



Stimulants: Cocaine & Methamphetamine



CRIT/FIT/CFS program – May 2026
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Learning Objectives

At the end of this session, participants will be able to

1. Understand why and how people use stimulants
 2. Name the medical complications of stimulant use
 3. Identify the characteristics of stimulant intoxication and withdrawal syndromes, along with techniques to manage overamping
 4. Describe the current options for treatment of stimulant use disorders
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Basics of Cocaine & Methamphetamine



Overview: Cocaine

Derivative: erythroxylum coca leaves in Andes

History of Use:

Used in medicines and beverages until early 1900s

Street preparations 10-50% cocaine

Hydrochloride powder is sniffed or injected; *Blow, Snow, Powder*

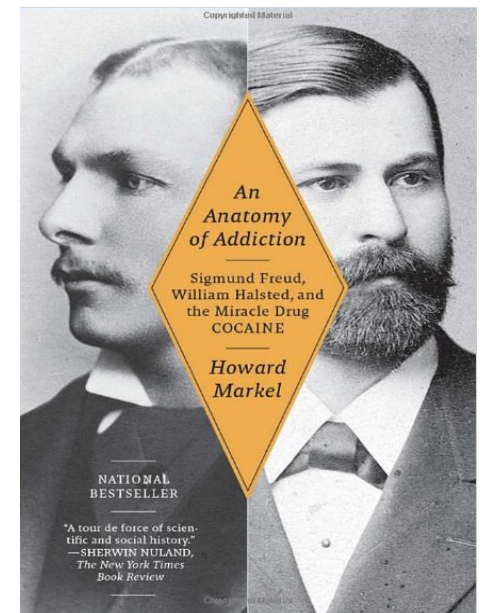
Alkaline rocks (aka crack) are smoked; *Crack, Rock, Base*

Routes of Use: Intranasal, Intravenous, smoked/inhalation

Metabolized: Rapidly absorbed, metabolized (liver), and excreted in the urine.
Benzoylecgonine = metabolite

Prevents the reuptake of dopamine

Half-Life: IV 20-60 min, IN 60-90 min, smoked 5-15 min
IN slower onset and prolonged action v. IV or smoked.



Overview: (Meth)amphetamine

Derivative: lab derived from ephedrine components

Tina, Speed, Crystal, Crank, Ice, Meth

History of Use: 1893 methamphetamine first synthesized in Japan as decongestant



Route of Use: Smoked/Inhalational, Intranasal, Rectal, Intravenous

Metabolized: Renal and hepatic clearance, highly bioavailable, slowly metabolized

Increases dopamine in synaptic terminal **AND prevents its reabsorption**

Half-Life: Peaks ~2-4 hours after use

Long ½ life, between 10-12 hours, independent of route of use



PK: Cocaine

	IV	Smoked	Snorted
Time to effect	10-60sec	3-5sec	1-5min
Peak concent.	3-5min	1-3min	15-20min
Half-life	20-60min	5-15min	60-90min

Lange, R. A. and L. D. Hillis (2001). "Cardiovascular complications of cocaine use." *N Engl J Med* **345**(5): 351-8.

PK: Methamphetamine

	IV	Smoked	Snorted	Ingested
Time to effect	15-30 sec	Immediate	3-5 min	15-20 min
Peak concent.	2-4 h	2-4 h	2-4 h	2-4 h
Half-life	10-12 h	10-12 h	10-12 h	10-12 h

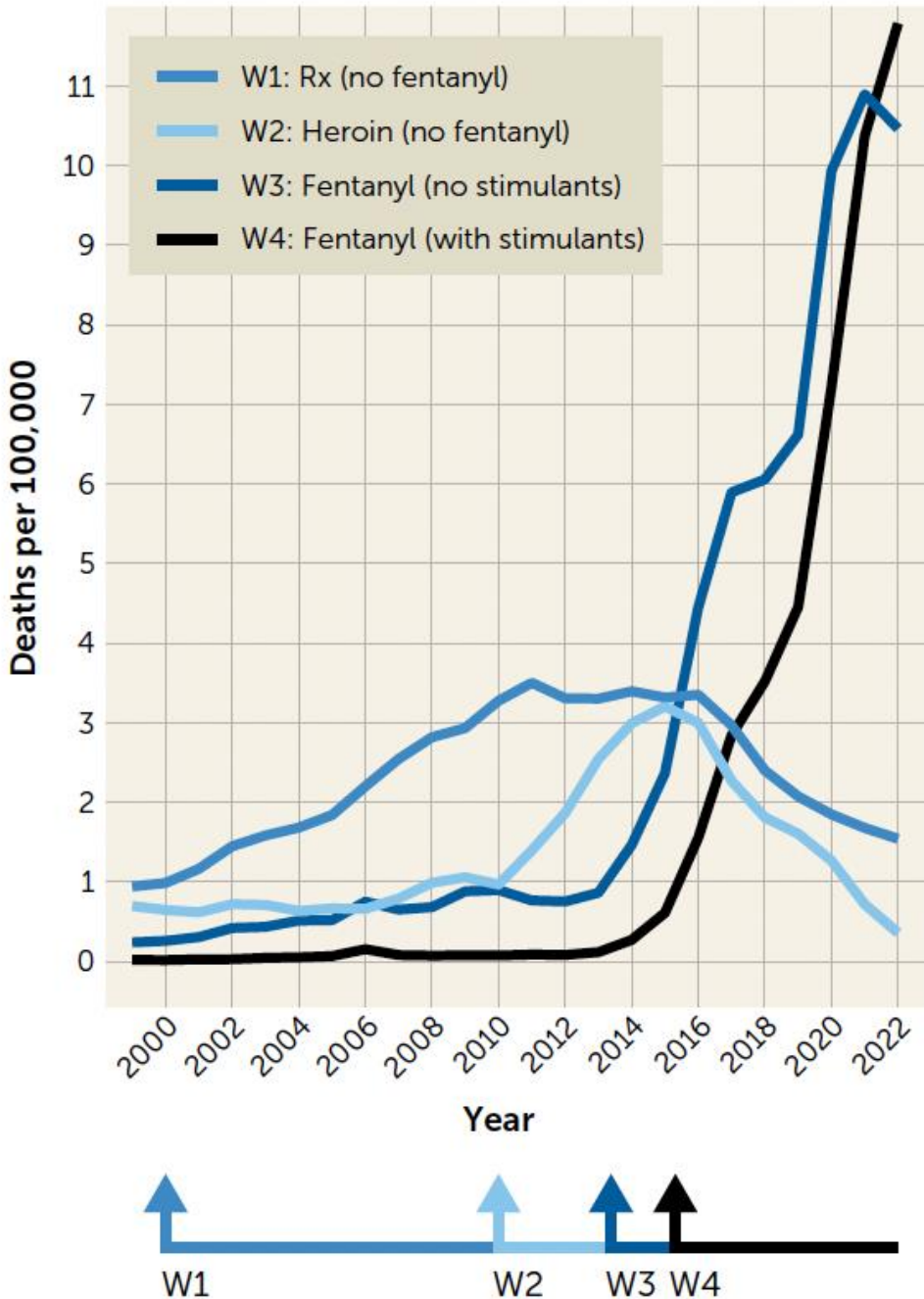
Lineberry 2006



Epidemiology



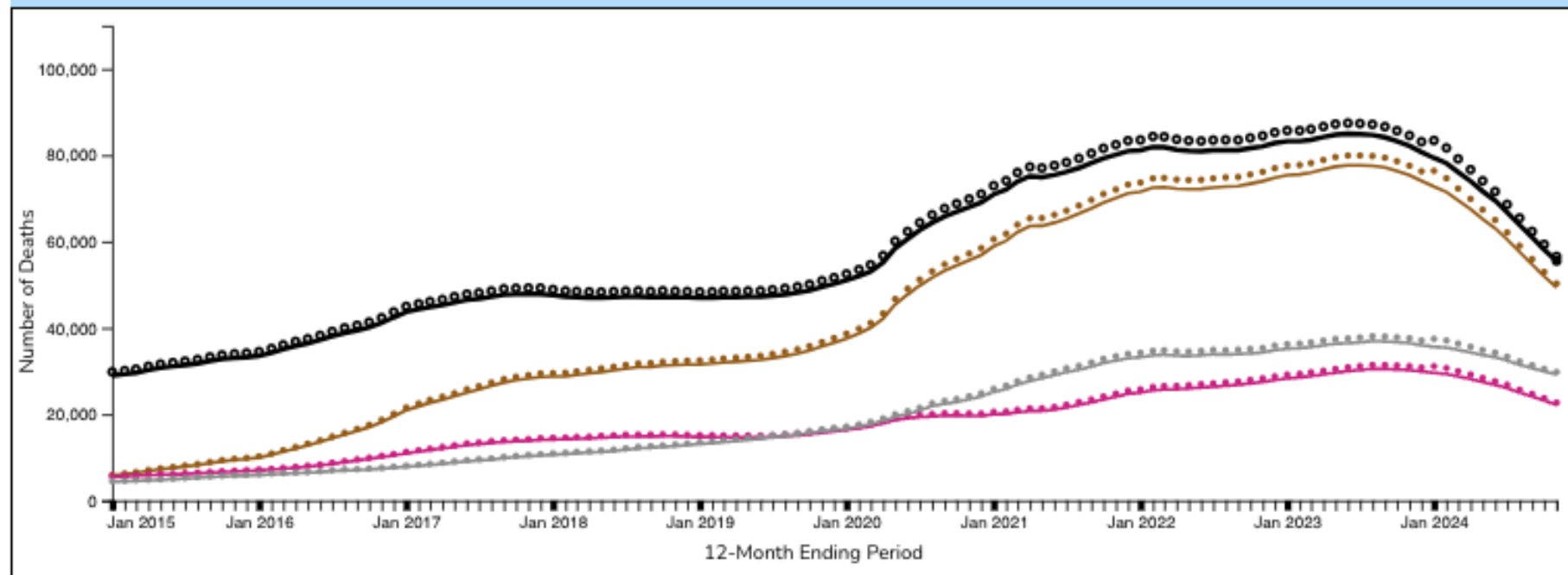
FIGURE 2. Overall and race/ethnicity trends in the four waves of the overdose crisis^a



Friedman JR, Nguemeni Tiako MJ, Hansen H. Understanding and Addressing Widening Racial Inequalities in Drug Overdose. Am J Psychiatry. 2024 May 1;181(5):381-390.

Overdoses are dropping, but less for cocaine and methamphetamine

Figure 2. 12 Month-ending Provisional Number of Drug Overdose Deaths by Drug or Drug Class: United States



United States, Nov 2024,
Opioids (T40.0-T40.4, T40.6)

Reported number of deaths:	55,511
Predicted number of deaths:	56,542
Percent pending investigation:	0.32
Percent with drugs specified:	95.96
*Underreported due to incomplete data.	

Source: <https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>



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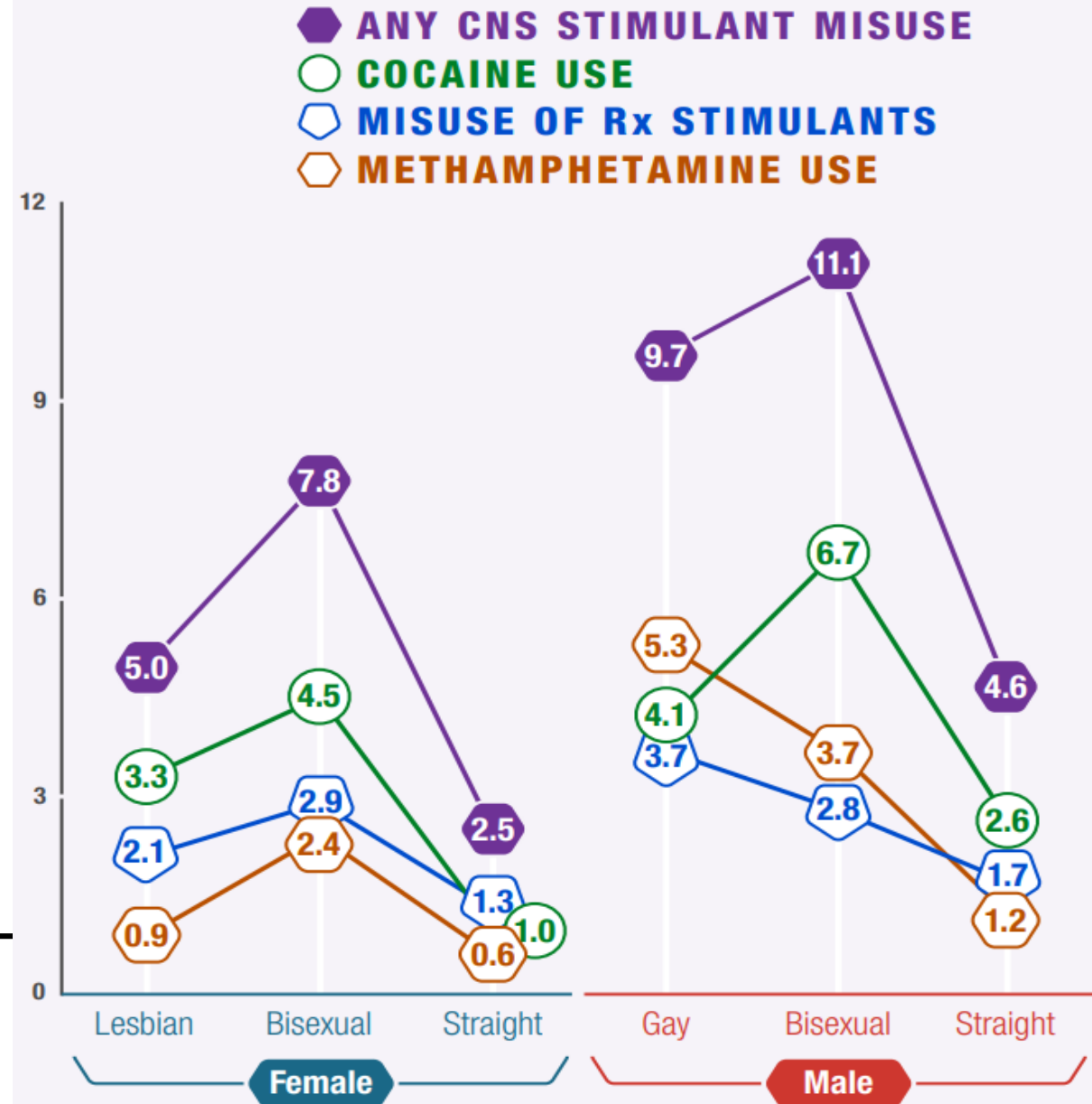


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Stimulant Use and Sexuality

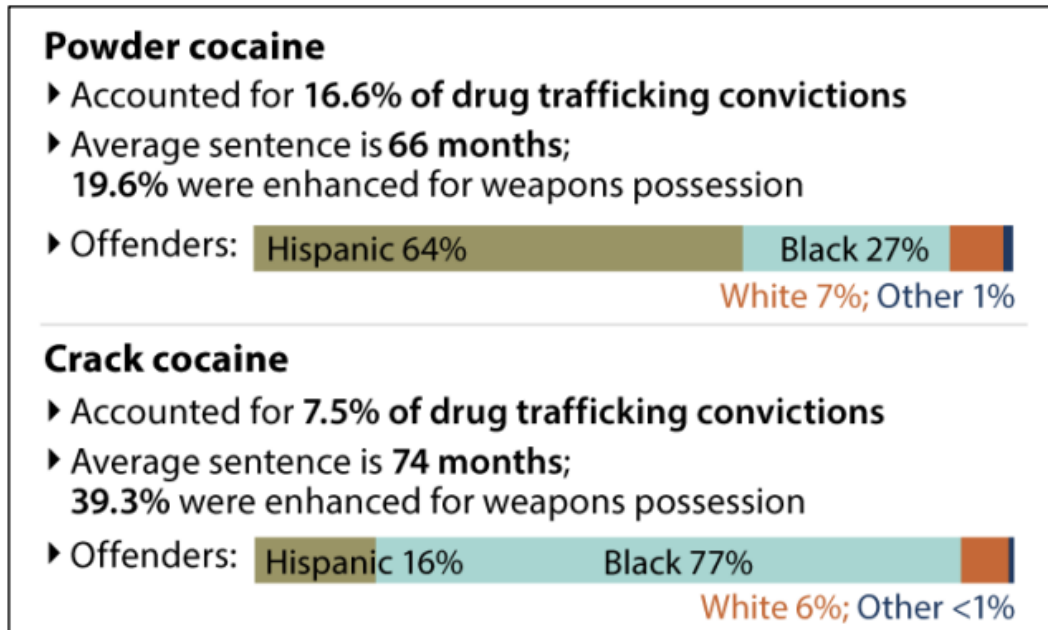
- Sexuality diverse patients are twice as likely as heteronormative counterparts to have any type of stimulant use disorder
- Highest rates of methamphetamine use are among gay identifying men
- Highest rates of cocaine use among bisexual men and women

SAMHSA, 2023



Structural Racism

Figure 1. Federal Cocaine Trafficking Convictions, FY2020



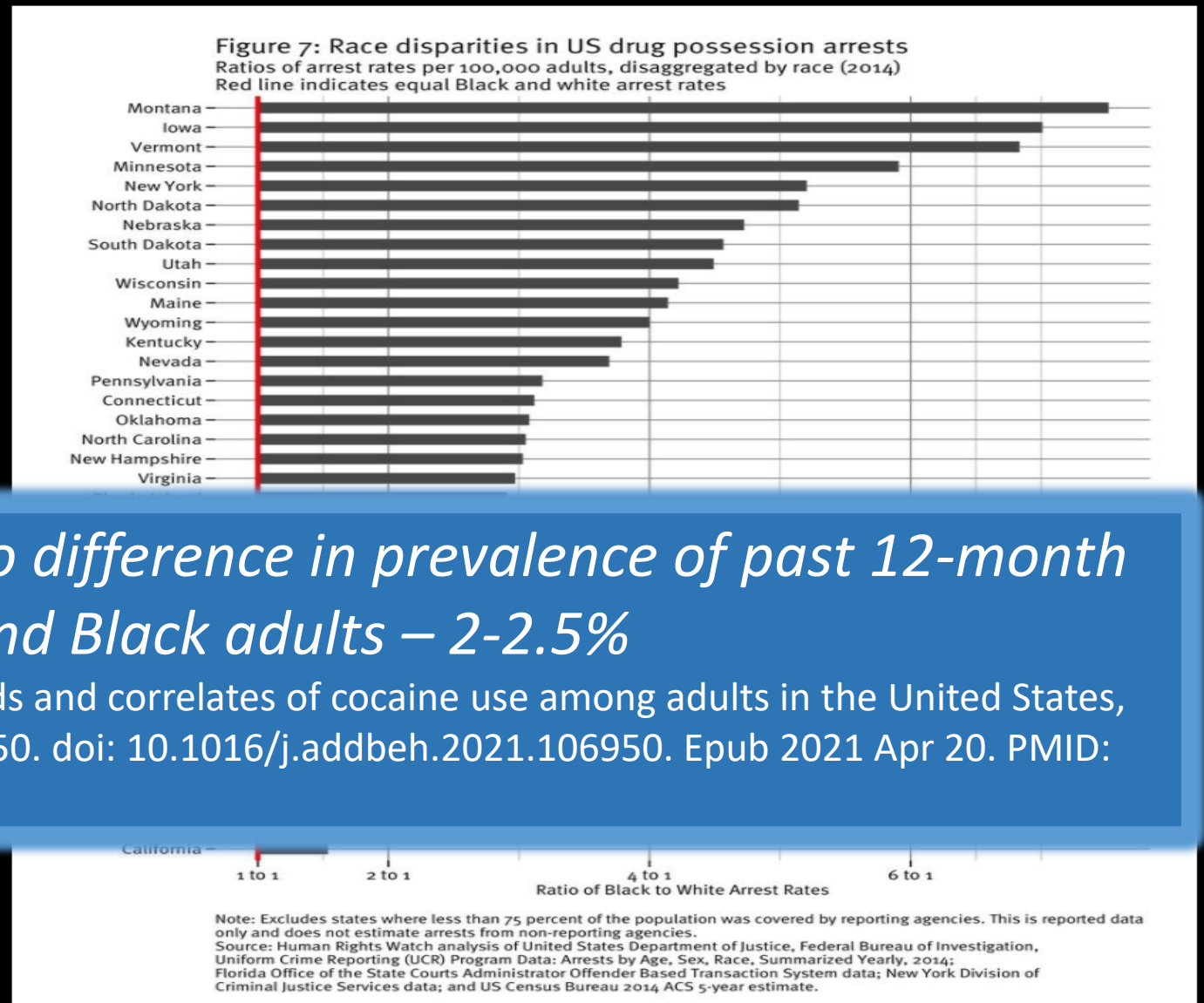
Source: CRS presentation of data from U.S. Sentencing Commission, *Quick Facts: Powder Cocaine Trafficking Offenses*, June 2021; and U.S. Sentencing Commission, *Quick Facts: Crack Cocaine Trafficking Offenses*, June 2021.

- **1972 Controlled Substances Act:** did not distinguish powder from crack cocaine
- **1986 Anti Drug Abuse Act:** mandatory min sentencing for trafficking (100:1 ratio - 5 yrs for 5g crack vs 500g of powder)
- **1988 Anti-Drug Abuse Act:** 5 year min for simple possession of crack
- **2010 Fair Sentencing Act:** reduced sentencing disparity to 18:1 ratio crack:powder cocaine
- **2018 First Step Act:** applied the 2010 rules retroactively and allowed for resentencing

Substance use rates
are similar across
racial and ethnic
groups,

In NSDUH from 2006-2019, no difference in prevalence of past 12-month cocaine use between White and Black adults – 2-2.5%

Mustaquim D, Jones CM, Compton WM. Trends and correlates of cocaine use among adults in the United States, 2006-2019. Addict Behav. 2021 Sep;120:106950. doi: 10.1016/j.addbeh.2021.106950. Epub 2021 Apr 20. PMID: 33940336; PMCID: PMC10032475.

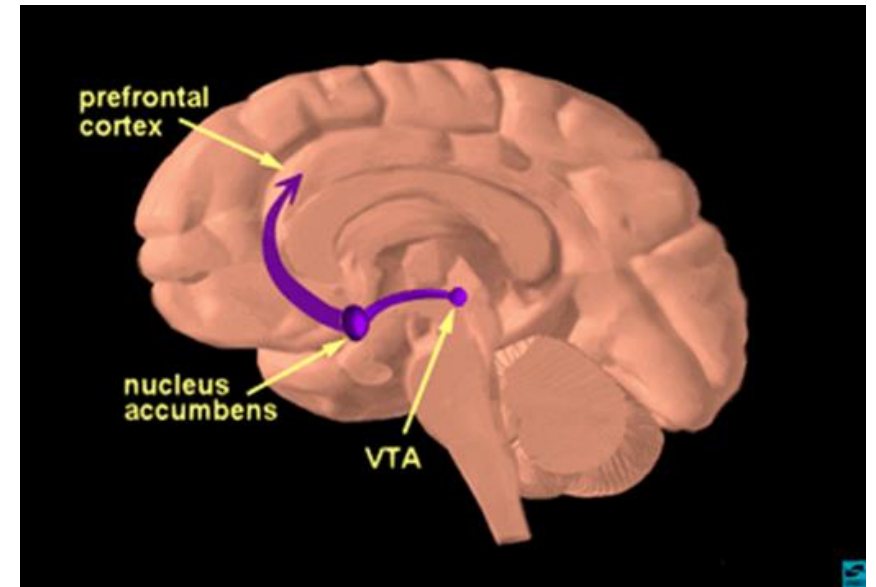


Stimulants: Why & How



Why do people use stimulants?

- Euphoria / rush
 - Onset and intensity depends on delivery method
- Increased energy, attention/focus
- Increased vigilance (survival)
- Diminished social inhibition
- Sexual enhancement (libido)
- Decreased appetite
- To counteract the sedative effect of opioids



Binge Patterns of Use

- Binge patterns may include using sporadically or may occur multiple days in a row
- During a binge, initial substance use increases the desire to use more.
- Decreased desire to use varies based on stimulant:
 - Cocaine – 46 hours
 - Methamphetamines – day 4-5
- Binge use patterns may result in more severe side effects and adverse events at the end of a binge episode.



Psychostimulant Withdrawal

53-97% experience withdrawal with abstinence after prolonged use

Symptoms may last weeks to months

Dopamine stores may take up to 12-18 months to recover after chronic meth use

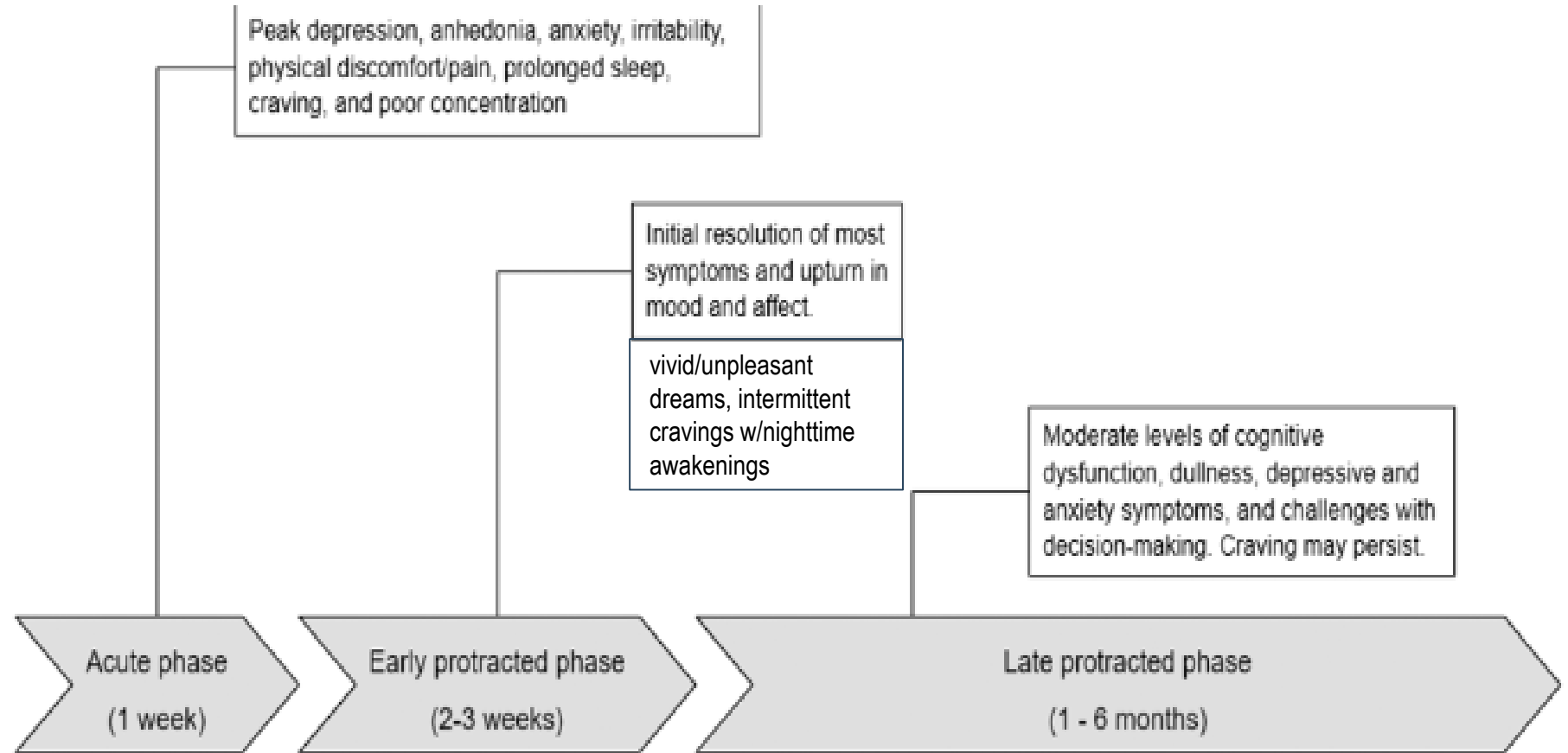


FIGURE 1 Summary of stimulant withdrawal symptoms across different phases (with time-frame following abstinence)

Health Consequences of Chronic Stimulant Use

Dental

- Darkened teeth
- Periodontal disease

Pulmonary

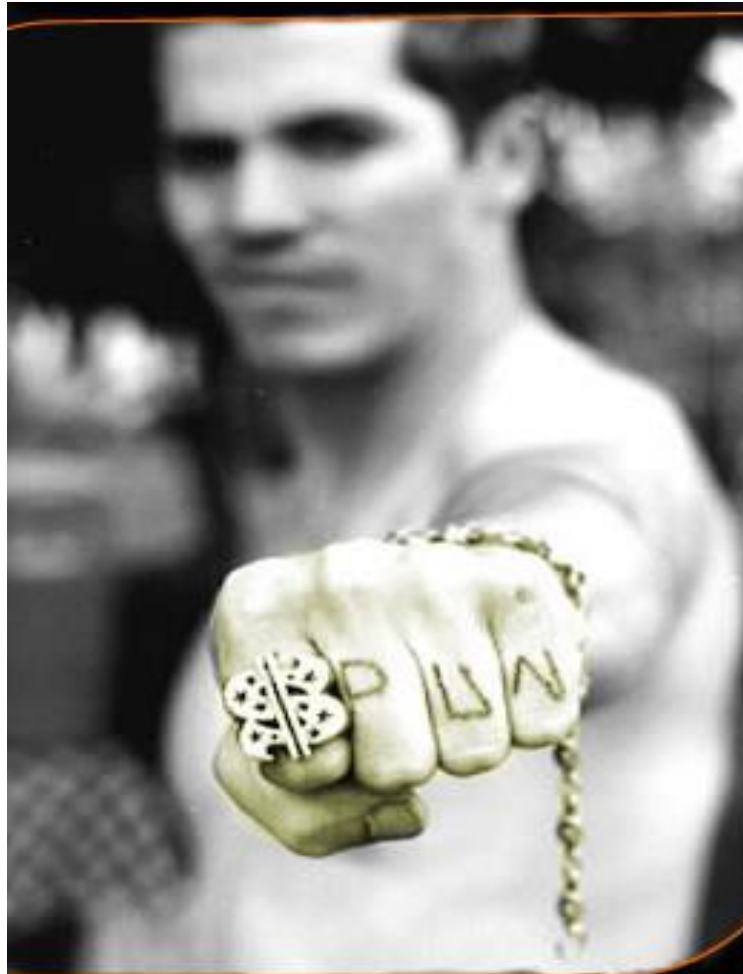
- Acute pulmonary edema
- Pulmonary HTN
- Inhalation injury

Cardiovascular

- Hypertension
- Arrhythmias
- Cardiomyopathy
- Acute Coronary Syndrome
- Aneurysm/dissection
- Erectile dysfunction

Infectious

- HIV/AIDS
- HCV/HBV
- STIs
- SSTIs



Neuro-psychiatric

- Stroke
- Seizure
- Depression
- Anxiety
- Mania
- Psychosis (paranoia, AH/VH/TH)

Liver

- Drug-induced hepatitis
- Cirrhosis or liver failure

Renal/Metabolic

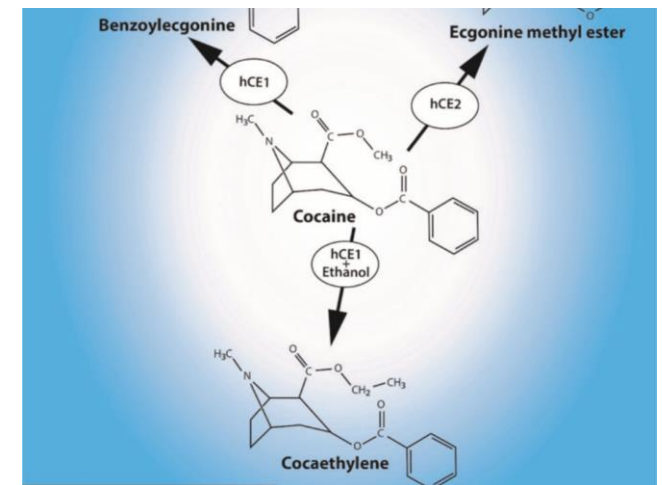
- Rhabdomyolysis
- AKI/CKD
- Hyperthermia

Skin

- Superficial/deep tissue wounds/infections
- Excoriations
- Chemical burns

Cocaethylene Toxicity

- **Cocaethylene** = psychoactive substance produced when cocaine is used in presence of alcohol
 - Alcohol interferes with metabolism of cocaine
- Longer $\frac{1}{2}$ life, more potent, larger volume of distribution
- 60-90% of people who use cocaine also use alcohol
 - Alcohol as a “landing gear” from cocaine
 - Prolongs and/or potentiates effects of cocaine
- Estimated to be 10x more cardiotoxic than cocaine alone
- Increased likelihood of liver injury, neurologic effects (seizures), death

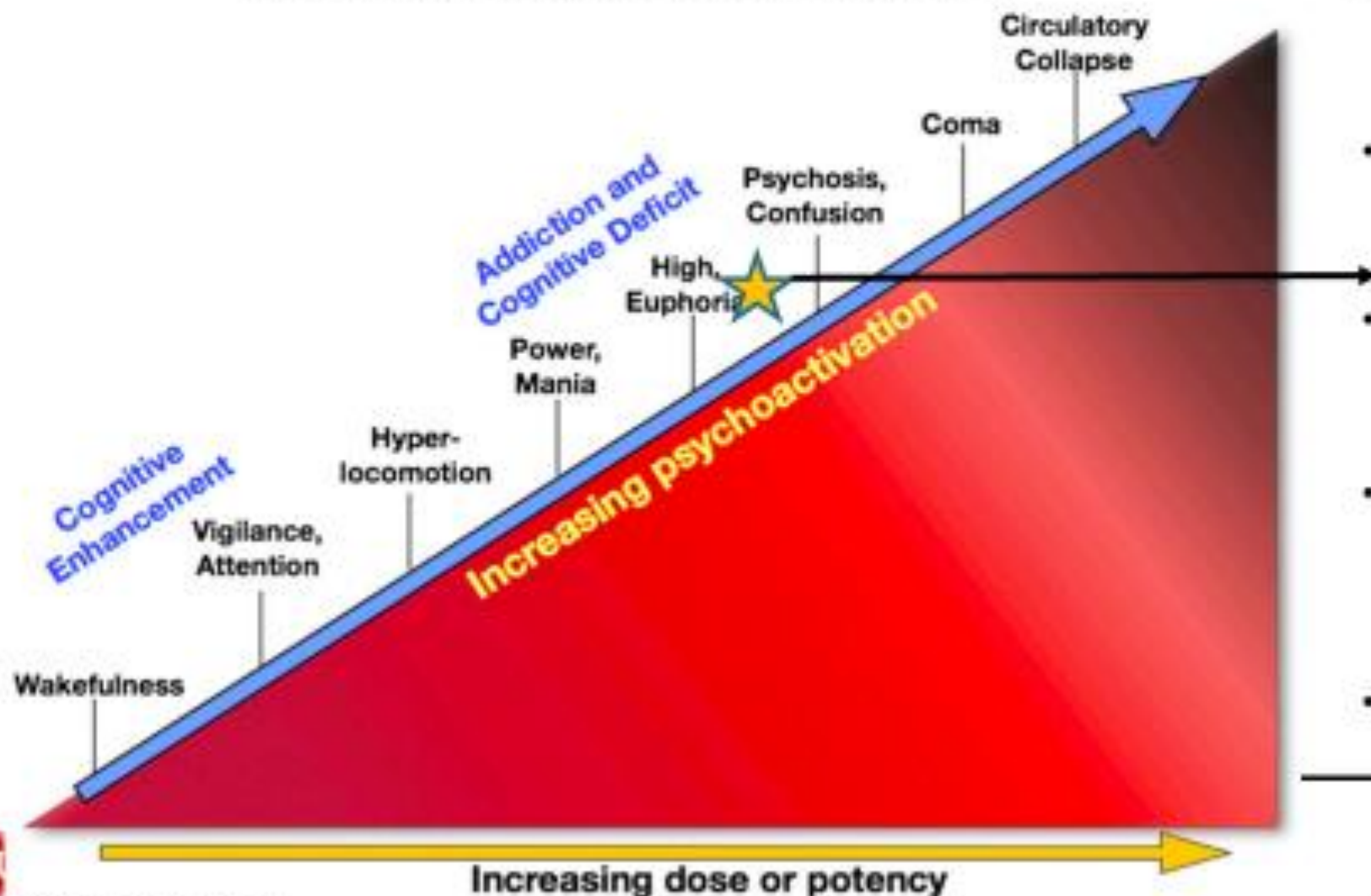


Addressing Stimulant Intoxication



Overamping

Continuum of Psychostimulant Activation



- Begins with extended period of euphoria
- After dose exceeding the level of desired euphoria
- Exacerbated by sleep deprivation, dehydration
- May experience: altered mental status, psychosis (VH/AH/TH, paranoia) as result
- Patients may experience acute medical complications

Signs of Overamping

Physical	Psychological
Headache	Paranoia
Jaw grinding	Altered perceptions of reality
Spasticity/dyskinesia	Persecutory delusions
Xerostomia (dry mouth)	Auditory hallucinations
Chest pain	Visual hallucinations
Seizure	Tactile hallucinations/disturbances
Hyperthermia	
Hypertension	Protective behaviors: hypervigilance, fear, anxiety, panic, agitation, increased sensory awareness
Syncope	



De-escalation

A	G	R	O	+
Assess	Gauge	Respond	Observe	Positive Reinforcement
Using a patient-centered focus, assess the cause of the patient's agitation. CALMLY engage the patient in conversation.	How are you feeling? Be mindful of the feelings that you may be projecting that may escalate or de-escalate the patient.	Be calm yet firm in your interactions. Use open ended questions and empathetic listening to respond to the patient's concerns.	Observe verbal and non-verbal cues. Is this working?	As the patient starts to de-escalate offer them something. A place to sit, a glass of water, a snack.

Interventions

Cool down space to reduce stimuli:

- Quiet, low light setting; white noise machine
- Eye mask or sunglasses & earplugs
- Place to lie down/rest (cot or exam room table or floor mat)

Address appetite/hydration

- Offer snacks
- Offer water, gum for dry mouth; chapstick

Pharmacologic Interventions:

- Benzos for anxiety
- Neuroleptics (eg. olanzapine) for agitation
 - 4x 5mg olanzapine +instructions + referral
- For increased BP+HR, use CCB or non-selective beta-blockers
- Treat hyperthermia (external cooling)

PURPOSE

Meth Intoxication can cause you to feel **anxious, agitated, fearful** and sometimes, to **hear voices**.

These symptoms can be safely managed outside of a clinic or hospital when you take medication to "chill-out."

Olanzapine can reduce common symptoms of methamphetamine when used **off-label*** as directed.

*You and your provider can discuss the risks and benefits of continuing these medications.

HOW TO TAKE OLANZAPINE

Olanzapine can help if you

- Feel **anxious or agitated**
- Feel **fearful or paranoid**
- Hear **voices**
- Cannot **fall sleep**

Place **Olanzapine ODT 5mg** (1 tablet) under your tongue until it fully dissolves. You may take olanzapine **twice a day** until your symptoms improve or you "chill-out" (feel relaxed.)

Side effects with the first dose may include sleepiness or dry mouth**

**For a full list of side effects see NAMI Mental Health Medication Information

A SAFE PLACE

If you struggle with the symptoms of meth, the staff at SoMa RISE can help you safely come down when you are high or anxious. They provide food, showers and a comfortable place to rest.

**SoMa RISE (open 24/7)
Drug Sobering Center
1076 Howard St.
San Francisco, CA**

If you experience a severe mental health crisis, then call 911 or go to the nearest clinic or hospital.



Treatment of Stimulant Use Disorders



Pharmacologic Management

- No FDA approved medications for stimulant use disorders
- Preliminary research **with some promise** for:
 - IM naltrexone + bupropion (methUD)
 - mirtazapine (methUD)
 - mixed amphetamine salts (CUD + ADHD, meth withdrawal)
 - topiramate (CUD)
 - topiramate + mixed amphetamine salts (CUD)
 - modafinil (post-acute stimulant withdrawal)



Promising medications for Methamphetamine Use Disorder

MA Use Disorder	Comparison	Population	Outcomes	Limitations
Coffin PO et al. JAMA Psychiatry 2020 77(3):246-255	Mirtazapine 30mg vs. placebo once daily + counseling	120 men who have sex with men who use methamphetamine	At 24 weeks RR of 0.75 for MA use RR <0.52 for multiple sex partners, condomless anal sex Improved depressive symptoms and insomnia severity	Medication adherence was almost 40%
Trivedi MH et al. N Engl J Med. 2021 384(2):140-153	IM-NTX 380mg Q3wks + Bupropion 450mg vs. placebo	403 with MA UD in stage 1 and 225 with MA UD in stage 2	At 12 weeks BPP+NTX 13.6% vs. Placebo 2.5% (3 of 4 MA negative urine tox)	Adherence to medication was 75-86%, Adverse events: Nausea, vomiting, dizziness



Promising medications for Cocaine Use Disorder

Cocaine Use Disorder	Comparison	Population	Outcomes	Dropout
Nuijten M et al. Lancet. 2016; 387:2226-34.	Dexamphetamine 60mg QD vs. placebo	73 Dutch patients with cocaine UD with OUD on MOUD (methadone)	At 12 weeks Fewer days of cocaine use More cocaine-neg tox tests No differences in craving, use of other substances, or criminality	11% dropout
Levin FR et al. JAMA Psychiatry. 2015 1;72:593-602.	Mixed amphetamines (MAS-ER) 60-80mg QD vs. placebo	126 US patients with adult-ADHD and cocaine UD	At 13 weeks Reduced ADHD symptoms: 60-75% vs 40% 3-wk abstinence: 30-17% vs. 7%	26% dropout
Dakwar E et al. Am J Psychiatry. 2019 176(11):923-930.	40 min infusion of ketamine at 0.5mg/kg vs. midazolam + All 5-wks counseling	55 inpatients with cocaine UD	At 5 weeks Abstinence: 48% vs. 11% Cravings: Ketamine 58% lower	dropout: 26% ketamine; 57% midazolam
Levin FR et al. DAD 2020 206:107700.	MAS-ER at 60mg QD + topiramate 100 BID vs. placebo	127 adults with CUD using at least 9 days in the prior month	At 3 weeks Abstinence: 14% vs. 0%	20% discontinued for elevated HR/BP

Non-pharmacologic Management



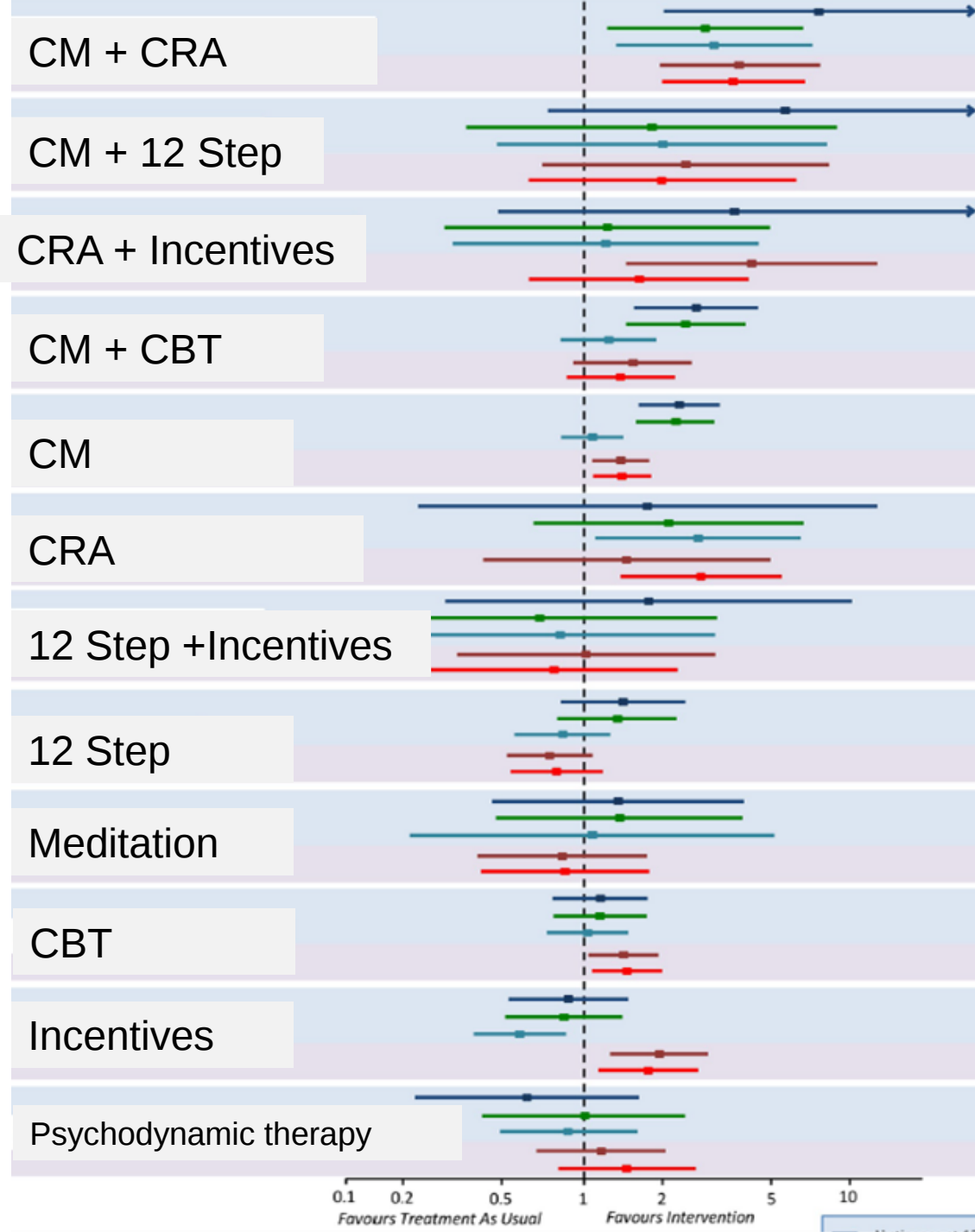
Behavioral Interventions for StUD

Evidence-Based Treatments	Description of Treatment	References
Contingency Management	Provides reinforcers (\$, gift cards, motivational encouragement, etc) for treatment adherence.	(Bach et al., 2020; Brown & DeFulio, 2020; Lake et al., 2020; Minozzi et al., 2016; Okafor et al., 2020)
Community Reinforcement Approach	Using therapeutic modalities, job training, education, behavioral skills training, social training, relapse prevention and relationship counseling.	(Meyers et al., 2011; Riccardo De Giorgi et al., 2018; Stitzer et al., 2011)
Matrix Model	An 8-16-week structured intensive outpatient group utilizing group therapy, connection to self-help, and exploration of underlying causes of disease. Regular UDS screening.	(Huber et al., 1997; Rawson et al., 1995, 2002)
Exercise Supported Recovery	Varying exercise programs have been described, but those with a combination of daily aerobic and anaerobic exercise are associated with long term recovery.	(Huang et al., 2020; Killeen et al., 2020; Liu et al., 2021; Zhou et al., 2021)
Trauma-Informed Care Seeking Safety	A therapeutic model for the treatment of co-occurring PTSD and SUD that emphasizes the need to be safe in order to explore and cope with trauma.	(Lange-Altman et al., 2017; Lenz et al., 2016; Morley et al., 2016; Murphy et al., 2019; Najavits & Anderson, n.d.; Sperlich et al., 2021; Takahashi et al., 2020)

Comparing Behavioral Health Approaches

Research indicates that a combination of behavioral health approaches are most effective in producing abstinence at 12 weeks

Contingency management combined with any additional behavioral health approach improves outcomes



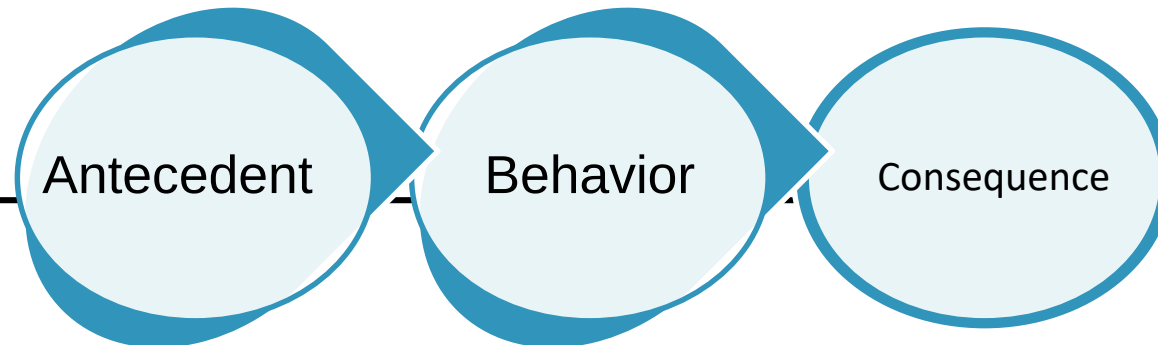
DeCrescenzo, et al, 2018

CRA=Community Reinforcement Approach,
CM=Contingency Management,
CBT=Cognitive Behavioral Therapy



Basics of Contingency Management

- CM is a behavioral health intervention based in operant conditioning principles that provides tangible reinforcers for evidence of behavior change
- Essential theory behind CM: “A behavior that is reinforced in close temporal proximity to its occurrence will increase in frequency” (ex. engagement in care is reinforced with cash given to patient at the visit/point of engagement)
- In CM programs that focus on abstinence, the magnitude of reinforcement provided should increase with sustained periods of abstinence



Petry et al, 2011

Harm Reduction Practices



- People without opioid tolerance unwittingly exposed to fentanyl via non-opioids
 - *Innovate to focus on engaging people who use stimulants and counterfeit non-opioid prescription pills*

100%



An increasing, but unknown, number of people who do not have opioid use disorder are overdosing due to fentanyl contamination of cocaine, methamphetamine, and counterfeit prescription pills

- People without opioid tolerance unwittingly exposed to fentanyl via non-opioids
 - *Innovate to focus on engaging people who use stimulants and counterfeit non-opioid prescription pills*

Overdose from Unintentional Fentanyl Use when Intending to Use a Non-opioid Substance: An Analysis of Medically Attended Opioid Overdose Events

Alexander R. Bazazi · Patrick Low · Bryson O. Gomez · Hannah Snyder ·
Jeffrey K. Hom · Christine S. Soran · Barry Zevin · Michael Mason ·
Joseph Graterol · Phillip O. Coffin

Among 448 opioid overdose survivors in SF 6/2022-9/2022

- 57% intended to use opioids
- 43% intended to use methamphetamine or cocaine
 - 58% of Black and 52% of Latinx survivors
 - 29% of White Survivors

Overdose Prevention

- Patient education on contaminated drug supply
- Distributing fentanyl test strips
- Naloxone education and **on site** distribution
- Safer supply distribution (booty bumping kits, safer smoking kits for meth/cocaine, safer injection equipment)
- For people with opioid overdose or repeatedly testing positive for fentanyl, consider MOUD



Fentanyl Test Strips

1. Add sterile water to your **empty** baggie or the **cooker you just prepped** – mix well!
Load your shot **FIRST! Only test your rinse water!
2. **Dip the test strip** in the water, in up to the first line & **hold for 15 seconds**
3. **Place test strip** on sterile surface or across top of cooker.

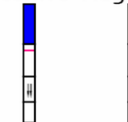
One line POSITIVE



Two lines NEGATIVE



Positive Negative



STI and Infectious Disease Screening & Treatment

- Screening for STIs and infectious diseases, including HIV, HBV, HCV at frequency based on risk or on a schedule for at risk patients.
 - Increased risk for HIV with rectal stimulant use associated with sex (chemsex), though less risk than IVDU
- Screening for TB
- Screening for syphilis
- Screening for GC/CT at *all* sites of contact (throat, genital, rectal)
- Safer sex supplies (condoms, lube, booty bumping kits)
- Education/Rx for nPEP and PrEP with low threshold for initiation
 - Consider injectable cabotegravir (apretude) if available
- Immunize for HAV, HBV, Mpox, HPV, Tdap, influenza, COVID



Self Care Planning

- Discuss plan for binge use:
 - Eat, stay hydrated, and have appropriate supplies including first aid kit and condoms/lubricant
- Wash your hands
- Take breaks if possible
- Identify safe space to crash/sleep
- Agitation, depression and anxiety are common post stimulant use
 - connect patient with a BH provider or local services



START Resources

STIMULANT TREATMENT AND RECOVERY TEAM

CLINICAL GUIDELINES

A COLLABORATIVE
CARE APPROACH



Grayken Center for Addiction
Training & Technical Assistance
Boston Medical Center



EXERCISE PLAN

High-intensity
Weeks 1 - 4



Complete all exercises, rest for 3 minutes, repeat, rest 3 minutes, repeat.



Medical Group Plan



Behavioral Health Group Plan



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Clinical Addiction Research & Education Unit



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for Addiction
Boston Medical Center

Stimulant Trainings

Stimulants 101

- Introduction to stimulant treatment in the outpatient setting
- 1 hour - CME offered

Essentials of Stimulant Use Disorder

- Overview of evidence-based interventions for StUD
- 3 hour - CME offered



Register Here

Free education with continuing education credits and support funded and supported by:



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Opioid
Response
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Treatment for Stimulant Use Disorders

UPDATED 2021

TIP 33

TIP 33-
SAMHSA

TREATMENT IMPROVEMENT PROTOCOL

TIP 33



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