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.

- 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.

- Illicit drugs: 20.7%
- Cigarettes: 28.3%
- Alcohol: 61.2%
- Cannabis: 44.5%

National Institute on Drug Abuse, 2016

2016
Heroin = 0.7%
Narcotics = 7.8%
Prescription = 18.0%

National Institute on Drug Abuse, 2016
How do youth in Maine compare to adolescents across the US?
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)
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.
### Key points

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

**Past month cigarette use (12 – 17 year olds)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Maine</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-2011</td>
<td>8.9</td>
<td>8.1</td>
</tr>
<tr>
<td>2011-2012</td>
<td>8.4</td>
<td>7.2</td>
</tr>
<tr>
<td>2012-2013</td>
<td>7.2</td>
<td>6.1</td>
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<tr>
<td>2013-2014</td>
<td>6.3</td>
<td>5.2</td>
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</table>

SAMHSA (2015)
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.
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

Percent in Past Year

- Any = 5.0%
- Alcohol = 2.7%
- Cannabis = 2.7%
- Pain Reliever = 0.7%
- Heroin = 0.1%

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

1. **Trends**
   - Detail the scope of the problem

2. **Importance of Adolescence**
   - Describe why adolescence is a key period in the pathogenesis of addiction

3. **Co-Occurring Disorders**
   - Explain the prevalence and clinical importance of co-occurring disorders

4. **Best Available Treatments**
   - Review evidence-based interventions & recommendations for improving treatment
Developmental Perspective on Addiction

**Biological**
- Brain changes
- Sleep changes
- Emotional & behavioral regulation

**Cognitive**
- Decision-making
- Working memory
- Executive functions

**Social Emotional**
- Family relationships
- Peer relationships
- Romantic relationships & sexuality

**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
### 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

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?
Compared to adult rats and mice, adolescent animals:

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

But, do animal findings apply to human adolescents?

The acute effects of alcohol and other drugs are almost never studied in human adolescents due to important ethical and legal restrictions.
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** are completed after substance use.
Ecological momentary assessment data streams from three research participants
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
Craving matters

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

- Adolescents' hypersensitivity to the rewarding effects of alcohol appear to promote associative learning that links substance use and drug-related cues
Adolescent substance use is associated with a host of acute and long-term adverse effects. 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.
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4. **Best Available Treatments**
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Co-occurring psychiatric and substance use disorders

32% of teens with an SUD meet criteria for a non-substance psychiatric disorder.

80% of teens referred for SUD treatment meet criteria for non-substance psychiatric disorder.

Robinson & Riggs, 2016, Child Adolesc 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)

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)

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)
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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.
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

- **Trends**: Detail the scope of the problem
- **Importance of Adolescence**: Describe why adolescence is a key period in the pathogenesis of addiction
- **Co-Occurring Disorders**: Explain the prevalence and clinical importance of co-occurring disorders
- **Best Available Treatments**: Review evidence-based interventions & recommendations for improving treatment
What can we do?

- Interventions
- Critical Common Features
- Integrated Care
- Resources
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

1. General Effects
   Does treatment work?

2. Specificity
   What is the comparative effectiveness of different types of treatment?

3. Magnitude
   How effective are the best available interventions?

4. Precision
   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.
What is the comparative effectiveness of different treatments?
### What is the comparative effectiveness of different treatments?

<table>
<thead>
<tr>
<th>Family Therapy</th>
<th>Behavioral Therapy</th>
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</thead>
<tbody>
<tr>
<td>• Based on the premise that the family has the most profound and lasting influence</td>
<td>• Ultimate goal is to reinforce desirable behaviors and eliminate unwanted or maladaptive behaviors</td>
</tr>
<tr>
<td>• Focus on family communication, cohesiveness, and problem-solving</td>
<td>• Focus on teaching and reinforcing new skills</td>
</tr>
<tr>
<td>• Five evidenced-based family interventions</td>
<td>• Targets new ways of thinking and coping</td>
</tr>
<tr>
<td></td>
<td>• Can include contingency management approaches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognitive-Behavioral Therapy</th>
<th>Motivational Enhancement Therapy</th>
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<tbody>
<tr>
<td>• Centered on the notion that thoughts cause behaviors and determine the ways youth perceive, interpret, and navigate their environment</td>
<td>• Uses the motivational enhancement/interviewing strategies that use reflective listening, open-ended strategies, and comparisons of behavior to normative standards</td>
</tr>
<tr>
<td>• Helps youth recognize situations in which they are most likely to use, and how to avoid and cope with those situations</td>
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</tbody>
</table>
### How effective is outpatient treatment?

#### Pre-post substance use effect sizes

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

Tanner-Smith et al. 2013, *J Subst Abuse Treat*
## Key intervention components

<table>
<thead>
<tr>
<th>Component</th>
<th>MET</th>
<th>Family Therapy</th>
<th>Behavioral Therapy</th>
<th>CBT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build therapeutic alliance using a non-judgmental approach</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Assess stage of change</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Decisional-balance exercise</td>
<td>✔️</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Provide feedback on risks or levels of use</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Personalized normative feedback</td>
<td>✔️</td>
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</table>
# Key intervention components

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</thead>
<tbody>
<tr>
<td>Teach coping skills</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Set goals</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Develop plan for dealing with drinking or drug use situations</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Involve the family (parents)</td>
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<td>✔</td>
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</tbody>
</table>
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
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

Leverage common features of effective interventions
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.

<table>
<thead>
<tr>
<th>Resources</th>
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<tbody>
<tr>
<td>Integrated Dual Diagnosis Treatment (IDDT)</td>
</tr>
<tr>
<td>ENCOMPASS University of Denver</td>
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<tr>
<td>Treatment Improvement Protocols (TIPS)</td>
</tr>
<tr>
<td>Evidence-Based Practices Kit: Integrated Treatment for Co-Occurring Disorders</td>
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</tbody>
</table>
“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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