Thug Drugs

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Faculty

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- WV PDMP Advisory Panel Member
- CDC Grant Reviewer
Disclosures

- Consultant/Independent Contractor: Daiichi Sankyo, Clinical Pharmacists Advisory Panel, Member

This presentation was not a part of the presenter’s official duties at the WVU and does not represent the opinion of WVU
Learning Objectives

- Recognize commonly abused substances across the globe.

- Classify commonly abused substances based on each substance’s mechanism(s) of action.

- Explain how to provide guidance to the lay public on the anticipated effects of commonly abused substances.
What are *illicit* substances?

1. Schedule 1 Controlled Substances
   - Illegal to make, sell, or use
   - No accepted medical use, dangerous, & potential severe dependence

2. Any Schedule Controlled Substance utilized for unintended people/uses

   Laws are not uniform among states/countries

   - Heroin is LEGAL in the UK, Portugal, Canada, etc.
   - Marijuana is “LEGAL” in certain US states, yet Illegal on the Federal Level
Most Abused Illicit Substances (2015)


Source: National Drug Threat Survey
Illicit Therapeutic Index

![Graph showing the ratio of fatal dose to effective dose for various drugs. The x-axis represents the ratio, ranging from 0 to 1,000. The y-axis lists different drugs, including marijuana (oral), LSD (oral), psilocybin (oral), nitrous oxide (inhaled), kava kava (oral), dimethyltryptamine (oral), ketamine (oral), Rohypnol (oral), mescaline (oral), codeine (oral), MDMA (oral), cocaine (intranasal), alcohol (oral), dextromethorphan (oral), GHB (oral), isobutyl nitrite (inhaled), datura (oral), nutmeg (oral), and heroin (intravenous). The graph indicates which drugs are less lethal than alcohol and which are more lethal than alcohol.]
Word of Mouth

www.streetrx.com

Shows daily observed prices by location

Resource for addiction treatment centers by zip code
(Links to SAMHSA)
Illicits de Venn

The image contains a Venn diagram illustrating the relationship between different types of illicit substances. The diagram is divided into three main categories: Stimulants, Anti-Psychotics, and Depressants, with a central focus on Hallucinogens. Each category contains various substances, such as amphetamines, marijuana, and barbiturates, respectively, highlighting their interconnections and classifications.
### Illicit Substances Overview

<table>
<thead>
<tr>
<th>Hallucinogens</th>
<th>Stimulants</th>
<th>Opioid-Related Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBOME</td>
<td>Cocaine</td>
<td>Heroin</td>
</tr>
<tr>
<td>LSD</td>
<td>Meth(amphetamine)</td>
<td>Laced Heroin</td>
</tr>
<tr>
<td>Ketamine</td>
<td>KHAT</td>
<td>Krokodil</td>
</tr>
<tr>
<td>MXE</td>
<td>Bath Salts &amp; Gravel</td>
<td>Kratom</td>
</tr>
<tr>
<td>PCP</td>
<td></td>
<td>Salvia</td>
</tr>
<tr>
<td>Psychedelic Mushrooms</td>
<td></td>
<td>Dextromethorphan</td>
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<tr>
<td>Peyote Cacti</td>
<td></td>
<td>Loperamide</td>
</tr>
<tr>
<td>Ecstasy</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cannabis Products</strong></td>
<td><strong>Stimulants</strong></td>
<td></td>
</tr>
<tr>
<td>Marijuana Plant</td>
<td>Cocaine</td>
<td></td>
</tr>
<tr>
<td>Synthetic Marijuana</td>
<td>Meth(amphetamine)</td>
<td></td>
</tr>
<tr>
<td>Marijuana Extracts</td>
<td>KHAT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bath Salts &amp; Gravel</td>
<td></td>
</tr>
</tbody>
</table>

*Painweek*
### Increased Neurotransmitter Effects

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<thead>
<tr>
<th>Serotonin (5HT)</th>
<th>Dopamine (DA)</th>
<th>Norepinephrine (NE)</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Effects</strong></td>
<td>“Reward &amp; Pleasure”</td>
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<tr>
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<td>Fever/Sweating</td>
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<td>Diarrhea</td>
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<tr>
<td>Seizures</td>
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<td>Restlessness</td>
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<td>Tachycardia</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Structures</strong></td>
<td></td>
<td>Morphine (Phenanthrine)</td>
<td></td>
</tr>
</tbody>
</table>

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HALLUCINOGENS
Hallucinogens

- **NBOMe**: 1st 5-HT-2A Receptor Agonist
- **LSD**: Affects D/5HT/NE Receptors
- **Ketamine**: NMDA Antagonist, D/mu/K agonist, S/N/D-RI, Na/Ca Channel Blockers, NO Synthase Inhibitor
- **MXE**: NMDA Antagonist & SSRI (5HT)

Hallucinogens

- **PCP**: NMDA Antagonist, Anti-Cholinergic, & Dopamine
- **Psychedelic Mushrooms**: 5-HT$_{1A}$ and 5-HT$_{2A}$ and 5-HT$_{2C}$ Agonist
- **Peyote Cacti**: 5HT-2A Receptors & Dopamine
- **Ecstasy (MDMA)**: 5HT/DA/NE

STIMULANTS
Nicknames
- Coke, Speed, Snow, Blow, or Cocoa Puffs

Mechanism
- 5HT/NE/D & Na-Channel Blocker

Market
- Snorted Powder “Lines” include: “Bumps” (35mg) or “Rails” (100mg)
- Cocaine HCL + Baking Soda → Crack Dime Bags: $10 for 1/10th Gram (Smoked)
Marijuana
Let’s Dive into the WEEDs...

THC
- Pain
- Nausea
- Vomiting
- Appetite
- Glaucoma
- Insomnia
- Anxiety
- Muscle Spasticity (Stiffness)

CBD
- Pain
- Inflammation
- Seizures
- Psychosis
- Depression
- IBS

- Tetrahydrocannabinol (THC)
- Cannabidiol (CBD)
Marijuana

Plant
THC, CBD, etc.

Synthetic
Scooby Snax®, K2®, Spice®, Legal Funk®, etc.

Extractions
DAB, Butane Hash Oil (BHO), Hash Oil, Honey Oil, & Shatter

KD
Plant/Synthetic Marijuana, Tobacco, or BANANAS Laced with Bug Spray

# Cannabinoids

## Adverse Effects & Interactions

<table>
<thead>
<tr>
<th>Adverse Effect</th>
<th>~Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disorientation</td>
<td>5</td>
</tr>
<tr>
<td>Dizziness</td>
<td>5</td>
</tr>
<tr>
<td>Dry Mouth</td>
<td>4</td>
</tr>
<tr>
<td>Euphoria</td>
<td>4</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>4</td>
</tr>
<tr>
<td>Confusion</td>
<td>4</td>
</tr>
<tr>
<td>Balance Issues</td>
<td>3</td>
</tr>
<tr>
<td>Hallucinations, Nausea, Vomiting, Diarrhea, &amp; Fatigue</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cannabinoid</th>
<th>CYP-2C9</th>
<th>CYP-2C19</th>
<th>CYP-3A4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ9-THC</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Δ8-THC</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CBD</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>CBN</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

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“Medical” Marijuana States Timeline

- California 1996
- Alaska 1998
- Oregon 1998
- Washington 1998
- Maine 1999
- Colorado 2000
- Hawaii 2000
- Nevada 2000
- Montana 2004
- Vermont 2004
- Rhode Island 2006
- New Mexico 2007
- Michigan 2008
- Arizona 2010
- New Jersey 2010
- Washington, DC 2010
- Delaware 2011
- Connecticut 2012
- Massachusetts 2012
- Illinois 2013
- New Hampshire 2013
- Maryland 2014
- Minnesota 2014
- New York 2014
- Arkansas 2016
- Florida 2016
- North Dakota 2016
- Ohio 2016
- Pennsylvania 2016
- West Virginia 2017
- Oklahoma 2018

http://ohiovalleyresource.org/2016/07/15/medical-marijuana-laws/?_ga=1.210143126.2028368723.1468936668
Opiates/Opioids
Opioid Abuse Transition

75% of Heroin Users Started with Legal Prescription Opioids

- Hydrocodone Combo Tablets: $5-10/Tab
- Oxycodone Combo IR Products: $10-15/Tab
- Oxycodone Sole ER/IR Products: $1.50/mg
- Heroin ($10/Bag)

Heroin

**Nicknames**
- Dope, H, Brown Sugar, Black Tar, Smack, & Dragon

**Mechanism**
- Mu Opioid Receptors

**Chemical**
- Di-acetyl-morphine
Heroin Production

1. Purification of raw opium
2. Extractions of morphine from opium
3. Morphine → Diacetylmorphine Base
4. Diacetylmorphine Base → Diacetylmorphine HCl Salt

https://www.erowid.org/archive/rhodium/chemistry/heroinmfg.html
Laced Heroin

<table>
<thead>
<tr>
<th>Drug</th>
<th>MME</th>
<th>Common Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heroin</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fentanyl</td>
<td>100</td>
<td>Theraflu, Bud Ice, or Income Tax</td>
</tr>
<tr>
<td>Carfentanil</td>
<td>10,000</td>
<td>Wildnil, Elephant tranquilizer</td>
</tr>
</tbody>
</table>

Remifentanil, Sufentanil, Alfentanil

Krokodil

- **Nicknames**: Russian Magic or Poor Man’s Heroin
- **Mechanism**: Mu Opioid Receptors
- **MME Factor**: Ten (10)
- **Chemical**: Desomorphine (di-hydro-des-oxy-morphine) patented in 1934 as Permonid in Switzerland

Kratom

Nicknames: Thang, Thom, & Swim

Mechanism: Potent K-Opioid, D2 Agonist, COX-2 Anti-inflammatory

Drug Interactions: CYP450 3A4, 2D6, & 1A2 Inhibitor

Chemical: Mitragyna Speciosa, Tropical plant in coffee family, Native to Southeast Asia

Salvia

### Nicknames
- Salvia Divinorum
- La Maria
- Magic Mint
- Diviner’s Sage

### Mechanism
- Potent K-Opioid
- D2 Agonist
- Endocannabinoid Modulator

### Drug Interactions
- CYP450 1A1, 2C18, 2D6, & 2E1

### Chemical
- Sage plant (Mint Family)
- Native to Mexico

Dextromethorphan (DXM)

**Nicknames**
- Sizzurp, Purple Drank, Purple Tonic
- Robitussin DM® → Roboshake
- Delsym® → Agent Orange
- Coricidin HBP® → Skittles

**Mechanism**
- Non-Selective Serotonin Reuptake Inhibitor,
- NMDA Antagonist, Opioid Sigma Agonist, & Anesthetic

**Chemical**
- D-enantiomer of levomethorphan (methyl-levorphanol)

**Dose (mg)**

<table>
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<tr>
<td>100-200</td>
<td>Mild Stimulation</td>
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<tr>
<td>201-400</td>
<td>Euphoria &amp; Hallucinations</td>
</tr>
<tr>
<td>401-600</td>
<td>Distorted Vision &amp; Coordination</td>
</tr>
<tr>
<td>601-1500</td>
<td>Dissociative Sedation</td>
</tr>
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</table>

One in 10 American teenagers has abused products with DXM

Clinical Pharmacology Online Database. 2018
Chirality
Opioid “Cousins”

Dextromethorphan (DXM)

CYP-2D6
O-demethylation

Dextrorphan (DXO)
“D(+)‐enantiomer” of racemorphan

Levorphanol
“L(−)‐enantiomer” of racemorphan

PAINweek. Clinical Pharmacology Online Database. 2018
loperamide

Nicknames: Poor Man’s Methadone & Imodium®

Mechanism: Peripheral Mu-Opioid Agonist

Info: 1988 Moved from C-V to OTC

## Illicit Substances Overview

### Hallucinogens
- NBOME
- LSD
- Ketamine
- MXE
- PCP
- Psychedelic Mushrooms
- Peyote Cacti
- Ecstasy

### Stimulants
- Cocaine
- Meth(amphetamine)
- KHAT
- Bath Salts & Gravel

### Cannabis Products
- Marijuana Plant
- Synthetic Marijuana
- Marijuana Extracts

### Opioid-Related Products
- Heroin
- Laced Heroin
- Krokodil
- Kratom
- Salvia
- Dextromethorphan
- Loperamide
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<tr>
<td><strong>Substances</strong></td>
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</tr>
<tr>
<td>Peyote Cacti</td>
<td>Gravel</td>
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<td>DXM</td>
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<td>Khat</td>
<td>Kratom</td>
</tr>
<tr>
<td>Kratom</td>
<td>Khat</td>
<td>LSD</td>
<td>Krokodil</td>
</tr>
<tr>
<td>LSD</td>
<td>Bath Salts</td>
<td>Bath Salts</td>
<td>Salvia</td>
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<tr>
<td>Psilocybin Mushrooms</td>
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</tr>
<tr>
<td>MXE</td>
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<tr>
<td>NBOMe</td>
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<tr>
<td>PMA</td>
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Pharming & Punchbowl Parties
Resources Concentrating on Illicit Substances

- **BlueLight**
- **Drugs-Forum**
- **European Monitoring Centre for Drugs and Drug Addiction**
- **Drugs of Abuse**
- **EROWID**
- **Foundation for a Drug-Free World**
Support Groups

Alcoholics Anonymous (AA)
- [http://www.aa.org/](http://www.aa.org/)
- 212-870-3400

Narcotics Anonymous (NA)
- 1-818-773-9999

Nar Anon (Family & Friends)
- [www.nar-anon.org](http://www.nar-anon.org)
- 1-800-477-6291
Audience Question #1

Which of the following illicit substances is a hallucinogen?

a) Bath Salts
b) Khat
c) Ketamine
d) Carfentany
Which of the following illicit substances is a hallucinogen?

a) Bath Salts
b) Khat
c) KETAMINE
d) Carfentanyl
Audience Question #2

While stopped at a cross-walk on Las Vegas Boulevard (i.e. “The Strip”) at 2am, you notice a college student next to you leaning against a stop light post, shaking, with a red-toned skin color, grinding her teeth, and profusely sweating. If she was to have ingested an illicit substance, which of the following would be the most likely of the listed substances.

a) Kratom  
b) Scooby Snax  
c) Heroin  
d) Ecstasy
While stopped at a cross-walk on Las Vegas Boulevard (i.e. “The Strip”) at 2am, you notice a college student next to you leaning against a stop light post, shaking, with a red-toned skin color, grinding her teeth, and profusely sweating. If she was to have ingested an illicit substance, which of the following would be the most likely of the listed substances.

a) Kratom
b) Scooby Snax
c) Heroin
d) ECSTASY
Which of the following are effects of various doses of dextromethorphan (i.e. DXM)?

a) Cough Suppression
b) Pain Suppression
c) Hallucinations
d) Euphoria
e) All of the Above
Which of the following are effects of various doses of dextromethorphan (i.e. DXM)?

a) Cough Suppression  
b) Pain Suppression  
c) Hallucinations  
d) Euphoria  
e) ALL OF THE ABOVE