Stimulants: An Overview

James A. Peck, Psy.D.

UCLA Integrated Substance Abuse Programs
Pacific Southwest Addiction Technology Transfer Center

ATTC
Addiction Technology Transfer Center Network
Funded by Substance Abuse and Mental Health Services Administration

HI Behavioral Health ECHO
June 22, 2021

Acknowledgments

The following slides were drawn from various modules of SAMHSA's Addiction Technology Transfer Network Stimulants 101 Core Curriculum. The entire core curriculum and supplemental modules, including Stimulants and HIV, can be accessed at:

https://attcnetwork.org/centers/network-coordinating-office/introducing-new-national-core-curriculum-stimulants-and-their

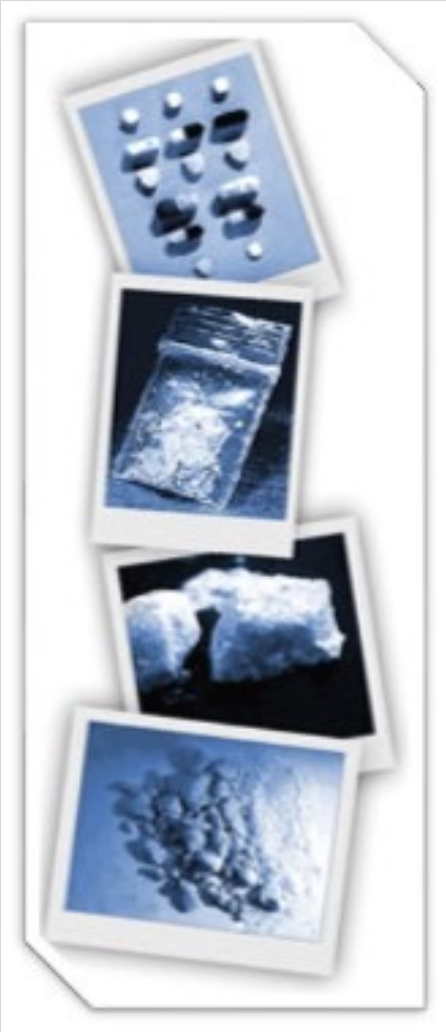
Stimulants:
What are We Talking About?

Forms of Cocaine

- Powder cocaine (Hydrochloride salt)
- Smokable cocaine (Crack, rock, freebase)
- Cocaine half-life: ~1-2 hours

SOURCE: NIDA, 2018

Methamphetamine



Methamphetamine Powder

Description: Beige/yellowy/ off-white powder

Base / Paste Methamphetamine

Description: 'Oily', 'gunky', 'gluggy' gel, moist, waxy

Crystalline Methamphetamine

Description: White/clear crystals/rocks; 'crushed glass' / 'rock salt'

SOURCE: NIDA, 2019

Types of Stimulants: Methamphetamine

Amphetamine-Type Stimulants (ATS)

- Methamphetamine
  - Speed, crystal, ice, yaba, shabu, tina
- Amphetamine
- Pharmaceutical products used for ADD and ADHD

Methamphetamine half-life: 8-10 hours

- 50% of drug is removed from the body within 8 hours

SOURCE: NIDA, 2019

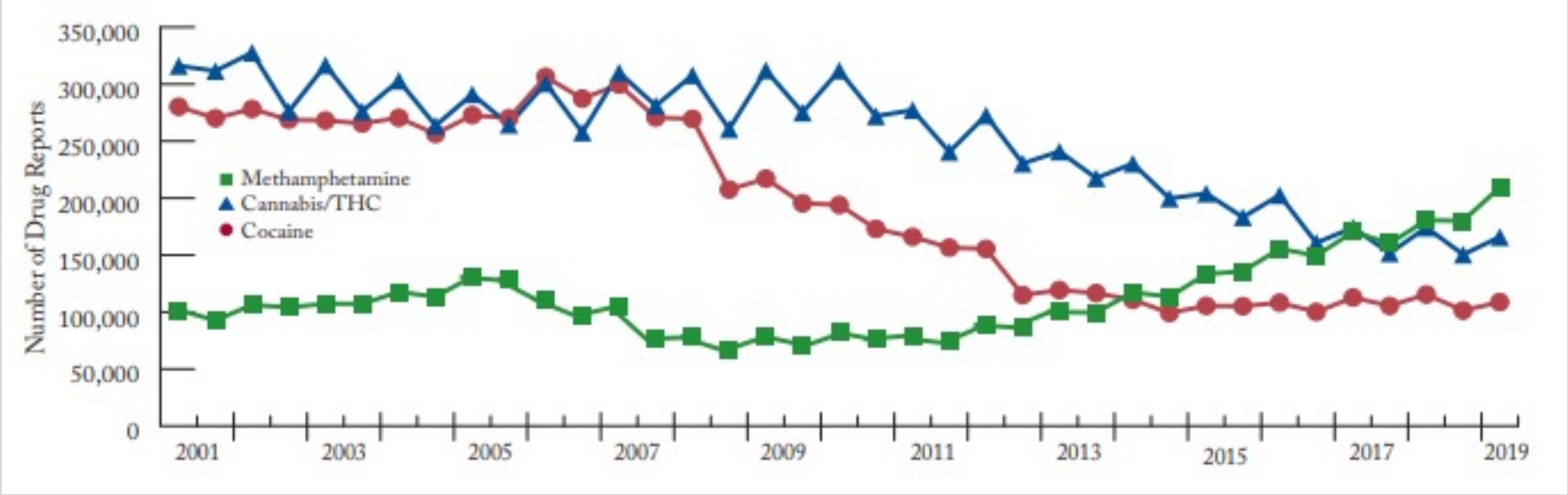
Methamphetamine: Patterns of Use

- Either smoking or injecting causes an immediate, intense "rush" which lasts a few minutes
- Snorting or oral ingestion produces euphoria—a high, but not an intense rush.
  - Snorting produces effects within 3 to 5 minutes
  - Oral ingestion produces effects within 15 to 20 minutes
- Often abused in "binge & crash" pattern
  - "Run": foregoing food and sleep while continuing to take the drug for up to several days

SOURCE: NIDA, 2019

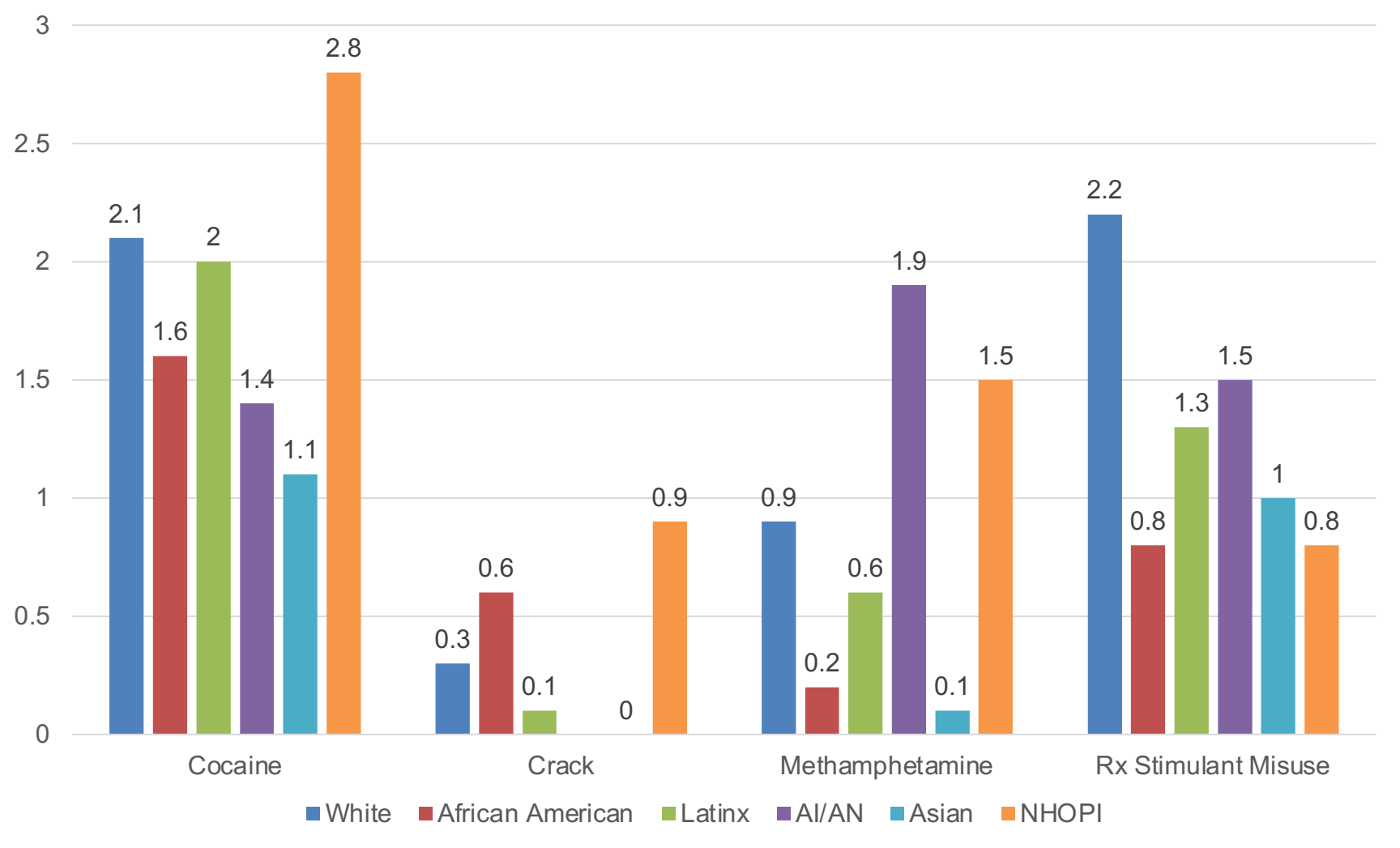
Epidemiology

National Trend Estimates for Stimulants and Cannabis, NFLIS, 2001-2019



SOURCE: U.S. DEA, 2020

Past Year Use (as Percentages) of Stimulants by Racial/Ethnic Group, 2019



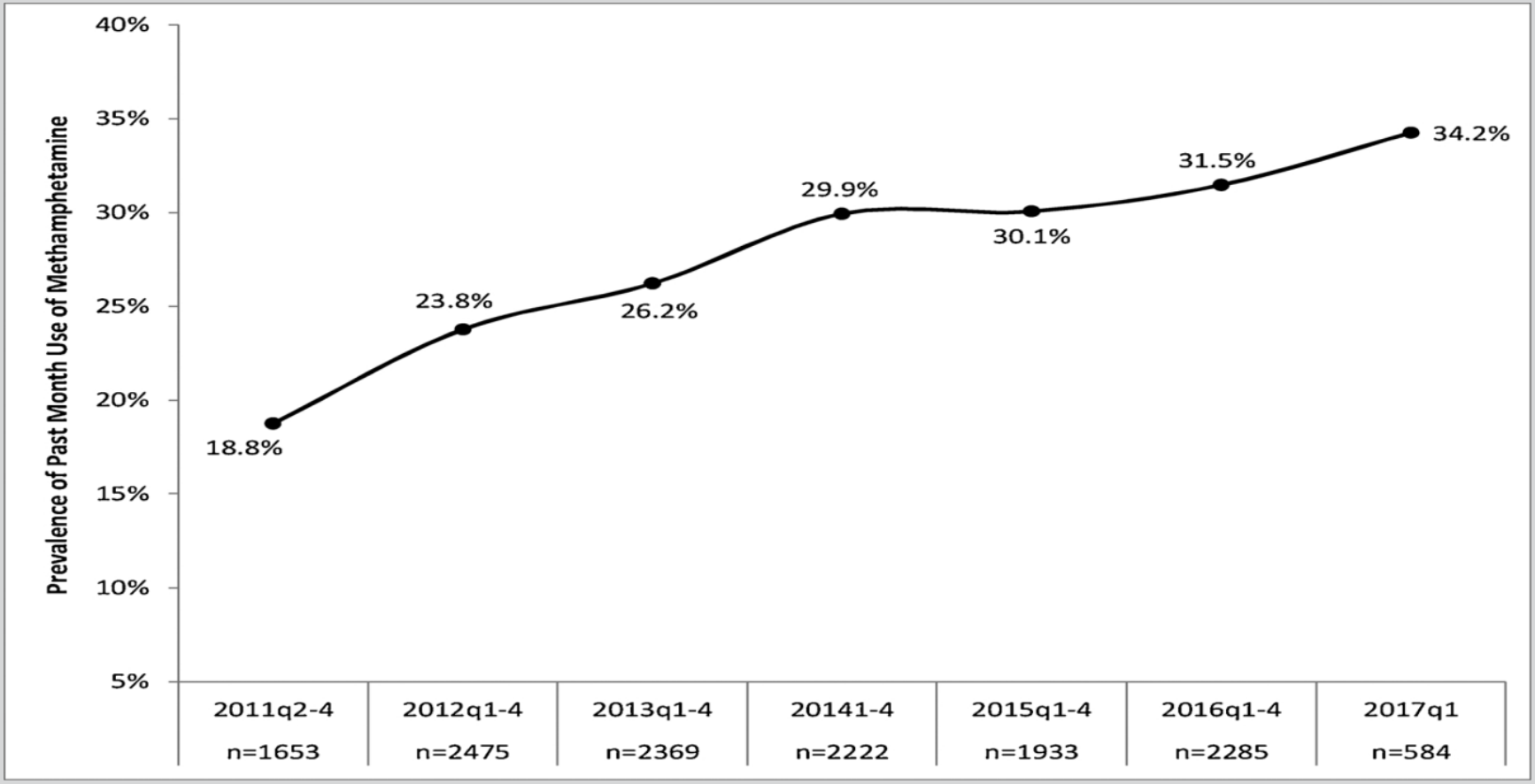
SOURCE: SAMHSA, 2020

Methamphetamine and Opioid Co-Ingestion – What are the Issues?

- A synergistic effect occurs when using meth and an opioid together (i.e., the result of using both is greater than either alone)
- The stimulant effect counterbalances the depressant effect, thus increasing overdose risk (respiratory depression AND cardiac arrest)
- The most potent effect seems to be in the first 90 minutes of co-ingestion

SOURCES: Ellis et al., 2018; Tian et al., 2017; Meacham et al;, 2016; Trujillo et al., 2011

Past Month Use of Methamphetamine among People Seeking Treatment for an Opioid Use Disorder

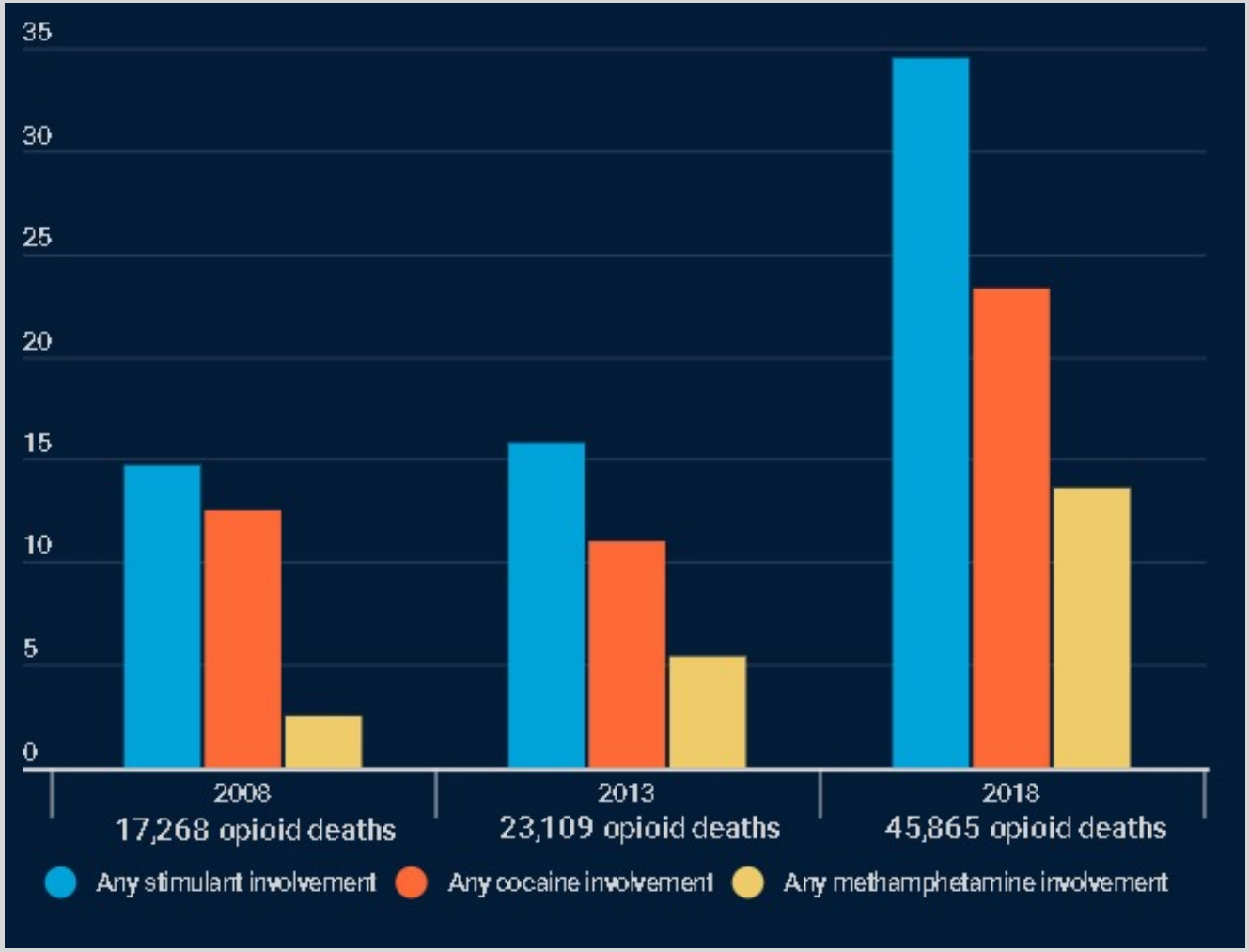


SOURCE: Ellis et al., 2018

What are Some Treatment Implications for Methamphetamine and Opioid Co-Ingestion?

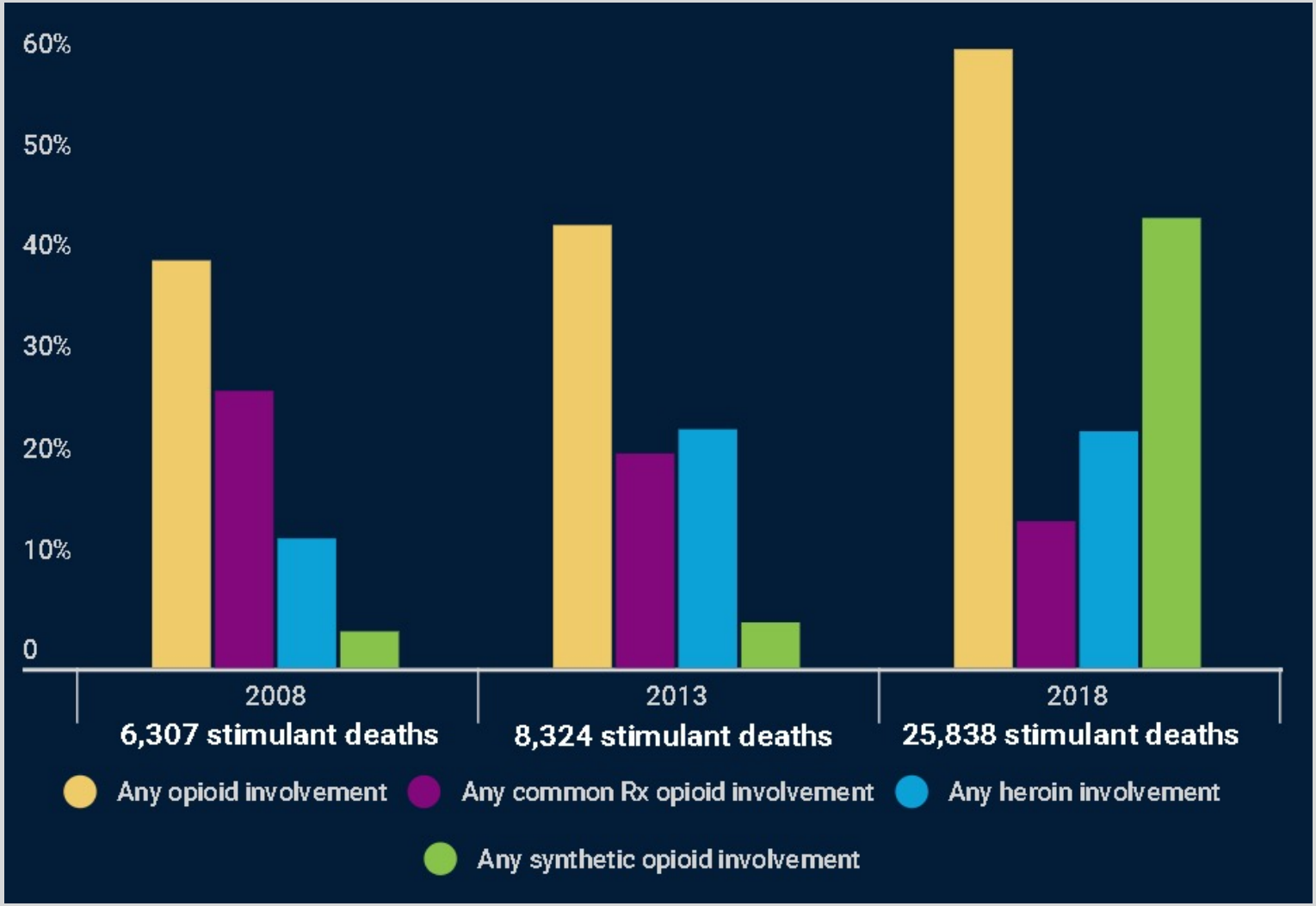
- Make sure you have sufficient naloxone kits available for overdoses
  - Because of the interaction effect, it may require more than one dose to counteract the effects of meth and heroin
- Combine medication-assisted treatment for heroin with contingency management for meth
  - It may be better to use buprenorphine rather than methadone, since methadone and meth would still have a potent interaction (for people who relapse on meth during treatment)
- Exercise may help to reduce methamphetamine use and reduce depression and anxiety symptoms

A Growing Percentage of Opioid-Related Deaths also Involve Stimulants



SOURCE: NIHCM Foundation, 2020

Increases Seen in Stimulant-Related Deaths that also Involve Opioids



SOURCE: NIHCM Foundation, 2020

Cocaine vs. Methamphetamine

Methamphetamine

- Stimulant
- Man-made
- Smoking produces a long-lasting high
- 50% of drug is removed from body in 12 hours
- Increases dopamine release and blocks dopamine re-uptake
- Limited medical use

Cocaine

- Stimulant and local anesthetic
- Plant-derived
- Smoking produces a brief high
- 50% of drug is removed from body in 1 hour
- Blocks dopamine re-uptake
- Limited use as a local anesthetic (surgical)

SOURCE: NIDA, 2019

Summary

- Psychostimulant use is increasing in the US
- Rates of use vary by racial/ethnic group and by location across the US
- Purity and potency have both increased because of the way that it is made.
- Stimulant related deaths are increasing with rates varying significantly across the country
- Co-ingestion of stimulants with opioids is also increasing

Acute and Chronic Effects of Stimulants

Acute Effects of Stimulants

Physical

Increases

- Heart rate
- Blood pressure
- Pupil size
- Respiration
- Sensory acuity
- Energy

Decreases

- Appetite
- Sleep
- Reaction Time

Psychological

Increases

- Confidence
- Alertness
- Mood/Euphoria
- Sex drive
- Energy
- Talkativeness

Decreases

- Boredom
- Loneliness
- Timidity

SOURCE: NIDA, 2019

Chronic Psychological Effects of Stimulants

- Confusion
- Poor concentration
- Hallucinations
- Fatigue
- Memory loss
- Insomnia
- Irritability
- Paranoia
- Panic reactions
- Depression
- Anger
- Psychosis
- Disinhibition and impulsivity

SOURCE: NIDA, 2019

Chronic Physical Effects of Stimulant Use

- Respiratory (pulmonary hypertension, difficulty breathing, pleuritic chest pain, decreased capacity)
- Neurological (stroke, seizure, hemorrhage, cerebral vasculitis)
- Renal failure (resulting from rhabdomyolysis)
- Hepatic failure (resulting from rhabdomyolysis)
- Cardiac (tachycardia, arrhythmia, reduced heart rate variability, myocardial infarction, heart failure)
- Dental and skin issues

SOURCE: NIDA, 2019

Methamphetamine Use and Violence

- Compared to no use, amphetamines use was associated with a 2-fold increase in the odds of hostility or violence
- Frequent use increases the risk of violent behavior
- Other risk factors included: psychotic symptoms, alcohol or other drug use, psychosocial problems, and impulsivity
- People who use methamphetamine are also more likely to be victims of abuse or violent acts
- Women who used methamphetamine are significantly more likely to experience partner abuse/violence

SOURCES: Foulds et al., 2020; Cohen et al., 2003

Treatments for Stimulant Use Disorders

Are there Medications for the Treatment of Stimulant Use Disorder?

- The short answer is NO
- A few medicines have had positive results in clinical trials, most notably off-label use of bupropion or mirtazapine
- To date, these medicines have not demonstrated reproducible results
- Much more research is needed to determine the overall efficacy of these medicines

SOURCE: Skolnick, 2015

What Do the Results from the Latest Methamphetamine Medication Trial Tell Us?

- Multi-site, double-blind, two-stage, placebo controlled trial to evaluate the efficacy and safety of extended-release injectable naltrexone plus oral extended-release bupropion
- 403 participants enrolled in stage 1; 225 participants enrolled in stage 2
  - Stage 1: 18 of 109 participants (16.5%) in the naltrexone-bupropion group and 10 of 294 (3.4%) in the placebo group had a response
  - Stage 2: 13 of 114 (11.4%) in naltrexone-bupropion group and 2 of 111 (1.8%) in the placebo group had a response

SOURCE: Trivedi et al., 2021

Behavioral Treatments

- Contingency Management
- Community Reinforcement Approach
- Cognitive Behavioral Therapy/Relapse Prevention
- Motivational Interviewing
- Matrix Model
- Exercise
- Mindfulness

Contingency Management (1)

- Based on pioneering work of Steven Higgins & colleagues at the University of Vermont
- Very powerful approach for achieving initial abstinence from numerous drugs of abuse
- Patients adhering to targeted behavior (i.e. drug abstinence, attendance, attending job training, etc) are positively reinforced

SOURCES: Davis et al., 2016; Higgins & Petry, 1999

Contingency Management (2)

A technique employing the systematic delivery of positive reinforcement for desired behaviors. In the treatment of methamphetamine dependence, vouchers or prizes can be “earned” for submission of methamphetamine-free urine samples.

SOURCE: NIDA, 2020

Community Reinforcement Approach

- Community Reinforcement Approach (CRA) is a combination of behavioral strategies to
  - Identify the role of environmental contingencies in encouraging or discouraging substance use
  - Rearrangement of these contingencies so that a non-substance using life is more rewarding than a using one.

SOURCES: Meyers et.al., 2011; Budney & Higgins, 1998

Components of CRA

- CRA Components include:
  - behavioral skills training
  - social and recreational counseling
  - marital therapy
  - motivational enhancement
  - job counseling
  - relapse prevention

- For application to the treatment of cocaine dependence, a voucher based reinforcement program is added.

SOURCES: Meyers et.al., 2011; Budney & Higgins, 1998

Cognitive Behavioral Therapy (CBT)

- Underlying assumption = learning processes play an important role in the development and continuation of a stimulant use disorder
- CBT attempts to help patients recognize the situations in which they are most likely to use stimulants, avoid these situations when appropriate, and cope more effectively with a range of problems and problematic behaviors associated with substance use.
- CBT is compatible with a range of other treatments patients may receive, such as pharmacotherapy.
- Also known as Relapse Prevention

SOURCE: NIDA, 2016; Carroll, 1998

What CBT Skills can Clinicians Use when Working with People Who Use Stimulants?

- Functional analysis and patterns of use
- Coping with craving
- Addressing and resolving ambivalence
- Refusal skills
- Seemingly irrelevant decisions
- Planning for emergencies
- Problem solving skills
- HIV/HCV risk reduction

SOURCES: McHugh et al., 2010; Carroll, 1998; Carroll et al., 1994

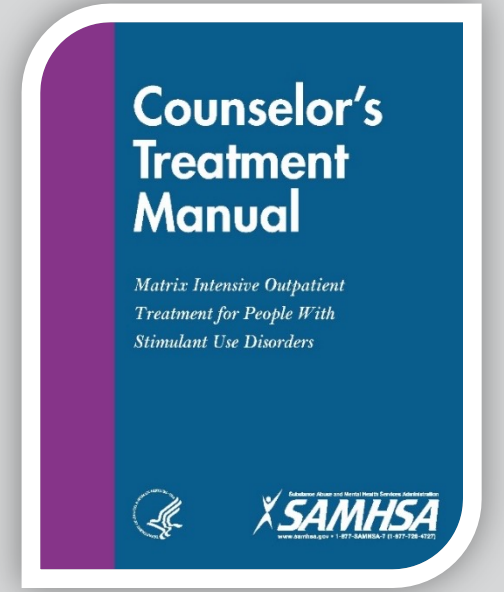
Motivational Interviewing (MI)

- "…a directive, client-centered method for enhancing intrinsic motivation for change by exploring and resolving ambivalence (Miller & Rollnick, 2002).
- "…a way of being with a client, not just a set of techniques for doing counseling" (Miller and Rollnick, 1991).
- Studies demonstrated reduction in stimulant use with motivational interviewing

SOURCES: Polcin, et al., 2014;
Miller, & Rollnick, 2012; Stein et al., 2009

Behavioral Approach: Matrix Model

- 16-week intensive outpatient treatment was modestly better treatment as usual to improve retention and reduce methamphetamine use
- Therapist functions as teacher and coach
- Incorporates a variety of approaches
  - CBT
  - CM
  - MI
  - 12-Step Facilitation
  - Family Involvement
  - Person-centered therapy



SOURCES: CSAT, 2006; Rawson, et al., 2004

Exercise for Methamphetamine Dependence Study Design

Research has demonstrated benefit of aerobic exercise for improving depression, anxiety, cognitive deficits, and substance use outcomes.

Methods:

- All 135 study participants received treatment as usual for MUD in a residential treatment program
- They were randomly assigned to either:
  - an 8-week, 3x/week structured aerobic and resistance exercise intervention
  - an 8-week health education condition.
- Outcome measure collected through study enrollment and for 12 weeks follow-up.

SOURCES: Rawson et al., 2015; Mooney et al., 2014

Does Exercise Improve Outcomes Post-Treatment?

- Yes!
- Fewer exercise participants returned to meth use compared to the education participants at 1-, 3-, and 6-months post-discharge (not statistically significant)
- Significant interaction found for self-reported meth use and meth urine drug test results – lower severity users in the exercise group reported using meth significantly fewer days at the three post-discharge time points than lower severity users in the education group
- Lower severity users in the exercise group also had a lower percentage of positive urine results at the three time points than the lower severity users in the education group (relationships not seen in higher severity groups)
- Results support exercise as tx component for ppl using meth 18 or fewer days per month

SOURCE: Rawson et al., 2015

Recommendations for Outpatient Stimulant Use Disorder Treatment (1)

- Durations over 90 days (with continuing care for another 9 months).
- Techniques and clinic practices that improve treatment retention are critical.
- Treatment should include 3-5 clinic visits per week for at least 90 days.

SOURCES: UNODC, 2019; Rawson et al., 2020; CSAT, 1999

Recommendations for Outpatient Stimulant Use Disorder Treatment (2)

- Employ evidence-based practices
  [i.e., Contingency Management (CM), Community Reinforcement Approach (CRA), Cognitive Behavioral Therapy (CBT), Motivational Interviewing (MI), Matrix Model]
- Family involvement and 12-step programs appear to improve outcome
- Urine testing (at least weekly is recommended)

SOURCES: UNODC, 2019; Rawson, et al., 2020; CSAT, 1999

Concluding Thoughts

- The availability and use of cocaine and methamphetamine is widespread across the U.S. and beyond
- Central nervous system stimulants affect multiple organ systems, including the brain, heart, lungs, kidneys, liver, and skin
- A variety of behavioral interventions have been shown to be effective
- No FDA-approved medications exist (yet)
- Recovery is possible

Resources for Continued Learning

- ATTC Network's Focus on Stimulant Misuse Web Page: https://attcnetwork.org/centers/global-attc/focus-stimulant-misuse
- Evidence-Based Resource Guide Series: Treatment of Stimulant Use Disorders: https://store.samhsa.gov/product/Treatment-of-Stimulant-Use-Disorder/PEP20-06-01-001
- Northwest ATTC's Contingency Management for Healthcare Settings Self-Paced Online Course: https://healtheknowledge.org/course/search.php?search=Contingency+Management

Thanks for Participating!

James A. Peck, Psy.D.

jpeck@mednet.ucla.edu

UCLA Integrated Substance Abuse Programs

Pacific Southwest Addiction Technology Transfer Center