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Treating Clients with Methamphetamine and Stimulant Use Disorders

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BJA's RSAT PROGRAM

Advocates for Human Potential, Inc.

RSAT Training Tool: Treating Clients with Methamphetamine and Stimulant Use Disorders

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1 Methamphetamine and Cocaine Use: Historical Trends and Recent Growth

There has been alarming growth in both methamphetamine (meth) and cocaine use in recent years. These stimulant drugs have much in common, but each has some distinguishing features. The Drug Enforcement Administration (DEA) classifies both drugs as Schedule II controlled substances, meaning they have legitimate medical uses but high abuse potential. Typically, illicitly produced forms of both drugs are trafficked, rather than diverted pharmaceuticals.[1] Over the last 5 years, upticks in overdose deaths involving cocaine and methamphetamine have become a growing concern.

In 2002, cocaine was the most commonly reported drug of abuse among arrestees (excluding alcohol and cannabis), at nearly double the rate of illicit opioid abuse. In 2004, cocaine and methamphetamine were the most and second most regularly used substances among state and federal prison inmates (excluding alcohol and cannabis).[2] The same was also true for convicted jail inmates.[3] However, stimulant use among arrestees declined steadily for more than a decade—and was overtaken by rates of opioid use.[4]

Methamphetamine is one of the most commonly abused drugs worldwide, second only to cannabis.[5] It was first synthesized in the late 19th century but wasn't widely used until processing and production was streamlined and the crystalized form was introduced around 1920. During World War II, troops on

[1] Drug Enforcement Administration. (2020). *Drugs of abuse: A DEA resource guide, 2020 edition*. U.S. Department of Justice. **https://www.dea.gov/sites/default/files/2020-04/Drugs%20of%20Abuse%202020-Web%20Version-508%20compliant-4-24-20_0.pdf**

[2] Mumola, C. J., & Karberg, J. C. (2007). *Drug use and dependence, state and federal prisoners, 2004* (NCJ 213530). Bureau of Justice Statistics, U.S. Department of Justice Office of Justice Programs. **https://www.bjs.gov/content/pub/pdf/dudsfp04.pdf**

[3] Karberg, J. C., & James, D. J. (2005). *Substance dependence, abuse, and treatment of jail inmates, 2002* (NCJ 209588). Bureau of Justice Statistics, U.S. Department of Justice Office of Justice Programs. **https://www.bjs.gov/content/pub/pdf/sdatji02.pdf**

[4] Office of National Drug Control Policy. (2014). *2013 annual report, Arrestee Drug Abuse Monitoring Program II*. Executive Office of the President. **https://www.abtassociates.com/sites/default/files/migrated_files/91485e0a-8774-442e-8ca1-5ec85ff5fb9a.pdf**

[5] United Nations Office on Drug and Crime. (2019). *World drug report 2019* (United Nations publication, Sales No. E.19.XI.8). **https://wdr.unodc.org/wdr2019/prelaunch/WDR19_Booklet_2_DRUG_DEMAND.pdf**

both sides used it to stay awake and alert, with an over-the-counter (OTC) version available in Germany. U.S. military use of stimulants continued throughout the Korean War, the Vietnam War, and beyond.[6]

Examples of early forms marketed by U.S. pharmaceutical companies include OTC inhalers for asthma, and later an OTC pill for narcolepsy called Benzedrine. Benzedrine's popularity as a recreational drug grew until the U.S. Food and Drug Administration (FDA) began to require a prescription in 1959. It was still widely prescribed for treatment of attention deficit hyperactivity disorder (ADHD), narcolepsy, depression, and alcoholism, and as a diet aid.

Injection abuse accelerated during the 1960s, fueled by so-called "diet doctors" who prescribed Benzedrine, until 1963 when the State Attorney General of California and the U.S. Department of Justice (DOJ) requested injectable ampoules of amphetamine products be removed from the market. This left intravenous users with a supply vacuum, ushering in an increase of illicitly manufactured methamphetamine. By the 1980s, illegal meth labs proliferated, prompting a tightening of ephedrine regulations (a precursor used to make crystal meth). But illegal production continued, substituting pseudoephedrine—an ingredient found in OTC cold and sinus remedies—until its availability was also restricted by the Combat Methamphetamine Epidemic Act of 2005.[7]

Large-scale trafficking in illicit meth was concentrated on the west coast and controlled by criminal motorcycle gangs such as the Hells Angels. Meth use in the United States began to explode during the 1990s, with usage rates increasing from less than 2 percent of the adult population to more than 5 percent by 2004. Meth use proliferated in rural western states, especially. For example, in 2007, Wyoming had the one of highest proportions of children in foster or kinship care due to parental meth use.[8] Homebuyers in many central northwestern states demanded testing for remnants of toxic chemicals before making a purchase, to ensure properties had never hosted a meth lab.[9]

There is no doubt that, at its peak, meth was associated with devasting individual and societal consequences such as violent crime, child abuse and neglect, and astronomic costs of treating its medical consequences. The Herculean efforts aimed at supply reduction included enforcement, crackdowns, border interdiction, and legislation. However, public information and prevention campaigns often relied on scare tactics that were criticized for further marginalizing meth use instead of promoting recovery and for creating a sensationalized stereotype that contributed to the invisibility of the onset of problematic use, with such use often not being recognized until it is blatantly obvious.[10]

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[6] Hunt, D., Kuck, S. & Truitt, L. (2006). *Methamphetamine use: Lessons learned*. Abt Associates Inc. **https://www.ncjrs.gov/pdffiles1/nij/grants/209730.pdf**

[7] Ibid.

[8] Brown, J. A., & Hohman, M. (2006). The impact of methamphetamine use on parenting. *Journal of Social Work Practice in the Addictions*, *6*(1–2), 63–88. **https://doi.org/10.1300/J160v06n01_04**

[9] Wermuth, L. (2000). Methamphetamine use: Hazards and social influences. *Drug Education*, *30*(4), 423–433. **https://doi.org/10.2190%2FGMH7-3FWX-1AC1-RWXP**

[10] Scheibe, L. (2017). Visualising "junkies" and "meth heads" – A visual analysis of the persistent negative reputation of heroin and meth users. *Drugs and Alcohol Today*, *17*(1), 40–49. **https://doi.org/10.1108/DAT-11-2016-0027**

The “meth problem” never really disappeared, but by 2007 usage rates decreased and stabilized. In 2012 meth use began to accelerate again, and as of 2020, this trend has yet to show signs of stopping and is expected to continue its upward trajectory. Today’s meth rarely comes from makeshift labs in remote rural regions of the U.S. (a prominent source in the past). The number of domestic clandestine labs is at a 15-year low. Most meth is manufactured in “super labs” in Mexico, often with chemical precursors from China that make it much more potent than “homemade” meth using pseudoephedrine. It is transported across the southern border by transnational criminal organizations.[11] Although meth has rightly earned the warning “speed kills,” cocaine-related deaths have surpassed methamphetamine deaths in recent years and have increased at faster rates. Cocaine is used by a greater proportion of the overall U.S. population (although not necessarily of specific regions or states) and has been implicated in more recent drug deaths than its synthetic cousin.[12]

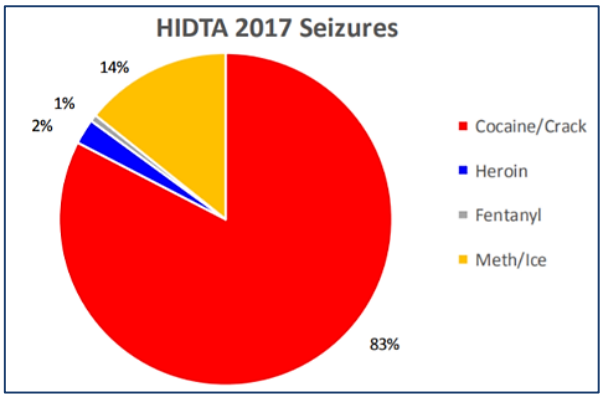

Figure 1. High Intensity Drug Trafficking Areas National Emerging Drug Threats Initiative. (2019). *Emerging threats report 2018: Status and factors affecting the United States*. Drug Enforcement Administration, U.S. Department of Justice.

The origins of cocaine use date back to pre-Columbian South American civilizations; however, it is the recent increase in Colombian cocaine production that has become a serious concern. Production took off in 2015, when the Colombian government banned aerial spraying of coca fields due to the toxicity of the herbicides used. The number of Colombian campesinos (rural farmers) whose livelihoods depend on coca cultivation has doubled since 2015, and the amount of cocaine entering the United States has increased significantly.[13]

[11] Drug Enforcement Administration. (2019). *2019 National drug threat assessment* (DEA-DCT-DIR-007-20). U.S. Department of Justice. **https://www.dea.gov/sites/default/files/2020-02/DIR-007-20%202019%20National%20Drug%20Threat%20Assessment%20-%20low%20res210.pdf**

[12] Kariisa, M., Scholl, L., Wilson, N., Seth, P., & Hoots, B. (2019, May 3). Drug overdose deaths involving cocaine and psychostimulants with abuse potential — United States, 2003–2017. *Morbidity and Mortality Weekly Report (MMWR)*, *68*(17), 388–395. **http://dx.doi.org/10.15585/mmwr.mm6817a3**

[13] High Intensity Drug Trafficking Areas National Emerging Drug Threats Initiative. (2019). *Emerging threats report 2018: Status and factors affecting the United States*. Drug Enforcement Administration, U.S. Department of Justice.

The current wave of stimulant deaths is unlike any other that has come before. It has been primarily driven by synthetic opioids, either taken concomitantly or used to adulterate heroin, counterfeit prescription opioids, cocaine, and meth. Opioids were involved in 75 percent of cocaine deaths and half of deaths involving psychostimulants in 2017, representing almost 20 percent and 15 percent of all overdose fatalities, respectively.

The graph of cocaine deaths through 2018 (figure 2) suggests increases are starting to level off. The blue line, representing cocaine deaths without opioid involvement, has remained relatively flat. However, methamphetamine deaths with and without opioid involvement have maintained the same 50:50 ratio, and both are continuing to increase. [14]

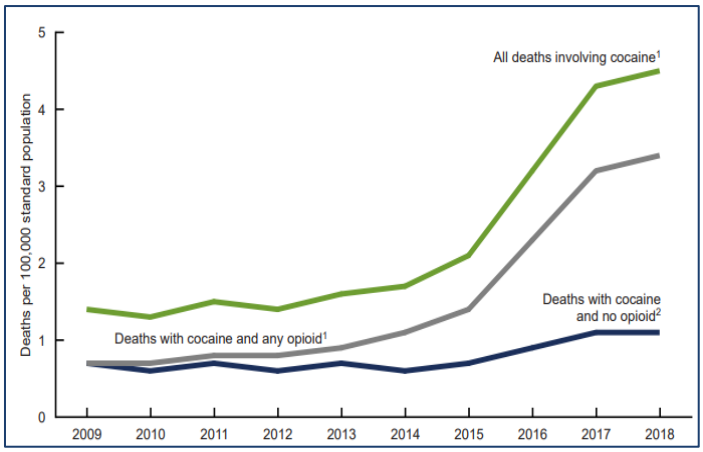

Figure 2. Hedegaard, H., Spencer, M. R., & Garnett, M. F. (2020). *Increase in drug overdose deaths involving cocaine: United States, 2009–2018* (NCHS Data Brief No. 384). National Center for Health Statistics.

Section II of this manual focuses on concurrent opioid and cocaine or methamphetamine use among Residential Substance Abuse Treatment (RSAT) clients with opioid use disorder (OUD) and among those receiving medication-assisted treatment (MAT). It includes tools to address polysubstance use and the increased risks of relapse as well as overdose risks posed by adulteration of cocaine and meth supplies with fentanyl. RSAT programs are likely to see more individuals with histories of—or current—complex, shifting polysubstance use patterns. It is becoming nearly impossible to treat any substance use disorder (SUD) without untangling the tentacles of polysubstance use wrapped around it.

Section III covers the consequences of stimulant use, with a focus on methamphetamine. Understanding the profound physiological, cognitive, and neuropsychological consequences of chronic meth use is essential to delivering effective treatment. This includes related mental health disorders that can predispose individuals to meth use, manifest during active use, accompany withdrawal, or persist in recovery. The section explains what we know about the potential duration or permanency of meth-related mental disorders and cognitive deficits. It also gives an overview of some of the pharmacological interventions that have shown promise.

[14] Jones, C. M., Compton, W. M., & Mustaquim, D. (2020, March 27). Patterns and characteristics of methamphetamine use among adults — United States, 2015–2018. *Morbidity and Mortality Weekly Report (MMWR)*, 69(12), 317–323. **http://dx.doi.org/10.15585/mmwr.mm6912a1**

Section IV emphasizes the only evidenced-based approaches to treating meth and other stimulant use disorders—behavioral treatments, as no approved medications are currently available. It covers best practices that support treatment engagement and retention and provides details on evidence-based interventions. It also offers information on how these practices have been applied and adapted for custody-based treatment programs and lists helpful resources. This includes information on recidivism and other post-release outcomes relevant to reentering RSAT clients recovering from meth or other stimulant use disorders.

DEA Launches Operation Crystal Shield—February 20, 2020

Together, the following nine cities accounted for more than 75 percent of methamphetamine seized in 2019: Atlanta, Dallas, El Paso, Houston, Los Angeles, New Orleans, Phoenix, San Diego, and St. Louis. DEA-directed enforcement resources are focusing on these hub cities where large quantities of meth are trafficked for distribution across the country. Operation Crystal Shield partners with local law enforcement and leverages existing DEA initiatives that target major drug trafficking networks, including Mexican cartels responsible for virtually all meth trafficked into and within the United States.

DEA. (2020, September 10). *Attorney General Barr announces results of DEA Operation Crystal Shield*.

Why Focus on Meth?

There are several reasons why much of this manual is heavily focused on meth. The first is its longstanding relationship to crime, including non-drug-related violent crime. The age demographic of meth users tends to be younger than opioid or cocaine users, making meth users statistically more likely to engage in criminal behavior. In 2018, adults 26–34 years old were at highest risk for methamphetamine use, but the fastest increases in usage rates were among girls under 26, with boys under 26 close behind.[15] Moreover, predisposing factors and consequences of use tend to parallel certain criminogenic traits such as impulsivity and a tendency toward physical aggression. Research shows methamphetamine use is associated with subsequent hospitalizations for drug-induced psychosis, increased recidivism and medical costs, and higher crime and criminal justice costs.[16]

In 2005, the National Drug Threat Assessment found more than 40 percent of local law enforcement agencies considered methamphetamine the biggest drug threat.[17] By 2014, half of arrestees in Sacramento, California, and 16 percent of arrestees in Denver, Colorado, were testing positive for methamphetamine.[18] Results from the 2018 National Survey on Drug Use and Health estimate 6.6 percent of respondents have ever used methamphetamine, making today's usage rates higher than

[15] National Institute on Drug Abuse. (2020). *National Survey on Drug Use and Health: Trends in prevalence of various drugs for ages 12 or older, ages 12 to 17, ages 18 to 25, and ages 26 or older; 2016 – 2018*. National Institutes of Health. **https://www.drugabuse.gov/drug-topics/trends-statistics/national-drug-early-warning-system-ndews/national-survey-drug-use-health**

[16] Cumming, C., Kinner, S. A., McKetin, R., Li, I., & Preen, D. (2020). Methamphetamine use, health and criminal justice system outcomes: A systematic review. *Drug and Alcohol Review*, *39*(5), 505–518. **https://doi.org/10.1111/dar.13062**

[17] National Drug Intelligence Center. (2005). *National drug threat assessment 2005*. **https://www.justice.gov/archive/ndic/pubs11/12620/index.htm**

[18] Office of National Drug Control Policy. (2014). *ADAM II 2013 annual report: Arrestee Drug Abuse Monitoring Program*. Executive Office of the President. **https://www.abtassociates.com/sites/default/files/migrated_files/91485e0a-8774-442e-8ca1-5ec85ff5fb9a.pdf**

they were at the peak of the last meth crisis.[19] The law enforcement community is once again expressing concern and taking measures to reduce the supply of meth.[20]

This quotation from a report on Texas characterizes the usage and demographic trends many jurisdictions are seeing.

> *Methamphetamine admissions to treatment programs increased from 3% of all admissions in 1995 to 11% in 2007, dropped to 8% in 2009, and then rose to 18% of admissions in 2018. . . . Route of administration in 1995 was primarily injecting (68%), but by 2018, it was smoking (59%), injecting (27%), and inhaling (9%). . . . In 1995, 91% were White, 5% were Hispanic, and 2% were Black. Of the 2018 admissions, 72% were White, 21% were Hispanic, and 5% were Black. In 1994, 59% of the clients were male, as compared to 44% male in 2018.*[21]

Another reason for the focus on methamphetamine is its growing popularity with transnational criminal drug trafficking organizations, or cartels. Synthetic stimulants and synthetic opioids are less expensive to produce, easy to manufacture, potent, and long acting. Heroin and cocaine involve growing seasons, harvesting, and processing before they are transported to retail markets. The same reasons for the meteoric rise of illicit fentanyl are motivating methamphetamine suppliers to pursue bigger profits with smaller investments of time and money.[22]

In 2018, methamphetamine purity levels averaged well above 90 percent, while prices remained low. Availability was highest in the West and Midwest, with a strong presence in the Southeast and evidence of infiltration into new markets. DEA domestic seizures of methamphetamine increased by 127 percent between 2017 and 2019, while the number of related DEA arrests increased by nearly 20 percent.[23] The 2019 DEA Drug Threat Assessment indicates meth availability increased in the areas of 14 out of 21 field offices, with evidence of traffickers attempting to expand into new, nontraditional markets.[24]

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[19] National Institute on Drug Abuse. (2020). *National Survey on Drug Use and Health: Trends in prevalence of various drugs for ages 12 or older, ages 12 to 17, ages 18 to 25, and ages 26 or older; 2016 – 2018*. National Institutes of Health. **https://www.drugabuse.gov/drug-topics/trends-statistics/national-drug-early-warning-system-ndews/national-survey-drug-use-health**

[20] Listwan, S. J., Shaffer, D. K., & Hartman, J. L. (2009). Combating methamphetamine use in the community: The efficacy of the drug court model. *Crime & Delinquency*, *55*(4), 627–644. **https://doi.org/10.1177/0011128707307221**

[21] Maxwell, J. C. (2019). *State of Texas drug use patterns and trends, 2019*. University of Texas at Austin Steve Hicks School of Social Work, Addiction Research Institute. **https://socialwork.utexas.edu/wp-content/uploads/2020/09/Texas-Substance-abuse-trends-2019.pdf**

[22] High Intensity Drug Trafficking Areas National Emerging Drug Threats Initiative. (2019). *Emerging threats report 2018: Status and factors effecting the United States*. Drug Enforcement Administration, U.S. Department of Justice.

[23] U.S. Department of Justice Office of Public Affairs (2020, September 10). A*ttorney General William P. Barr and DEA Acting Administrator Timothy J. Shea announce results of Operation Crystal Shield* [Press release].

https://www.justice.gov/opa/pr/attorney-general-william-p-barr-and-dea-acting-administrator-timothy-j-shea-announce-results

[24] Drug Enforcement Administration. (2019). *2019 National drug threat assessment* (DEA-DCT-DIR-007-20). U.S. Department of Justice. **https://www.dea.gov/sites/default/files/2020-02/DIR-007-20%202019%20National%20Drug%20Threat%20Assessment%20-%20low%20res210.pdf**

While it is true the meth problem varies geographically, with the largest number of seizures still in the West, Midwest, and Southeast, it is now permeating other regions—regions that have been consistently associated with high rates of illicit opioid use. For example, Louisa, Kentucky, and Concord, New Hampshire, have both been hit extremely hard by the opioid crisis and are seeing unparalleled increases in supplies of methamphetamine. In Concord, meth now accounts for 60 percent of all drug seizures. State police near Louisa report 8 out of 10 arrests are meth related. More than half of states report meth plays a role in the crimes committed by at least one in five individuals in custody.[25]

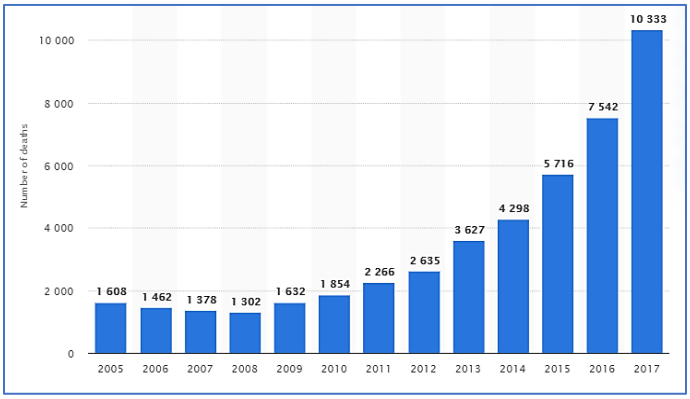

Figure 3. Kariisa, M., Scholl, L., Wilson, N., Seth, P., & Hoots, B. (2020). Drug overdose deaths involving cocaine and psychostimulants with abuse potential — United States, 2003–2017. *Morbidity and Mortality Weekly Report (MMWR)*, 68(17), 388–395.

Death counts for psychostimulants with abuse potential continue to rise. According to the Centers for Disease Control and Prevention (CDC), there were 10,333 psychostimulant drug deaths in 2017, representing a 37 percent increase from the previous year and a 543 percent increase since 2005.[26] Final 2018 drug overdose mortality data, 2019 provisional data, and 2020 projections suggest a trend of continued acceleration.[27]

Finally, treating methamphetamine abuse has long been considered a challenge. Many of the effective approaches outlined in this manual are based on practices that were developed to treat cocaine use disorder.[28] There are combinations of interventions specific to meth; however, cognitive behavioral interventions (CBIs), including contingency management, dominate treatment approaches for all stimulant use disorders.

While prolonged, heavy cocaine use can have physical and neuropsychological consequences, meth's greater neurotoxicity increases the potential for serious deficits in cognitive functioning that may be profound and permanent.[29] Although some of these brain alterations may diminish with 6–12 months or

[25] Listwan, S. J., Shaffer, D. K., & Hartman, J. L. (2009). Combating methamphetamine use in the community: The efficacy of the drug court model. *Crime & Delinquency*, *55*(4), 627–644. **https://doi.org/10.1177/0011128707307221**

[26] Kariisa, M., Scholl, L., Wilson, N., Seth, P., & Hoots, B. (2019, May 3). Drug overdose deaths involving cocaine and psychostimulants with abuse potential — United States, 2003–2017. *Morbidity and Mortality Weekly Report (MMWR)*, 68(17), 388–395. **http://dx.doi.org/10.15585/mmwr.mm6817a3**

[27] National Center for Health Statistics. (n.d.). *Vital statistics rapid release: Provisional drug overdose death counts*. Centers for Disease Control and Prevention. Retrieved September 16, 2020. **https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm**

[28] Hunt, D., Kuck, S. & Truitt, L. (2006). *Methamphetamine use: Lessons learned*. Abt Associates Inc. **https://www.ncjrs.gov/pdffiles1/nij/grants/209730.pdf**

[29] Rawson, R. (2019, June 11). *Strategies to address cocaine and methamphetamine use* [Webinar]. Great Lakes ATTC and Northwest ATTC. **https://attcnetwork.org/centers/northwest-attc/event/strategies-address-cocaine-and-methamphetamine-use-webinar**

more of abstinence, other alterations may not, even after long periods of time.[30] The same can be said of methamphetamine-related mental health disorders.[31]

RSAT clients are already more likely to have low levels of literacy and educational attainment than in the general populations. Treatment for moderate to severe methamphetamine use disorder must make allowances for the compounded effects of mental health, cognitive, learning, and memory problems. Even in cases where mental health symptoms and cognitive deficits are temporary, they are likely to persist throughout entire episodes of long-term treatment. It is not enough to deliver CBIs that are demonstrated to be effective in treatment of stimulant use disorders (with fidelity). Mental, cognitive, and neuropsychological damage due to chronic meth use may be an unwelcome participant in every group and individual session, presenting an additional challenge for RSAT program staffs.

***Note**: Methamphetamine deaths are included in the broader category of deaths related to psychostimulants with abuse potential, encompassing caffeine, cathinones, and phenethylamines (such as MDMA, amphetamine, and methamphetamine). Meth involvement in overdose deaths is difficult to differentiate from the effects of MDMA or amphetamine without confirmatory tests such as gas chromatography, making it hard to parse out meth data, specifically.*

[30] Wang, G., Volkow, N. D., Chang, L., Miller, E., Sedler, M., Hitzemann, R., Zhu, W., Logan, J., Ma, Y., & Fowler, J. S. (2004). Partial recovery of brain metabolism in methamphetamine abusers after protracted abstinence. *The American Journal of Psychiatry*, *161*(2), 242–248. **https://doi.org/10.1176/appi.ajp.161.2.242**

[31] Glasner-Edwards, S., Mooney, L. J., Marinelli-Casey, P., Hillhouse, M., Ang, A., Rawson, R., & the Methamphetamine Treatment Project Corporate Authors. (2008). Identifying methamphetamine users at risk for major depressive disorder: Findings from the methamphetamine treatment project at three-year follow-up. *The American Journal on Addictions*, *17*(2), 99–102. **https://doi.org/10.1080/10550490701861110**

II Concurrent Use of Opioids and Stimulants

Research shows heroin or cocaine users who also use other drugs have higher offending rates than heroin or cocaine users who are not polydrug users.[32] Methamphetamine users, in particular, are more likely to have complex histories of polydrug use than non-meth users, as well as higher rates of involvement in criminal activities (including violent crime) than opioid users.[33]

Current use patterns vary among people who use both opioids and stimulants, as does motivation. They can be grouped into three general categories:

1. Intentional concomitant use to produce effects attained from taking both drugs together.
2. Concomitant use due to cross-contaminated or adulterated supplies of one or both illicit drugs.
3. Meth or cocaine use among current or former opioid users, including those receiving medication-assisted treatment (MAT).

In the case of intentional concomitant use, "speedballs" and "goofballs" are the highest risk forms. This typically involves intravenous use of a mixture of opioids and stimulants to produce the desired effects of taking both drugs together. There are variations on speedballs or goofballs wherein one or both drugs may be insufflated (snorted) or smoked, but it is more common to inject a mix of both drugs in a single shot.[34]

A speedball is the infamous mix of cocaine and heroin (or other opioids) responsible for the deaths of John Belushi, Chris Farley, River Phoenix, Phillip Seymour Hoffman, and many other famous artists and musicians. Death can result from the synergistic and potentiating effects of combining both drugs. A goofball is a historically less common mixture of meth and heroin or fentanyl (or other opioids) that appears to be gaining popularity, although not all users may recognize the name. Both combinations are extremely dangerous, especially if injected, as all the substances involved can contribute to

[32] Bennett, T., & Holloway, K. (2005). The association between multiple drug misuse and crime. *International Journal of Offender Therapy and Comparative Criminology*, *49*(1), 63–81. **https://doi.org/10.1177%2F0306624X04269003**

[33] Goldsmid, S., & Willis, M. (2016). Methamphetamine use and acquisitive crime: Evidence of a relationship. *Trends & Issues in Crime and Criminal Justice,* No. 516. Australian Institute of Criminology. **https://www.aic.gov.au/publications/tandi/tandi516**; Darke, S., Torok, M., Kaye, S., Ross, J., & McKetin, R. (2010). Comparative rates of violent crime among regular methamphetamine and opioid users: Offending and victimization. *Addiction*, *105*(5), 916–919. **https://doi.org/10.1111/j.1360-0443.2009.02872.x**

[34] Jones, C. M., Underwood., N., & Compton, W. M. (2020). Increases in methamphetamine use among heroin treatment admissions in the United States, 2008–17. *Addiction*, *115*(2), 347–353. **https://doi.org/10.1111/add.14812**

respiratory depression. Most users operate under inaccurate assumptions about the way the two drugs interact and may think one can counteract the effects of the other. In actuality, stimulants sometimes temporarily mask the potency of a lethal dose of opioids until it is too late.[35]

Use of opioid/stimulant cross-adulterated substances is primarily driven by local illicit drug supplies. For example, individual heroin users may be unaware they are taking something adulterated with combinations of fentanyl, cocaine, methamphetamine, and possibly other substances. But seasoned heroin users, especially in regions where illicit fentanyl formulations dominate, may have come to expect local illicit opioid supplies to be laced with fentanyl or meth. Sadly, some long-term heroin users who are severely addicted have been known to seek out fentanyl despite the associated fatality risk. Adulteration of illicit opioids may have increased due to the global COVID-19 pandemic. This is likely due to disrupted trafficking in drugs and supplies of chemicals used to manufacture or process them, commonly involving routes from China, through Mexico or Canada, before reaching U.S. markets.[36]

However, the counterpart to adulterated opioids (cocaine or other stimulants adulterated with fentanyl) appeared first. This resulted in emergency rooms being inundated with fentanyl overdose victims who reported they exclusively used crack cocaine or other stimulants. For example, in 2017 the Hamilton County, Ohio, coroner warned that cocaine laced with illicit fentanyl was causing sharp increases in opioid overdose deaths. The Cuyahoga County, Ohio, coroner told U.S. senators at a hearing in May of that year that drug traffickers were targeting African Americans who use cocaine as a new market for opioids.[37] A September 2018 DEA press release warned the public after a spate of deaths in occurred in San Diego, California, due to fentanyl-laced cocaine.[38] In the spring of 2019, the Hamilton County (Ohio) Heroin Task Force announced local supplies of methamphetamine and pills that were being sold as ecstasy were tainted with fentanyl, after 18 overdose deaths occurred in less than 2 weeks. In October 2020, the DEA announced the indictment of a New York City drug trafficker for “dangerous, unusual drug mixtures of heroin, fentanyl, tramadol and methamphetamine.”[39]

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[35] Ellis, M. S., Kasper, Z. A., & Cicero, T. J. (2018). Twin epidemics: The surging rise of methamphetamine use in chronic opioid users. *Drug and Alcohol Dependence*, *193*, 14–20. **https://doi.org/10.1016/j.drugalcdep.2018.08.029**

[36] National Institute on Drug Abuse. (2019). *Methamphetamine DrugFacts*. **https://www.drugabuse.gov/publications/drugfacts/methamphetamine**

[37] Crime and Justice News. (2019, April 2). Opioid overdose deaths increase among Blacks. *The Crime Report*. **https://thecrimereport.org/2019/04/02/opioid-overdose-deaths-increase-among-blacks/**

[38] Drug Enforcement Administration. (2018, September 14). *Cocaine laced with fentanyl leads to multiple deaths, overdoses* [Press release]. U.S. Department of Justice. **https://www.dea.gov/press-releases/2018/09/14/cocaine-laced-fentanyl-leads-multiple-deaths-overdoses**

[39] Drug Enforcement Administration. (2020, October 5). *Indictment charges man for trafficking dangerous, unusual drug mixtures of heroin, fentanyl, tramadol and methamphetamine* [Press release]. U.S. Department of Justice. **https://www.dea.gov/press-releases/2020/10/05/indictment-charges-man-trafficking-dangerous-unusual-drug-mixtures-heroin**

Between 2016 and 2017, fentanyl/cocaine mixtures increased 74 percent and fentanyl/meth mixtures increased 173 percent among samples tested from illicit drug seizures[40]. Fentanyl has become a popular adulterant among drug dealers as an inexpensive way to boost the effects and addictive properties of stimulants. It is certain that the recent increases in stimulant-related deaths are primarily driven by involvement of fentanyl-like illicit drugs.[41]

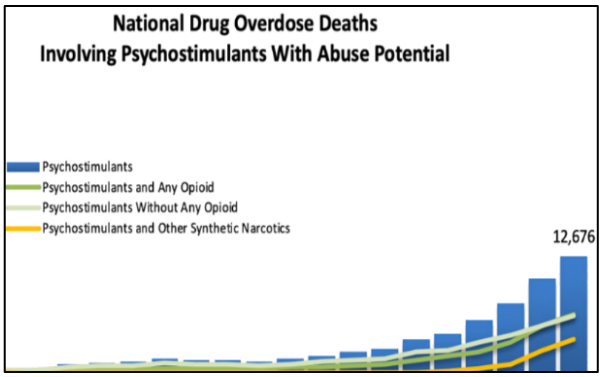

Figure 5. Hedegaard, H., Spencer, M. R., & Garnett, M. F. (2020). Increase in drug overdose deaths involving cocaine: United States, 2009–2018 (NCHS Data Brief No. 384). National Center for Health Statistics.

Meth or other stimulant use by current and former opioid users, including those receiving MAT, is particularly relevant to RSAT programs treating clients with opioid use disorder (OUD). People who are actively using opioids report using meth to get through opioid withdrawal, as a more readily available substitute when they crave opioids, or to control the consequences of their opioid use (improve functioning or decrease compulsive use). A study that examined the proportions of people entering treatment primarily for heroin use disorder between 2008 and 2017 found that reported meth use increased an average of 23 percent annually. Overall, the prevalence of meth use increased from 1 out of 50 people admitted for heroin treatment to 1 in 8 over the 10-year period.[42] The graph in figure 6 illustrates results of a different study of rates of past-month meth use among people seeking treatment for opioid use. In 2011, less than 19 percent of the sample reported past-month meth use; however, by 2017, more than 34 percent reported past-month meth use.[43]

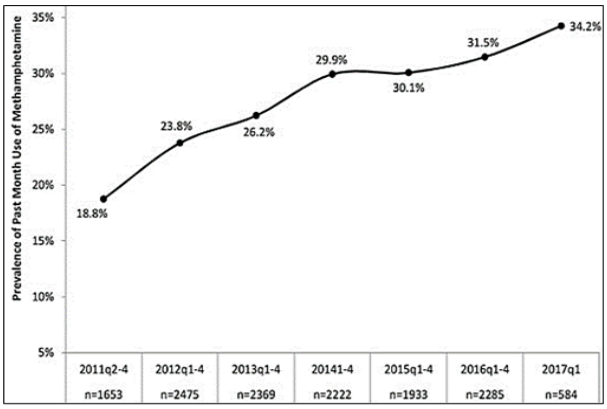

Figure 6. Jones, C. M., Underwood, N., & Compton, W. M. (2020). Increases in methamphetamine use among heroin treatment admissions in the United States, 2008–17. Addiction, 115(2), 347–353. **https://doi.org/10.1111/add.14812**

Individuals in early recovery from OUDs may harbor the illusion that they can control their stimulant use or that a slip involving meth or cocaine will not plunge them back to the depths of opioid addiction. However, research clearly shows that stimulant use undermines treatment of OUD. A recent study examined meth use among individuals receiving buprenorphine for OUD and

[40] Drug Enforcement Administration. (2019). 2019 National drug threat assessment (DEA-DCT-DIR-007-20). U.S. Department of Justice. **https://www.dea.gov/sites/default/files/2020-02/DIR-007-20%202019%20National%20Drug%20Threat%20Assessment%20%20low%20res210.pdf**

[41] Hedegaard, H., Spencer, M. R., & Garnett, M. F. (2020). Increase in drug overdose deaths involving cocaine: United States, 2009–2018 (NCHS Data Brief No. 384). National Center for Health Statistics.

[42] Jones, C. M., Underwood, N., & Compton, W. M. (2020). Increases in methamphetamine use among heroin treatment admissions in the United States, 2008–17. *Addiction*, *115*(2), 347–353. **https://doi.org/10.1111/add.14812**

[43] Ellis, M. S., Kasper, Z. A., & Cicero, T. J. (2018). Twin epidemics: The surging rise of methamphetamine use in chronic opioid users. *Drug and Alcohol Dependence, 193*, 14-20. **https://doi.org/10.1016/j.drugalcdep.2018.08.029**

found patients who concurrently used methamphetamine were at least twice as likely to drop out of treatment. Methamphetamine use did decrease over time among those who were retained in buprenorphine treatment.[44]

Stimulant Use and MAT for OUD

During the 1980s, research was conducted on cocaine use among methadone maintenance patients to determine cocaine's impact on treatment progress. Opioid Treatment Programs (OTPs) reported the results of urine screens of patients receiving methadone. The proportions that tested positive for cocaine were as high as 70 percent. During the 1990s, rates of crack cocaine use increased among stable methadone maintenance patients who had been abstinent from illicit drug use for years. Ultimately, the impact of crack cocaine was dramatic, resulting in high rates of premature treatment terminations/dropouts and increases in drug-related crime, injection drug use, and the spread of HIV/AIDS and viral hepatitis.[45]

Some older RSAT clients with significant stimulant use histories that include intravenous use may report initiating opioid use to "escape" the throes of meth or cocaine addiction. Both cocaine and meth addiction are characterized by relentless binge use, during which users remain awake for days at a time, compulsively injecting or smoking increasing dosages of stimulants. Binge use of any stimulant is extremely risky. But methamphetamine's extended half-life (12 hours) allows a buildup of its toxicity during binge use. Cocaine has a much shorter half-life (about 1 hour), which may be one of the reasons most cocaine fatalities are due to opioid involvement. However, half of methamphetamine overdose deaths do not involve opioids; these fatalities have also increased dramatically.[46]

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[44] Tsui, J. I., Mayfield, J., Speaker, E. C., Yakup, S., Ries, R., Funai, H., Leroux, B. G., & Merrill, J. O. (2020). Association between methamphetamine use and retention among patients with opioid use disorders treated with buprenorphine. *Journal of Substance Abuse Treatment*, *109*, 80–85. **https://doi.org/10.1016/j.jsat.2019.10.005**

[45] Ellis, M. S., Kasper, Z. A., & Cicero, T. J. (2018). Twin epidemics: The surging rise of methamphetamine use in chronic opioid users. *Drug and Alcohol Dependence*, *193*, 14–20. **https://doi.org/10.1016/j.drugalcdep.2018.08.029**

[46] Maxwell, J. C. (2015) Implications of research for treatment: Methamphetamine. Gulf Coast Addiction Technology Transfer Center and Center for Excellence in Drug Epidemiology at the University of Texas Center for Social Work Research.

Current Trends Among the Reentry Population

Opioids are still implicated in a majority of post-release overdose deaths. However, a larger proportion of overdose deaths among individuals recently released from custody have involved multiple substances.[47] A study of drug overdose deaths of ex-prisoners from 2000 to 2007 showed polysubstance use was a factor in 72 percent of drug-related fatalities.[48] At the beginning of 2017, the Delaware Monitoring Initiative reported multiple substances were present in 86 percent of overdose decedents with a history of recent incarceration.[49]

Addressing Stimulant Use in RSAT Programs

By definition, RSAT clients have moderate to severe substance use disorders (SUDs). Moreover, OUD is widely considered one of the most difficult SUDs to recover from. RSAT clients with OUD who are fortunate enough to have access to MAT need to fully understand that outcomes are poor when people receiving MAT experiment with, occasionally use, or substitute stimulants. They cut in half the chance of succeeding at something that is difficult to begin with. Risks include overdose fatality, a return to opioid addiction, and development of a stimulant addiction, a more severe form of addictive illness, or polysubstance use disorder.[50]

Stimulant Overdose

There is no medication that can reverse a stimulant overdose. Severe symptoms of cocaine overdose include irregular heart rhythm, heart attacks, seizures, strokes, and difficulty breathing. Methamphetamine overdose can result in high blood pressure and body temperature, stroke, or cardiac collapse. There is not much a bystander can do other than call 911 as soon as possible and provide information to medical staff. First responders and emergency room doctors treat symptoms in cases of stimulant overdose by:

- Stopping seizures, lowering blood pressure, and lowering body temperature.
- Restoring blood flow to the heart.
- Restoring oxygen-rich blood to affected parts of the brain.

Health status can also influence susceptibility to overdose. People with existing heart disease who abuse stimulants are among the most susceptible to stimulant overdose death.

Despite the best efforts of RSAT staff to integrate these messages into psychoeducation and relapse prevention groups, some clients will insist on opening Pandora's box. Aside from other motivations, neuropsychological factors are powerful motivators and reinforcers of this irrational behavior. When the brain has an external source of potent opioids, its capacity to manufacture its own opioid-like neurochemicals that naturally control pain and regulate mood is impaired for a very long time. Less is known about the way methamphetamine and other stimulants affect the brain, but we know they cause

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[47] Warner, M., Trinidad, J. P., Bastian, B. A., Miniño, A. M., & Hedegaard, H. (2016). Drugs most frequently involved in drug overdose deaths: United States, 2010–2014. *National Vital Statistics Reports*, *65*(10). https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_10.pdf#:~:text=National%20Vital%20Statistics%20Reports%2C%20Vol.%2065%2C%20No.%2010%2C,classified%20in%20the%20same%20category%20of%20Natural%20and

[48] Andrews, J. Y., & Kinner, S. A. (2012). Understanding drug-related mortality in released prisoners: A review of national coronial records. *BMC Public Health*, *12*, Article 270. https://doi.org/10.1186/1471-2458-12-270

[49] Johns Hopkins Bloomberg School of Public Health & the Bloomberg American Health Initiative. (2018). *A blueprint for transforming opioid use disorder treatment in Delaware*. Delaware Department of Health and Social Services. https://dhss.delaware.gov/dhss/files/johnshopkinsrep.pdf

50 This and other relevant MAT research is summarized in "Recent Medication-Assisted Treatment Studies Relevant to Corrections and can be found on www.rsat-tta.com.

a dramatic spike in dopamine levels, something our brain manufactures in response to natural rewards. A brain impaired by long-term opioid use leaves the abstinent opioid user craving dopamine. The surge of dopamine provided by stimulants, especially meth, is a powerful reinforcer of behavior in the former or current opioid user.[51]

The strongest recommendation from current researchers is to ensure regular and random drug testing continues. This is critically important for RSAT clients reentering the community. It is easier to arrange for those released to community supervision, but it is also a best practice in community-based MAT. OTPs are required to drug test clients at least eight times a year. Drug testing is recommended, but not required, for office-based buprenorphine prescribers; however, corrections professionals can insist providers agree to drug testing as a condition of referrals.

Securing transitional, substance-free housing upon reentry affords RSAT clients a tremendous advantage. If correctional halfway houses or transitional housing units are not an option, there may be reliable local "sober housing" resources available. The Substance Abuse and Mental Health Services Administration (SAMHSA) has released national recovery housing standards, and a number of states are adopting or implementing their own recovery housing standards. The prerelease exercise that follows has examples of factors that contribute to likelihood of relapse or meth or cocaine use upon reentry. It prompts RSAT clients with examples of strategies to reduce or eliminate these risk factors, and then asks them to list some of their own.

[51] McCann, M. (2006). *The Matrix Model treatment approach for methamphetamine dependence*. Matrix Institute on Addictions.

OUD Relapse Prevention: Steps to Reduce the Risk of Stimulant or Other Drug Use

1. **Availability:** Some opioid users say meth is now more readily available and cheaper than other drugs.

   Can I avoid conversations about drugs, what's around, and how much it costs?

   Can I avoid certain people who know this type of information?

   Can I set some limits on my relationships with friends who are still using?

   How would I ask someone to please avoid these topics when I'm around?

   What can I say to interrupt a conversation that is going in that direction?

   Can I give myself permission to leave if drugs are the topic of conversation?

   What else will I do?

   _____

2. **Environmental cues**: Stimulant users are very sensitive to sensory reminders of drug use.

   Can I make sure I don't see paraphernalia of any kind, even in a store?

   Which neighborhoods and bars remind me of using?

   Are there certain people I can't be around for now?

   Have a ever wanted to use after watching a movie or TV show?

   Would a change of scene or living situation be a good thing?

   What are my biggest triggers?

   How will I deal with them?

   _____

3. **Unstructured time:** Unstructured time makes people vulnerable, especially to meth use.

How much free time will I have in my schedule right after release?

What can I do to fill up some of my free time?

Do I have backup plans in case anything falls through?

When I'm done with treatment and off supervision, what will I put in its place?

What keeps me busy and takes my mind off drug cravings?

What will I do when I'm bored?

_____

4. **Exposure:** People who learn to limit the chances of being around drugs find it easier to stay clean.

Have I made sure I will have a sober/drug-free place to stay?

Do I need reminders to take the full dose of my prescribed medications every day?

Can I make sure I am not around anyone using or buying any kind of drugs?

Am I willing to pass on making a few extra bucks, even if it involves something I don't use?

Have I accepted I can't afford to let my guard down by having a drink or getting high?

Do I recognize thoughts that lead to cravings and counter them right away?

What will I do if people are using where I live?

_____

5. **Nutrition and wellness**: Rebuilding your life is easier when you are healthy and feel better.

If I can't sleep, will I try catch-up sleep, relaxation, natural supplements, etc.?

Can I exercise to help me sleep or to deal with stress or depressed mood?

Will I make sure I eat regularly and choose foods that replace nutrients lost while using?

What kind of things do I like to do that I haven't done in a long time?

What is something I have always wanted to do but never had a chance to try?

How can I stay connected with the people who are in my corner?

How can I take better care of myself?

_____

6. **Stress and depression:** Feeling depressed is normal sometimes, as long as it's temporary.

When I'm depressed, what are the things that are good for me that I stop doing?

Where can I go to force myself to get out of the house and talk to people?

What type of exercise can I do for more than 30 minutes to help with mood and stress?

Can I do something for someone else when I need to get out of my own head?

What are things that stress me out that I can reduce or eliminate?

What else has worked for me?

_____

7. **Untreated mental health disorders:** If mental health problems are too much, what are my options?

Where could I go if I wanted to get help?

Do I have information on self-help, phone lines, and support groups?

Is there a counselor who could help me figure out what I need?

What has helped me in the past when I had these kinds of problems?

When I get depressed, anxious, or stressed, does the urge to use get stronger?

What would I want to happen if I really needed help?

_____

III. Consequences of Meth and Other Stimulant Use

Widespread chronic cocaine and/or methamphetamine use can boost crime rates, socially and economically devastate entire regions, destroy families, and cause lasting harm to children. Many communities experienced such consequences as a direct result of the crack cocaine and methamphetamine crises of the recent past. While the societal costs are an enormous concern, this section focuses largely on consequences to the individual user and how they can affect treatment engagement and progress.

Social and familial consequences associated with cocaine, methamphetamine, and other psychostimulant addiction include high rates of homelessness, complete loss of familial and social support networks, increased hospital admissions and high health care costs (psychiatric and medical), criminal justice involvement, physical aggression and violence, overdose, and child endangerment, neglect, or abuse. Meth, in particular, is also associated with poverty, suicide, and sexual/violent victimization, especially among female meth users.[52]

Research on the effects of methamphetamine use during pregnancy is limited, as they are difficult to isolate from the effects of alcohol, tobacco, or other drug use that typically accompany meth use. Available research indicates meth is associated with premature delivery, placental abruption, and low

Figure 7. Substance Abuse and Mental Health Services Administration (SAMHSA). (2020). T*reatment of stimulant use disorders* (SAMHSA Publication No. PEP20-06-01-001). National Mental Health and Substance Use Policy Laboratory.

[52] Government of Canada. (2019). *Impacts of methamphetamine abuse in Canada: Report of the Standing Committee on Health*. 42nd Parliament, 1st session. **http://www.publications.gc.ca/collections/collection_2019/parl/xc62-1/XC62-1-1-421-26-eng.pdf**; National Institute on Drug Abuse. (2019). *Methamphetamine research report*. National Institutes of Health, U.S. Department of Health and Human Services. **https://www.drugabuse.gov/publications/research-reports/methamphetamine/overview**

birth weight. Effects on infants can include heart and brain abnormalities, decreased arousal, lethargy, increased stress, and poor quality of movement. Delayed motor development and attention impairments can occur among toddlers and preschool-age children, along with ongoing behavioral difficulties in school related to self-control, executive function, and cognitive deficits.[53]

Pharmacological Properties of Methamphetamine

Unlike opioids and most other abused drugs, methamphetamine is a neurotoxin. Like other drugs, it affects the release and reuptake of certain brain chemicals, but methamphetamine can also damage the neural tissues within the brain. It is a more potent stimulant than cocaine or other amphetamines because greater amounts of the drug get into the brain and remain there longer. Cocaine quickly leaves the body, with a half-life of about 1 hour, whereas meth's 12-hour half-life makes it a much longer acting stimulant. However, the euphoric effects of meth peak long before its stimulant effects, which increases the risk of binge use and a buildup of meth toxicity that can result in overdose. Moreover, the come down from methamphetamine, often referred to as "crashing," is characterized by fatigue, cravings, depression, anxiety, insomnia, and mental confusion. To find relief from this unpleasant state, users become trapped in a cycle of repeat dosages that can lead to a buildup that results in overdose death.

Meth's potential to cause long-lasting harm to the central nervous system sets it apart from other stimulants.[54] These physiological effects impact the brain, which in turn impacts behavior. It can be difficult to distinguish meth's physiological effects from its psychological consequences. Its significant and complex relationship to co-occurring psychiatric disorders is discussed at length later in this section.[55] First, we will examine the physiological changes that occur with methamphetamine use and the long- and short-term health consequences.

Physiological Effects

Upon ingesting methamphetamine, the user's heart rate accelerates, blood pressure and body temperature rise, and pupils dilate. Cardiovascular effects such as irregular or racing heartbeat may occur as dosages increase. Binge use can result in overdose, stroke, or convulsions, which must be treated immediately to prevent fatality.

Users describe feeling more energetic and alert, experiencing elevated mood and feelings of euphoria, power, and control. Meth also increases attention and focus while decreasing appetite. It may manifest

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[53] Smith, L. M., Diaz. S., LaGasse, L. L., Wouldes, T., Derauf, C., Newman, E., Arria, A., Huestis, M. A., Haning, W., Strauss, A., Della Grotta, S., Dansereau, L. M., Neal, C., & Lester, B. M. (2015). Developmental and behavioral consequences of prenatal methamphetamine exposure: A review of the Infant Development, Environment, and Lifestyle (IDEAL) study. *Neurotoxicology and Teratology*, *51*, 35–44. **https://doi.org/10.1016/j.ntt.2015.07.006**

[54] Rusyniak, D. E. (2013). Neurologic manifestations of chronic methamphetamine abuse. *Psychiatric Clinics of North America*, *36*(2), 261-275. **https://doi.org/10.1016/j.psc.2013.02.005**

[55] Akindipe, T., Wilson, D., & Stein, D. J. (2014). Psychiatric disorders in individuals with methamphetamine dependence: Prevalence and risk factors. *Metabolic Brain Disease*, *29*, 351–357. **https://doi.org/10.1007/s11011-014-9496-5**

as talkativeness, activity, anxiety, and psychomotor agitation. If meth is injected or smoked, users feel an intensely euphoric "rush."[56]

Meth users can become deeply immersed in compulsive or repetitive behaviors. The derogatory term "tweaker" is used to describe twitching, jitteriness, jaw clenching or teeth grinding, or picking at real or imaginary sores. Meth users can also be prone to physical aggression and violent outbursts, often due to effects on mental status while under the influence, while "crashing'" (coming down from the meth high), or during withdrawal. They may experience confusion, paranoia, mood disturbances, hallucinations, or other symptoms of methamphetamine-induced psychosis. These effects can last for weeks, several months, a year, or more, and in some cases are permanent. Most scientists agree heavy meth use results in some degree of permanent neurological damage.[57]

Method	Takes effect	Lasts
Inject	1–2 minutes	3–7 hours
Smoke	1–2 minutes	3–7 hours
Snort	5–10 minutes	4–10 hours
Swallow	20–60 minutes	5–12 hours

Some users engage in sexually compulsive behavior or use meth to enhance sexual performance. Its use among certain elements of gay male subcultures has garnered a lot of attention, but heterosexual meth users also engage in high-risk sexual behaviors, including unprotected sex with one or more partners. Because chronic methamphetamine use attacks and weakens the immune system, risk of HIV and other sexually transmitted infections is very high. This is compounded by the tearing that often occurs during extended periods of high-risk sexual activity while under the influence such as receptive anal or vaginal intercourse.[58]

Short-term health-related effects include headaches, insomnia, dizziness, skin sores and infections, malnutrition, and severe dental decay. **Potential long-term health effects** include liver damage, extreme itching, insomnia, and increased vulnerability to heart attack and stroke. Meth use is also associated with eight times the risk of developing Parkinson's disease.[59] Psychiatric symptoms, memory problems, cognitive deficits, and impaired decisionmaking and behavioral inhibition may persist for many months and are sometimes permanent.[60]

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[56] Embry, D., Hankins, M., Biglan, A., & Boles, S. (2009). Behavioral and social correlates of methamphetamine use in a population-based sample of early and later adolescents. *Addictive Behaviors*, *34*(4), 343–351. **https://doi.org/10.1016/j.addbeh.2008.11.019**

[57] Clark, M., & Featherstone, R. (2019). *Management of acute withdrawal and detoxification for adults who misuse methamphetamine: A review of the clinical evidence and guidelines* (PMID: 31411840). Canadian Agency for Drugs and Technologies in Health. **https://www.ncbi.nlm.nih.gov/books/NBK545066/**

[58] Vik, P. W., & Ross, T. (2003) Methamphetamine use among incarcerated women. *Journal of Substance Use*, *8*(2), 69–77. **https://doi.org/10.1080/1465989031000109806**

[59] National Institute on Drug Abuse. (2019). *Methamphetamine research report.* National Institutes of Health; U.S. Department of Health and Human Services. **https://www.drugabuse.gov/publications/research-reports/methamphetamine/overview**

[60] Petit, A., Karila, L., Chalmin, F., & Lejoyeux, M. (2012). Methamphetamine addiction: A Review of the literature. *Journal of Addiction Research & Therapy*, S1:006. **https://doi.org/10.4172/2155-6105.S1-006**

Psychological Effects

According to the CDC, more than 57 percent of persons who used methamphetamine reported mental illness, and 25 percent reported serious mental illness during the past year.[61] Heavy methamphetamine use is associated with manifestations of psychopathology and high levels of psychiatric problems, such as depression, anxiety, psychosis, suicide, and violent behaviors. The same is true for an array of cognitive deficits ranging from short-term memory issues to problems with impulse control and decisionmaking.[62]

Stimulant users in general, and methamphetamine users in particular, have unusually high rates of relapse, experience extended periods of depression, and have episodes of confusion and paranoia, even after a long period of abstinence. Protracted intense craving, confusion, suicidality, and even psychotic episodes make treatment challenging.[63]

Effective treatment approaches must account for both co-occurring mental disorders *and* cognitive deficits, especially in time-limited, custody-based programs where recidivism reduction is an important goal.[64] Moreover, the physiological consequences of methamphetamine addiction influence behavior and may mimic or contribute to certain mental health disorders. For example, meth users entering treatment may suffer from malnutrition, which is known to cause or contribute to depression and other mental and physical health problems.[65]

Methamphetamine is an equal opportunity addiction, as it is one of the only illicit drugs women and men abuse at equal rates. Women's motivation for initiating methamphetamine use is often related to its effects on decreasing appetite and increasing energy.[66] Malnourished meth users who enter treatment

Examples of Symptoms of Psychopathology Due to Stimulant Use

Delusions: Paranoia, mind reading, etc. Feeling powerful and omnipotent or sure they are being persecuted or followed may contribute to violence.

Hallucinations: Mostly aural, but "zoom lensing" is common (abrupt pupil dilation causing objects to seem to jump closer). Increases risk of violence.

Psychosis: Meth users without a prior history of mental health disorders are significantly more likely to be diagnosed with schizophrenia.

Dissociation: Stimulant use contributes to memory deficits; plus, stimulant users may have been exposed to traumatic events. Both can contribute to dissociative states.

Depression: Depression is one of the hallmarks of stimulant withdrawal. People with pre-existing, undetected mood disorders may be drawn to stimulant use.

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[61] Jones, C. M., Compton, W. M., & Mustaquim, D. (2020). Patterns and characteristics of methamphetamine use among adults — United States, 2015–2018. *Morbidity and Mortality Weekly Report (MMWR)*, *69*(12), 317–323. **http://dx.doi.org/10.15585/mmwr.mm6912a1**

[62] Substance Abuse and Mental Health Services Administration (SAMHSA). (2020). T*reatment of stimulant use disorders* (SAMHSA Publication No. PEP20-06-01-001). National Mental Health and Substance Use Policy Laboratory. **https://integrationacademy.ahrq.gov/news-and-resources/news/treatment-stimulant-use-disorders-samhsa-evidence-based-resource**

[63] Hunt, D., Kuck, S., & Truitt, L. (2006). *Methamphetamine use: Lessons learned*. Abt Associates Inc. **https://www.ncjrs.gov/pdffiles1/nij/grants/209730.pdf**

[64] Cumming, C., Kinner, S. A., McKetin, R., Li, I., & Preen, D. (2020). Methamphetamine use, health and criminal justice system outcomes: A systematic review. *Drug and Alcohol Review*, *39*(5), 505–518. **https://doi.org/10.1111/dar.13062**

[65] Werb, D., Kerr, T., Zhang, R., Montaner, J. S., & Wood, E. (2010). Methamphetamine use and malnutrition among street-involved youth. *Harm Reduction Journal*, *7*, Article 5. **https://doi.org/10.1186/1477-7517-7-5**

[66] Vik, P. W., & Ross, T. (2003). Methamphetamine use among incarcerated women. *Journal of Substance Use*, *8*(2), 69–77. **https://doi.org/10.1080/1465989031000109806**; Substance Abuse and Mental Health Services Administration. (2020). *Treatment of stimulant*

at the end of a run sometimes display symptoms that mimic those of binge eating disorder or bulimia nervosa. These behaviors usually disappear, but may persist among a small minority of clients, some of whom likely had a pre-existing eating disorder. The same can be said for an array of other mental health disorders, although mood disorders, for example, tend to persist in a higher proportion of individuals.

Methamphetamine-induced psychosis is far more likely to occur among individuals with histories of schizophrenia or other types of psychosis; long-term heavy, habitual users; or binge users who inject the drug. Symptoms usually manifest shortly after the drug is taken, but their duration can vary. In most cases, psychosis dissipates with a short period of abstinence (less than a week). However, symptoms can persist and can require hospitalization, sedation, and treatment with antipsychotic medications. In some cases, enough symptoms persist to warrant diagnosis of a psychotic disorder. Studies suggest between 23 percent and 31 percent of meth users experience symptoms of psychosis, and 13 percent screen positive for a psychotic disorder (1.2% of the general population).[67] The table shows the complexity of methamphetamine-related mental health issues and how they can impact RSAT clients at various points.

Table 1: Impact of Methamphetamine-Related Mental Health Issues on RSAT Clients

	Pre-existing/-disposing	During active use	During withdrawal	During treatment
Risk factors	Early age of initiation; "relief" of mood or attention disorders reinforces use	Methamphetamine-induced psychosis, with IV use, smoking, or binge use	Withdrawal severity can depend on delivery route and mental health status	Mental health issues can persist 6–14 months or may be permanent; repeated assessments may be necessary
Symptoms	ADHD, depression, history of trauma, personality or psychotic disorders	Hearing things, delusions of paranoia/persecution, mind reading, omnipotence, etc.	Depression, anhedonia, insomnia, anxiety, somatization, agitation	Symptoms of mood or psychotic disorder are common and can dissipate over time
Persistence/ next steps	Once abstinent, mental health/neuropsychiatric assessments are in order	Dissipating in under a week; or assessment, sedation, or medications may be required	Usually resolves after 2 weeks; severe symptoms are associated with relapse	Typically, depressive symptoms or attention issues are likely to persist
Treatment	Treatment integrating assertive community reinforcement approaches	Risk of violence, may need to be stabilized on anti-psychotics to enter treatment	Social, medical, and psychological support required to retain clients	Integrated, long-term treatment; modified therapeutic communities, simplicity, repetition

use disorders (SAMHSA Publication No. PEP20-06-01-001). National Mental Health and Substance Use Policy Laboratory. **https://store.samhsa.gov/product/Treatment-of-Stimulant-Use-Disorder/PEP20-06-01-001**

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Treatment Approaches

RSAT program staff may be familiar with strategies that help meet the needs of clients with co-occurring disorders, such as integrated care, collaboration with mental health staff, and accommodations and modifications to therapeutic communities. These same approaches, outlined below, can effectively increase treatment engagement among RSAT clients with stimulant use disorder who experience related mental health issues. The mental health status of habitual meth users is fluid and likely to change more than once. For example, clients may have displayed symptoms of psychosis upon intake that soon gave way to deep depression, persisting throughout withdrawal but becoming less severe over time. Such clients' mental health status is typically quite dynamic throughout the months they remain in treatment.

Collaborative Care—Many clients with stimulant use disorder will receive mental health treatment and medications before or during participation in RSAT programs. Ensuring a framework is in place for close collaboration with mental health care providers makes treatment coordination strategies such as team approaches and unified treatment planning possible.

Screening and Assessment—Most clients will have been screened for mental health disorders, but symptoms can emerge, develop, or recede over time. Likewise, psychiatric medications may require dosage adjustments, work wonders, or have adverse effects. RSAT staff will need to work closely with mental health staff to share information and monitor symptom emergence, worsening, or improvement. Repeated screening and assessment will likely be the rule rather than the exception.

Integrated Treatment Interventions—Most of the evidence-based interventions included in the next section of this manual are compatible with treatments for co-occurring depression, anxiety, and other mood disorders. RSAT program planners can work with mental health staff to select any additional appropriate interventions.

Integrated Case Management—Integrated case management and reentry planning for transitioning to community-based care for clients with co-occurring disorders requires identifying resources for medication management and other psychiatric services upon release. However, for clients with histories of long-term, heavy meth use, it is critical to arrange post-release appointments, ensure they remember to go, and make sure they understand how to get there.

Community-Based Peer Support—Co-occurring peer recovery support is ideal, but any type of peer support can increase social connectedness and offer concrete guidance with day-to-day reentry tasks. RSAT clients recovering from stimulant use disorders can benefit from structured recovery coaching aimed at developing achievable goals and concrete action steps.

Cognitive Impairments

Chronic stimulant use results in permanent alterations to brain structures and impaired functioning of cognitive, neurological, and emotional systems. Long-term, heavy use of cocaine and/or meth can inhibit impulse control, reduce motor skills, cause confusion, and impair cognition.[68] Research suggests impairments may be due to the permanent destruction of brain tissues that play a role in these neurological functions.[69] Although deficits may not be permanent in most cases, they typically persist for 6 months or more after withdrawal.[70]

Consider the impact that problems with episodic memory, executive function, speed of information processing, and learning can have on treatment engagement. Effective program delivery for clients with severe stimulant use disorders has to account for these impairments. The combination of cognitive deficits, mental health disorders, and low literacy levels can present responsivity challenges that need attention before clients can truly benefit from treatment.

Repetition, reinforcing information in print and aloud, predictable schedules—posted incrementally on chalkboards or whiteboards—groups with consistent formats, simple, concrete directives and goals, and continually asking clients to articulate their understanding of key information are techniques that are easily incorporated. The tips and options sheet at the end of this section can help RSAT programs engage clients recovering from methamphetamine and other stimulant use disorder in effective, evidence-based interventions.

Pharmacological Interventions

When it comes to stimulants, addiction science has searched high and low for a sliver bullet to advance treatment of cocaine use disorders and even more so for methamphetamine. Medications for the treatment of methamphetamine addiction are a national research priority. This type of research has been funded since 1999.[71] A long list of medications have been studied, and several have shown promise. But there is no pharmaceutical approved for the treatment of any type of stimulant use disorder so far. Nor are there any FDA-approved drugs that can reverse a stimulant overdose. It is reasonable to expect something may become available in the not-too-distant future. However, it is important to emphasize that behavioral interventions are currently recognized as best practice for treatment of stimulant use disorders.

Much of the research has focused on existing medications used to treat various psychiatric disorders. This has included antidepressants, mood stabilizers for bipolar disorder, antipsychotics, and even some medications used to treat ADHD. As stated at the beginning of this manual, it is very difficult to

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[68] Substance Abuse and Mental Health Services Administration. (2020). *Treatment of stimulant use disorders* (SAMHSA Publication No. PEP20-06-01-001). National Mental Health and Substance Use Policy Laboratory. **https://store.samhsa.gov/product/Treatment-of-Stimulant-Use-Disorder/PEP20-06-01-001**

[69] McCann, M. J. (2006, May 9). *The Matrix Model treatment approach for methamphetamine dependence* [Presentation]. The Matrix Institute on Addictions, Arlington, VA, United States. **http://www.cffutures.org/files/presentation-pdfs/13_MichaelMcCann.pdf**

[70] Basterfield, C., Hester, R., & Bowden, S. C. (2019). A meta-analysis of the relationship between abstinence and neuropsychological functioning in methamphetamine use disorder. *Neuropsychology*, *33*(5), 739–753. **http://dx.doi.org/10.1037/neu0000552**

[71] National Institute on Drug Abuse. (n.d.). *Methamphetamine*. National Institutes of Health. **https://www.drugabuse.gov/drug-topics/methamphetamine**

distinguish symptoms of serious and persistent mental illness from many temporary effects of methamphetamine intoxication or withdrawal and from long-term effects that may impair cognition, impulse control, decision making, and other functions. It is possible some of the medications that have shown promise are actually helpful to individuals struggling with undiagnosed mental health conditions.

When it comes to chronic stimulant use disorders, it may not be possible to fully sort out physiology from psychopathology or pharmacology. The important take-home messages for RSAT staff are:

- Different approaches can help different individuals.
- Treating chronic methamphetamine use means working hand in hand with mental health.
- Behavioral interventions are the only recognized, evidence-based treatments.
- Responsivity issues may require specific interventions before treatment can be effective.
- Although there are no approved drugs for stimulant use disorders, psychiatric medications have helped certain individuals.
- Meth users can recover and respond well to treatment tailored to meet their needs.

The next section discusses specific evidence-based behavioral treatments considered effective for treatment of stimulant use disorders.

Tips and Options for RSAT Programs

Visuals: Post short reminders in simple language for rules and key concepts or steps in group rooms, dorms, and communal areas. Have clients read them aloud as often as possible.

Handouts: Prepare brief opening/closing handouts for groups or psychoeducational sessions with a simple outline or schedule, one or two take-home points, or short homework assignments.

Reminders: Use the therapeutic community structure to make a job out of giving morning and evening reminders of what is planned, assigned, or needs to be completed.

Dyads and triads: Use partners or triads to assign exercises that involve repeating information back to each other, listening, and helping partners when they miss something.

Openings and closings: Start groups with a review of last session and end with a summary. Experiment with assigning individual group members, calling on volunteers, or going around the room.

Concrete examples: Prepare sets of concrete examples in advance. Consider using visual aids or images to help illustrate key concepts.

Group size and length: When possible, experiment with changing group size, scheduling breaks, or making sessions a little shorter.

Checklists: Create a series of short, simple checklists for use at different junctures so clients can mark off tasks as they complete them. Consider working with case managers on shared checklists.

Incremental success: Break down complex objectives into series of small steps. Reinforce completion of each step by recognizing successes.

Worksheets and exercises: Avoid open-ended questions. Use multiple choice, fill-in-the-blank, and sentence completion worksheets with simple instructions and completed examples.

Be prepared: Have extra copies on hand and some alternate activities for participants who lose, forget, or fail to complete assignments.

Demonstrate confidence: People recover from chronic methamphetamine use. Research shows that, with appropriate treatment, meth users recover at rates comparable to other drug users. Pass it on!

IV. Evidence-Based Treatments for Stimulant Use Disorder

Treatment of stimulant use disorders, especially chronic methamphetamine use, has long been considered a challenge. But chronic meth users are not hopelessly resistant to treatment. It is important for RSAT staff to become familiar with the outcomes of effective treatments. It is equally important to convey to RSAT clients that recovery is possible.

Long-term RSAT programs are also less likely to face retention issues and have certain advantages in that they may align more closely with best practices for treatment of chronic methamphetamine use than some community-based treatment programs.

- It is critical to retain chronic meth users in long-term treatment.
- Effective treatments rely on cognitive behavioral approaches.
- Drug-free settings where clients are not exposed to environmental cues associated with using are ideal.

RSAT program settings and staff skills in the delivery of cognitive behavioral interventions (CBIs) are both advantages, as is a drug-free setting.

National Institute on Drug Abuse (NIDA) research has long supported the effectiveness of cognitive behavioral therapy (CBT), contingency management (CM), community reinforcement approaches (CRA), and the Matrix Model. NIDA clinical trials demonstrating the effectiveness of these interventions include:

- 1995: CBT & CM for cocaine use disorder
- 1995: CBT & CM for stimulant users on methadone
- 1998: Methamphetamine Treatment Project: Matrix Model vs. treatment as usual

Other promising and effective practices include Motivational Interviewing, exercise, manualized relapse prevention groups, mindfulness, and family therapy.[72] In other words, most effective approaches are already familiar to RSAT staff. The first part of this section will focus on specific evidence-based interventions and review skills and practices used to deliver them. The second part will provide

[72] Enos, G. (2020, February 7). Researchers report on new development in quest for cocaine vaccine. *Addiction Professional*. **https://www.psychcongress.com/article/researchers-report-new-development-quest-cocaine-vaccine**

information on the success of correctional methamphetamine treatment and examples of programs in custody settings.[73] The resource pages offer links and additional information applicable to both.

Best Practices and Evidence-Based Interventions

The cornerstone of effective treatment for methamphetamine and other stimulant use disorders is the Matrix Model, originally developed as a 16-week intensive outpatient treatment. It has been assessed in several large-scale studies with outcomes demonstrating its effectiveness.[74] It is made up of a combination of effective approaches. Findings of the Methamphetamine Treatment Project also support the value of integrated treatment for co-occurring conditions and the importance of training staff to handle psychotic symptoms when needed.[75]

Before outlining its structural components, let's look at some of the outcomes reported in evaluation studies of the Matrix Model. It should be noted sample sizes and research design vary.

- Matrix patients reported significantly less cocaine use 8 months after treatment admission than did controls.
- Greater treatment participation is associated with higher proportions of negative urine test results for cocaine among Matrix clients, to a greater degree than in other community-based treatments.
- Matrix clients were retained in treatment longer and had higher proportions of negative urine test results for methamphetamine.
- At follow-up, meth users reported significant increases in employment and decreases in reported symptoms of paranoia as compared to controls.
- In the 1998 Center for Substance Abuse Treatment (CSAT) multisite evaluation, seven of eight sites reported superior retention, better urinalysis results, and longer periods of abstinence from meth use compared to treatment as usual.[76]
- The Washington State Institute for Public Policy's 2019 cost-benefit analysis estimated $2,512 in net cost savings per participant in lower health care costs, increased employment, and decreased mortality.[77]

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[73] Cumming, C., Kinner, S. A., McKetin, R., Li, I., & Preen, D. (2020). Methamphetamine use, health and criminal justice system outcomes: A systematic review. *Drug and Alcohol Review*, *39*(5), 505–518. **https://doi.org/10.1111/dar.13062**

[74] Rawson, R. A., Marinelli-Casey, P., Anglin, M. D., Dickow, A., Frazier, Y., Gallagher, C., Galloway, G. P., Herrell, J., Huber, A., McCann, M. J., Obert, J., Pennell, S., Reiber, C., Vandersloot, D., Zweben, J., & the Methamphetamine Treatment Project. (2004). A multi-site comparison of psychosocial approaches for the treatment of methamphetamine dependence. *Addiction*, *99*(6), 708–717. **https://doi.org/10.1111/j.1360-0443.2004.00707.x**

[75] National Institute on Drug Abuse. (2019). *Methamphetamine research report: What treatments are effective for people who misuse methamphetamine?* National Institutes of Health. **https://www.drugabuse.gov/publications/research-reports/methamphetamine/what-treatments-are-effective-people-who-misuse-methamphetamine**

[76] Rawson, R. A., & McCann, M. J. (2008). *The Matrix Model of intensive outpatient treatment: A guideline developed for the Behavioral Health Recovery Management project*. **https://addictiondomain.com/wp-content/uploads/2016/08/Matrix_Model-Description-and-Outcomes-Research.pdf**

[77] Washington State Institute for Public Policy. (2019). *Matrix Model intensive outpatient treatment program (IOP) for stimulant use disorders: Substance use disorders: Treatment for adults*. **https://www.wsipp.wa.gov/BenefitCost/ProgramPdf/292/Matrix-Model-Intensive-Outpatient-Treatment-Program-IOP-for-stimulant-use-disorders**

Overview of the Matrix Model

The model combines individual and group sessions delivered over a period of at least 16 weeks. Smaller groups of 8 to 12 are ideal, but larger groups can be broken down for skill rehearsals and experiential exercises.

Individual sessions

Between 3 and 10 individual sessions are recommended, with flexibility to offer more to individuals who may benefit and to offer some sessions to small cohorts of clients. The focus is on building rapport, ensuring clients understand what they are learning in group, setting goals, and checking on progress achieving them.

Group sessions

Early Recovery Skills Groups are eight sessions long, designed for the first month of treatment and focused on:

1. Using cognitive tools to reduce craving.
2. The nature of classically conditioned cravings.
3. Time management.
4. The importance of discontinuing use of other substances.
5. Linking patients with community support services to sustain recovery.

Relapse Prevention Groups at the beginning and end of each week explore 32 topics pertaining to behavioral change, changing the client's cognitive/affective orientation, and connecting with 12-step and other support systems, using a specific structured format:

1. New group members are introduced.
2. Each client reports on progress in recovery.
3. A client reads the topic of the day, and group members relate it to their experience.
4. Each client shares schedules, plans, and commitments until the next group meeting.

The counselor maintains control of the group, allowing encouragement from group members but prohibiting cross talk about what others have said, graphic stories of drug and alcohol use, and confrontation. Peers with at least 6 months of solid recovery may co-lead groups by sharing their recovery experiences.

Family Education Groups consist of 12 sessions that cover topics such as:

1. The biology of addiction, tolerance, impact on brain structure, and functioning.
2. Conditioning and addiction, with concepts such as cue extinction and conditioned abstinence.
3. Medical effects of drugs and alcohol on the heart, lungs, reproductive system, and brain.
4. Addiction and the family; how relationships are affected by addiction and recovery.

Engaging family members in these psychoeducational groups has been shown to increase retention in community-based treatment, but clients also benefit from attending on their own.

Social Support Groups begin during the final weeks of treatment and are aimed at establishing new non-drug-related contacts and activities. They are less structured and topic-focused and support ongoing recovery planning.

Relapse Analysis Groups are optional and include exercises and forms designed to help clients examine and understand issues and events that lead to relapse(s). This can be done during individual sessions, or clients who have made past attempts at recovery may benefit from sharing relapse analyses in group.

Weekly onsite 12-step meetings and frequent random drug testing continue throughout treatment.

Matrix and RSAT Evidence-Based Practices

The Matrix Model is rooted in approaches that are not only familiar to RSAT staff, but also fully compatible with evidence-based treatments that are already part of most RSAT programs. The second half of this section will provide specific examples of how correctional methamphetamine treatment programs have integrated the Matrix Model, CM, and other effective practices. Below is a brief review of some of the shared evidence-based practices involved in RSAT programs, the Matrix Model, and other effective treatments for methamphetamine or other stimulants.

Psychoeducation: Group sessions employ primarily didactic approaches to improve client understanding of the nature of their disorder and to educate them about the treatment and ongoing recovery process.

Cognitive Behavioral Intervention (CBI): Cognitive approaches target attitudes and thought processes and teach individuals to recognize thinking errors and replace them with rational, prosocial thoughts. Behavioral approaches reinforce new behaviors.

Motivational Interviewing (MI)*:* Motivation is seen as dynamic, and resistance is reframed as ambivalence—a normal part of the change process. MI is a brief, directive counseling approach that employs specific skills to resolve ambivalence. Motivational enhancement elements relevant to stimulant use disorders include eliciting client commitments to change and increasing self-efficacy.

Community Reinforcement Approaches: The goal of community reinforcement is to teach clients new life skills to help them maintain abstinence while reinforcing the rewards of a drug-free lifestyle. It relies on a mix of recreational, familial, social, and vocational reinforcers.

Involvement in 12-Step Programs: Facilitating engagement in these or other peer support programs during treatment is supported by both the Matrix Model and by studies on other approaches to treating meth users.[78]

[78] Petit, A., Karila, L., Chalmin, F., & Lejoyeux, M. (2012). Methamphetamine addiction: A review of the literature. *Journal of Addiction Research & Therapy*, S1:006. **https://doi.org/10.4172/2155-6105.S1-006**

Contingency Management (CM)

Generally, treatment and post-release supervision of RSAT clients utilize consistent, swift, and graduated sanctions, as well as rewards. RSAT *Promising Practices Guidelines* recommend rewards outnumber sanctions by a 4:1 ratio, based on available research. Often disciplinary concerns, the need to maintain security, and ensuring rule adherence among RSAT clients makes it challenging to prioritize the reward side of the coin. However, a 2017 evaluation of RSAT programming indicated 18 percent of programs included in the study sample reported CM as a core intervention.[79] The strength of the evidence demonstrating CM's ability to boost the effectiveness of treatment for both cocaine and methamphetamine warrants the attention of RSAT programs with large proportions of stimulant users.[80]

CM is based on applying principles of classical and operant conditioning to shaping behavior. Classical conditioning strengthens new behaviors by providing rewarding consequences. For example, the positive "natural" rewards individuals experience when they initiate substance use tend to hasten the adoption of new learned behaviors related to using. Operant conditioning looks at how consistency and frequency of rewards reinforce behavior. Below are examples of how these principles are applied.

- *Predetermined tangible rewards/incentives are offered to reinforce target behaviors.* In other words, rewards are offered for engaging in treatment and/or maintaining abstinence. Research on the use of CM in meth treatment suggests the immediacy of rewards can be as important as their perceived value.[81] Although tangible rewards are important to ensuring CM is effective, verbal recognition, assignment of coveted jobs, privileges, and the like are also useful.
- *Intermittent reward is the most powerful type of reinforcement*. Ask anyone who has spent hours feeding money into a slot machine. Programs often combine small rewards with chances to win bigger prizes. For example, when drug screens are negative, clients are entered in periodic drawings for a bigger prize, but two consecutive negative drug screens can get clients three entries, and so forth.

Below are meta-analyses and other research studies on CM's effectiveness in treatment of cocaine, meth, and other stimulant use disorders—along with a brief summary of outcomes.[82]

- De Crescenzo et al., 2018—Meta-analysis of 50 studies offering 12 different psychosocial interventions for cocaine and/or amphetamine addiction. *Results:* A combination of CM and community reinforcement approach was the most efficacious and acceptable short- and/or long-term treatment.

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[79] Stainbrook, K., Hanna, J. & Salomon, A. (2017). *The Residential Substance Abuse Treatment (RSAT) study: The characteristics and components of RSAT funded treatment and aftercare services, final report*. Office of Justice Programs National Criminal Justice Reference Service. **https://www.ojp.gov/library/publications/residential-substance-abuse-treatment-rsat-study-characteristics-and**

[80] Higgins, S. T. (2006). Extending contingency management to the treatment of methamphetamine use disorders. *The American Journal of Psychiatry*, *163*(11), 1870–1872. **https://doi.org/10.1176/appi.ajp.163.11.1870**

[81] Lake, M. T., Shoptaw, S., Ipser, J. C., Takada, S., van Nunen, L. J., Lipinska, G., Stein, D. J., & London, E. D. (2020). Decision-making by patients with methamphetamine use disorder receiving contingency management treatment: Magnitude and frequency effects. *Frontiers in Psychiatry*, *11*. **https://doi.org/10.3389/fpsyt.2020.00022**

[82] Rawson, R. (2019, June 11). *Strategies to address cocaine and methamphetamine use* [Webinar]. Great Lakes ATTC and Northwest ATTC. **https://attcnetwork.org/centers/northwest-attc/event/strategies-address-cocaine-and-methamphetamine-use-webinar**

- Knapp et al., 2009—Compared one or more outcomes across 27 randomized controlled studies of psychosocial interventions for cocaine- and psychostimulant-related disorders. *Results:* Treatments including some form of CM had better rates of abstinence and retention.
- Roll et al., 2006—Clients diagnosed with methamphetamine abuse or dependence were randomly assigned to 12 weeks of treatment as usual (TAU) or CM with TAU. *Results:* Clients receiving TAU with the addition of CM had more negative urine screens and were abstinent for longer periods.

The pages that follow offer more on how evidence-based interventions for stimulant use disorder have been incorporated into custody-based programs. But one promising practice is worth mentioning before moving on, not only because a co-developer of the Matrix Model is among the respected researchers studying it, but also because the costs and risks are so minimal. The following are examples of studies on exercise programs included in a recent systematic review of non-pharmacological interventions for chronic meth use.

- Rawson et al. (2015) found fewer exercise participants returned to meth use at 1-, 3- and 6-month follow-up of post-residential treatment, as compared to controls.
- Wang et al. (2015) found short exercise sessions facilitated better executive functioning, suggesting even light exercise has beneficial effects.
- Wang et al. (2016, 2017) showed significant reductions in meth cravings among moderate and vigorous intensity exercise groups as compared to light exercise participants and to controls.[83]

There have also been several systematic reviews that show the positive results of exercise for stress reduction and for a variety of co-occurring mood disorders, suggesting it may benefit RSAT clients initiating recovery from stimulant use disorders.[84]

Chronic Meth and Other Stimulant Use Disorders in Custody

Some research has suggested male meth users with felony convictions differ significantly from other meth users. They tend to have high-risk usage patterns, elevated psychosocial and sexual risk factors, and social networks that revolve around meth use.[85] Fortunately, quite a bit of information is available on treating chronic meth use in correctional systems. Some in-custody programs have been operating for a decade or more, and several have been evaluated. There is also new research from correctional systems in the United States, Canada, and Australia—all countries seeing a similar resurgence in meth use. Two foundational topics relevant to RSAT programs are the impact of cognitive deficits on treatment engagement and whether meth users require substance-specific programming.

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[83] AshaRani, P. V., Hombali, A., Seow, E., Ong, W. J., Tan, J. H., & Subramaniam, M. (2020). Non-pharmacological interventions for methamphetamine use disorder: A systematic review. *Drug and Alcohol Dependence*, *212*, Article 108060. **https://doi.org/10.1016/j.drugalcdep.2020.108060**

[84] Barbour, K. A., Edenfield, T. M., & Blumenthal, J. A. (2007). Exercise as a treatment for depression and other psychiatric disorders: A review. *Journal of Cardiopulmonary Rehabilitation and Prevention*, *27*(6), 359–367. **https://doi.org/10.1097/01.HCR.0000300262.69645.95**; Herring, M. P., O'Connor, P. J., & Dishman, R. K. (2010). The effect of exercise training on anxiety symptoms among patients: A systematic review. *Archives of Internal Medicine*, *170*(4), 321–331. **https://doi.org/10.1001/archinternmed.2009.530**

[85] Semple, S. J., Zians, J., Strathdee, S. A., & Patterson, T. L. (2008). Methamphetamine-using felons: Psychosocial and behavioral characteristics, *The American Journal on Addictions*, *17*(1), 28–35. **https://doi.org/10.1080/10550490701756294**

A 2005 Minnesota Department of Corrections (DOC) report on the impact of meth use succinctly concluded: "Research indicates that meth users need about a year to start to recover from the cognitive damage to their brain. For that reason, much more time-intensive treatment is needed than a traditional 30-day program."[86] This mirrors research discussed at length in Section III, which supports the utility of the RSAT model for treating chronic meth use.

Not every RSAT client with a stimulant use disorder will display signs of cognitive deficits. However, studies comparing methamphetamine and cocaine abusers on cognitive performance measures found that comprehension deficits, trouble organizing information from multiple sources, and difficulty switching points of view were more common among chronic meth users.[87] It is important that the initial phases of treatment take steps to ensure participants understand rules and expectations and incorporate reminders into all phases of treatment.

Best practices for treatment of meth or other stimulant use disorders do not differ significantly from evidence-based approaches many RSAT programs are already using. Research on treating chronic meth use in criminal justice programs supports this conclusion. Nebraska's report to its community corrections council noted most meth users had long histories of polysubstance use and were often equally dependent on alcohol or other drugs. Programs with a narrow a focus on meth risked setting up participants to swap one substance for another unless they emphasized recovery as abstinence from abuse of all legal and illegal substances.[88]

A study of methamphetamine users in drug courts also found polysubstance use was more prevalent in comparison to participants who had never used meth. Meth users were also more likely to self-report theft, selling drugs other than marijuana, and breaking and entering, but less likely to have a record of weapons charges and probation violations. Those who reported meth as their drug of choice were as likely to succeed in non-substance-specific drug court programs as other participants, suggesting such alternatives to incarceration may prevent meth users with severe substance abuse histories from progressing into more serious criminal behavior.[89]

A study comparing three different types of in-custody treatment programs was conducted with inmates in the Indiana DOC. It compared outcomes for meth users completing (1) a program based on an outpatient treatment model, (2) a modified 6- to 9-month therapeutic community (TC), and (3) a specialized 6- to 9-month TC for meth users. In 2005, the Indiana DOC developed the award-winning Clean Lifestyle Is Freedom Forever (CLIFF-TC) program, based on the Matrix Model, as a specialized unit for heavy methamphetamine users. Participants in all three programs showed improvement on

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[86] Minnesota Department of Corrections. (2005). *The methamphetamine epidemic: Impact on the Minnesota Department of Corrections*. **https://mn.gov/doc/assets/methimpact_002_tcm1089-271734.pdf?sourcePage=/doc/data-publications/research/publications/publications-list.jsp%3Fid=1089-272917**

[87] Simon, S. L., Domier, C. P., Sim, T., Richardson, K., Rawson, R. A., & Ling, W. (2001). Cognitive performance of current methamphetamine and cocaine abusers. *Journal of Addictive Diseases*, *21*(1), 61–74. **https://doi.org/10.1300/J069v21n01_06**

[88] Robinson, T. H. (2006). *Final report to the MA Treatment Study Committee of the Nebraska Community Corrections Council: Moving past the era of good intentions: Methamphetamine treatment study*. University of Nebraska at Omaha. **https://ncc.nebraska.gov/sites/ncc.nebraska.gov/files/pdf/others/meth/Methamphetamine_Treatment_Study_2006_Report.pdf**

[89] Listwan, S. J., Shaffer, D. K., & Hartman, J. L. (2009). Combating methamphetamine use in the community: The efficacy of the drug court model. *Crime & Delinquency*, *55*(4), 627–644. **https://doi.org/10.1177/0011128707307221**

substance abuse measures, but participants in the modified TC and the CLIFF-TC also showed improvement on measures related to criminality.[90]

Taken collectively, the research suggests RSAT programs that employ a modified TC model can successfully treat chronic methamphetamine users without developing specialized meth programs, provided they rely on evidence-based practices demonstrated effective for stimulant use disorder treatment. It also suggests the Matrix Model can be readily adapted for use in long-term TC settings inside correctional facilities. The RSAT model also appears to appropriate for treating meth users with related cognitive deficits and histories of heavy polysubstance use.

Several studies point out the unique implications for prerelease planning and reentry. For example, reentry planning for individuals with opioid use disorder (OUD) generally prioritizes initiation or continuation of medication-assisted treatment (MAT) and overdose prevention. People recovering from methamphetamine use disorder may require specialized reentry support that includes structured relapse prevention group counseling and linkages to mental health services and supports.[91] The following are examples of various correctional systems that have implemented programs to address increasing needs for treatment of chronic methamphetamine use among criminal justice populations.

Nebraska Department of Correctional Services (DCS): In 2006, the impact of the methamphetamine crisis in Nebraska, coupled with a scarcity of appropriate treatment resources, prompted establishment of a Methamphetamine Treatment Study Team. The Team produced a report with recommendations and an implementation plan to address chronic meth use at multiple justice intercepts. Below are relevant highlights of the Nebraska DCS plan. For more detailed information and a link to the full report, see the resource pages.[92]

- *A centralized secure treatment facility* for medium- to high-risk prison inmates in need of mandated, aggressive treatment for methamphetamine abuse. Research shows methamphetamine users are overwhelmingly ambivalent about seeking treatment, but they do as well in coerced treatment as in voluntarily treatment.[93]
- *Screening and placement upon intake* for detoxification in the centralized facility, assessment of the degree to which serious mental health problems emerge, and delivery of structured treatment employing evidence-based interventions (adapted from the Matrix Model). Length of stay is based on offender progress, averaging 6 months or more.

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[90] Joe, G. W., Rowan-Szal, G. A., Greener, J. M., Simpson, D. D., & Vance, J. (2010) Male methamphetamine-user inmates in prison treatment: During-treatment outcomes. *Journal of Substance Abuse Treatment*, *38*(2), 141–152. **https://doi.org/10.1016/j.jsat.2009.08.002**

[91] AshaRani, P. V., Hombali, A., Seow, E., Ong, W. J., Tan, J. H., & Subramaniam, M. (2020). Non-pharmacological interventions for methamphetamine use disorder: A systematic review. *Drug and Alcohol Dependence*, *212*, Article 108060 **https://doi.org/10.1016/j.drugalcdep.2020.108060**;

Rabiei, R., Moghaddasi, H., & Heidari, M. (2020). Design and evaluation of a mobile application for relapse prevention to methamphetamine use disorder. *International Journal of High Risk Behaviors and Addiction*, *9*(1), Article e100340. **https://doi.org/10.5812/ijhrba.100340**

[92] Robinson, T. H. (2006). *Final report to the MA Treatment Study Committee of the Nebraska Community Corrections Council: Moving past the era of good intentions: Methamphetamine Treatment Study*. University of Nebraska at Omaha. **https://ncc.nebraska.gov/sites/ncc.nebraska.gov/files/pdf/others/meth/Methamphetamine_Treatment_Study_2006_Report.pdf**

[93] Brecht, M., Anglin, M. D., & Dylan, M. (2005). Coerced treatment for methamphetamine abuse: Differential patient characteristics and outcomes. *The American Journal of Drug and Alcohol Abuse*, *31*(2), 337–356. **https://doi.org/10.1081/ADA-56764**

- *Programming in other DCS facilities,* including establishing a separate unit for these purposes in the women's prison and offering treatment to inmates with chronic meth addiction in maximum security facilities where they are housed.
- *Day reporting centers* staffed by addiction professionals trained in methamphetamine-specific, evidence-based interventions such as the Matrix Model. These centers offer long-term, intensive outpatient treatment of meth addiction to lower risk offenders and structured aftercare to reentering offenders who have completed treatment in custody.

Other recommendations include integrated treatment that offers:

- Graduated phases.
- Directive counseling.
- Ongoing drug screenings.
- Case management and employment services.
- Structured relapse prevention.

The South Dakota Women's Prison began developing a methamphetamine program for female inmates in 2006 in collaboration with the South Dakota Departments of Social Services and Health. They sought federal technical assistance to ensure implementation of best practices.

- *Intensive Methamphetamine Treatment (IMT)* is a phased program that offers approximately 50 hours of intensive, structured programming each week, including chemical dependency treatment, life skills classes, mental health services, academic instruction, and family and parenting work. Participants complete a 6-month stay as part of a 15-month continuum of care that also includes 3 months in a halfway house and 6 months of aftercare in the community. (See resource pages for additional information.)

Matrix Model Resources

The Matrix Model of Intensive Outpatient Treatment: A guideline developed for the Behavioral Health Recovery Management project. (2016). Rawson, R. A., & McCann, M. J.

The Matrix Model for Criminal Justice Settings. (2014). Matrix Institute. Can be completed within a 16-week time frame and extended up to 12 months, if necessary.

Matrix Institute. (CLARE|MATRIX—the CLARE Foundation and the Matrix Institute on Addictions combined in 2018). Matrix Model training, treatment and research.

The Matrix Model. Hazelden Publishing.

A Four-Pillars Approach to Methamphetamine: Policies for Effective Drug Prevention, Treatment, Policing and Harm Reduction. (2008). Piper, B. The Drug Policy Alliance.

SAMHSA series of Matrix manuals. (2012–2015).

- Using Matrix with Women Clients: A Supplement to the Matrix Intensive Outpatient Treatment for People with Stimulant Use Disorders
- Matrix Intensive Outpatient Treatment for People with Stimulant Use Disorders: Counselor's Treatment Manual
- Matrix Intensive Outpatient Treatment for People with Stimulant Use Disorders: Client's Treatment Companion
- Matrix Intensive Outpatient Treatment for People with Stimulant Use Disorders: Client's Handbook
- Matrix Intensive Outpatient Treatment for People with Stimulant Use Disorders: Counselor's Family Education Manual

Other Resources

Methamphetamine resources: National Center on Substance Abuse and Child Welfare

NIDA Principles of Drug Addiction Treatment: A Research-Based Guide. Behavioral Therapies.

National Drug Abuse Treatment Clinical Trials Network brochure: Motivational Incentives Study (CM)

Promoting Awareness of Motivational Incentives (PAMI) (introductory training in use of incentives)

Motivational Incentives: Positive Reinforcers to Enhance Successful Treatment Outcomes (self-guided, interactive online course for behavioral health care practitioners)

In-Custody Treatment Resources

Evaluation of Montana's Residential Methamphetamine Treatment Programs (DOC). (2013). Research & Survey Consulting.

- Elkhorn Treatment Center for Women
- Nexus Treatment Center for Men

South Dakota Intensive Methamphetamine Treatment (IMT) Program: Technical Assistance Project Report. Cobb, K.

Moving Past the Era of Good Intentions: Methamphetamine Treatment Study. (2006). University of Nebraska at Omaha.

Indiana Clean Lifestyle is Freedom Forever Program

The Emerging Issue of Crystal Methamphetamine Use in First Nations Communities. (2006). First Nations Centre.