

## A Literature Review: Current Trends in Methamphetamine Use among Methamphetamine Users in the United States

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### Abstract:

**Introduction:** Due to the documented severe effects and high potential for abuse and addiction, the United States categorizes methamphetamine as a Schedule II stimulant. Methamphetamine use can cause severe cellular toxicity resulting in long term changes to both the CNS and the peripheral nervous system. Users can become anxious, confused, aggressive, violent, psychotic, and experience paranoia, hallucinations and delusions. Overdose mortality rates have escalated making methamphetamines one of the most frequently identified drug in forensic crime laboratories. **Methods:** To comprehend the scope of the surging trend of methamphetamine use, a literature review of peer-reviewed articles written within the past five years was performed to evaluate trends in methamphetamine use, leading causes and future solutions. A total of 201 records were produced from APA Psyc INFO, Embase, and PubMed databases. A selection of 10 records was included in this study, Selections were further organized under trends in methamphetamine use, trends in mortality rates, and societal and economic costs. **Results:** Key findings demonstrated a strong association between methamphetamine administration through injection with 81% of methamphetamine users who injected as the main route of administration, engaged in co-administration of opioids and methamphetamines. Mortality Rates in annual methamphetamine related deaths involving co-involvement of opioids and methamphetamines increased 58-fold. **Conclusion:** This review identified key trends associated with methamphetamine use in the United States. Most important was the recognition of the relationship between the increase in methamphetamine use and the on-going opioid crisis, associated with climbing drug overdoses, increasing mortality rates, homelessness, spread of disease, and an ever-growing economic burden on our communities.

**Keywords:** Methamphetamines, heroin, polydrug use, goofball, co-administration of opioids, synergistic effects, psychostimulants.

## **Introduction:**

Between 2015 and 2017, overdose mortality rates involving methamphetamines more than doubled. By 2017, methamphetamine was the most frequently identified drug in forensic crime laboratories across the U.S. (Daniulaityte et al., 2020). Methamphetamines are members of a class of amphetamines that consists of tiny lipophilic molecules that easily cross the blood brain barrier where they target the central nervous system (CNS) and accumulate in the brain parenchyma (Miller et al., 2021). Recent studies have recognized that methamphetamines disrupt the communications between the glia and dopaminergic neurons within the CNS which increases the extra cellular monoamine neurotransmitters and dysregulates the release of serotonin, epinephrine and norepinephrine (Miller et al., 2021). With self-administered high methamphetamine use, severe cellular toxicity can occur resulting in long term changes in both the CNS and the peripheral nervous system (Miller et al., 2021).

Methamphetamine toxicity causes users to become anxious, confused, aggressive, violent, psychotic, and to experience paranoia, hallucinations and delusions (DOJ, 2020). Methamphetamine users become extremely anorexic, experience severe dental decay and debilitating memory loss (DOJ, 2020). High dose users risk elevating body temperature to lethal levels resulting in convulsions, increased blood pressure, cardiovascular collapse, stroke, organ failure, and death (DOJ, 2020). Due to the devastating effects and its' high potential for abuse and addiction, the United States categorizes methamphetamine as a Schedule II stimulant under Title II of the Comprehensive Drug Abuse Prevention and Control Act of 1970 (Ortiz et al., 2024). Substances that fall under Schedule II classification also include fentanyl, morphine, oxycodone, phencyclidine (PCP) and many barbiturates and amphetamines (Ortiz et al., 2024).

Methamphetamine was first synthesized by Nagai Nagayoshi (Miller et al., 2021). By the start of World War II, methamphetamine was extensively used for military purposes due to its ability to impair inhibitions and increase wakefulness (Miller et al., 2021). The illicit use of methamphetamine in the United States was primarily powdered methamphetamine locally made in limited quantities and mortality rates related to methamphetamines remained stable until after 2010 (Daniulaityte et al., 2020). By 2015 powdered methamphetamine was replaced by large quantities of inexpensive, high purity, Mexican Drug Cartel produced methamphetamine that could be easily purchased in most communities throughout the country and continues to escalate today (Daniulaityte et al., 2020).

To comprehend the scope of this deadly trend of methamphetamine use, a literature review of peer-reviewed articles written within the past five years was

performed to evaluate trends and correlations of methamphetamine use, leading causes and future solutions.

## Methods

A literature review was performed to survey peer reviewed articles on trends in methamphetamine use in the United States. Inclusion criteria were articles that were conducted in the United States, published within the last five year, and written in English. Articles that did not meet criteria were excluded. Databases accessed through Rutgers University Library included APA PsycINFO, Embase, and PubMed. A total of 201 records were produced. Two records were removed as duplicates, 178 records were excluded by title, two records were excluded by abstract assessment, and nine records were excluded by full text assessment. A total of 10 records were selected and included in this study. Records included in this study were further organized under the following main groups: Trends in methamphetamine use and user characteristics, trends in mortality rates, and the human and societal cost of methamphetamine use.

- 1) Trends in methamphetamine use and user characteristics: These studies provided data on trends in methamphetamine use, poly drug use, and user characteristics.
- 2) Trends in mortality rates: These studies provided data on increases in mortality rates and poly drug relationships within mortality trends.
- 3) Trends in societal and economic cost of methamphetamine use: These studies provided data on the human and societal cost of methamphetamine use.

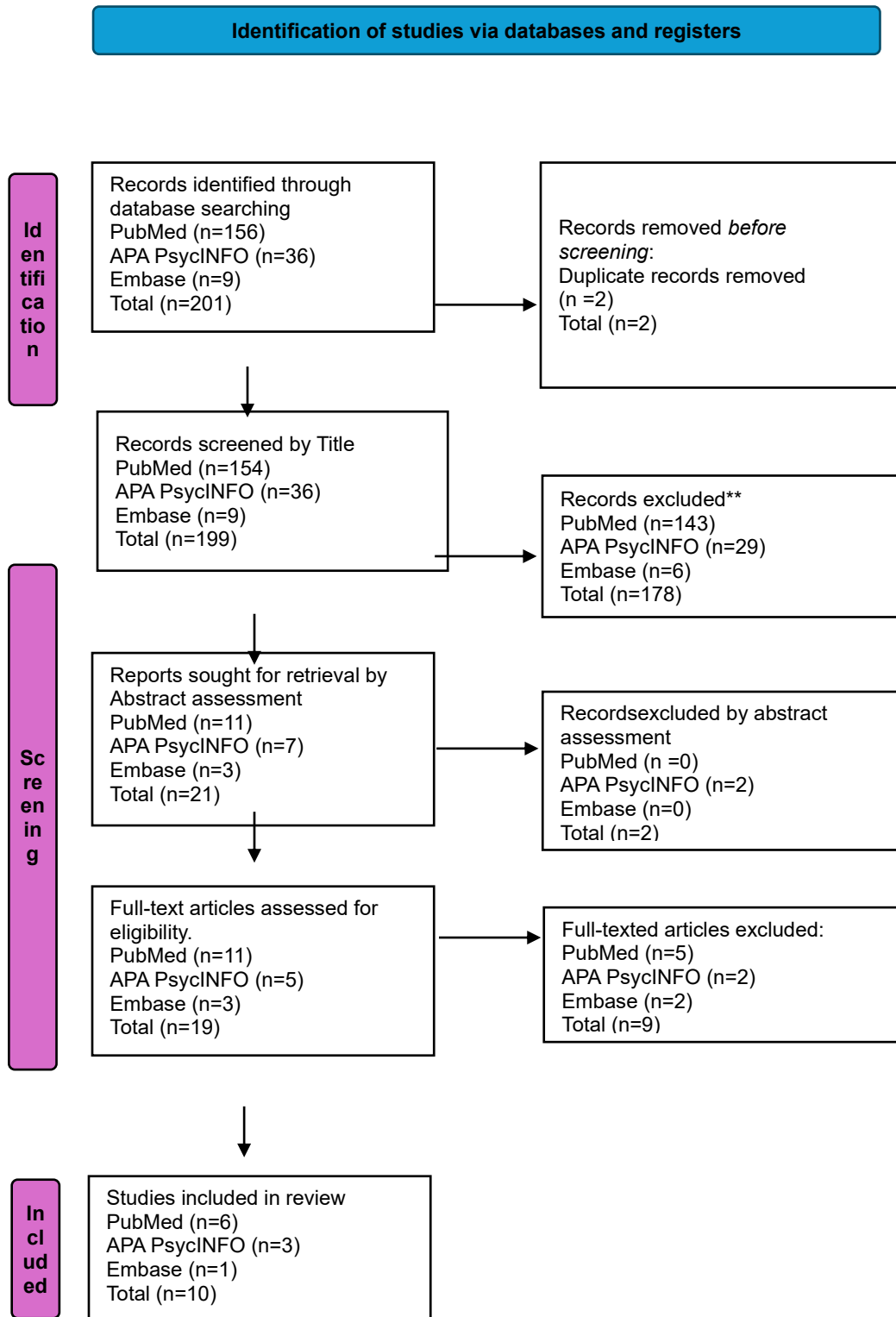
See Table 1 for database and search formula. See Figure 1 for PRISMA Flow Diagram.

**Table 1**

*Database and Search Formula*

| Database      | MeSH Terms and or Limiter   | Total records |
|---------------|---|---------------|
| APA PsychINFO | APA PsychINFO Search performed on 10/08/2024: exp Trends/ exp methamphetamine/2019-2024   | 36            |
| Embase        | Embase Search performed on 10/08/2024:('trends'/exp OR 'trends') AND ('methamphetamine'/exp OR 'methamphetamine') AND ([cochrane review]/lim OR [controlled clinical trial]/lim OR [systematic review]/lim OR [randomized | 9             |

|        |   |     |
|--------|---|-----|
|        | controlled trial]/lim OR [meta-analysis]/lim) AND [2019-2024]/py  |     |
| PubMed | <p><b>PubMed Search:((methamphetamine) AND (trends)) AND (United States) Filters: in the last 5 years</b></p> <p>((("methamphetamine"[MeSH Terms] OR "methamphetamine"[All Fields] OR "methamphetamine s"[All Fields] OR "methamphetamines"[All Fields]) AND ("trend"[All Fields] OR "trended"[All Fields] OR "trending"[All Fields] OR "trends"[MeSH Subheading] OR "trends"[All Fields]) AND ("united states"[MeSH Terms] OR ("united"[All Fields] AND "states"[All Fields]) OR "united states"[All Fields])) AND (y_5[Filter])</p> <p><b>Translations</b></p> <p><b>methamphetamine:</b> "methamphetamine"[MeSH Terms] OR "methamphetamine"[All Fields] OR "methamphetamine's"[All Fields] OR "methamphetamines"[All Fields]</p> <p><b>trends:</b> "trend"[All Fields] OR "trended"[All Fields] OR "trending"[All Fields] OR "trends"[Subheading] OR "trends"[All Fields]</p> <p><b>United States:</b> "united states"[MeSH Terms] OR ("united"[All Fields] AND "states"[All Fields]) OR "united states"[All Fields]</p> | 156 |



**Figure 1**  
*PRISMA Flow Diagram*

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372: n71. doi: 10.1136/bmj. n71

## Results

After data collection, studies were categorized into three groups.

- (1) Trends in methamphetamine use and user characteristics (N=6)
- (2) Trends in mortality rates (N=2)
- (3) Human and societal cost of methamphetamine use (N=2).

Important findings that fell under trends in methamphetamine use and user characteristics showed the following: methamphetamine use was relatively stable in 2008 at 5.1%. By 2017, methamphetamine use had increased 28.6% (Table 3). All racial and ethnic groups experienced statistically significant percentage rates ( $P < .001$ ) (Table 3). Users between the ages 35 and 44 years had the highest rate of drug related treatment admission. Results showed an increase in treatment admissions for both genders (Table 3). Among methamphetamine users, 74% were unemployed, most often homeless, and up to 99% met criteria for severe opioid use disorder (Table 3).

Key findings demonstrated a strong association between methamphetamine administration through injection. Eighty-one percent of methamphetamine users who injected methamphetamine as the route of administration also engaged in co-administration of opioids and methamphetamine. For co-administration of opioids and methamphetamines, 60% used injection as the primary route of administration, followed by smoking or intranasal administration (Table 3). Reasons for co-administration of opioids and methamphetamines included: avoiding pain, pleasure seeking, diminishing negative side effects, enhancing pleasurable effects, synergistic effects, fabulous high, increasing potency, affordability, and availability (Table 3).

Important findings categorized under Trends in Mortality Rates included a 58-fold increase in annual methamphetamine related deaths involving co-involvement of opioids and methamphetamines. Data demonstrated overdose deaths involving psychostimulants (mostly methamphetamines) increased 180% between 2015 to 2019 (Table 4).

Important findings that were categorized under human and societal cost of methamphetamine use showed 28.9% of participants were infected with hepatitis

C, and 49.5% of participants tested positive for HIV. Ninety percent of methamphetamine users that were homeless experienced physical abuse and over 30% experienced sexual abuse (Table 5.). Among women who were addicted to methamphetamine 90% had attempted suicide. More than 50% of users also experienced an overdose and almost all had increased periods of homelessness (Table 5.). Sixteen percent of methamphetamine users seeking psychiatric evaluation were psychotic and more likely to be accompanied by police or law officers. Results showed a statistically significant relationship between psychosis and methamphetamine use ( $p=0.001$ (Table 5.).

**Table 2**  
*Descriptive Statistics of Participants*

| <b>First Author<br/>Year Published</b> | <b>Participant<br/>s</b> | <b>Men</b>                         | <b>Wome<br/>n</b> | <b>Age</b>   | <b>location</b>                        |
|--|--------------------------|------------------------------------|-------------------|--|--|
| Coombs, T. et al.<br>(2023)            | 133504                   | Majority<br>Male                   |                   | 18 - 64<br>years   | United States                          |
| Daniulaityte, R. et<br>al.<br>(2020)   | 356                      | 50.30%                             | 49.7%             | Mean<br>39.2   | Midwestern<br>United States            |
| Guerrero, E. G. et<br>al.<br>(2023)    | 60732                    | 63.03%                             | 36.97%            | Mean<br>33.7   | Los Angeles<br>county<br>United States |
| Han, B. et al.<br>(2021)               | 195711                   | 49.10%                             | 50.90%            | 18 - 64<br>years   | United States                          |
| Hoopsick, R. A. et<br>al.<br>(2023)    | 135433<br>deaths         |                                    |                   | 15-74<br>years   | United States                          |
| Jones, C. M. et al.<br>(2020)          | 15747334                 |                                    |                   | 12 years<br>or older   | United States                          |
| Miller, J. et al.<br>(2020)            | 7366                     | 66.0% of<br>meth<br>encounte<br>rs | 44.0%             | 34 years<br>for<br>meth<br>users,<br>37 years<br>non-<br>users | New Mexico<br>United States            |
| Rhed, B. D. et al.                     | 21                       | 52.0%                              | 48.0%             | Median   | New Mexico,                            |

|                                 |  |  |  |                   |                         |
|---------------------------------|--|--|--|-------------------|-------------------------|
| (2022)                          |  |  |  | 35                | Nevada<br>United States |
| Strickland, J. C. et al. (2019) |  | 68.0% (not in group)<br>61.9% (in group) | 32.0% (not in group)<br>38.1% (in group) | 12 years or older | United States           |
| Strickland, J. C. et al. (2021) |  |  |  | 12 years or older | United States           |

**Table 3**  
*Trends in Use and User Characteristics*

| Study Description   | Study Results   | Additional Findings  | Future Directions   |
|---|---|--|---|
| Daniulaityte, R. et al.<br><br>356 adult individuals with current Opioid Use Disorder were recruited and interviewed on social and drug use characteristics to identify characteristics associated with methamphetamine use over the past 6 months. | 84.9% of participants reported first time use of methamphetamine after the illicit opioids. Methamphetamine was associated with Homelessness (P=0.0001), Over 74% were unemployed, 99% met criteria for severe opioid use disorder and over 60% used injection as the most common route of administration of methamphetamine. 25.3% preferred | A strong association was found between methamphetamine use and injection as the primary administration. This association led to adverse consequences that were more severe for those who injected it, resulting in escalation of OUD symptoms, increased tolerance, and greater risk-taking behaviors. The emergence of methamphetamine creates much | Current response to the opioid epidemic in Ohio and around the country leans on medication-based treatments for opioid use and are insufficient responses to the twin epidemic of opioid and methamphetamine use. A focus on the risk posed by opioid use must include the social and public health crisis created by increased methamphetamine use in combination with the ongoing |

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|   | smoking, 15.2% intranasal use and 1% oral.   | greater health risks for vulnerable populations. Current strategies of public health fall short of the needs created by the twin epidemics.  | opioid crisis.   |
| Guerrero, E. G. et al.<br><br>Study analyzed large groups from 2011, 2013, 2015, and 2017 of clients to identify differences across subgroups and trends in treatment episodes to differentiate users of meth and users of other drugs. | Clients seeking treatment increased across each gender and race 3072 to 6562 annual total with 37.9% increase. Whites increased 30.9%, Blacks increased 73.8%, Latinos increased 35.1%. All four groups (overall, white, black, Latino, showed statistically significant increases. (P<.001) | P<.001 for all four groups, 80% of individuals entering treatment were between 18 and 50 years. Treatment episodes for methamphetamine users increased. 59.1% vs users of other drugs 41.0%. The percentage of treatment episodes involving women was much higher for methamphetamine users than other drugs 43.4% VS 33.6%(p<.001) Methamphetamine users were younger 33.7 years, referred from drug court, or social services, more often homeless, and less likely eligible for | programs seemed to have lower capacity to deliver care to women and less likely to accept Medi-Cal. Were less culturally responsive less educated staff, relied on public funding, findings showed a need for focus on integrated comprehensive services by gender and ethnocracies groups. tailoring services to clients needs improved health and social outcomes for men and women and SUF treatment services showed improved treatment outcomes for all gender and ethno-racial subgroups. |

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|   |   | Medi-Cal. less likely to complete treatment  |  |
| Jones, C. M. et al<br>The study focused on 2772632 treatment admissions in which methamphetamine use was reported at admission. | Meth treatment admissions remained stable in 2008 at 5.1% and 2010 at 14.1%. That number rose to 23.6% in 2017. among females, drug treatment episodes increased from 19.2% 2008 to 28.3% in 2017. Males increased from 11.7% 2010 to 20.9% 2017. Highest percentage drug related treatment admission involving meth was between 35 to 44 years. All races and ethnicity groups except non-Hispanic experienced increased percentage rate. In 2017 non-, American Indian/Alaska native group increased 43.5%, whites (26.2%, Hispanic increased | Smoking methamphetamine was the usual route of use 58.8% of admission, Injections were 28.4% of admission in 2017. that was up from 17.5% in 2008. Smoking remained the most common route of meth use. The increase of meth injections seen in this study increased 62% among meth related treatment admissions and 55% among primary methamphetamine admissions. Injections may be increasing due to injection of opioids heroin and fentanyl. The highest percentages were found in the US West regions, and the lowest percentages were | Increases in injection of methamphetamine s complicates treatment and recovery efforts. Treatment outcomes are already sub optimal for users who inject rather than smoke or snort. Drug management, community reinforcement, cognitive behavioral therapy along with recovery support services may provide the most optimal outcomes. |

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|  | 26.2% also.   | found in the northeast regions, increasing 36.1% per year between 2013 -2017. Midwest and South were consistent at 10.1 per year between 08 and 2011   |  |
| Rhed, B. D. et al. personal interviews with 21 participants who co-use opioids and methamphetamines and how they administer the drugs. | 81% of participants engaged in co-administration and fell into 3 subgroups 1)12 participants used both drugs simultaneously called goofball the simultaneous injection or smoking of both drugs in quick succession. 2) injecting heroin and smoking meth at separate times and 3) injection use of both drugs but at separate times. Injections raised risks of transmission of HIV, Hep C, and other bloodborne infections. 51% used goofball for high seeking, 39% | avoiding pain or discomfort such as vain pain. Seeking pleasure means using one drug to enhance the pleasurable effects of one drug with the other drug. Some users modified their pattern of co-administration according to who they were doing the drugs with. Users also used co-administration to deal with the changes in drug availability and affordability and supplies available. | Polydrug use is understudied. Further studies are needed to patient centered understanding and to address the individual and social drivers of substance use behavior. |

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|   | for synergistic effect, and 15% used as substitute drug.   |   |  |
| Strickland, J. C. et al. (2019)<br>NSDUH data were analyzed to identify yearly variations in methamphetamine use by opioid use history.   | Methamphetamine use tripled from 9.0% 2015 to 30.2% 2017 in individuals reporting past month heroin use. 38.6% used to balance effects of opioids, 15.2% used as an opioid substitute.                     | Increases were specific to methamphetamine and not observed for other illicit substances. Reasons include High seeking, synergistic effects, and fabulous high, increased potency, affordability, and availability. | It is paramount to recognize global drivers of drug taking behaviors. Treatment and prevention efforts must be broader and systemic contributors to substance use disorder.  |
| Strickland, J. C. et al. (2021)<br>Using past month methamphetamine use data was analyzed to determine the association of increased methamphetamine use among heroin and fentanyl | . Logistic regression models resulted in significant interactions between past month heroin use, HUD and OUD, $P < .05$ Past month methamphetamine use tripled from 9.0% 2015 to 19.7% 2016 to 30.2% 2017. | This study demonstrated a sustained increase in methamphetamine use among people who use heroin in the past month. People who do not report opioid use did not show increases in methamphetamine use.               | These findings emphasize a consistent increase in Methamphetamine use among heroin users in the US. This highlights the need for continued attention to specific high-risk patterns that appear unlikely to naturally resolve. |

**Table 4**  
*Trends in Mortality Rates*

| Study Description      | Study Results                     | Additional Findings             | Future Directions       |
|------------------------|-----------------------------------|---------------------------------|-------------------------|
| Hoopsick, R. A. et al. | There were 135433 methamphetamine | 2014-2021 reported the greatest | Results demonstrate the |

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| <p>examined the annual number of deaths involving methamphetamine and age-adjusted mortality rates per 100000 population among us residents. Quantified trends and proportion of deaths with heroin or fentanyl co-involvement.</p> | <p>-related deaths among US residents aged 15-74 years. Of which 42.8%involved heroin or fentanyl. This was a 58-fold increase in annual methamphetamine related deaths. Annual co-involvement of heroin and fentanyl ranged from 7.5 in 2005 to 61.2% in 2021.</p> | <p>annual increases. Increasing proportion of methamphetamine deaths co-involved heroin or fentanyl demonstrated the greatest increases taking place in 2010-2021. mortality rate increases 20.1% annually between 1999-2005 (APC=20.1%; 95%CI=14.9, 25.6; P&lt;.001;b = 0.18) 2005-2008 remained stable (APC=-8.6%;95%CI = -29.7,18.8;P&gt;.05;b=-0.09), 2008-2014 continued increase 21.8% (APC= 21.8%; 95% CI = 14.9, 29.1;P &lt;.001; b=0.20), 2014-2021 continued increase of 32.5% annually APC= 32.5%; 95% CI = 28.0, 37.2;P &lt;.001; b=0.28. 1999-2005 showed a 6.6% decrease in proportion of methamphetamine</p> | <p>need to develop and implement robust harm reduction services for polysubstance use patients. These services must be available and easily accessible to those seeking help.</p> |
|---|---|---|---|

|   |  |  |   |
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|   |  | e related deaths with heroin or fentanyl. 2005-2010 showed an 8.9% increase and 2010-2021 showed a 17.3% increase.   |   |
| Han, B. et al<br><br>To access the national trends in methamphetamine use, and how they correlate with previous data on methamphetamine use disorder MUD, Injection, frequent use and associated overdose mortality from 2015-2019. | Overdose deaths involving psychostimulants (mostly meth) increased 180% between 2015-2019, Methamphetamine use increased 43%, frequent meth use increased 66%. Adults with MUD or using injections were more likely to use meth frequently. Adjusted prevalence of MUD without injection tripled among heterosexual women and double among heterosexual men. Increased use among Blacks was 10-fold, tripled for whites and doubled among Hispanics. | Risk factors for methamphetamine use, MUD Injection and frequent use was associated with lower educational attainment, lower annual household income, lack a insurance, housing instability, criminal justice involvement, Higher rates of HIV/AIDS, Hep B or C, depression suicidal ideation and polysubstance use. | Evidence-based prevention and treatment interventions are needed to combat the methamphetamine use, MUD and associated mortality increase |

**Table 5***The Human and Societal Cost*

| Study Description  | Study Results   | Additional Findings  | Future Directions  |
|--|---|--|--|
| Coombs, T. et al.<br>Systematic review of substance abuse and homelessness   | Substance abuse among the homeless population had a rate of over 50% in most studies in this review. 56% of participants reported mental health issues. | physical effects associated with injection drug use reported that 28.9% of participants had Hep C, and 49.5% of participants tested positive for HIV. 90% of homeless experienced physical abuse and over 30% experienced sexual abuse. Over 70% of women who were addicted attempted suicide. 50% of opioid users experienced overdose and had increased periods of homelessness. | Future work should focus on psychoactive substance awareness among healthcare providers care givers, social workers academics and government agencies. |
| Miller, J. et al.<br>De-identified data from patients presenting to PES 2011-2015 were analyzed to assess the relationship between Methamphetamine | Methamphetamine use encounters rose from 5% 2007 to over 20% in 2015. Methamphetamine use increased faster than any other drug tested                   | Methamphetamine patients are seeking help from emergency psychiatric evaluation from PES. Meth users are more likely to be accompanied   | Further evidence-based studies, interventions and policy recommendations must be developed with racial, ethnic and socioeconomic                       |

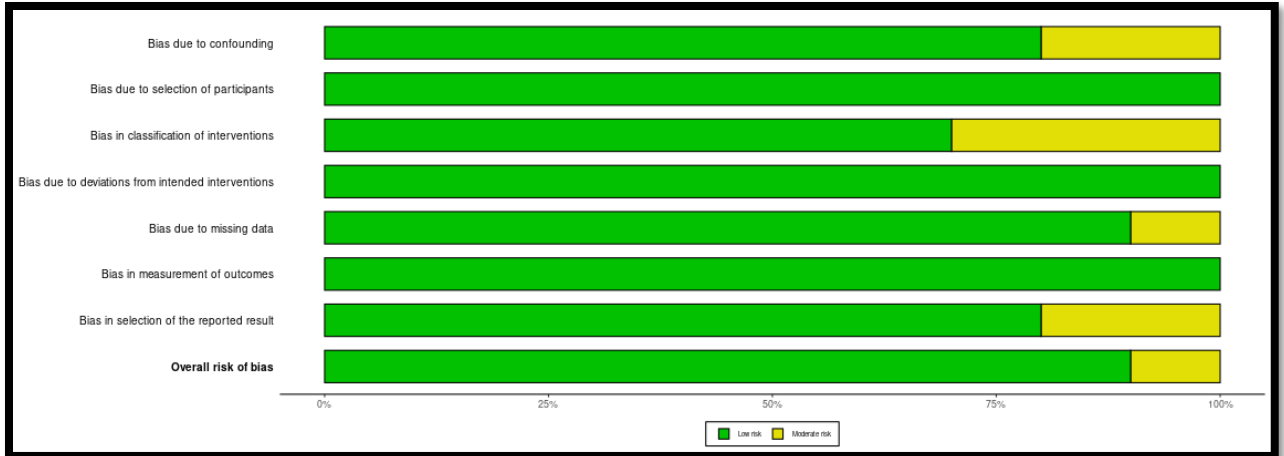
|             |  |   |  |
|-------------|--|---|--|
| use trends. |  | by police or law officers; Psychosis was present in 16% of meth users. Bivariate analysis for Psychosis and meth use was statistically significant (p=0.001). 66% were male, mean age was 34 years, | perspectives to properly address the Methamphetamine epidemic. |
|-------------|--|---|--|

|       |                                 | Risk of bias domains |    |    |    |    |    |    | Overall |
|-------|---------------------------------|----------------------|----|----|----|----|----|----|---------|
|       |                                 | D1                   | D2 | D3 | D4 | D5 | D6 | D7 |         |
| Study | Coombs, T. et al.               | +                    | +  | +  | +  | +  | +  | +  | +       |
|       | Daniulaityte, R. et al.         | +                    | +  | +  | +  | +  | +  | +  | +       |
|       | Guerrero, E. G. et al.          | -                    | +  | +  | +  | -  | +  | +  | -       |
|       | Hans, B. et al.                 | +                    | +  | +  | +  | +  | +  | +  | +       |
|       | Hoopsick, R. A. et al.          | +                    | +  | +  | +  | +  | +  | -  | +       |
|       | Jones, C. M. et al.             | -                    | +  | +  | +  | +  | +  | +  | +       |
|       | Miller, J. et al.               | +                    | +  | +  | +  | +  | +  | -  | +       |
|       | Rhed, B. D. et al.              | +                    | +  | -  | +  | +  | +  | +  | +       |
|       | Strickland, J. C. et al. (2019) | +                    | +  | -  | +  | +  | +  | +  | +       |
|       | Strickland, J. C. et al. (2021) | +                    | +  | -  | +  | +  | +  | +  | +       |

Domains:  
D1: Bias due to confounding.  
D2: Bias due to selection of participants.  
D3: Bias in classification of interventions.  
D4: Bias due to deviations from intended interventions.  
D5: Bias due to missing data.  
D6: Bias in measurement of outcomes.  
D7: Bias in selection of the reported result.

Judgement  
- Moderate  
+ Low

**Figure 2**  
*ROB 1 Risk of Bias for Non-Randomized Studies*



**Figure 3**

*Distribution of Risk of Bias Judgements Within Each Bias Domain*

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**Discussion:**

This investigation included ten articles looking for patterns or trends in methamphetamine use. Included articles provided mortality data, personal interviews with methamphetamine users, data collected from treatment admissions, and data collected through national surveys. This allowed for a broad examination of health-related implications to be considered.

Prior to 2005, methamphetamine rates were decreasing annually and remained stable until 2010 (Hoopsick, R. A. et al., 2023, Hans, B. et al., 2021). The first and major trend identified in this study was the increase in mortality rates involving methamphetamines. Methamphetamine use increased faster than any other substance with a 58-fold spike between 2010 and 2021 (Hoopsick, R. A. et al., 2023, Hans, B. et al., 2021). Further investigation revealed a second alarming trend. Most deaths involving methamphetamines also included opioids (Hoopsick, R. A. et al., 2023, Hans, B. et al., 2021).

The relationship between the opioid crisis and methamphetamine use began in the 1990's as the United States experienced the first wave of a drug overdose crisis stemming from the overprescribing of prescription opioids for pain relief (NIH,

2024). A second wave of overdose deaths began around 2010 as stricter prescription regulations were implemented. Without alternatives, addicted individuals turned to inexpensive illicit heroin abundant on the streets (NIH, 2024). At the same time, methamphetamine overdose deaths drastically increased. Two thousand sixteen brought the onset of synthetic opioids (fentanyl) laced heroin for a more lethal drug combination. By 2021 fentanyl had found its way into over 60% of illicit heroin (Hoopsick, R. A. et al., 2023).

Co-administration falls under three groups (Rhed, B. D. et al., 2022). A goofball is a combination of an opioid and methamphetamines administered at the same time using the same route of administration (Rhed, B. D. et al., 2022). Other forms of co-administration include the administration of one drug shortly after the other or injecting opioids and smoking methamphetamines (Rhed, B. D. et al., 2022). Co-administration of more than one substance is practiced for many reasons. Over ninety percent who administered goofballs did so to increase their high or for the synergistic effects that lessen the negative side effects of both drugs (Rhed, B. D. et al., 2022).

The societal and economic cost of methamphetamine is complex and intertwined with the larger opioid crisis and ramifications of homelessness (Rhed, B. D. et al., 2022) & (Coombs, T. et al., 2023). The increase in injection of methamphetamines has dramatically elevated the spread of bloodborne pathogens such as Hep C. and HIV in many communities (Rhed, B. D. et al., 2022). Co-administration of opioids and methamphetamines has increased the risk of overdose and may reduce the effectiveness of the few treatment options available to drug addicted individuals (Rhed, B. D. et al., 2022).

Another dangerous and costly threat to the methamphetamine user and their communities is homelessness. Most methamphetamine users experience homelessness during their addiction (Coombs, T. et al., 2023). One study conducted by the University of California reveals the true cost of homelessness in Irvine California (Jamboree). Results of the study determined the annual cost for services for chronically homeless people to be \$100,759.00 (Jamboree, 2024). That number drops to approximately 50% or 51,587.00 per year, once permanent housing is provided (Jamboree, 2024). Even more dramatic results were realized when the most chronically homeless individuals were provided with permanent housing. For the most chronically homeless, the annual cost of services is \$439,787.00 (Jamboree, 2024). That number drops to \$55,332.00 once permanent housing was provided, saving the community over 88% (Jamboree, 2024).

According to Community Solutions Research and Evaluation, homelessness puts individuals at significant risk of tuberculosis, anemia, asthma, and epilepsy, as well

as increasing the risk of violent attacks and sexual victimization (Chimowitz, H., Ruege, A., 2024). Psychosis was present in 16% of methamphetamine users resulting in resistant or violent behavior leading to police or law enforcement involvement(Chimowitz, H., Ruege, A., 2024).

### **Conclusion**

This review identified key trends associated with methamphetamine use in the United States. Most important was the recognition of the relationship between the increase in methamphetamine use and the on-going opioid crisis. This deadly combination has resulted in climbing drug overdoses, mortality rates, homelessness, disease, along with the enormous economic burden on our communities.

More research is needed to better understand the effects of co-administration of opioids and methamphetamines. Future studies must also include evidence-based prevention and treatment interventions to combat polysubstance abuse. And finally, more work is needed to raise psychoactive substance awareness among healthcare providers, care givers, social workers, academics and government agencies.

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