.e., practice as usual) showed statistically significant improvements over time
- Only family therapy was significantly better than the “no treatment” control conditions

Tanner-Smith et al. 2013, *J Subst Abuse Treat*

What is the comparative effectiveness of different treatments?



Tanner-Smith et al. 2013, *J Subst Abuse Treat*

What is the comparative effectiveness of different treatments?

Family Therapy

- Based on the premise that the family has the most profound and lasting influence
- Focus on family communication, cohesiveness, and problem-solving
- Five evidenced-based family interventions

Behavioral Therapy

- Ultimate goal is to reinforce desirable behaviors and eliminate unwanted or maladaptive behaviors
- Focus on teaching and reinforcing new skills
- Targets new ways of thinking and coping
- Can include contingency management approaches

Cognitive-Behavioral Therapy

- Centered on the notion that thoughts cause behaviors and determine the ways youth perceive, interpret, and navigate their environment
- Helps youth recognize situations in which they are most likely to use, and how to avoid and cope with those situations

Motivational Enhancement Therapy

- Uses the motivational enhancement/interviewing strategies that use reflective listening, open-ended strategies, and comparisons of behavior to normative standards

How effective is outpatient treatment?

Pre-post substance use effect sizes

Substance(s)	Effect size (g)	p	Pre-post reduction
Alcohol	0.31; 95% CI (0.22, 0.39)	$p < .001$	2 to 0.6 use days/month
Cannabis	0.58; 95% CI (0.38, 0.77)	$p < .001$	13 to 6 use days/month
Other specific drug use (e.g. cocaine)	0.13; 95% CI (0.01, 0.25)	$p < .05$	3.5 to 2.7 use days/month
Mixed use	0.65; 95% CI (0.52, 0.77)	$p < .001$	10 to 5 use days/month

Tanner-Smith et al. 2013, *J Subst Abuse Treat*

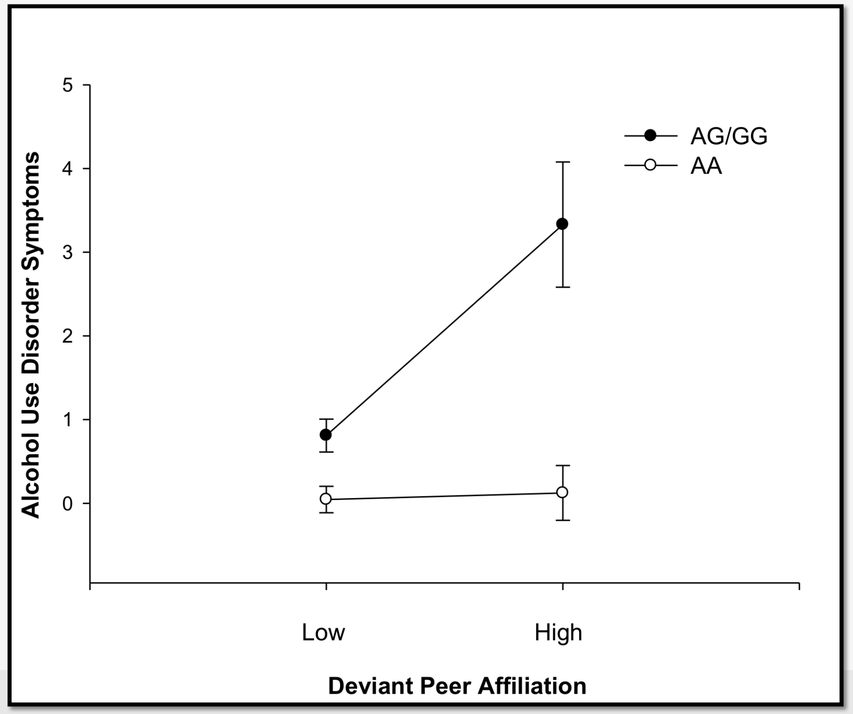
Key intervention components

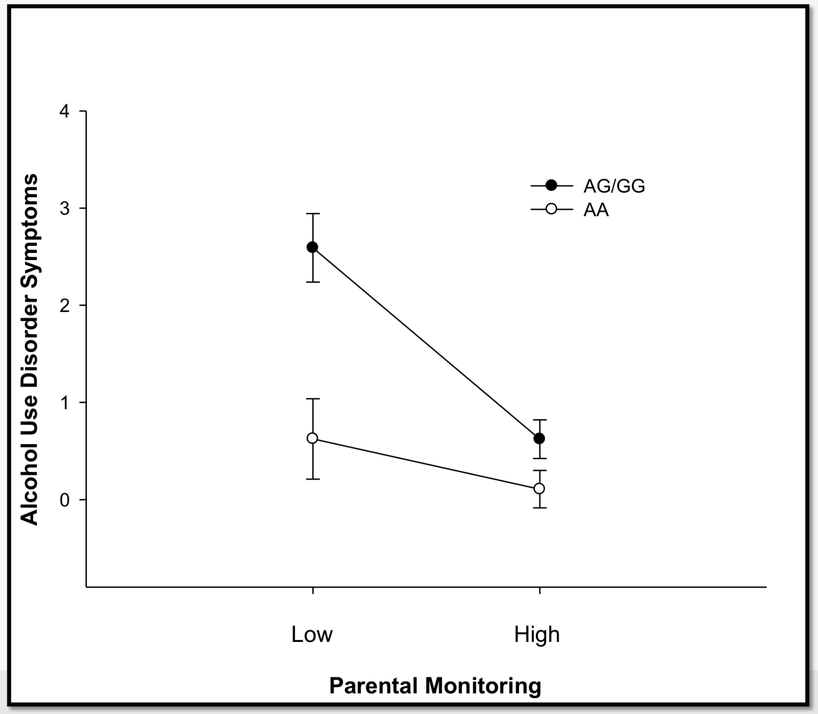
Component	MET	Family Therapy	Behavioral Therapy	CBT
Build therapeutic alliance using a non-judgmental approach	✓	✓	✓	✓
Assess stage of change	✓			
Decisional-balance exercise	✓			
Provide feedback on risks or levels of use	✓	✓	✓	✓
Personalized normative feedback	✓			

Key intervention components

Component	MET	Family Therapy	Behavioral Therapy	CBT
Teach coping skills	✓	✓	✓	✓
Set goals	✓	✓	✓	✓
Develop plan for dealing with drinking or drug use situations	✓	✓	✓	✓
Involve the family (parents)		✓		

Evidence for a gene-environment interaction in predicting alcohol misuse in adolescents





Key findings

- Parental monitoring may play a protective role against vulnerability for AUD symptoms in youth at elevated risk based on their genotype; variation in parental monitoring had a negligible influence on AUD symptoms in youth homozygous for the lower risk allele.

Miranda et al., 2010, *Alcohol Clin Exp Res*

Integrated care

Standardized assessment

- Establish valid substance and psychiatric diagnoses at treatment initiation (Robinson & Riggs, 2016)
- Establish baseline levels of substance use and psychiatric symptoms (self-report, biomarkers, collateral report)

Stage-wise interventions (Drake et al., 2001)

- Achieve incremental success through stage of personal change (IDDT, www.centerforebp.case.edu)
  - Form a trusting relationship (Engagement)
  - Develop motivation for change (MET)
  - Teach skills and provide supports for managing drug use and psychiatric symptoms (Active treatment)
  - Help client develop maintenance strategies

Comprehensive services from a multidisciplinary team

- Individual, group, and family services, family psychoeducation, medical & pharmacological treatment
- Requires professionals trained in the best practices for both substance abuse & psychiatric disorders

What is integrated care?

- Targets both substance misuse and psychiatric symptoms
- Combines evidence-based mental health & substance abuse interventions in one setting by one treatment team

Leverage common features of effective interventions

1. Developmentally appropriate approach
   - Therapeutic alliance is essential
   - Negotiate treatment goals
2. Understand major components of treatments that work best
3. Use appropriate instruments for screening and assessment
4. Match level of treatment with severity of the problem
5. Prepare to deal with comorbidity
6. Shape treatment to maximize engagement
   - Understand stages of change
   - MET approach
   - Engage parents

Resources

Integrated Dual Diagnosis Treatment (IDDT)

ENCOMPASS
University of Denver

Treatment Improvement Protocols (TIPS)

Evidence-Based Practices Kit:
Integrated Treatment for Co-Occurring Disorders

There are a number of evidence-based resources available, typically free of charge, that provide detailed information about best practices for treating individuals with co-occurring psychiatric disorders and substance abuse.

“So, what’s the
take-home message?”

Key points to remember

- Substance use and misuse among teenagers remains highly prevalent and confers risk for major problems and can interrupt healthy development, physically, socially, and occupationally.
- Adolescence is a key developmental period in the pathogenesis of addiction.
- Treatments work but should be developmentally tailored.
- Integrated care is essential for effectively treating adolescents who struggle with co-occurring substance abuse and mental health problems.

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https://vivo.brown.edu/display/romirand