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# The crisis we are not talking about: One-in-three annual HIV seroconversions among sexual and gender minorities were persistent methamphetamine users

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## Abstract

**Introduction:** Methamphetamine use is once again on the rise among sexual and gender minorities who have sex with men (SGMSM).

**Methods:** Baseline and 12-month data are taken from an ongoing cohort study of $n = 4{,}786$ SGMSM aged 16 to 49 at risk for HIV from across the US. Participants completed annual online surveys as well as at-home HIV testing (oral fluid samples returned via mail).

**Results:** Overall, 2.47 per 100 persons seroconverted over 12 months. In addition, 13.8% of participants reported any methamphetamine use over the 12-month study period. Nearly three-fourths (74.7%; 422 of 565) of those who reported using methamphetamine at baseline were persistent users at 12 months. In adjusted analyses, compared to those who did not use methamphetamine, incident methamphetamine users (i.e., those who indicated use between baseline and follow up) and persistent methamphetamine users had significantly higher odds of HIV seroconverting (AOR = 3.95, 95% CI: 1.64–9.47; and 7.11, 4.53–11.17, respectively).

Persistent methamphetamine users accounted for one-third of all observed HIV seroconversions (41 of 115).

**Discussion:** Among SGMSM at elevated risk for HIV, persistent methamphetamine use was prevalent and associated with substantially amplified risk for HIV seroconversion. Expanded efforts are needed to test implementation strategies for scalable, evidence-based interventions to reduce HIV risk in SGMSM who use methamphetamine.

### Keywords

Methamphetamine; HIV incidence; HIV prevalence; gay and bisexual men; sexual and gender minorities; syphilis

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## INTRODUCTION

Methamphetamine, known colloquially as meth, crystal, or ice, is an addictive and potent stimulant drug that may be smoked, snorted, injected, or orally ingested.[1,2] For a period of time, many components necessary to manufacture methamphetamine could be purchased over-the-counter, and the drug itself could be manufactured in the home.[3] This perhaps facilitated the initial proliferation of methamphetamine use in the United States in the 1990s and early 2000s.[4] In 2005, the Combat Methamphetamine Epidemic Act effectively banned over-the-counter sales of products that contained key ingredients to manufacture methamphetamine like pseudoephedrine.[5] Since then, production of methamphetamine has declined within the US, and today, a majority of methamphetamine found in the United States being imported in an increasingly inexpensive and potent form.[4,6]

Rates of substance use, and particularly methamphetamine use, are higher among sexual and gender minority populations (SGM) compared to heterosexuals, and particularly among gay and bisexual and other men who have sex with men (GBM).[7] Although recent largescale epidemiological data on methamphetamine use and abuse amongst GBM is scant, prior literature has suggested that use of methamphetamine and other amphetamine-type stimulants in GBM is 5–10 times higher than in the general population.[8] Following significant public health and community attention, methamphetamine use amongst GBM appeared to decline overall following a peak in 2005.[9] However, disaggregated data from Pantalone et al. indicated that use amongst HIV positive GBM again rose to a similar level in 2007 (12.3%) as was observed in 2002 (12.1%),[10] suggesting continued use amongst vulnerable sub-populations. Additionally, more recent studies have found that methamphetamine use in recent years has either remained stable or increased in GBM.[11–13]

Research dating back to the 1990s and early 2000s have shown an alarming connection between methamphetamine use and risk for HIV infection. As a stimulant, methamphetamine increases sexual libido while simultaneously decreasing behavioral inhibitions.[2,14,15] That is, methamphetamine users often report using for sexual enhancement and are simultaneously less likely to use condoms while high.[16–18] Methamphetamine additionally reduces the need for sleep, such that users may often go on sexual binges lasting hours, if not days, that involve multiple sexual partners, and often sex without condoms.[19] In the UK and Europe, this has been called “chemsex;” however, chemsex broadly described, can include other drugs like mephedrone, ecstasy, speed, and GHB, with or without methamphetamine.[20–22]

With increasing public attention to the ongoing opioid crisis, there seems to be a parallel decrease in attention to the problems methamphetamine poses in GBM communities. A 2020 *New York Times* article labeled methamphetamine use amongst sexual minorities “a crisis we are not talking about,” citing an increase in use within the community coupled with paltry funding and support from the public health sector.[23] To that end, the present study examines methamphetamine use and HIV seroconversion between baseline and month 12 in an ongoing U.S. national cohort study comprised predominately of cisgender GBM, but also includes transgender men and transgender women who have sex with men. We specifically examine the association between persistent methamphetamine use between baseline and 12

months with HIV seroconversion relative to non-users, those who discontinued methamphetamine use after baseline, and those who initiated methamphetamine use after baseline. Our goal is to inform HIV prevention strategies to help end the epidemic in high priority population.

## METHOD

### Enrollment

Data are taken from *Together 5000* (herein T5K), a U.S. national, internet-based cohort study of men, trans men, and trans women who have sex with men. The goal of T5K is to identify modifiable individual and structural factors associated with HIV seroconversion. Enrollment began in October 2017 using ads on men-for-men geosocial networking phone applications (apps) and concluded in June 2018. The cohort and study procedures have been fully described elsewhere.[24–26] Briefly, core eligibility criteria for enrollment specified that participants were aged 16 to 49; had at least two male sex partners in the past three months; were not currently participating in an HIV vaccine or PrEP clinical trial; were not *currently* on PrEP; lived in the U.S. or its territories; were not known to be HIV-positive; had a gender identity other than cisgender female; and reported behavioral risk for HIV.

Participants clicking on one of our study ads were routed from geosocial apps to a secured informed consent and enrollment survey webpage that presented questions about demographic characteristics, sexual behavior, and substance use. Of those who completed the enrollment survey, 8,755 participants met eligibility criteria and provided contact information for later follow-up. These participants were sent a link to complete a supplemental secondary survey. Of the 8,755 eligible, 6,267 (71.6%) completed the secondary survey and received a $15 incentive.[24,26]

Following completion of the secondary survey and for an additional $15 incentive, participants were mailed an OraSure HIV-1 specimen collection device[27] to use at home. Participants were also provided access to an instructional video along with printed instructions on completing the test. Collection procedures involved taking an oral swab and placing it in an oral fluid container and mailing the specimen using provided prepaid shipping materials to the Wadsworth Center Laboratory of the New York State Department of Health for antibody testing (Avioq HIV-1 Microelisa System). We successfully delivered 6,150 HIV test kits to participants, 5,065 of which were returned by the lab at baseline. At enrollment, 201 participants had HIV-positive results (herein “HIV prevalence”). HIV-positive results were delivered to participants via phone along with referrals to local clinics or other healthcare providers to link them to care following our clinical protocols.

### Month 12 follow up

Twelve months after enrollment, participants were invited via email and text message to complete another online survey as well as at-home HIV testing. Participants who tested HIV-positive at baseline (i.e., prevalent cases) were not asked to test again. Furthermore, participants who told us on their month 12 survey that they were on PrEP (i.e., began PrEP), or that they had been diagnosed with HIV in the year that passed since baseline (i.e.,

diagnosed outside of the study) were not asked to complete testing with us at 12 month follow-up. Instead, participants on PrEP were asked to submit a digital photo of their prescription bottle showing their name and date. Meanwhile, participants indicating they had been diagnosed with HIV between study assessments were asked to provide proof of status (i.e., photo of documentation indicating HIV diagnosis). At 12-months, participants were compensated $25 for completing the online survey as well as $25 for completing HIV testing (or providing photo proof of PrEP or HIV-positive diagnosis). For the present analyses, only those participants for which we had data at baseline and 12-month follow up were included ($n$ = 4,786).

## Measures

The primary measures of interest were HIV prevalence (at enrollment) as well as HIV incidence (either diagnosed with HIV at 12 months by *our* test, or reporting that they had been diagnosed with HIV outside of the study between their baseline and 12 month assessments).

Our primary independent variable of interest was self-reported methamphetamine use. At enrollment, participants were asked if they used methamphetamine in the three months prior to baseline (coded yes/no). At month 12, participants were asked to report if they used methamphetamine in the prior year (coded yes/no). Based on these data, participants were categorized into four mutually exclusive groups:

- **Abstinent ($n$ = 4127):** No methamphetamine use reported in the three months prior to baseline or in the 12 months of prospective follow up.
- **Baseline only ($n$ = 143):** Reported methamphetamine use in the three months prior to baseline, but no use reported in the 12 months of prospective follow up.
- **Incident use ($n$ = 94):** No methamphetamine use reported in the three months prior to baseline; however, indicated use between baseline and 12-month follow up.
- **Persistent use ($n$ = 422):** Reported methamphetamine use in the three months prior to baseline as well as in the 12 months of prospective follow up.

Additional covariates of interest included demographic characteristics (e.g., age at enrollment, gender identity, race or ethnicity), history of syphilis infection, as well as experiences with incarceration (both at enrollment and during follow up). Both syphilis infection and incarceration are known factors to exacerbate risk of incident HIV infection.

## Analysis Plan

We used descriptive statistics—frequencies and percentages—to describe the patterns of prevalence and incidence of methamphetamine use among our geographically diverse study participants from baseline to year one follow-up by U.S. census-defined region and state. We also used descriptive statistics to describe prevalence and incidence of methamphetamine use by various sociodemographic characteristics and sexual health factors. To assess differences of methamphetamine use among factor subgroups, we used chi-squared tests. Based on findings from these bivariate analyses ($p < 0.05$) and known factors associated

with both HIV and meth use from the literature, we conducted a multivariable logistic regression analysis to determine the magnitude of the association of methamphetamine use with HIV seroconversion at 12-month follow-up. We report adjusted odds ratios (AORs) and 95% confidence intervals (CIs) from this model. All analyses were completed in SAS 9.4.

## RESULTS

In Table 1 we report frequencies of methamphetamine use by U.S. Census-designated region and state-by-state. At the regional level, there were significant differences in the prevalence and incidence of methamphetamine use. The Northeast (5.4%) had the lowest rates of persistent methamphetamine use, compared with the West (11.5%), Southeast (9.4%), and Midwest (6.7%), $\chi^2 = 35.4$, $p < .001$.

In Table 2 we report bivariate associations with patterns of methamphetamine use. All variables were significant. Methamphetamine use was highest among those aged 36 to 45, specifically for persistent users (15.8% were persistent users). Cisgender men (8.9%) were significantly more likely to be persistent users than gender minority individuals (i.e., transgender men, transgender women, non-binary, 4.3%). White and Latinx participants were the most likely to report using methamphetamine at some point during the study period; Asians were the least likely. Persistent methamphetamine use was also strongly associated with self-reported reoccurring syphilis infections as well as incarceration (see Table 2). Furthermore, methamphetamine use was associated with HIV infection (both at enrollment as well as in the year following enrollment). A total of 251 HIV infections were identified in this study (baseline + 12 months), of which 136 were identified at enrollment (2.84% prevalence, 136/4786), and 115 were identified at month 12 (i.e., 2.47% annual seroconversions: 4786 enrolled – 136 prevalence = 4650. 115/4650 = 2.47%). Of the 115 participants who seroconverted between baseline and 12 months, 35.7% (greater than one-in-three) were persistent methamphetamine users.

Next, we performed a multivariable logistic regression to examine factors associated with incident HIV diagnoses between enrollment and month 12 follow up. For these analyses, prevalent HIV cases at enrollment were excluded. Nearly all of those having seroconverted were GBM; however, one was a transgender man, one was a transgender woman, and three individuals indicated they were gender non-binary (assigned male sex at birth). Compared to those who did not use methamphetamine, incident methamphetamine users (i.e., those who indicated use between baseline and follow up) and persistent methamphetamine users had significantly higher odds of HIV seroconverting (AOR = 3.95, 95% CI: 1.64–9.47; and 7.11, 4.53–11.17, respectively). All persistent methamphetamine users who seroconverted were GBM.

Meanwhile, those who reported methamphetamine use prior to baseline only (i.e., had discontinued use between baseline and follow up) did not significantly differ from non-users in their odds of HIV seroconverting at 12 months. Compared to white participants, Black participants had significantly higher odds of seroconverting (AOR = 2.88, 95% CI: 1.68–4.93). Those who reported a syphilis diagnosis between baseline and month 12 were also significantly more likely to have seroconverted (AOR = 2.47, 95% CI: 1.48–4.11). Neither

age nor incarceration experience between baseline and month 12 were associated with HIV seroconversion.

## DISCUSSION

In this study, we examined factors associated with HIV prevalence (at enrollment) and in incident HIV infection in the 12 months following enrollment. An alarming 2.47 per 100 persons of our participants seroconverted between baseline and month 12, which was decidedly higher than observed seroconversions among all GBM in the US nationwide.[28] Using 2015 surveillance data, Singh et al. estimated an annual U.S. HIV incidence of 513.7/100,000 persons (0.51 per 100 persons) due to male-to-male sexual contact.[28] More recent, non-population-based samples of similarly high risk (to *T5K* participants) SGM have reported incidence estimates of 2.4–2.9.[29,30]

In total, 13.8% of participants (more than 1 out of every 8) had used methamphetamine at some point in our study's assessment periods—i.e., in the three months prior to baseline or in the year following baseline. Further, of those using methamphetamine at baseline ($n$ = 565), 74.7% (422 of 565) were classified as persistent users. In our adjusted logistic regression model, and compared to other variables in the model, being a persistent methamphetamine user was associated with the single greatest odds (AOR = 7.11) of seroconverting.

Methamphetamine exacerbates HIV risk via increasing sexual libido while simultaneously reducing inhibitions.[2,14,15] Our findings highlight the need to address methamphetamine use and its associated risks among SGM, the likes of which may also serve to help end the HIV epidemic.[31] PrEP in-and-of itself can greatly reduce the risk of HIV infection in the event of exposure, and one study found an association between PrEP use and methamphetamine[15]; meaning methamphetamine users were taking advantage of the biological protection PrEP provides. However, we lack sufficient data on the role that methamphetamine plays across the full PrEP care continuum. That is, gaining access to a PrEP provider, renewing a prescription for PrEP, consistently adhering to a dosing schedule, and attending PrEP follow up visits for long-term care.

Other factors known to be associated with HIV seroconversion risk also evinced themselves in our sample including race and incident syphilis diagnosis. Syphilis diagnosis is a co-indicator that sexual behavior without condoms likely occurred and directly serves as a transmission pathway for HIV.[32,33] Syphilis rates in the U.S. have been steadily increasing for two decades,[34] and our findings highlight the importance of screening for and treating syphilis as well as offering HIV testing combined with STI testing.

Taken together, findings underscore the urgent need for implementation science research to test novel approaches for delivering scalable, evidence-based substance use interventions to optimize HIV prevention efforts in methamphetamine users. Intensive behavioral interventions such as cognitive-behavioral therapy and contingency management have demonstrated moderate effectiveness for reducing substance use (including methamphetamine) and sexual risk,[35,36] including among GBM.[37,38] Although mirtazapine

has shown some promise as a pharmacologic treatment for Methamphetamine Use Disorder in two efficacy trials with SGMSM,[39,40] medication adherence remains a key challenge and the durability of treatment gains remains unclear. Expanded efforts are needed as part of the Ending the HIV Epidemic Initiative[31] to develop and test scalable approaches for targeting methamphetamine use as an enduring driver of the HIV epidemic among SGMSM. In particular, novel intervention approaches are needed to optimize engagement along the PrEP care continuum in SGMSM who use methamphetamine.

For clinical providers and community-based groups working with SGMSM—be it for HIV testing, primary healthcare, social service delivery, etc.—our findings suggest an urgent need to include assessments of methamphetamine use among their patients/clients given the alarming strong connection observed with HIV incidence. This is particularly important considering already documented barriers among racial/ethnic minority groups who have limited access to healthcare, are an increased risk for HIV due to structural racism and, based on this research findings, are at increased risk of seroconversion due to methamphetamine use. Likewise, those delivering treatment and care targeted to reduce substance use, particularly methamphetamine, would be well served were they to include HIV prevention as part of that service delivery.

Our findings should be understood in light of their limitations. While the use of at-home HIV testing and photo verification of HIV status is a strength in our design, not all participants completed these procedures in the study, and our analyses are limited to only those who completed HIV testing or photo verification of HIV status at baseline and follow up. It may be that those using methamphetamine may be more difficult to retain, and thus we might have underestimated rates of use in this study. Next, online studies have the ability to reach a large number of participants, often at a lower cost than traditional face-to-face studies, but this too can present challenges in longitudinal retention.[41] That is, the lack of a face-to-face “human connection,” could pose challenges to retention. To enhance participation, we used the OraSure HIV specimen collection device, which is an oral swab, as opposed to a finger-stick blood draw. This is a third generation HIV test with a window period of up to three months.[27] It is possible that acutely infected participants were not detected at the month 12 assessment, and thus our estimates of HIV incidence could be higher than we have reported. However, it is also possible that acutely infected individuals at baseline were not detected at enrollment, but were detected at month 12 (i.e., were recorded as incident infections). Next, other measures in this study, including methamphetamine use, were self-reported, which could be subject to social desirability biases; however, that effect could be minimized by the use of an online survey, versus a face-to-face assessment methods.[41] We also recognize that our measurement methamphetamine use was dichotomous over a long recall period. We recognize that patterns of methamphetamine use can change seasonally over time within individuals, and that granularity was not captured in our study.

Web-based recruitment also increases our vulnerability to repeat participation and fraudulent manipulation of HIV testing procedures (e.g., someone else’s saliva, other than that of the enrolled participant, could be submitted to the lab). However, we followed established and effective measures to minimize these risks.[42–44] This included advertising only to

participants geolocated in the U.S., links that expired after one click, blocking multiple submissions from a given IP address, and requiring unique and valid mailing addresses for test kits to be mailed. Further, the incentive for participating in HIV testing as well as participating in the study longitudinally was the same regardless of one's HIV test result. That is, we did not tell participants that they would be disqualified from further participation if their results were HIV positive. Finally, the incentive used at enrollment was fairly low, which can help to disincentivize repeat participation, were someone to figure out how to. Participants were paid $15 for completing the secondary survey and $15 for returning an HIV test kit to the lab.

Next, we found an alarming connection between methamphetamine use and HIV prevalence (at enrollment) and incidence (one year later). Although we believe there is a causal pathway between the two, we cannot say so for sure. We also lack data on the route in which methamphetamine was used (e.g., snorting, smoking, rectal administration (booty bump), or injection). We can say, however, that nearly all injection drug users also reported methamphetamine use (161 of 171 at enrollment and 231 of 274 at month 12). Both injection drug use (if sharing needles) and rectal administration (booty bumps) can serve to create a direct route for HIV to pass between partners (the risk posed by needle sharing is perhaps self-evident, whereas booty bumps compound risk via the damage that methamphetamine itself can do to the lining of the rectum, and booty bumps are often followed by anal sex).

### Conclusion

An alarming number of individuals HIV seroconverted within a year of joining this study and HIV prevalence (at enrollment) as well as HIV seroconversion was strongly associated with methamphetamine use. In addition, HIV seroconversion was particularly high among those having persisted in their use from prior to baseline into the 12 months of follow up. Urgent measures are needed to curb methamphetamine use and its associated risk factors. Providers conducting HIV testing to GBM should simultaneously assess for methamphetamine use. And if their patients report use, appropriate referrals for harm reduction both in sexual behavior and drug use, should be given to patients. PrEP can greatly reduce the biological risks of HIV infection; however, more data are needed to understand how methamphetamine may serve as a barrier to PrEP initiation, adherence, and long-term retention in care.

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**Table 1.**

Regional and state-by-state prevalence of methamphetamine use between baseline and 12 month follow up, *Together 5,000* cohort study, $n$ = 4786, 2017 – 2019

| | **Total participants *n* = 4786, 100%** | | **Abstinent: No use at BL or 12M *n* = 4127, 86.2%** | | **Baseline only: BL use only, no use between BL and 12M *n* = 143, 3.0%** | | **Incident use: Indicated use between BL and 12M *n* = 94, 2.0%** | | **Persistent use: Baseline and 12M use *n* = 422, 8.8%** | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** |
| ***Northeast*** | **738** | **(15.4)** | **660** | **(89.4)** | **24** | **(3.3)** | **14** | **(19)** | **40** | **(5.4)** |
| Connecticut | 28 | (0.6) | 24 | (85.7) | 2 | (7.1) | 0 | (0.0) | 2 | (7.1) |
| Maine | 5 | (0.1) | 5 | (100.0) | 0 | (0.0) | 0 | (0.0) | 0 | (0.0) |
| Massachusetts | 79 | (1.7) | 69 | (87.3) | 6 | (7.6) | 2 | (2.5) | 2 | (2.5) |
| New Hampshire | 9 | (0.2) | 7 | (77.8) | 0 | (0.0) | 1 | (11.1) | 1 | (11.1) |
| New Jersey | 72 | (1.5) | 64 | (88.9) | 1 | (1.4) | 2 | (2.8) | 5 | (6.9) |
| New York | 394 | (8.2) | 359 | (91.1) | 11 | (2.8) | 7 | (1.8) | 17 | (4.3) |
| Pennsylvania | 131 | (2.7) | 113 | (86.3) | 3 | (2.3) | 2 | (1.5) | 13 | (9.9) |
| Rhode Island | 18 | (0.4) | 17 | (94.4) | 1 | (5.6) | 0 | (0.0) | 0 | (0.0) |
| Vermont | 2 | (0.0) | 2 | (100.0) | 0 | (0.0) | 0 | (0.0) | 0 | (0.0) |
| ***Southeast*** | **2214** | **(46.3)** | **1894** | **(85.5)** | **62** | **(2.8)** | **50** | **(2.3)** | **208** | **(9.4)** |
| Alabama | 74 | (1.5) | 61 | (82.4) | 3 | (4.1) | 2 | (2.7) | 8 | (10.8) |
| Arkansas | 20 | (0.4) | 17 | (85.0) | 1 | (5.0) | 0 | (0.0) | 2 | (10.0) |
| Delaware | 5 | (0.1) | 5 | (100.0) | 0 | (0.0) | 0 | (0.0) | 0 | (0.0) |
| District of Columbia | 37 | (0.8) | 32 | (86.5) | 0 | (0.0) | 0 | (0.0) | 5 | (13.5) |
| Florida | 503 | (10.5) | 424 | (84.3) | 8 | (1.6) | 18 | (3.6) | 53 | (10.5) |
| Georgia | 256 | (5.4) | 214 | (83.6) | 13 | (5.1) | 6 | (2.3) | 23 | (9.0) |
| Kentucky | 42 | (0.9) | 37 | (88.1) | 0 | (0.0) | 0 | (0.0) | 5 | (119) |
| Louisiana | 77 | (1.6) | 60 | (77.9) | 4 | (5.2) | 3 | (3.9) | 10 | (13.0) |
| Maryland | 58 | (1.2) | 54 | (93.1) | 1 | (1.7) | 2 | (3.5) | 1 | (1.7) |
| Mississippi | 28 | (0.6) | 23 | (82.1) | 1 | (3.6) | 1 | (3.6) | 3 | (10.7) |
| North Carolina | 182 | (3.8) | 158 | (86.8) | 4 | (2.2) | 3 | (1.7) | 17 | (9.3) |
| Oklahoma | 52 | (1.1) | 46 | (88.5) | 4 | (7.7) | 0 | (0.0) | 2 | (3.9) |
| South Carolina | 59 | (1.2) | 56 | (94.9) | 0 | (0.0) | 0 | (0.0) | 3 | (5.1) |
| Tennessee | 62 | (1.3) | 53 | (85.5) | 3 | (4.8) | 1 | (1.6) | 5 | (8.1) |
| Texas | 647 | (13.5) | 554 | (85.6) | 19 | (2.9) | 12 | (1.9) | 62 | (9.6) |
| Virginia | 92 | (19) | 83 | (90.2) | 1 | (1.1) | 2 | (2.2) | 6 | (6.5) |
| West Virginia | 20 | (0.4) | 17 | (85.0) | 0 | (0.0) | 0 | (0.0) | 3 | (15.0) |
| ***Midwest*** | **729** | **(15.3)** | **650** | **(89.2)** | **15** | **(2.1)** | **15** | **(2.1)** | **49** | **(6.7)** |
| Illinois | 185 | (3.9) | 173 | (93.5) | 3 | (1.6) | 3 | (1.6) | 6 | (3.2) |
| Indiana | 76 | (1.6) | 60 | (79.0) | 3 | (4.0) | 4 | (5.3) | 9 | (11.8) |
| Iowa | 29 | (0.6) | 26 | (89.7) | 1 | (3.5) | 2 | (6.9) | 0 | (0.0) |

| | Total participants *n* = 4786, 100% | | Abstinent: No use at BL or 12M *n* = 4127, 86.2% | | Baseline only: BL use only, no use between BL and 12M *n* = 143, 3.0% | | Incident use: Indicated use between BL and 12M *n* = 94, 2.0% | | Persistent use: Baseline and 12M use *n* = 422, 8.8% | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** |
| Kansas | 29 | (0.6) | 26 | (89.7) | 1 | (3.5) | 1 | (3.5) | 1 | (3.5) |
| Michigan | 67 | (1.4) | 62 | (92.5) | 1 | (1.5) | 2 | (3.0) | 2 | (3.0) |
| Minnesota | 60 | (1.3) | 52 | (86.7) | 3 | (5.0) | 0 | (0.0) | 5 | (8.3) |
| Missouri | 75 | (1.6) | 66 | (88.0) | 1 | (1.3) | 1 | (1.3) | 7 | (9.3) |
| Nebraska | 18 | (0.4) | 16 | (88.9) | 0 | (0.0) | 0 | (0.0) | 2 | (11.1) |
| North Dakota | 6 | (0.1) | 4 | (66.7) | 0 | (0.0) | 1 | (16.7) | 1 | (16.7) |
| Ohio | 117 | (2.4) | 104 | (88.9) | 1 | (0.9) | 0 | (0.0) | 12 | (10.3) |
| South Dakota | 6 | (0.1) | 5 | (83.3) | 0 | (0.0) | 0 | (0.0) | 1 | (16.7) |
| Wisconsin | 61 | (1.3) | 56 | (91.8) | 1 | (1.6) | 1 | (1.6) | 3 | (4.9) |
| ***West*** | **1084** | **(22.7)** | **904** | **(83.4)** | **42** | **(3.9)** | **13** | **(1.2)** | **125** | **(11.5)** |
| Alaska | 10 | (0.2) | 9 | (90.0) | 0 | (0.0) | 0 | (0.0) | 1 | (10.0) |
| Arizona | 89 | (19) | 70 | (78.7) | 4 | (4.5) | 3 | (3.4) | 12 | (13.5) |
| California | 550 | (11.5) | 450 | (81.8) | 23 | (4.2) | 6 | (1.1) | 71 | (12.9) |
| Colorado | 99 | (2.1) | 85 | (85.9) | 5 | (5.1) | 1 | (1.0) | 8 | (8.1) |
| Hawaii | 12 | (0.3) | 6 | (50.0) | 1 | (8.3) | 2 | (16.7) | 3 | (25.0) |
| Idaho | 20 | (0.4) | 17 | (85.0) | 1 | (5.0) | 0 | (0.0) | 2 | (10.0) |
| Montana | 14 | (0.3) | 11 | (78.6) | 0 | (0.0) | 0 | (0.0) | 3 | (21.4) |
| Nevada | 52 | (1.1) | 41 | (78.9) | 4 | (7.7) | 1 | (1.9) | 6 | (11.5) |
| New Mexico | 22 | (0.5) | 22 | (100.0) | 0 | (0.0) | 0 | (0.0) | 0 | (0.0) |
| Oregon | 64 | (1.3) | 60 | (93.8) | 2 | (3.1) | 0 | (0.0) | 2 | (3.1) |
| Utah | 48 | (1.0) | 35 | (72.9) | 2 | (4.2) | 0 | (0.0) | 11 | (22.9) |
| Washington | 100 | (2.1) | 96 | (96.0) | 0 | (0.0) | 0 | (0.0) | 4 | (4.0) |
| Wyoming | 4 | (0.1) | 2 | (50.0) | 0 | (0.0) | 0 | (0.0) | 2 | (50.0) |
| ***Territories*** | | | | | | | | | | |
| Puerto Rico | 19 | (0.4) | 17 | (89.5) | 0 | (0.0) | 2 | (10.5) | 0 | (0.0) |
| APO or FPO or DPO | 2 | (0.0) | 2 | (100.0) | 0 | (0.0) | 0 | (0.0) | 0 | (0.0) |

BL: Baseline (reported at BL with a 3 month recall window), 12M: 12 months (reported at month 12 with a 12 month recall window)

**Table 2.**

Characteristics associated with methamphetamine use at baseline and/or 12 month follow up, *Together 5,000* cohort study, $n = 4786$, 2017 – 2019

| | **Abstinent: No use at BL or 12M *n* = 4127, 86.2%** | | **Baseline only: BL use only, no use between BL and 12M *n* = 143, 3.0%** | | **Incident use: Indicated use between BL and 12M *n* = 94, 2.0%** | | **Persistent use: Baseline and 12M use *n* = 422, 8.8%** | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** | **Chi-squared** | ***p*** |
| Age at enrollment | | | | | | | | | 134.90 | <.0001 |
| 16–24 years old | 1010 | (92.2) | 26 | (2.4) | 30 | (2.7) | 30 | (2.7) | | |
| 25–35 years old | 2081 | (85.7) | 91 | (3.8) | 45 | (1.9) | 212 | (8.7) | | |
| 36–45 years old | 797 | (80.3) | 20 | (2.0) | 18 | (1.8) | 157 | (15.8) | | |
| 46–55 years old | 239 | (88.9) | 6 | (2.2) | 1 | (0.4) | 23 | (8.6) | | |
| Gender | | | | | | | | | 10.37 | 0.02 |
| Male | 4029 | (86.3) | 135 | (2.9) | 89 | (1.9) | 417 | (8.9) | | |
| Gender minority | 98 | (84.5) | 8 | (6.9) | 5 | (4.3) | 5 | (4.3) | | |
| Race/ethnicity | | | | | | | | | 44.72 | <.0001 |
| White | 2202 | (85.8) | 64 | (2.5) | 43 | (1.7) | 259 | (10.1) | | |
| Black | 438 | (90.7) | 14 | (2.9) | 12 | (2.5) | 19 | (3.9) | | |
| Latinx | 965 | (85.0) | 48 | (4.2) | 27 | (2.4) | 96 | (8.5) | | |
| API | 171 | (93.4) | 3 | (1.6) | 3 | (1.6) | 6 | (3.3) | | |
| All Other, Multiracial | 351 | (84.4) | 14 | (3.4) | 9 | (2.2) | 42 | (10.1) | | |
| Incident HIV at 12 months (HIV diagnoses between BL and 12M) | | | | | | | | | 75.74 | <.0001 |
| No | 4064 | (87.0) | 138 | (3.0) | 88 | (1.9) | 381 | (8.2) | | |
| Yes | 63 | (54.8) | 5 | (4.4) | 6 | (5.2) | 41 | (35.7) | | |
| Prevalent HIV (baseline and 12 months) | | | | | | | | | 183.40 | <.0001 |
| No | 3876 | (88.4) | 116 | (2.6) | 87 | (2.0) | 308 | (7.0) | | |
| Yes | 138 | (55.0) | 18 | (7.2) | 6 | (2.4) | 89 | (35.5) | | |
| Indeterminate | 38 | (79.2) | 3 | (6.3) | 0 | (0.0) | 7 | (14.6) | | |
| Syphilis | | | | | | | | | 122.06 | <.0001 |
| No diagnoses (lifetime) | 3786 | (88.1) | 116 | (2.7) | 84 | (2.0) | 314 | (7.3) | | |
| In the year prior to enrollment | 120 | (76.9) | 8 | (5.1) | 1 | (0.6) | 27 | (17.3) | | |
| Incident: Diagnosis between enrollment and 12 months | 185 | (69.6) | 16 | (6.0) | 8 | (3.0) | 57 | (21.4) | | |

| | **Abstinent: No use at BL or 12M *n* = 4127, 86.2%** | | **Baseline only: BL use only, no use between BL and 12M *n* = 143, 3.0%** | | **Incident use: Indicated use between BL and 12M *n* = 94, 2.0%** | | **Persistent use: Baseline and 12M use *n* = 422, 8.8%** | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** | **Frequency** | **(%)** | **Chi-squared** | ***p*** |
| Persistent: In the year prior to enrollment as well as following enrollment | 36 | (56.3) | 3 | (4.7) | 1 | (1.6) | 24 | (37.5) | | |
| Incarceration | | | | | | | | | 376.85 | <.0001 |
| No incarceration in lifetime or during 12 month follow up | 3682 | (90.1) | 93 | (2.3) | 84 | (2.1) | 227 | (5.6) | | |
| Lifetime: Prior to enrollment, but not during 12 month follow up | 365 | (66.7) | 36 | (6.6) | 7 | (1.3) | 139 | (25.4) | | |
| Incident: Incarcerated between enrollment and 12 month | 56 | (76.7) | 4 | (5.5) | 0 | (0.0) | 13 | (17.8) | | |
| Persistent: In the year prior to enrollment as well as following enrollment | 24 | (30.0) | 10 | (12.5) | 3 | (3.8) | 43 | (53.8) | | |

BL: Baseline (reported at BL with a 3 month recall window), 12M: 12 months (reported at month 12 with a 12 month recall window)

**Table 3:**

Multivariate logistic regression, factors associated with incident HIV diagnoses between enrollment and 12 month follow up, $n = 4649$[a]

| | Estimate | aOR | 95% CI | Pr > ChiSq |
|---|---|---|---|---|
| Methamphetamine use | | | | |
| Never users | Ref | | | |
| Baseline only use | 0.81 | 2.26 | 0.88 -- 5.78 | 0.090 |
| Indicated use between BL and 12M | 1.37 | 3.95 | 1.64 -- 9.47 | 0.002 |
| Persistent methamphetamine use at BL and 12M | 1.96 | 7.11 | 4.53 -- 11.17 | <.0001 |
| Age | | | | |
| 16–24 years old | Ref | | | |
| 25–35 years old | 0.12 | 1.13 | 0.67 -- 1.91 | 0.64 |
| 36–45 years old | 0.17 | 1.19 | 0.65 -- 2.19 | 0.58 |
| 46–55 years old | −0.19 | 0.83 | 0.28 -- 2.49 | 0.74 |
| Race/ethnicity | | | | |
| White | Ref | | | |
| Black | 1.06 | 2.88 | 1.68 -- 4.93 | 0.0001 |
| Latino | 0.02 | 1.02 | 0.61 -- 1.69 | 0.94 |
| Asian/Pacific Islander | 0.31 | 1.37 | 0.48 -- 3.91 | 0.56 |
| Other or multiracial | 0.42 | 1.52 | 0.80 -- 2.87 | 0.20 |
| Syphilis in the past year | | | | |
| Yes | 0.90 | 2.47 | 1.48 -- 4.11 | 0.001 |
| No | Ref | | | |
| Incarcerated in the past year | | | | |
| Yes | 0.36 | 1.43 | 0.70 -- 2.95 | 0.33 |
| No | Ref | | | |

BL: Baseline (reported at BL with a 3 month recall window), 12M: 12 months (reported at month 12 with a 12 month recall window)

aOR: Adjusted Odds Ratio

[a] In order to estimate HIV incidence at 12 months, prevalent HIV cases ($n = 137$) identified at baseline were excluded.