Youth Drug Abuse and Addiction

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Summit on Prescription Drug Abuse in Georgia
March 2, 2011

1. Epidemiology of Rx Abuse by Youth

2. Adolescent brain development

3. Implications for community response

4. Summary
(Grant, B.F., et al., Drug and Alcohol Dependence, 74, 223-234, 2004)

Percentages of Past Year Alcohol Use Disorder (Abuse or Dependence) Among Adults Aged 21 or Older, by Age of First Use (SAMHSA, 2005)

Fewer Problems in Those Who Start Later
Percentages of past year alcohol use disorder among those with a recent onset (prior 2 years; \( n = 4074 \)) of alcohol use (Winters & Lee, 2007)

\[
\begin{array}{cccccccccccc}
12\ y & 13\ y & 14\ y^* & 15\ y & 16\ y^* & 17\ y^* & 18\ y^* & 19\ y & 20\ y & 21\ y & 22-26\ y \\
7.2 & 8.2 & 9.2 & 8.3 & 9.5 & 9.2 & 9.9 & 6.7 & 4.1 & 5.9 & 3.7 \\
\end{array}
\]

Lower Rates with Older Recent Users

\( * p \leq .05; \) compared to 22-26y group

Percentages of past year cannabis use disorder among those with a recent onset (prior 2 Years; \( n = 2176 \)) of cannabis use (Winters & Lee, 2007)

\[
\begin{array}{cccccccccccc}
12\ y^* & 13\ y^* & 14\ y^* & 15\ y^* & 16\ y^* & 17\ y^* & 18\ y^* & 19\ y & 20\ y & 21\ y & 22-26\ y \\
6 & 17.4 & 14.1 & 16.4 & 15.4 & 10.6 & 12.8 & 8 & 6.9 & 4.4 & 3 \\
\end{array}
\]

Lower Rates with Older Recent Users

\( * p \leq .05; \) compared to 22-26y group
### 2009 Monitoring the Future Study

**Prevalence of Past Year Drug Use Among 12th Graders**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Prev. (%)</th>
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<th>Prev. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>66.2</td>
<td>MDMA (Ecstasy)</td>
<td>4.3</td>
</tr>
<tr>
<td>Marijuana/Hashish</td>
<td>32.8</td>
<td>Cocaine (any form)</td>
<td>3.4</td>
</tr>
<tr>
<td>Vicodin*</td>
<td>9.7</td>
<td>Inhalants</td>
<td>3.4</td>
</tr>
<tr>
<td>Amphetamines*</td>
<td>6.6</td>
<td>Cocaine Powder</td>
<td>3.0</td>
</tr>
<tr>
<td>Tranquilizers*</td>
<td>6.3</td>
<td>Ritalin*</td>
<td>2.1</td>
</tr>
<tr>
<td>Cough Medicine*</td>
<td>5.9</td>
<td>LSD</td>
<td>1.9</td>
</tr>
<tr>
<td>Salvia</td>
<td>5.7</td>
<td>Provigil*</td>
<td>1.8</td>
</tr>
<tr>
<td>Adderall*</td>
<td>5.4</td>
<td>Ketamine</td>
<td>1.7</td>
</tr>
<tr>
<td>Sedatives*</td>
<td>5.2</td>
<td>Steroids</td>
<td>1.5</td>
</tr>
<tr>
<td>OxyContin*</td>
<td>4.9</td>
<td>Crack</td>
<td>1.3</td>
</tr>
<tr>
<td>Hallucinogens</td>
<td>4.7</td>
<td>Methamphetamine</td>
<td>1.2</td>
</tr>
</tbody>
</table>

* Nonmedical use, or not prescribed by a doctor

### 2009 Monitoring the Future Study

**Source of Prescription Drugs* Among 12th Graders who Used in Last Year**

<table>
<thead>
<tr>
<th>Source</th>
<th>Range pf Prev. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet</td>
<td>0.1 – 3.4</td>
</tr>
<tr>
<td>Took from friend/relative</td>
<td>10.2 – 18.6</td>
</tr>
<tr>
<td>without asking</td>
<td></td>
</tr>
<tr>
<td>Given for free from friend/relative</td>
<td>51.5 – 64.3</td>
</tr>
<tr>
<td>Bought from friend/relative</td>
<td>33.6 – 48.8</td>
</tr>
<tr>
<td>Bought from dealer/stranger</td>
<td>13.0 – 21.8</td>
</tr>
<tr>
<td><strong>Legitimate Prescrip.</strong></td>
<td><strong>15.3 – 30.3</strong></td>
</tr>
</tbody>
</table>

* Amphetamines, tranquilizers and narcotics other than heroin
In 2007-2008 Where Pain Relievers Were Obtained for Most Recent Nonmedical Use: Ages 12+

Source Where Respondent Obtained
- Drug Dealer/Stranger 4.3%
- More than One Doctor 2.4%
- One Doctor 18.0%
- Bought/ Took from Friend/Relative 14.3%
- Other* 4.8%
- Bought on Internet 0.4%

Source Where Friend/Relative Obtained
- More than One Doctor 1.6%
- Drug Dealer/Stranger 5.4%
- Bought/ Took from Friend/Relative 6.2%
- Free from Friend/Relative 3.4%
- Other* 1.6%
- Bought on Internet 0.1%

Source: SAMHSA, 2008 National Survey on Drug Use and Health

Past Year Initiates for Specific Illicit Drugs, Ages 12+, 2007

Numbers in Thousands
- Marijuana: 2,147
- Cocaine: 2,090
- Tranquilizers: 1,232
- Ecstasy: 906
- Inhalants: 781
- Stimulants: 775
- Sedatives: 642
- LSD: 270
- Heroin: 198
- PCP: 106

Source: SAMHSA, 2007 National Survey on Drug Use and Health
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2-Minute Drill: Adolescent Brain Development
Adolescence is a period of profound brain maturation.

- We now know... maturation is not complete until about age 25!!

- Different systems mature at different points in time and at different rates

- Most important areas
  - prefrontal cortex
  - limbic system

Brain Development

Tapert & Schweinsburg (2005)
Brain Development

Gray Matter Maturation, Age 4-20
Gogtay et al., 2004

Maturation Occurs from Back to Front of the Brain
Images of Brain Development in Healthy Youth
(Ages 5 – 20)

Earlier: limbic regions
Later: prefrontal cortex

Blue represents maturing of brain areas

A Tale of Two Systems: Incentive Processing System

These two systems are involved in how we value and predict potential rewards and punishments, and process emotional and social information.

- Key Nodes
  - Ventral striatum
  - Orbitofrontal cortex
  - Posterior cingulate cortex
  - Amygdala
  - Nucleus accumbens

Prefrontal Area

- Dorsolateral (reasoning and self-control)
- Ventromedial (gut-level decisions)
- Orbitofrontal (evaluating risk and reward)
  - The CEO of the brain
  - Deliberative thinking
  - Logical reasoning
  - Planning ahead
  - Weighing costs and benefits
  - Regulating impulses
The Limbic System

- Processing emotions
- Associating emotions with memories
- Processing social information
- Experience of reward and punishment

Timing is Everything

- The excitation of the incentive processing system occurs early in adolescence, around puberty, and peaks during mid-adolescence.
- The maturation of the cognitive control system is gradual and not complete until late adolescence or early adulthood.
- The “accelerator” is activated before a good braking system is in place.
- The result?
Starting the engine without a skilled driver behind the wheel

To Review: A Reward-Biased Incentive System May Reveal These Tendencies (Dahl, 2004)

- **Preference for ....**
  1. physical activity
  2. high excitement and rewarding activities
  3. activities with peers that trigger high intensity/arousal
  4. novelty

- **Less than optimal..**
  5. control of emotional arousal
  6. consideration of negative conseq.

- **Greater tendency to...**
  7. be attentive to social information
  8. take risks and show impulsiveness
Standard View

- Adolescents underestimate risk
- Adolescents believe they are invulnerable
- Adolescents engage deficient cognitive processes when making decisions
- Adolescents are unaware of the dangers associated with risky behavior

Alternative View

- Risk taking in adolescence ...
  - is normative; important to development
  - has evolutionary significance
  - is due primarily to emotional and contextual factors
  - is perceived in similar ways as by adults
- Recent research on adolescent brain development provides a useful framework.
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“Young man, go to your room and stay there until your cerebral cortex matures.”
Implications for Interventions

- Harm perception
- Social/Environmental
- Self-regulation skills

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- Harm perception
- Social/Environmental
- Self-regulation skills
12th Graders’ Past Year Marijuana Use vs. Perceived Risk of Occasional Marijuana Use

SOURCE: University of Michigan, 2009 Monitoring the Future Study

Implications for Interventions

• Harm perception
• Social/ Environmental
• Self-regulation skills
Smoking and Price: Relation Between Cigarette Consumption and Adjusted Price During 1972-92

Townsend J et al. BMJ 1994;309:923-927

Minimum Legal Drinking Age (MLDA) and Vehicle Fatalities Among Young Drivers (16 – 20)

Percent of fatally injured passenger vehicle drivers age 16 – 20 with positive BACs, by age 1982 – 2008 (Longthorne et al., 2010)
Chein et al., in press

Impact of Peer Presence on Risky Driving in Simulated Context

Chein et al., in press

Allstate ad, NY Times, May, 2007
Implications for Interventions

- Harm perception
- Social/Environmental
- Self-regulation skills

Self-Regulation

- Teaching important skills that may be a “weakness” for the adolescent brain
  - impulse control
  - “second” thought processes
  - social decision making
  - dealing with risk situations
  - taking healthy risks
New 12-Step Program for Adolescents?

12-Steps of Self-Regulation

1. impulse control
2. “second thought” processes
3. social decision making
4. dealing with risk situations
5. taking healthy risks
6. attention regulation
7. anger control
8. modulating reward incentives
9. choosing options
10. considering consequences
11. minimizing arousal
12. dealing with peer influences

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Summary

- Adolescence is an extended period of transition from reliance on adults to independence
- Normal adolescence is characterized by:
  - increase in conflicts with family members
  - desire to be with one's friends
  - resistance to messages from authority
  - irritability
  - proclamations of sheer boredom
  - risk taking
  - reward incentive-biased decision making

Implications for Interventions

- Harm perception
- Social/ Environmental
- Self-regulation skills
THANK YOU!

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