

Health Services Needs and Utilization of People Who Use Methamphetamine

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Abstract

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Background: Methamphetamine use is increasing in the United States, especially in western states where it is more prevalent. People who inject drugs (PWID) and cisgender men who have sex with men (MSM) are disproportionately impacted by methamphetamine and its deleterious effects, including methamphetamine-related morbidity and mortality and increased risk of HIV acquisition. Identifying ways to lower the morbidity and mortality of methamphetamine among PWID and MSM should be a public health priority.

Methods: This dissertation explores interest in reducing methamphetamine use among PWID who use methamphetamine and knowledge of and uptake of pre-exposure prophylaxis (PrEP) among MSM who use methamphetamine. First, we describe interest in reducing methamphetamine use and correlates of interest in reducing use among PWID who access syringe exchange services across Washington State. We also report the types of help participants would want to reduce their methamphetamine use. Second, we explore knowledge of PrEP and barriers to uptake among MSM who use methamphetamine in Seattle, WA through focus groups with peer educators at a harm reduction organization that focuses on health risks associated with

methamphetamine. Finally, we estimate the prevalence of PrEP use among participants in the 2017 MSM National HIV Behavioral Surveillance (NHBS) survey from Seattle, WA; Denver, CO; and Portland, OR who used methamphetamine in the past year and compare it to respondents who did not use methamphetamine but met other adapted PrEP eligibility criteria. Reasons for not using PrEP among those who had not used PrEP in the past year and challenges using it among those who had used PrEP are reported by past-year methamphetamine use.

Results: The majority (52%) of the PWID we surveyed were interested in reducing their methamphetamine use and participants with concerns about their mental health were more than three times as likely to be interested (AOR=3.13, 95% CI: 1.51-6.48, $p=0.002$). The peer educators described stigma related to the multiple marginalized identities of MSM who use methamphetamine as a barrier to each step of the PrEP continuum. Other barriers were also described, including avoidance of HIV testing and “losing days” related to methamphetamine use. Almost all of the MSM in the NHBS survey had heard of PrEP (95%) and about one-third had used it in the past year (35%). Significantly fewer participants who had used methamphetamine in the past year had heard of PrEP (89% vs 95%, $p=.01$). Being unsure of PrEP’s effectiveness was reported by a higher proportion of participants who had used methamphetamine compared to participants who had not used methamphetamine (38% vs. 19%, $p=.002$).

Conclusions: Collectively, our findings indicate that there are unmet health service needs for PWID and MSM who use methamphetamine and begin to identify ways to address them. PWID who use methamphetamine should be supported to reduce their methamphetamine use. Providing mental health support may help mitigate some negative effects of methamphetamine and be an appealing component of methamphetamine reduction programs. Among MSM who use

methamphetamine, our results highlight the need for continued efforts to educate and promote PrEP uptake among MSM and to the importance of incorporating stigma reduction into PrEP delivery programs.

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Chapter 1: Introduction

Methamphetamine is a stimulant and psychoactive substance that is associated with several serious health consequences including fatal overdose, cardiac pathology, psychosis, immune suppression, and dental disease.(1-5) Methamphetamine production, availability, seizures, forensic testing, and treatment admissions are increasing in the United States.(6, 7) In parallel, methamphetamine-related mortality is increasing, especially in the western US, where its use is more prevalent.(8-10) In 2017, the rate of deaths involving methamphetamine among residents of Washington state was 6.5 per 100,000 people, which is almost a four-fold increase from 1.8 deaths per 100,000 residents in 2010.(11) Identifying ways to lower the overall morbidity and mortality of methamphetamine use in the US and specifically western states should be a public health priority.

While there are no medications to treat methamphetamine use disorder currently approved by the US Food and Drug Administration (FDA), there is ongoing research of pharmacological agents. These agents include mirtazapine, an antidepressant; naltrexone, an opioid receptor antagonist; dexamphetamine, an amphetamine agonist; and buprenorphine, a partial opioid receptor agonist, among others.(12-16) In a review of 17 studies of psychostimulants as maintenance-type treatments, no overall effect was found for sustained abstinence or retention.(17) However, antidepressants may help alleviate withdrawal symptoms. In a study among cisgender men who have sex with men (MSM) using mirtazapine in addition to counseling, the combined treatment was significantly associated with reduced methamphetamine use, even in the context of suboptimal adherence.(13) Other approaches for treating

methamphetamine use disorder include 12-step programs and psychosocial interventions (e.g., cognitive behavioral therapy (CBT), and contingency management (CM)). (18, 19)

In the US methamphetamine use disproportionately affects people who inject drugs (PWID) and MSM and is increasing among certain subgroups. The 2016 National Survey on Drug Use and Health (NSDUH) estimated that 0.2% of the overall US population 12 years or older use methamphetamine.(20) In the National HIV Behavioral Surveillance (NHBS) surveys from 2014 and 2017 methamphetamine use among MSM respondents was similar with 7% and 8% of the sample reporting past year methamphetamine use respectively. However, the proportion of HIV positive MSM who reported methamphetamine use increased slightly from 10% to 12% (21, 22) In the 2012 and 2015 NHBS surveys of PWID, reported methamphetamine use increased from 17% to 28% of respondents. (23, 24)

Methamphetamine use is also increasing in Washington State. The University of Washington Alcohol and Drug Abuse Institute (ADAI) conducts a biennial Washington State Syringe Exchange Health survey, which invites all of the syringe exchange programs in the state to participate in a cross-sectional survey of their participants. In the 2015 and 2017 ADAI SEP survey, reported methamphetamine use in the past 3 months increased from 69% to 82% of participants.(25, 26) Furthermore, methamphetamine-related mortality has been increasing in Washington State in recent years.(11) Among NHBS respondents in King County, the largest county in Washington, injection of methamphetamine in the past year among PWID rose significantly between 2005 and 2015 among all subgroups, with increases from 27% to 61% in women, 40% to 63% in men who have sex with women, and from 55% to 88% among MSM.(28)

The risk of HIV acquisition is elevated among PWID and MSM who use methamphetamine. (29-33) A study done by Public Health – Seattle & King County (PHSKC) found that 80% of new HIV diagnoses in King County are in MSM and MSM who used methamphetamine were 5 times more likely to be diagnosed with HIV than MSM who did not.(34) Methamphetamine use among MSM may be associated with increased risk for HIV due to both sexual and injection activities.(35) In the 2015 Seattle NHBS survey among PWID, while the prevalence of HIV was 3% among non-MSM PWID, prevalence among MSM-PWID was 22%, and it was even higher among the subset of MSM-PWID who injected methamphetamine, with approximately 45% infected with HIV.(36) There is concern for HIV transmission between MSM-PWID who inject methamphetamine and other PWID who have lower HIV prevalence. In the 2015 NHBS survey 25% of MSM-PWID reported sharing syringes with non-MSM PWID.(28) Furthermore, in 2018 there was an outbreak of 27 new HIV infections among non-MSM PWID in Seattle, which is an increase from the annual incidence of approximately 10 new infections among non-MSM PWID over the past decade.(37)

Daily, oral pre-exposure prophylaxis (PrEP) with Truvada® is a highly-efficacious strategy for the prevention of HIV acquisition that was approved by the US FDA in 2012 for HIV prevention in adults.(38-40) Studies among MSM who use methamphetamine and PWID have demonstrated interest in PrEP for HIV prevention.(41, 42) Despite elevated HIV risk among MSM and PWID and an apparent interest in PrEP, uptake has been limited in these groups.(42, 43)

It is critical to identify ways to mitigate the deleterious effects of methamphetamine among PWID and MSM who use methamphetamine. This dissertation focuses on two specific strategies: reduction of methamphetamine use among PWID and PrEP to prevent HIV among

MSM who use methamphetamine. First, we identify correlates of interest in reducing or stopping methamphetamine use among PWID at syringe exchange programs in Washington State and explore what types of help to reduce use are preferred (Aim 1). Second, we collaborated with peer educators to explore their perspectives of the knowledge of and interest in PrEP among their MSM contacts who use methamphetamine in Seattle, WA, and identify potential barriers to PrEP engagement for this group (Aim 2). Finally, we estimate the uptake of PrEP among MSM who use methamphetamine in three western cities and explore reasons for not using PrEP among those who had not used it in the past year and challenges to using it among those who had. Together, these three aims improve our understanding of the characteristics of PWID and MSM who use methamphetamine, correlates of interest in reducing use, and barriers to PrEP uptake among MSM who use methamphetamine. Our findings can inform interventions targeted to reducing methamphetamine-related morbidity and mortality among PWID and MSM.

Chapter 2: Interest in Reducing Methamphetamine Use among Syringe Exchange Participants in Washington State

Methamphetamine is a stimulant and psychoactive substance that is associated with several serious health consequences including fatal overdose, cardiac pathology, psychosis, immune suppression, and dental disease. (1-5) Methamphetamine use is increasing in the United States.(6, 7, 44) The National HIV Behavioral Surveillance (NHBS) survey among people who inject drugs (PWID) was conducted in 20 US cities and found that methamphetamine injection in the prior year increased from 17% in 2012 (45) to 28% in 2015.(46) Methamphetamine use among PWID is also increasing in Washington State. In a 2017 survey of Washington State syringe exchange program (SEP) participants 82% reported methamphetamine use in the past three months, compared to 69% of respondents in 2015.(26) Deaths related to methamphetamine use in Washington State also have been rising. In 2010 there were 1.8 deaths involving methamphetamine per 100,000 Washington State residents and in 2017 the rate of deaths increased to 6.5 per 100,000 residents. (11)

Identifying individuals interested in reducing or stopping their methamphetamine use and connecting them to appropriate interventions could reduce methamphetamine-related morbidity and mortality. While there are no medications to treat methamphetamine use disorder currently approved by the US Food and Drug Administration (FDA), there is ongoing research of pharmacological agents. These agents include mirtazapine, an antidepressant; naltrexone, an opioid receptor antagonist; dexamphetamine, a methamphetamine agonist; and buprenorphine, a partial opioid receptor agonist, among others.(12-16) Other approaches for treating methamphetamine use disorder include psychosocial interventions, such as 12-step programs, cognitive behavioral therapy (CBT), and contingency management (CM). (18, 19)

This study aims to identify if sociodemographic characteristics, substance use behavior, and concern about mental health are associated with an interest in reducing or stopping methamphetamine use among SEP clients in Washington State who report methamphetamine use as their main drug and use in the prior three months. We also explore the types of help participants would want to reduce or stop their methamphetamine use.

1. Materials and methods

2.1 Data Source and Study Population

We used data from the University of Washington (UW) Alcohol and Drug Abuse Institute (ADAI) 2017 Washington State Syringe Exchange Health Survey. This is a cross-sectional, biennial survey that began in 2015.(26, 27, 47) Surveying was conducted between June 12 and July 15, 2017. The surveys were administered verbally, in-person, and in English by each SEP's personnel or ADAI staff. Completed paper surveys were sent to ADAI for data entry. The survey had 50 items that included sociodemographic characteristics, sex partner gender, drugs used in the previous three months, past year injection-related infections (e.g., abscess, endocarditis), history of substance use treatment, locations of health care in the past year, interest in stopping or reducing drug use and desired services, and past year experiences with opioid overdose or stimulant overamping.

Data from 17 of the 18 participating exchanges were used in this study; we excluded responses collected from the SEP sites in King County, including Seattle, as they did not ask the same questions as the other SEPs regarding level of concern about mental health and locations of health care. This analysis was further restricted to survey participants who reported that methamphetamine was their main drug, had used methamphetamine in the past three months, and were not currently receiving substance use treatment. To focus this analysis specifically on

methamphetamine use, we also excluded participants who reported using other stimulants in the past three months (n=24), including cocaine, crack, speedballs (cocaine and heroin mixed together) or goofballs (heroin and methamphetamine mixed together). The Washington State Institutional Review Board determined that data collection procedures were not human subjects research and did not require full review. The University of Washington Institutional Review Board determined that secondary analyses presented here were not human subjects research and did not require review. Participants received no financial compensation for survey completion but were given candy during the survey.

2.2 Measurements

2.2.1 Outcome

The outcomes of interest were responses to the question “How interested are you in reducing or stopping your stimulant use?”. We avoided using the word “treatment” in our outcome measurement because it is ambiguous in its meaning and may not accurately reflect an individual’s motivational level for behavior change. The answer options were “very interested,” “somewhat interested,” “not interested,” and “not sure.” We created a binary variable that collapsed “very interested” and “somewhat interested” into “interested,” which was compared to respondents who reported that they were “not interested.” Since our analytical sample included respondents who reported methamphetamine as the only stimulant they had done in the past three months, we interpreted interest in reducing or stopping stimulant use as interest in reducing or stopping methamphetamine use. Responses of “not sure” were excluded (n=19) due to the small sample size and the limited interpretability of this answer but were included in a secondary descriptive analysis. (Supplemental Materials.)

2.2.2 Independent Variables

The sociodemographic variables in this analysis included age, gender, race, being a man who has sex with men (MSM), having health insurance, rurality, housing status, legal monthly income before taxes (not including food stamps), and past year incarceration. Age was modeled continuously. Gender was analyzed as male and female, as the one person who reported another gender was excluded due to the small sample size. Race was included as a binary variable (white vs not white) due to the majority of the sample identifying as white (84%) and small sample sizes across the non-white racial categories. Legal monthly income was categorized into a four-level variable that had one category for respondents reporting no income (54% of the sample) and three categories representing tertiles among those who reported any income (\$1-727, \$728-1100, and \$1101-6000). Type of health insurance was categorized as “public/government” (i.e., Medicaid/Apple Health, Medicare, Veterans Affairs/military, or tribal health/Indian Health Service), “private,” or “other.” One respondent who had both public and private insurance was categorized as private only. Rurality was defined by mapping respondent zip codes to the United States Department of Agriculture Rural-Urban Commuting Area Codes (RUCA) four-level categorization of “urban core,” “suburban,” “large town,” or “small/town”.(48) A three-category measurement of current housing status (temporary/unstable, homeless, or permanent) was collapsed into a binary measure (unstable/homeless vs permanent).

Substance use variables included route of ingestion, having experienced or witnessed someone else overamping in the past year, having an injection-related infection in the past 12 months, and using opioids or benzodiazepines in the past three months. The route of ingestion (defined as the route the participants reported using methamphetamine in the past three months) included smoking and injection but no other routes (e.g., snorting or vaping). The other drug use variable was modeled dichotomously. Injection-related infections included an abscess, skin or

soft tissue infection such as cellulitis or MRSA, or endocarditis in the past year and were measured only among participants who reported methamphetamine injection in the past three months. We adapted a definition of stimulant “overamping” used in a prior study which described it as an event that “usually looks like a heart attack; stroke; seizure; intense overheating; or really extreme, sudden psychosis”. (49) Opioids included prescription opioids (e.g., OxyContin, Vicodin, and methadone), heroin by itself (i.e., not mixed with cocaine in a speedball or methamphetamine in a goofball), and fentanyl (known or unintentional). The study did not ask about use of alcohol or marijuana.

Concern about mental health was assessed by the question “How concerned are you about depression, anxiety, or some other mental health issue?”. The answer options were “very,” “somewhat,” and “not at all.” We used a binary measure that collapsed “very” and “somewhat” into “concerned,” which was compared to “not at all concerned.” Sources of medical care in the past 12 months were categorized into “emergency room (ER)/urgent care,” “other care” (e.g., doctor’s office/clinic/tribal clinic, medical hospital, and jail/prison), or “none.” If respondents reported using both the ER and another source of care they were classified in the “ER/urgent care” category only.

Participants who reported that they were interested in reducing or stopping their methamphetamine use were asked “What types of help would you want if they were easy to get?”. The answer options (multiple responses allowed) were “detox,” “outpatient program,” “inpatient/residential program,” “medication that may help me reduce stimulant use,” “mental health care or medications,” “1:1 counseling for addiction,” “other,” and “don’t want any help.”

2.2.3 *Statistical analysis*

Bivariate analyses were conducted to describe and compare interest in reducing or stopping methamphetamine use across demographic characteristics, substance use behavior, and level of concern about mental health. Comparisons of categorical variables were made using the Pearson chi-square test and Fisher's exact test for cell counts less than five. The median age across groups was compared using a Kruskal-Wallis test. A p-value of less than 0.05 was considered statistically significant.

Successive multivariate logistic regression analyses were conducted based on conceptually related variables: the first model included only demographic variables; the second model added substance use variables; and the third model added concern about mental health. Variables included in the multivariate analyses either had a p-value of less than 0.25 in the bivariate analyses (50) or had been selected for inclusion a priori due to prior research indicating associations with methamphetamine use or seeking help to reduce methamphetamine use in other settings. The variables chosen a priori included age, race, gender, and housing status. (51-54)

The types of help participants reported wanting to receive, among those who said they were interested in reducing or stopping their methamphetamine use, are reported as frequencies. All analyses were performed in Stata 13.

3 Results

There were 164 participants who met the study inclusion criteria. The demographic characteristics of the overall sample and by interest in reducing or stopping methamphetamine use are in Table 1. The majority were male (60%) and the median age was 39 years (IQR: 31-50). Most respondents were white (84%), living in an urban setting (53%), and had health insurance (90%). Of the 164 participants, a little over half of the respondents (52%) said that they were interested in reducing or stopping their methamphetamine use. In the bivariate analysis

participants who were interested in reducing or stopping their methamphetamine use were significantly likely to be younger (median of 35 vs 42 years old, $p=0.011$), in unstable housing or homeless (58% vs 42%, $p=0.035$), and be concerned about depression, anxiety, or another mental health issue (66% vs 34%, $p<0.001$).

Route of methamphetamine ingestion in the past three months differed by groups based on interest in reducing or stopping methamphetamine use in the bivariate analysis ($p=0.012$), with more interest among respondents who only smoked (91% vs 9%), injected and smoked (53% vs 47%) and less interest among those who only injected methamphetamine (44% vs 56%). The remaining substance use measures were similar across groups. In the past year, 17% of participants “overamped” and 28% witnessed someone else “overamp.” Approximately one-third (31%) had experienced an injection-related infection over the past 12 months and almost half (40%) used other opioids or benzodiazepines in addition to methamphetamine in the past three months. (Table 2)

None of the demographic characteristics in the first multivariate analysis (Model 1) were significantly associated with interest in reducing or stopping methamphetamine use. In the regression model that included demographic and substance use behavior variables (Model 2), smoking methamphetamine only in the past three months (and not injecting it) was significantly associated with interest in reducing or stopping methamphetamine use (AOR= 12.83, 95% CI: 1.40-117, $p=0.024$). In the final model that included concern about mental health (Model 3) only smoking methamphetamine in the past three months (AOR= 14.5, 95% CI: 1.49-140, $p=0.021$) and having a concern about mental health (AOR=3.13, 95% CI: 1.51-6.48, $p=0.002$) were significantly associated with interest in reducing or stopping methamphetamine use. (Table 3)

Among those who said they were interested in reducing or stopping their methamphetamine use (n=86) the most common type of help wanted was “mental health care or medications,” with approximately one-third of participants (34%) selecting it. Slightly fewer respondents selected “inpatient/residential program” (28%), “1:1 counseling for addiction” (27%), and “outpatient program” (27%). Less than a quarter of participants selected “medication that may help reduce methamphetamine use” (20%) and “detox” (13%). Seventeen participants reported other types of help that they would want if they were easy to get. The most common other reasons were “don’t know”/“not sure” (41%) and housing (18%). Twelve participants who said they were interested in reducing or stopping their methamphetamine use said they did not want any help to reduce their use. (Figure 1)

4 Discussion

Identifying the prevalence and correlates of interest in reducing or stopping methamphetamine use among people who use methamphetamine can inform intervention design and optimize roll out. This is the first study to our knowledge assessing correlates of interest in reducing or stopping methamphetamine use among people with recent methamphetamine use who are not in treatment. In this study, the majority of respondents who reported that methamphetamine was their main drug and had used in the past three months were interested in reducing or stopping their methamphetamine use. People who use methamphetamine should be asked about their interest in reducing or stopping their use and provided appropriate support.

In the multivariate analysis controlling for demographic characteristics, substance use practices, and concern for mental health, participants who only smoked methamphetamine in the past three months had higher odds of being interested in reducing or stopping their use. People who only smoke methamphetamine may have a different trajectory of methamphetamine use

than people who inject methamphetamine; for example, they may be at a different phase in their use (escalating or declining) or less impacted by their use than those who inject. Having a concern about depression, anxiety, or another mental health issue was also significantly associated with interest in reducing or stopping methamphetamine use. While methamphetamine use can trigger and/or exacerbate depression, anxiety and psychosis, people may use methamphetamine to mitigate or cope with the symptoms of these conditions.(55) Understanding this relationship can support differential diagnosis of mental health conditions and selection of appropriate support services, including mental health care or other resources. The most frequently endorsed type of help people who were interested in reducing or stopping their methamphetamine use wanted was mental health care. This can inform programs aimed at supporting people who use methamphetamine to reduce their use, specifically that mental health practitioners should be involved in care provision. Furthermore, almost one-third of the sample was interested in either addiction counseling, outpatient and/or inpatient programs. Access to these resources should be increased for people who use methamphetamine. These findings also highlight the importance of asking specific questions, rather than using more nebulous terms such as “treatment”.

One-fifth of participants were interested in medications that may help reduce methamphetamine use; however, there are no pharmacological treatments for methamphetamine use disorder approved by the FDA. A systematic review of 49 peer-reviewed studies across 20 different pharmacotherapies did not find evidence to support the recommendation of any of the agents to treat methamphetamine use disorder due to variable results across studies. Individual studies have found significant results for some medications with some sub-populations, so the potential benefit of medications should not be discarded.(56) Ongoing and future research into

medications for methamphetamine use disorder should be a priority and in the meantime clinicians may want to still explore the potential benefit of medications with some of their clients.

Other studies in treatment settings have assessed characteristics of methamphetamine users seeking help to reduce or stop their use. Rural residence, younger age (20-40 years old), female gender, non-Hispanic white race, and having occupational or economic problems have been associated with seeking help to reduce use within treatment settings.(53, 54) In our analysis of people not in treatment however, we did not see significant differences of race, income category, or rural residence comparing those who were interested in reducing their methamphetamine use to those who were not. Differences across studies could be due to the settings in which the studies were conducted, different geographical areas and samples, as well as outcomes measured. Our results, which are among people who used a syringe exchange, recently used methamphetamine, and are not currently engaged in treatment are likely of particular value for planning outreach and engagement strategies for current methamphetamine users who may be different than those currently enrolled in treatment.

This study has several limitations. First, it is a cross-sectional survey and we cannot measure methamphetamine use or interest in reducing or stopping use over time or determine any causal associations between the variables analyzed. Second, our study sample included people who are using SEP services, and we therefore cannot generalize these findings to other populations of PWID who are not engaged in SEP services or to people who do not inject. Third, frequency of methamphetamine use may or may not be associated with interest in reducing or stopping methamphetamine use. While the survey asked about frequency of injecting *any* drug in the last week, we could not isolate the frequency of methamphetamine injection. Furthermore,

frequency of using drugs via other routes was not asked. Future surveys should assess frequency of methamphetamine use specifically to better understand if or how it is associated with interest in reducing or stopping use. Fourth, while there was an association between only smoking methamphetamine in the past three months and interest in reducing or stopping methamphetamine use, the confidence interval was extremely wide. Our sample included only 11 participants who only smoked methamphetamine in the past three months. Future research should include people who use methamphetamine only by smoking as it is a common route of ingestion and these individuals may have unique patterns of use and needs. However, it may be difficult to reach this population because they are unlikely to seek services at SEPs. Fifth, our outcome combined interest in reducing and stopping methamphetamine use. People may have different levels of interest in reducing versus stopping use altogether, and we were unable to assess for these differences.

Future research should build on identifying correlates of interest for reducing or stopping methamphetamine use in other populations who are impacted by methamphetamine use, including people who are not using SEP services and individuals who smoke and snort methamphetamine and do not inject drugs. In addition, the role of mental health care as support for reducing or stopping methamphetamine use should be explored. Qualitative research would be a useful approach to further elucidate barriers and facilitators to seeking help to reduce methamphetamine use, which could help programs serving methamphetamine users support them in accessing the help they want.

5 Conclusions

These findings describe interest in reducing or stopping methamphetamine use among PWID engaged in SEP services across Washington State who use methamphetamine as their

main drug and had used within the past three months. This is the first study to our knowledge assessing correlates of interest in reducing or stopping methamphetamine use among people with recent methamphetamine use who are not in treatment. The majority of participants were interested in reducing or stopping their methamphetamine use. Considering this level of interest providers who engage with people who use methamphetamine should ask about interest in reducing or stopping use and provide appropriate referrals and resources. Participants who reported a concern about depression, anxiety, or another mental health issue had more than three times the odds of being interested in reducing or stopping their methamphetamine use. Mental health care was the most frequently reported type of help participants wanted. Providing mental health support in combination with other help to reduce methamphetamine use may help mitigate its negative psychological effects as well as help reduce use among people who use methamphetamine to manage mental health. Furthermore, mental health services may be an appealing component of methamphetamine reduction programs and should be offered at existing locations where PWID who use methamphetamine seek services, like SEPs.

**Table 1. Participant Characteristics by Interest in Reducing or Stopping Stimulant Use
n=164)**

Characteristics ⁺	Total (164)	Not Interested (78)		Interested (86)		p value
	n	n	(%)	n	(%)	
Age						0.011
Median (IQR)	39 (31-50)	42	(34-51)	35	(29-45)	
Gender						0.059
Male	99	53	54%	46	46%	
Female	65	25	38%	40	62%	
Race						0.296
White	137	68	50%	69	50%	
Non-White	26	10	38%	16	62%	
MSM						0.885
No	153	73	48%	80	52%	
Yes	11	5	45%	6	55%	
Insurance						0.464
Uninsured	16	9	56%	7	44%	
Insured	148	69	47%	79	53%	
Insurance type						0.799
Public/Government	143	66	46%	77	54%	
Private	3	2	67%	1	33%	
Other	2	1	50%	1	50%	
Urban/Rural						0.296
Urban Core	87	38	44%	49	56%	
Suburban	12	6	50%	6	50%	
Large Town	51	24	47%	27	53%	
Small Town/Rural	14	10	71%	4	29%	
Housing						0.035
Permanent	50	30	60%	20	40%	
Unstable/Homeless	114	48	42%	66	58%	
Legal monthly income before taxes (USD)						0.091
None	88	35	40%	53	60%	
1st Tertile (\$1-727)	25	13	52%	12	48%	
2nd Tertile (\$728-1100)	27	18	67%	9	33%	
3rd Tertile (\$1101-6000)	23	12	52%	11	48%	
Jail						0.545
Not in jail in last year	114	56	49%	58	51%	
In jail in last year	50	22	44%	28	56%	
Concerned about Mental						< 0.001
Not at all	79	49	62%	30	38%	
Very/Somewhat	85	29	34%	56	66%	
Source of Care in Last Year						0.961
ER	71	33	46%	38	54%	
Other	41	20	49%	21	51%	
None	50	23	46%	27	54%	

† There was 1 missing value for race and income and there were 2 missing values for source of care in the last year.

**Table 2. Substance Use Behavior by Interest in Reducing or Stopping Stimulant Use
n=164)**

Characteristics ^I	Total (164)	Not Interested (78)		Interested (86)		p value
	n	n	(%)	n	(%)	
Route of ingestion						0.012
Both smoke and inject	88	41	47%	47	53%	
Inject only	64	36	56%	28	44%	
Smoke only	11	1	9%	10	91%	
Overamp (self)						0.834
Not in past 12 months	136	65	48%	71	52%	
In past 12 months	27	12	44%	15	56%	
Overamp (other)						0.862
Not in past 12 months	117	56	48%	61	52%	
In past 12 months	46	21	46%	25	54%	
Injection consequences ^{II}						0.442
Not in past 12 months	105	51	49%	54	51%	
In past 12 months	47	26	55%	21	45%	
Used opiates or benzos						0.508
Not in past 3 months	99	49	49%	50	51%	
In past 3 months	65	29	45%	36	55%	
<p>I There was 1 missing value for route of ingestion, overamp (self), and overamp (other).</p> <p>II Injection-related infections were only assessed of those reporting injection who answered the question (n=152) and include having an abscess, skin or tissue infection like cellulitis or MRSA, or endocarditis.</p>						

Table 3. Results of Multivariate Logistic Regression Analyses of Demographic and Drug Use Characteristics Associated with Interest in Reducing or Ceasing Stimulant Use

Characteristics	Model 1			Model 2			Model 3		
	AOR	95% CI	p-value	AOR	95% CI	p-value	AOR	95% CI	p-value
Increase in 10 years of age	0.79	0.58-1.07	0.128	0.75	0.54-1.04	0.081	0.79	0.56-1.12	0.184
Female gender	1.76	0.90-3.47	0.101	1.56	0.77-3.13	0.219	1.35	0.65-2.80	0.425
Nonwhite race	1.40	0.55-3.52	0.479	1.27	0.50-3.26	0.618	1.07	0.40-2.86	0.891
Unstable housing/homeless	1.84	0.85-3.98	0.119	2.18	0.96-4.93	0.061	2.24	0.96-5.21	0.062
Legal monthly income									
None	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
1st Tertile (\$1-727)	0.65	0.25-1.74	0.395	0.80	0.29-2.23	0.672	0.61	0.21-1.79	0.369
2nd Tertile (\$728-1100)	0.54	0.20-1.47	0.226	0.58	0.20-1.69	0.322	0.52	0.17-1.56	0.244
3rd Tertile (\$1101-6000)	1.02	0.37-2.83	0.972	1.39	0.48-4.00	0.549	1.27	0.42-3.81	0.670
Route of methamphetamine ingestion									
Injected and smoked meth in past 3 months				Ref	Ref	Ref	Ref	Ref	Ref
Only injected meth in past 3 months				0.82	0.41-1.65	0.580	0.96	0.46-1.98	0.912
Only smoked meth in past 3 months				12.83	1.40-117	0.024	14.5	1.49-140	0.021
Mental health concern in prior year							3.13	1.51-6.48	0.002
Model 1: Adjusted for demographic characteristics									
Model 2: Adjusted for demographic and drug use characteristics									
Model 3: Adjusted for demographics, drug use characteristics, and mental health concern.									

Chapter 3: “I make sure my doctor doesn’t know that I use meth”: Perceived Barriers to PrEP Uptake among Community Peer Educators in Seattle, WA

HIV disproportionately affects cisgender men who have sex with men (MSM) and transgender persons (TG) who use methamphetamine.(29, 33, 57, 58) In 2012, the US Food and Drug Administration (FDA) approved daily, oral pre-exposure prophylaxis (PrEP) with Truvada® for HIV prevention. While PrEP uptake among MSM/TG has been increasing in Seattle, WA, uptake among MSM/TG who use methamphetamine has been slow.(43) To better target PrEP to MSM/TG who use methamphetamine, we need to understand knowledge of, access to, and concerns about PrEP among this group at elevated risk for HIV acquisition.

MSM/TG who use methamphetamine are likely underrepresented in existing population-based PrEP surveys since drug use is stigmatized and illegal. Alternative sampling approaches, including working with key informants, are invaluable to understand the perspectives of this and other “hidden populations”.(59) Peer educators are ideal key informants since they share characteristics of the target group, have community-based expertise, and are aware of the barriers faced by community members.(60)

We collaborated with peer educators of a long-standing harm reduction program for MSM/TG who use methamphetamine in Seattle. We facilitated a series of focus groups to explore the knowledge, interest, and uptake of PrEP among MSM/TG who use methamphetamine in order to understand the informational needs of the peer educators and the perceived barriers to PrEP uptake and adherence among the population.

METHODS

DATA SOURCE

We conducted four focus groups with the peer educators of Project Needle and Sex Education Outreach Network (NEON) between October 2015 and April 2017. NEON is a harm reduction program of Seattle Counseling Service that serves MSM/TG who use methamphetamine. The peers were purposively sampled since they are both members and stakeholders of the target population. The focus groups aimed to assess the knowledge and perspectives of the peers regarding PrEP use among MSM/TG who use methamphetamine.

Each focus group followed a semi-structured discussion guide that asked about knowledge, attitudes, and PrEP use among MSM/TG who use methamphetamine. (Supplemental material.) Focus group participation was anonymous, and we did not collect demographic data from participants or track them over time. The focus groups were digitally recorded and transcribed verbatim using Verbal Ink (Los Angeles, CA), an official transcription service. The University of Washington Institutional Review Board approved this study (#STUDY00000054). All focus group participants provided verbal consent prior to participation and received \$40 gift cards in compensation for each focus group they participated in.

To our knowledge, there is no analytical framework specifically targeted to PrEP use among MSM/TG who use methamphetamine. Therefore, we developed a framework that borrowed from the PrEP continuum proposed by Kelley and colleagues (61) and a stigma toolkit developed by the National Alliance of State and Territorial AIDS Directors (NASTAD). We adapted NASTAD's "bar before the bars", which represents the negative effects stigma can have across the continuum, since MSM/TG who use methamphetamine have multiple stigmatized identities.(62)

ANALYSIS

The focus group facilitator (VM) and another coder (LV) independently reviewed the focus group transcriptions and thematically analyzed them in Dedoose (Dedoose Version 8.0.35 (2018) Los Angeles, CA) using grounded theory and the constant comparative method.(63) Before coding and throughout the analysis VM met with a qualitative expert (MA) with expertise in HIV prevention among MSM and TG populations.

A list of a priori codes was generated from the baseline focus group notes. VM and LV independently coded each transcript and met afterwards to discuss coding and emerging themes before coding the next transcript. Coding discrepancies were discussed until consensus was reached, new codes were created, or existing codes were modified. The codes expanded substantially; for example, at the onset “stigma” was one code, but after reviewing all focus groups there were seven stigma codes. Considering this expansion, the first three focus groups were coded twice. The list of a priori codes, final codes, and analytical codes are in Figure 1.

The final codes were mapped to the continuum steps based on each code’s underlying concept. Then VM and LV reviewed the excerpts for each code. Codes that had zero excerpts (e.g., parent codes like “PrEP”) were omitted. Codes that represented the same underlying concept were merged (e.g., “general HIV risk” and “HIV risk among meth users”) and excerpts that were better described by more specific codes were recoded (e.g., “concomitant PrEP and meth” was recoded to “adherence in the context of meth use” and “competing priorities”).

Six codes do not appear in the final analysis as they did not substantially contribute to any continuum step; these codes were: harm reduction, PrEP safety/tolerability, PrEP information, PrEP-related services, shifts in opinion, and relationships of negatives and positives. Due to the number of codes for the “Awareness/Willingness” step we collapsed them into five

larger concepts that represented the themes the codes described. (Figure 1) After omitting, merging, and recoding, VM and LV reviewed the codes for each continuum step to identify the most salient themes. During this review, if a code fit better with a different step it was moved (e.g., “condoms” was moved from “Defining an at-risk individual” to “Awareness/Willingness” since it reflected the peers’ preference for condoms). The final mapping of codes to the continuum is shown in Figure 2.

RESULTS

Approximately 10 peers participated in each focus group, and participants were mostly the same across focus groups. Barriers across the PrEP continuum were discussed in each focus group and the peers described their contacts’ experiences with intersectional stigma as a barrier to every continuum step. While we did not track participants across focus groups, there was an overall increase in PrEP knowledge and acceptance over time.

DEFINING AN AT RISK INDIVIDUAL

The first step of the PrEP continuum is to identify people who are HIV-negative and at risk for HIV acquisition. Four main themes arose regarding HIV risk: avoidance of HIV testing, increased risk for HIV associated with methamphetamine use, increased risk among youth, and risk around the time of methamphetamine initiation.

Avoidance of HIV testing

The peers discussed how their contacts frequently do not want to get tested for HIV or know their status. However, HIV testing is necessary to identify a PrEP candidate.

“...but you have a lot of people who really don’t want to know their status. So, they’re not trying to find out anything about PrEP or anything like that.” (Focus Group #1, Participant #3)

Increased risk for HIV associated with methamphetamine use

The peers described how people who use methamphetamine may be at higher risk for HIV due to the impact of methamphetamine on the immune system, less frequent condom use, and a greater number of sexual partners.

“...because most honestly with meth users, there’s very little condom use.” (Focus Group #1, Participant #5)

Increased risk among youth

The peers further identified that younger people who use methamphetamine were at increased risk of HIV acquisition and should be targeted for PrEP. The peers thought that the lack of exposure to the morbidity of HIV in the early years of the epidemic led to a perception that youth felt they were “invincible” and thus act in a “reckless” behavior.

“I think when you start having sexual experiences... I think that’s where you need to start with the PrEP, because once you become an adult, I mean you’re already kinda getting into a pattern of things I mean, if I had known about PrEP when I was in high school.... I probably wouldn’t have HIV right now.” (Focus Group #4, Participant #4)

Risk around the time of methamphetamine initiation

The peers described an association between sexual activity and the initiation of methamphetamine use, which has been seen in other settings.(64) They recommended targeting PrEP to people before they begin using methamphetamine.

“If I had known about the PrEP, I would have been on PrEP before I started using [methamphetamine]... I think the only way to really get [HIV] under control is to get people

before they form habits. If you can't get [PrEP] to people before they form habits, then you're gonna have a hard time selling them on it.” (Focus Group #4, Participant #4)

Stigma

The peers described stigma as a reason MSM/TG who use methamphetamine avoid HIV testing. The peers specifically discussed the fear of stigma among MSM who have female partners to whom they do not disclose that they have sex with men.

“you have a lot of men out there right now whose families don't even know they engage in... sex with men or anything like that. You know...they're on the down low. So, of course they're not going to want to know [their HIV status]. And some of them are like, well you know what – if I have it, I have it, but I don't want to know about it.” (Focus Group #1, Participant #3)

In addition, high HIV prevalence among MSM/TG who use methamphetamine, that puts this groups at increased risk for HIV, was described as contributing to stigma towards HIV-negative community members. One HIV-negative peer described stigma he experienced as a “minority” as a barrier to reducing his HIV risk. While most peers did not have this same experience, since many of them are HIV-positive, four peers indicated verbal agreement.

“I'm HIV negative. And I'm teetering on the idea of going on PrEP... I've been risky too sometimes... I've lucked out my whole life not getting it... it feels weird being [HIV] negative, when I know so many positive people. And I just feel like I'm, like, the....The minority, yeah, the minority. And I feel strongly about that, that I feel like I am a minority. I've actually heard someone, under their breath right next to me, said something, calling me the “privileged”... Maybe it would just be easier if I got HIV. And I don't want HIV...” (Focus Group #1, Participant #4)

AWARENESS/WILLINGNESS

The second step of the PrEP continuum concerns awareness and willingness to initiate PrEP. Two of the most salient themes concerned misinformation/lack of information and competing priorities. The other three themes reflected the peer's perceptions of PrEP: condom preference and concern about STIs, mistrust, and support for PrEP due to its sexual health benefits. Overall, the peers promoted PrEP, but support was tempered by concerns about risk disinhibition and a strong preference for condoms.

Misinformation/lack of information

The peers were well informed that PrEP is an effective for HIV prevention, that it is currently approved in the US as a daily oral regimen, and that it does not prevent other STIs. However, there was misinformation regarding its level of efficacy and how long PrEP needs to be used. The peers thought that MSM/TG who use methamphetamine were also aware of PrEP and that it prevents HIV, but that more detailed information was probably not known.

“The only problem I see with it is that it has to be done forever. You know, and I know a lot of people – or some people that I have met are reluctant to do it because it’s something once you start, you have to continue on for the rest of your life, basically, or it’s not – or it doesn’t work.”

(Focus Group #2, Participant #1)

Competing priorities

The peers described competing priorities that could impact the willingness to pursue PrEP, even among interested persons. Typically, these were described as not being able to follow through with appointments and preferring to prioritize methamphetamine use over seeking PrEP.

“Most of the times, like if you're meeting a client, you meet someone like at the bath house, that is going to be a very quick exchange because all they want is what they want right then and there, because they're getting ready to have sex and do whatever they're gonna do. They don't want to sit down and answer 20 questions [about PrEP] or whatever.” (Focus Group #2, Participant #4)

“My concern is this, given a choice about using those two things, they would just drop the PrEP and keep the meth.” (Focus Group #4, Participant #4)

Condom preference and concern about STIs

The fact that PrEP only prevents HIV and not other STIs was a reason some peers were less willing to promote PrEP.

“...the condom will protect you from so much more than just HIV. So it's hard for me to really push the PrEP sometimes because I think the condom is better.”(Focus Group #2, Participant #3)

Mistrust

The peers discussed a lot of mistrust of PrEP and in medications more broadly. Some peers thought PrEP would inevitably fail to prevent HIV, mostly due to drug resistance.

“I think that it's going to come to pass that Truvada will not be the answer. It will be another drug that worked well for a while and then falls off by the wayside. And... people that we've exposed to Truvada are going to have a different problem.” (Focus Group #1, Participant #1)

“If you keep doing something long enough, and people are doing it, then something’s going to happen bad out of that. I mean, you can’t just have people just on PrEP just doing each other every day without something bad happening.” (Focus Group #1, Participant #2)

Sexual health benefits

The peers also showed support for PrEP as the “best option that’s being offered.” The sexual health benefits were discussed, including the ability to have sex without needing to plan.

“So if you do find yourself in a sexual situation that maybe materialized out of nowhere or at the bathhouse of whatever, you don’t have to worry about do I have condoms, do I have the proper lube, do I have – you know, it allows for, to not be so damn much work to get laid.” (Focus Group #2, Participant #6)

Stigma

The concepts of stigma that arose most frequently in our discussions about awareness and willingness to use PrEP regarded the peers’ concerns of risk disinhibition. They frequently talked about how HIV-negative MSM/TG who use PrEP, especially younger individuals, were having a “free for all” and how this behavior negatively impacted the peers’ perceptions of PrEP.

“When [PrEP users] say “anything goes,” it’s anything goes, okay? And that’s just, pushing it a little too much for me, you know?”(Focus Group #1, Participant #3)

ACCESS TO HEALTHCARE

The third step of the PrEP continuum is access to healthcare, which is defined as having a source of affordable health care. Two main themes arose for this step: locations to access PrEP and PrEP affordability.

Locations to access PrEP

The peers made various suggestions for locations to increase access to PrEP among their contacts and overcome access-related barriers. The locations that they recommended had streamlined access, like the Kelley-Ross pharmacy,(65) or were places MSM/TG who use methamphetamine already frequent, like the bathhouse or their drug dealers.

“It’s not like you can walk into the bathhouse and they’ll have a little dispenser of Truvada there so that if you don’t have it, you can instantly get it.” (Focus Group #1, Participant #1)

PrEP affordability

PrEP affordability was considered a barrier to accessing PrEP, despite the availability of financial assistance programs, like the Washington State Department of Health PrEP Drug Assistance Program (PrEP DAP) and complete coverage by Medicaid in Washington State.

“If they don’t have insurance, they automatically figure they’re an out [for PrEP].” (Focus Group #1, Participant #5)

Stigma

The peers discussed the importance of locations to access PrEP where MSM/TG who use methamphetamine would not be stigmatized and having a list of non-judgmental PrEP providers.

“My doctor... she’s very supportive and all that. She doesn’t put that stigma on.... But then there are other doctors in that same place that are... Maybe we could compile... a list of care providers that would be very good for you to go see... these are doctors that you can go see that would be sympathetic and non-judgmental.” (Focus Group #1, Participant #2)

LIKELY TO RECEIVE A PRESCRIPTION

The fourth continuum step concerns the likelihood of receiving a prescription, which is related to a provider's awareness of and willingness to prescribe PrEP and a patient's disclosure of behavior consistent with PrEP eligibility. There were two main themes that arose: providers' lack of awareness of PrEP and targeting PrEP to people who use methamphetamine.

Provider lack of awareness

The peers reported a lack of provider awareness about PrEP, which could contribute to providers not discussing PrEP with their patients who are MSM/TG and use methamphetamine.

"My doctor's assistant, who is a nurse, I tell her about what I do [at NEON]... she didn't even know what PrEP was.... that was 6 months ago." (Focus Group #1, Participant #4)

Targeting people who use methamphetamine

The peers talked about the low rates of PrEP use among MSM/TG who use methamphetamine and the importance of targeting information specifically to this group.

"Gearing towards the PNP [Party and Play, meaning having sex while using methamphetamine]. That's what they'll look for. It's gonna catch their eyes."

(Focus Group #3, Participant #3)

"[Meth users are] the highest risk group of HIV transmission, which is why to get the other people to not have HIV we have to get [meth users] to be on Truvada. To get this number down is the important part..." (Focus Group #4, Participant #6)

Stigma

The most salient theme the peers discussed related to the likelihood of receiving a PrEP prescription was how stigma results in non-disclosure to providers of PrEP-eligible behaviors.

“I make sure my doctor doesn’t know that I use meth.... They don’t need to know that. I would never admit to it. Because if you do, I mean there’s all sorts of consequences.” (Focus Group #1, Participant #1)

“Stigma. I guess when PrEP is such a specifically used drug... especially if they are gay and IV drug users and all that, they may not want to tell their physician that they want to use PrEP because they have that idea that they’re looking at them like, you’re a drug-using man whore.” (Focus Group #2, Participant #3)

ADHERENCE/EFFICACY

The final step on the continuum is PrEP adherence, which is necessary for PrEP to prevent HIV acquisition. There were four salient themes: PrEP adherence in the context of methamphetamine use, adherence support, clinical monitoring on PrEP, and PrEP persistence.

PrEP adherence in the context of methamphetamine use

The methamphetamine-related barriers to PrEP adherence discussed were “losing days,” myopia associated with drug use, and not remembering to take PrEP while high.

“And oftentimes when people use meth they lose track of days... So they could start out on Monday, and pretty soon it’s Thursday and they, oh, what the hell happened. You know?” (Focus Group #2, Participant #1)

“Most people I talk to about [PrEP].... They’re just afraid that they’re not gonna be able to keep up the consistent use of it while they’re doing drugs, because when you do drugs, particularly if you’re injecting, you know, it – you lose focus on anything except for whatever you’re gonna do, like the sex or whatever.” (Focus Group #2, Participant #3)

Adherence support

The peers had various suggestions for promoting PrEP adherence, including cash incentives, peer and partner support, and matching PrEP with a daily routine. The peers who had experience taking HIV antiretroviral therapy shared strategies that helped them be adherent.

“When I was first diagnosed with HIV... we had someone who was already taking HIV medication and we had a beeper that reminded us when to take our medication....they made sure that you felt right about taking your medication and that you had somebody to talk to... if I was left to my own self, it would’ve never happened... that was one of the best systems put in place for people who were just starting out on medication...” (Focus Group #1, Participant #3)

Clinical monitoring on PrEP

The peers thought that the three-month recommended clinical monitoring for PrEP was a facilitator and barrier. The inclusion of STI testing in a population with high STI incidence was seen as a positive, whereas the need to see a doctor regularly was seen as a negative.

“You get the PrEP and then every three months or so, you’re supposed to go check in with the doctor so they can test you for all these other things..... that kind of does leave some security.... That’s a good way for people to be consistent.” (Focus Group #1, Participant #2)

“When I talk to people, their concern is... they’re going to have to go back to the doctor and get the pills and there’s going to have to be another test.” (Focus Group #1, Participant #5)

PrEP persistence

Finally, the theme of PrEP persistence was discussed the least frequently, but of the five persistence excerpts, three concerned PrEP affordability as a barrier.

“[My partner has] got private insurance [and] we’re having a hell of a time dealing with the whole PrEP and keeping it going, as far as his copay and this, that, and the other. His insurance is trying to refuse to pay anything...” (Focus Group #4, Participant #5)

Stigma

The stigma associated with adherence was varied. There was mention of it being easier for an HIV-positive person to adhere to their antiretroviral therapy, because HIV positive individuals understand the potential consequences of not being adherent. The internalized stigma of methamphetamine users was also noted as a barrier to adherence.

“... in the meth community there’s a lot of psychological issues. You usually don’t like yourself very much. You’re not going to take care of yourself, you’re not going to plan...So, if you don’t [like yourself very much], then you have no reason to want to plan. And to keep up on something, because what’s the point?” (Focus Group #1, Participant #5)

DISCUSSION

Consistent with the NASTAD report on Black and Latinx MSM, we found that MSM/TG who use methamphetamine experience stigma on multiple levels (e.g., individual, community, institutional) and that it is related to their various marginalized identities. This intersectional stigma is a barrier to PrEP engagement across the continuum.

Numerous studies describe the negative effects of the different types of stigma the peers described: stigma related to methamphetamine use,(66) HIV status,(67) PrEP use,(68, 69) and MSM/TG identity.(70, 71) Moreover, there is evidence that experiences of stigma can be barriers to specific steps in the PrEP continuum. For example, stigma among MSM has been shown to be a barrier for HIV testing,(72) and, in a group of MSM/TG in the Southeastern United States,

PrEP stigma was significantly associated with lower interest in using it.(73) However, to our knowledge no other studies have assessed the impact of stigma *across the PrEP continuum* among MSM/TG who use methamphetamine. Utilizing this framework helps identify how pervasive the effects of stigma are on PrEP uptake, adherence, and persistence among MSM/TG who use methamphetamine.

The peers also identified barriers to PrEP engagement across the continuum that related to methamphetamine. They described increased risk for HIV among MSM/TG who use methamphetamine, competing priorities when high on methamphetamine that may affects PrEP initiation, the need to target PrEP specifically to this group, and the impact methamphetamine may have on adherence (e.g., “losing days”). Previous studies have shown that methamphetamine use can be associated with low antiretroviral adherence among HIV-positive individuals.(74, 75) However, few studies have assessed PrEP among HIV-negative MSM/TG who use methamphetamine, and those have had mixed results. Our findings identify reasons why methamphetamine use may contribute to low engagement across the PrEP continuum.

This study has several limitations. First, while the NEON peers are both stakeholders and members of the target population, they are a group of incentivized peer educators, and their opinions may have been impacted by social desirability bias and not reflect the broader community. In addition, many of the peers are HIV-positive and their perspectives may not represent HIV-negative MSM/TG who use methamphetamine. Furthermore, these findings may not be representative of methamphetamine users in other locations where resources and access issues may be different. There have been increases in PrEP knowledge and uptake in Seattle since these focus groups were conducted,(76) so the findings may not reflect current barriers to PrEP uptake among MSM/TG who use methamphetamine. We also did not determine the PrEP

continuum as an analytical framework a priori. Therefore, we had more extensive discussions regarding certain steps, like awareness and willingness to use PrEP, than other steps. Finally, we did not collect demographic information from focus group participants or track participants longitudinally; therefore, we could not further characterize our results based on participant characteristics or describe changes in the peers' perspectives over time.

There are various strategies to try and increase PrEP uptake and support its use among MSM/TG who use methamphetamine that could be pursued based on our findings. Increasing HIV testing among this population could both help identify PrEP candidates and provide an access point to PrEP education and initiation. Clearly PrEP education remains critical. In a study among young MSM/TG, knowing about PrEP was associated with less stigma,(77) indicating that education could reduce stigma, which could potentially increase interest in PrEP.

The peers' also described a lack of PrEP awareness among providers and need for more provider education. In a survey of 735 providers in Washington State, only 65% of them had heard of PrEP and 39% of those who were aware of PrEP were either somewhat or very uncomfortable to discuss candidacy.(78) For PrEP uptake to increase, we must increase provider PrEP knowledge, including which patients should be screened for PrEP. However, knowledge of PrEP eligibility alone is not sufficient for PrEP to be prescribed to those who could benefit from it the most. Patients must also accurately report their behaviors to providers so they can assess their patients' potential risk for HIV. The peers described fear of provider stigma as a barrier to disclosing behavior consistent with PrEP candidacy. Therefore, provider education should emphasize the importance of non-judgmental PrEP screening among patients with stigmatized identities, including MSM/TG who use methamphetamine.

Providing PrEP in non-traditional settings could help increase access to PrEP. Our safety-net PrEP clinic in Seattle started a telemedicine PrEP program in a local bathhouse in December of 2017 to broaden our reach among MSM/TG.(79) In addition, it might be helpful for organizations serving MSM/TG who use methamphetamine to develop lists of providers who are willing to provide PrEP to this group in a non-stigmatizing manner. In those who do initiate PrEP, the peers recommended peer support to support adherence, work that is currently ongoing.

These efforts may help identify more HIV-negative MSM/TG who use methamphetamine for potential PrEP use, increase awareness and access to PrEP, and support adherence and persistence among those who initiate PrEP. However, if these interventions or others aimed at supporting PrEP use among MSM/TG who use methamphetamine do not attempt to combat the stigma experienced by this community, they will fall short of their full potential. PrEP delivery interventions must be developed that mitigate intersectional stigma associated with multiple devalued identities so individuals at substantial risk for HIV can access and effectively use evidence-based, effective prevention strategies.

Figure 1. A Priori, Transcript, and Analytical Codes

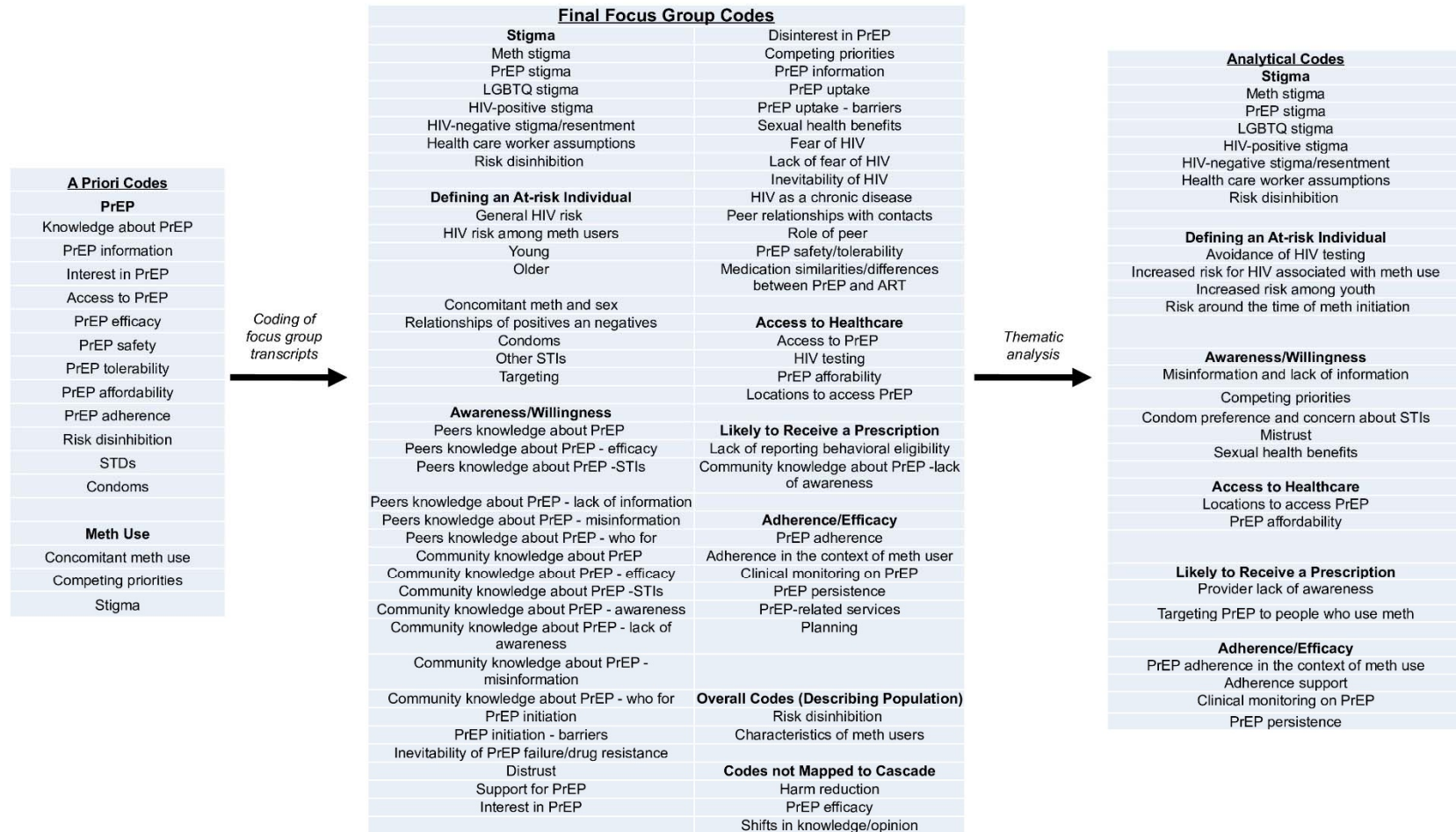
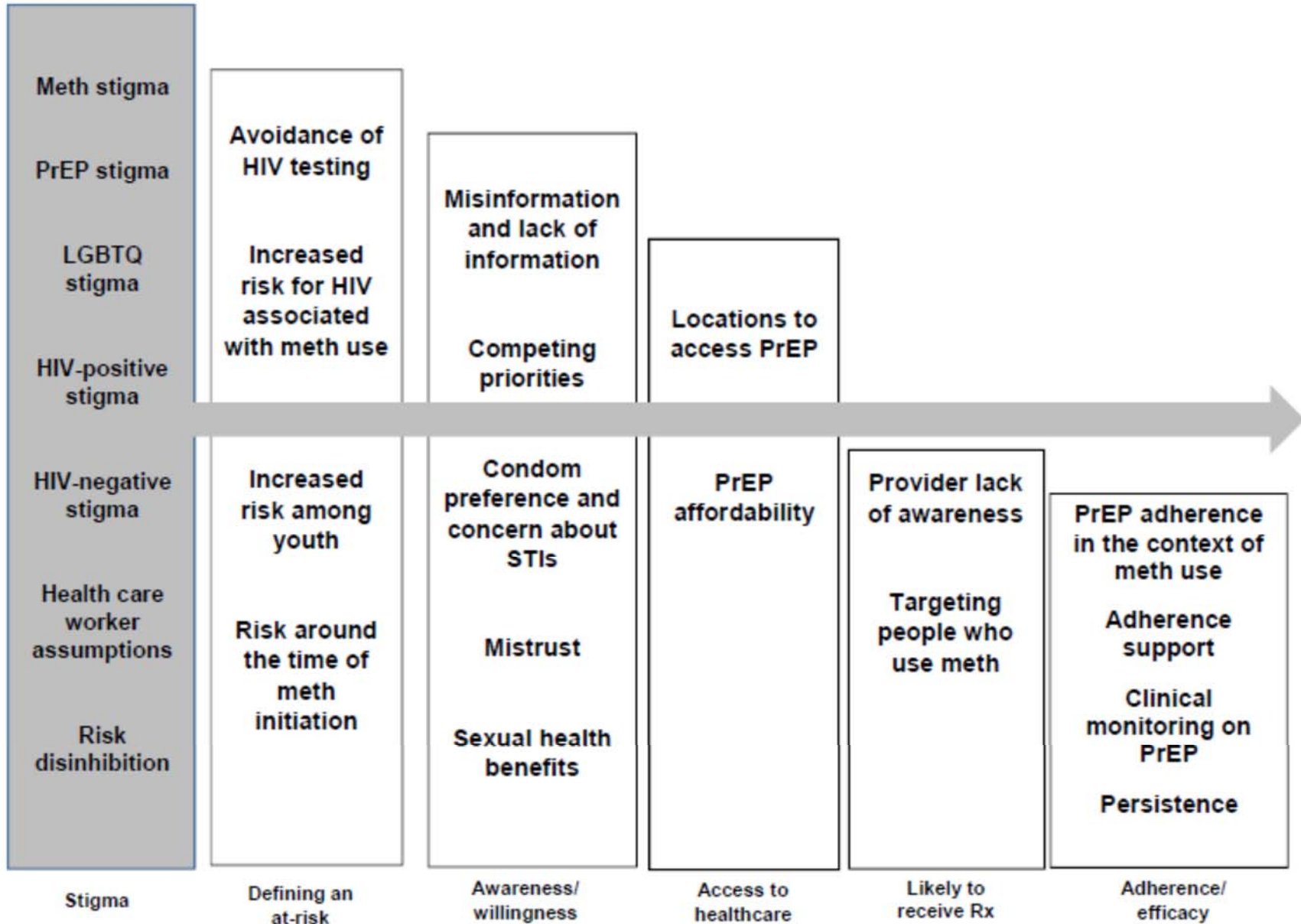


Figure 2. Adapted PrEP Continuum with Thematic Focus Group Code Assignments



Chapter 4: Pre-exposure Prophylaxis (PrEP) Awareness and Use Among Cisgender Men Who Have Sex With Men (MSM) Who Use Methamphetamine in Three Western US Cities

Daily, oral pre-exposure prophylaxis (PrEP) with Truvada® is a highly effective strategy for preventing HIV acquisition that was approved by the United States Food and Drug Administration (FDA) in 2012.(38-40) PrEP is most cost-effective when it is used by those at elevated HIV risk.(80, 81) In the United States cisgender men who have sex with men (MSM) have the highest number of new HIV diagnoses(82), and methamphetamine use among MSM is associated with greater HIV incidence.(29, 30, 32, 33)

Despite elevated risk for HIV, MSM who use methamphetamine have had limited PrEP uptake in Seattle, WA. In a survey of 221 MSM who used methamphetamine in 2016, although 96% had heard of PrEP, only 3% had used it. While a follow-up cross-sectional survey showed increased PrEP use (21%, $p < .001$), this was subsequent to a targeted educational campaign which could have impacted PrEP uptake.(43) The aim of the present study was to estimate PrEP awareness and use in a different sample of Seattle MSM and in two other cities where MSM are disproportionately impacted by HIV (21) and where methamphetamine is prevalent. (8)

We used data from the National HIV Behavioral Surveillance (NHBS) 2017 survey (21, 83) from Seattle, WA; Portland, OR; and Denver, CO to estimate PrEP awareness and use in the past 12 months among MSM who use methamphetamine and compared it to estimates among participants who do not use methamphetamine. We explored reasons for not using PrEP among those who had not used it, as well as challenges using it among those who had used PrEP in the past year. Estimating PrEP use among MSM who use methamphetamine and understanding

reasons for not using PrEP can inform intervention efforts to increase PrEP use among persons who may be at high risk for HIV.

METHODS

Data Source

The NHBS system was established in 2003 by the Centers for Disease Control and Prevention (CDC) to monitor risk behaviors among three populations at highest risk for HIV infection in the United States: gay, bisexual, and other MSM, persons who inject drugs (PWID), and heterosexually active adults at increased risk for HIV.(83) NHBS involves rotating 12-month cycles of surveillance activities in these three populations. Surveillance activities include ethnographic formative research, an in-depth behavioral survey, and HIV testing during each cycle. The data presented in this analysis were collected between June and December 2017 during the 5th MSM NHBS cycle (21) in Seattle, WA; Portland, OR; and Denver, CO.

Participants were recruited using venue-based time-space sampling informed by a formative research phase that identified venues and times to best recruit MSM. (84) Eligibility criteria for the NHBS-MSM survey included self-reported age 18 years or older, cisgender male sex, residence within the designated project area, ability to complete the survey in English or Spanish, and oral or anal sex with a man in the past year. All survey participants provided verbal consent and were offered optional HIV testing. Project activities were conducted anonymously. Participants were reimbursed \$25 (Denver) or \$50 (Seattle and Portland) for the survey and \$25 for the HIV test.

In Seattle and Portland, NHBS has been designated as a surveillance activity and data collection activities are not subject to further institutional review board (IRB) review. In Denver,

NHBS activities are designated as research and all activities were approved by the Colorado Multiple IRB (protocol # 11-0047). The University of Washington Human Subjects Division determined that the secondary analyses presented here were not human subjects research and did not require review.

Study Sample

We used PrEP eligibility criteria adapted from CDC practice guidelines to create a study sample that would be eligible for PrEP.⁽⁸⁵⁾ We restricted our analysis to NHBS participants who reported three of the adapted CDC PrEP criteria: that they had never tested positive for HIV, had at least one male anal sex partner in the past 12 months, and were not in a monogamous relationship with an HIV-negative man. Participants who met these criteria were further divided into two groups: participants who had used methamphetamine in the past 12 months, consistent with CDC criteria for screening for HIV risk among MSM and local PrEP criteria,⁽⁸⁶⁾ and those who had not used methamphetamine. We further excluded participants in the group who had not used methamphetamine if they did not report condomless anal sex with a man or a bacterial sexually transmitted infection (syphilis, gonorrhea, or chlamydia) in the past 12 months, which is consistent with CDC PrEP eligibility criteria.

Measurements

The NHBS survey is comprised of a core survey that is the same across all NHBS sites and a local questionnaire that can be customized by each site. We used data from the questions in the core survey that asked about demographics; sexual behavior; drug use; HIV testing experiences; and HIV prevention activities, including PrEP. We added four questions to the local

surveys at the three participating sites that assessed reasons for not using PrEP and challenges using PrEP.

Demographic Characteristics

Demographic characteristics included project site where surveys were conducted, age (continuous), sexual identity (Heterosexual or “Straight;” Homosexual, Gay or Lesbian; Bisexual), race (American Indian or Alaskan Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White, or Multiracial) , ethnicity (Hispanic, non-Hispanic), highest level of education (less than HS, HS or equivalent, some college, bachelors, post-grad), homelessness defined as “living on the street, in a shelter, in a Single Room Occupancy hotel (SRO), or in a car in the past year” (yes, no), and health insurance (insured, not insured).

Sexual Behavior

Questions about past year sexual behavior were used to define the study sample. Responses to the question “in the past 12 months, since [month of interview] of last year, with how many different men have you had oral or anal sex?” were used to define those who had any male sex partners in the past year. We excluded participants in a monogamous relationship with an HIV negative man, which was defined as having anal sex with only one HIV-negative male partner in the past 12 months and the participant thought their partners “definitely did not” have sex with other people. We also calculated the total number of male condomless anal sex partners across four questions that assessed condomless anal sex in the past year with main and casual partners.

HIV Status

The survey question about lifetime diagnosis of HIV (“have you ever tested positive for HIV, that is, do you have HIV?”) was used to exclude people who had previously received a positive HIV test result.

Methamphetamine Use

Three questions in the core survey asked about methamphetamine use. Participants were asked about frequency of non-injection methamphetamine use in the past 12 months, with the following categorical response options: “never,” “once a week or less,” “more than once a week,” “once a day,” and “more than once a day.” Additionally, people who reported injecting drugs in the past 12 months were asked which drug they injected most often and, if they injected other drugs in the past 12 months, which drugs.

PrEP Measurements

We used data collected across seven survey questions about PrEP, including if participants had ever heard of PrEP, and among those who had, if they had a discussion with a health care provider about taking PrEP or had used PrEP in the past 12 months. Participants who had used PrEP in the past 12 months were asked what challenges they have experience using PrEP. Participants who had not taken PrEP in the past 12 months were asked the reasons for not using PrEP, followed by the main reason they had not used it. The questions about reasons for not taking PrEP were asked differently for participants who had used methamphetamine in the past year and those who had not; participants who had used methamphetamine were provide an additional two answer options: “PrEP would not be safe to use while I am using meth” and “I think meth might make PrEP not work as well.” The answer options regarding reasons for not using PrEP were informed by formative work done in Seattle among MSM who use

methamphetamine and do not take PrEP. (43) Some participants were inadvertently asked the incorrect question about reasons for not using PrEP or asked both questions with the correct question asked second, in these cases the responses to the methamphetamine specific answer options were considered missing.

Statistical Analysis

PrEP Cascade

We assessed differences in covariates and the proportion who had heard of PrEP, discussed it with a provider in the past 12 months, or used it in the past year across participants who had used methamphetamine in the past year compared to those who had not using chi-square tests for categorical variables (with Fisher's exact tests for expected cell frequencies of <5) and Kruskal-Wallis tests for continuous variables. We then used a multivariable regression model with a log link and Poisson distribution to assess the association between methamphetamine use and PrEP use in the past 12 months after adjusting for potential confounders. We adjusted for project site, age, ethnicity, sexual identity, highest level of education, and homelessness in the prior year. Because the proportion of participants who had any condomless anal sex with a man in the past year was significantly different across groups defined by past year methamphetamine use, we performed a second, post-hoc, multivariable regression to assess the association between methamphetamine and PrEP use limited to those participants in the original study sample who reported at least 10 male sex partners in the prior 12 months.(87, 88)

Reasons for not using, and challenges to using, PrEP

We compared the frequencies of reasons participants had not used PrEP in the past year and challenges using PrEP across groups defined by methamphetamine use using chi-square tests.

All statistical analysis were conducted in Stata Version 12 (StataCorp, College Station, TX). Significance was defined as a p-value <0.05.

RESULTS

The total sample included 1,461 MSM who participated in the NHBS survey in Seattle, Portland, and Denver and reported sex with a man in the past year. Of those, 880 met adapted PrEP eligibility criteria for this analysis with 88 (10%) of participants reporting methamphetamine use in the past 12 months and 792 (90%) not reporting methamphetamine use but meeting other PrEP eligibility criteria. Of the 792 who had not used methamphetamine in the prior year, 186 had an STI diagnosis, 769 reported condomless anal sex with a man, and 163 reported both in the past 12 months. Of the 88 participants who used methamphetamine, 24 (27%) injected it in the past 12 months and of those, 3 reported only injection as their route of methamphetamine administration. Of the 85 (97%) who reported using methamphetamine through non-injection methods, 6 (7%) used it more than once a day, 5 (6%) used it once a day, 8 (9%) used it more than once a week, and 66 (78%) used it once a week or less.

The demographic characteristics by past year methamphetamine use are shown in Table 1. A greater proportion of participants who reported methamphetamine use were from Seattle (49%) than Denver (28%) or Portland (23%) ($p=.006$). Sexual identity was significantly different across methamphetamine use groups ($p<.001$), with more participants who used methamphetamine reporting bisexual identity (22% vs 15%) or heterosexual/ “straight” identity (6% vs 0%). A smaller proportion of participants who used methamphetamine were

Hispanic/Latinx (9% vs 21%, $p=.008$). Participants who reported methamphetamine use had fewer years of education ($p<.001$) and were more likely to report homelessness during the past year (35% vs 4%, $p<.001$).

PrEP Awareness and Use

The majority of participants had heard of PrEP before (832, 95%), a little more than half had discussed it with a medical provider in the past 12 months (480, 55%), and about one-third of participants had used PrEP in the past 12 months (308, 35%). Significantly fewer participants who had used methamphetamine in the past year had heard of PrEP (89% vs 95%, $p=.01$). However there was no significant difference comparing the proportion of participants who had discussed PrEP with a healthcare provider (47% vs 55%, $p=.11$) or used PrEP in the past 12 months (30% vs 36%, $p=0.26$) across groups defined by past year methamphetamine use. (Figure 1) In the multivariable analysis, methamphetamine use was also not significantly associated with PrEP use in the past 12 months with an adjusted prevalence ratio of 1.07 (95% CI: 0.70-1.65, $p=.75$). In the post hoc multivariate regression among those who reported 10 or more male sex partners in the past year there was also no significant difference of PrEP use in the past 12 months across methamphetamine use groups (APR: 1.17, 95% CI: 0.72-1.88).

Reasons for Not Using PrEP

Table 2 shows the reasons participants were not using PrEP among those who had heard of PrEP by whether or not they had used methamphetamine in the past 12 months. Overall, the most common reason for not using PrEP was thinking one's risk for HIV is not high enough to need PrEP (54% among participants who had used methamphetamine and 51% among those who had not). The second most common reason among both groups was being worried about side

effects (42% among participants who had used methamphetamine and 48% among those who had not). Among participants who used methamphetamine, the third most common reason was not being sure that PrEP would prevent them from getting HIV (38%). Being unsure of PrEP's effectiveness was reported by a significantly higher proportion of participants who had used methamphetamine compared to participants who had not used methamphetamine (38% vs. 19%, $p=.002$).

When asked about the main reason for not taking PrEP, the two most common responses of the listed answer options were not thinking one could afford it (18% among participants who had used methamphetamine and 16% among those who had not) and not thinking one's risk was high enough (16% and 13% respectively). However, 24% of participants who had used meth reported other reasons than the available answer options. Among the 24 participants who had used methamphetamine in the past 12 months and were asked the reasons they had not used PrEP specific to methamphetamine use, 3 (13%) said they did not think PrEP would be safe to use while using methamphetamine and 6 (25%) said that they thought PrEP would not be effective during concomitant methamphetamine use.

Challenges Using PrEP

Among participants who had taken PrEP in the past 12 months (308, 35%) there was no significant difference in challenges taking PrEP comparing those who had not used methamphetamine (282, 92%) and those who had (26, 8%) in the past 12 months (Table 3). The most common responses were not experiencing any challenges (31% among participants who had used methamphetamine and 29% among those who had not, $p=.83$) and that it is hard to remember to take a pill every day (31% and 23% respectively, $p=.38$).

DISCUSSION

MSM who use methamphetamine are disproportionately impacted by HIV in western US cities and should be a priority population for PrEP. In this analysis of 2017 NHBS MSM data from Seattle, Portland, and Denver, we found that while nearly all PrEP-eligible MSM had heard of PrEP, significantly fewer MSM who used methamphetamine had heard of it. In addition, not believing that PrEP would be effective in preventing HIV was reported by a significantly larger proportion of respondents who used methamphetamine. Increasing PrEP awareness among MSM who use methamphetamine as well as providing accurate information about PrEP's effectiveness is needed to increase PrEP uptake among this population at risk for HIV.

Consistent with findings in other PrEP continuums among MSM,(61, 89) only a portion of those who had heard of PrEP had discussed it with a health care provider in the past 12 months, and even fewer had used it during that time. The majority of the sample who had not used PrEP reported they were not using it because they did not think their risk for HIV is high enough even though everyone in the sample met eligibility for PrEP. Low risk perception has been a barrier in other settings where MSM meet criteria for PrEP use.(90-92) Approximately one-third had used PrEP in the past year, which was a similar prevalence as the national NHBS survey sample and an increase since 2014.(93) However, there is still need for increasing PrEP uptake, especially since everyone in the sample met adapted PrEP eligibility criteria. The decreases across the PrEP continuum, which were slightly steeper among MSM who used methamphetamine, highlight the need for increasing provider discussions about PrEP, which could help improve PrEP uptake.

The similar proportion of past year PrEP use we found among those who had used methamphetamine in the past 12 months and those who had not was inconsistent with prior data

among MSM in Seattle (43) and our hypothesis that methamphetamine use would be a barrier to PrEP uptake. We think that this may be due to two factors: first, PrEP use has been increasing in the US over the past few years (94) and it is possible that MSM who use methamphetamine have had increased uptake as PrEP has become more available and possibly better targeted to this risk group. Alternatively, it is possible that this sample is not representative of MSM who use methamphetamine who are at the highest risk of HIV. In formative work we did among MSM who use methamphetamine in Seattle who were recruited by needle exchange peer educators, 85% reported using methamphetamine at least weekly and only 3% reported using PrEP.(43) In the present analysis, only 22% of respondents who had used methamphetamine in the past 12 months used it weekly or more frequently. The remaining 78% who reported using methamphetamine weekly or less frequently may have used it only once in the prior year. Furthermore, less than one-third (27%) had injected methamphetamine in the past year, which is a subgroup of MSM who use methamphetamine who are at even higher risk for HIV.(95) The frequency of methamphetamine use in the present study sample may impact the generalizability of findings across the broader population of MSM who use methamphetamine in Seattle, Portland, and Denver. Future efforts should find ways to increase the recruitment of MSM who use methamphetamine more frequently, possibly by collaborating with organizations who already provide services to these groups (e.g., needle exchange) or recruiting more participants from certain venues where MSM who use methamphetamine may be more likely to attend (e.g., bathhouses).

This study has several limitations. First, all of the data are self-reported and may be impacted by recall or social desirability bias, especially considering questions were related to sensitive and illegal behaviors. However, the survey was administered anonymously by trained

interviewers, which should have help mitigate the effects of social desirability bias. Second, because we asked about past year PrEP use and not current use or discontinuations, we could not measure if participants had persisted using PrEP and if there was possible lower persistence among those who used methamphetamine, which has been seen in other settings.(96) Third, in some of our analyses regarding methamphetamine use the sample sizes were small which precluded us from conducting additional multivariable analyses. We did, however, collect detailed information regarding reasons PrEP-eligible MSM were not using PrEP and challenges using it among a large sample of MSM. Finally, these results may not be generalizable outside of this sample, especially among groups that may report higher risk for HIV or more frequent methamphetamine use, use other substances, or reside in other geographic locations. Future research should measure PrEP awareness and use among different subgroups of people who use methamphetamine that may be at higher risk for HIV, including transgender persons (97, 98) and MSM who inject drugs.(95)

In conclusion, we found that participants who used methamphetamine had significantly lower PrEP awareness and belief in PrEP effectiveness. Participants who had not used PrEP but met eligibility criteria reported low HIV risk as their primary reason they had not used PrEP. Finally, while there was no significant difference of past year PrEP use comparing respondents who had used methamphetamine in the past year to those who had not, only about one-third of MSM meeting PrEP eligibility criteria had used it in the past year. Our research highlights the need to educate and promote PrEP uptake among MSM who are at elevated risk for HIV, including those who use methamphetamine. Efforts to increase PrEP uptake could include offering PrEP at locations or by organizations that already engage MSM who use methamphetamine.

Table 1. Demographic Characteristics Comparing NHBS 2017 MSM Survey Respondents in Seattle, WA; Portland, OR; and Denver, CO Who Met Adapted CDC PrEP Eligibility Criteria by Past 12 Months Methamphetamine Use (N=880)

Characteristics	Methamphetamine Use in Past Year (n=88)		No Methamphetamine Use in Past Year (n=792)		P-value
	n	(%)	n	(%)	
Site					
Denver	25	28%	299	38%	.006
Portland	20	23%	240	30%	
Seattle	43	49%	253	32%	
Age (median, IQR)	32	(28-38)	32	(26-41)	.92
Sexual identity					<.001
Heterosexual or "straight"	5	6%	2	0%	
Homosexual or Gay	64	73%	669	84%	
Bisexual	19	22%	119	15%	
Race					.50
American Indian or Alaska Native	1	1%	24	3%	
Asian	1	1%	28	4%	
Black or African-American	6	7%	50	6%	
Native Hawaiian or Other Pacific Islander	1	1%	7	1%	
White	61	69%	584	74%	
Multiracial	13	15%	80	10%	
Ethnicity					.008
Not Hispanic/Latinx	79	90%	624	79%	
Hispanic/Latinx	8	9%	167	21%	
Highest Level of Education Completed					<.001
< 12 Grade 12	7	8%	5	1%	
Grade 12 or GED	25	28%	124	16%	
Some college, AA, or Tech	38	43%	253	32%	
Bachelor's degree	16	18%	261	33%	
Any post-grad	2	2%	149	19%	
Homeless					<.001
Homeless in past year	31	35%	34	4%	
Health insurance					.045
Currently have health insurance	70	80%	691	87%	

Figure 1. PrEP Awareness, Discussions with Providers in Past 12 Months, and Use in Past 12 Months Among NHBS 2017 MSM Survey Respondents in Seattle, WA; Portland, OR; and Denver, CO Who Met Adapted CDC PrEP Eligibility Criteria by Methamphetamine Use in Past 12 Months (n=880)

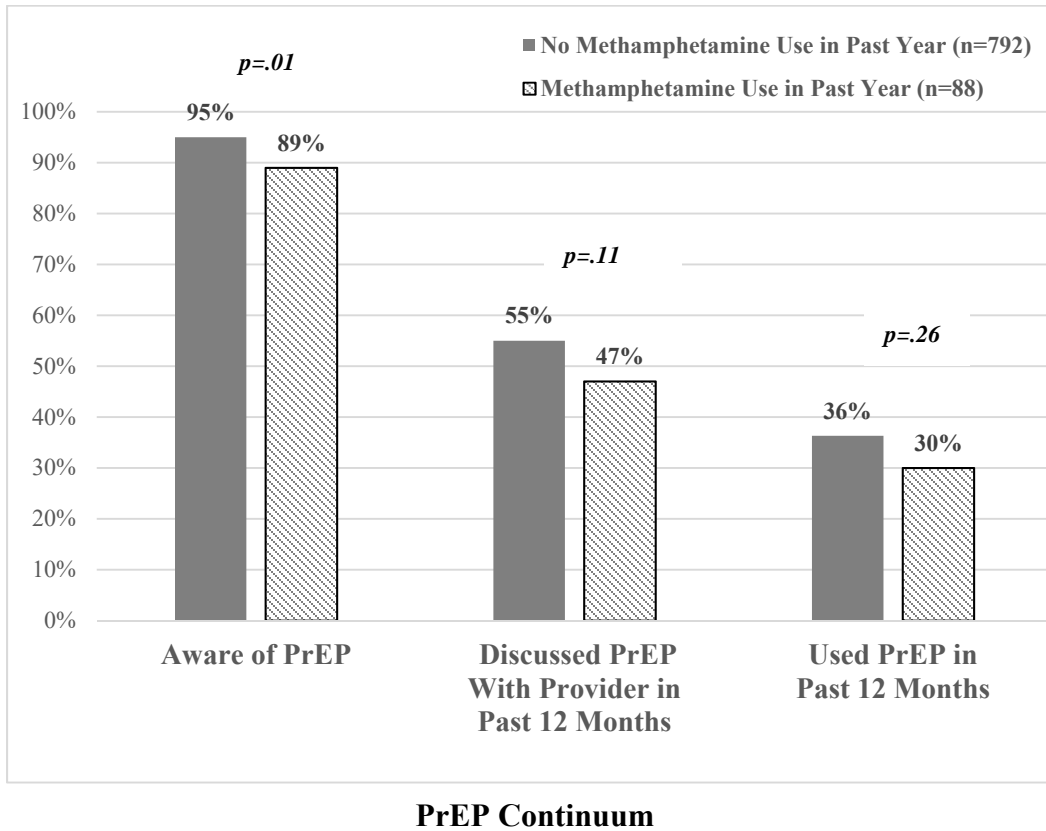


Table 2. Reasons Participants Had Not Used PrEP in the Past 12 Months Among NHBS 2017 MSM Survey Respondents in Seattle, WA; Portland, OR; and Denver, CO Who Met Adapted CDC PrEP Eligibility Criteria and Had Heard of PrEP by Past 12 Months Methamphetamine Use (n=524)

Reasons Participants Were Not Using PrEP	Multiple Answer Options Permitted [†]					Main Reason [†]				
	Participants Who Had Used Methamphetamine in the Past 12 Months (n=50)		Participants Who Had Not Used Methamphetamine in the Past 12 Months (n=457)		<i>p</i> -value	Participants Who Had Used Methamphetamine in the Past 12 Months (n=50)		Participants Who Had Not Used Methamphetamine in the Past 12 Months (n=457)		<i>p</i> -value
	n	%	n	%		n	%	n	%	
I don't think my risk for HIV is high enough to be on PrEP	27	54%	232	51%	.66	8	16%	59	13%	.56
I worry about the side effects	21	42%	220	48%	.41	5	10%	31	7%	.41
I am not sure it would prevent me from getting HIV	19	38%	89	19%	.002	1	2%	5	1%	.58
I don't think I can afford it	18	36%	167	37%	0.94	9	18%	72	16%	.70
I don't know enough about PrEP	17	34%	138	30%	.58	4	8%	26	6%	.52
I don't know where to get PrEP	15	30%	127	28%	.74	2	4%	34	7%	.37
I would need to take a pill every day	13	26%	119	26%	.99	1	2%	25	5%	.29

Seeing a provider every 3 months is too much trouble	10	20%	70	15%	.39	1	2%	28	6%	.23
Other reasons(s)	8	16%	93	20%	.47	12	24%	69	15%	.11
I worry about being judged for using PrEP	7	14%	35	8%	.12	2	0%	35	8%	.34

¹ Fifteen participants who had not used methamphetamine had missing data and two participants who had used methamphetamine in the past 12 months had missing data for both questions. Five participants who used methamphetamine and 73 of those who had not reported they "didn't know" their main reasons for not using PrEP.

Table 3. Challenges Using PrEP Among NHBS 2017 MSM Survey Respondents in Seattle, WA; Portland, OR; and Denver, CO Who Met Adapted CDC PrEP Eligibility Criteria and Had Used PrEP in the Past 12 Months by Past Year Methamphetamine Use (n=308)

Reasons Participants Had Used PrEP in the Past 12 Months	Participants Who Had Used Methamphetamine in the Past 12 Months (n=26)		Participants Who Had Not Used Methamphetamine in the Past 12 Months (n=282)		p-value
	n	%	n	%	
It is hard to remember to take a pill every day	8	31%	65	23%	.38
It is hard to make it to my clinic visits for refills	5	19%	33	12%	.27
I have experienced side effects	2	8%	51	18%	.18
I don't think my risk for HIV is high enough to be on PrEP	2	8%	27	10%	.76
I lost my insurance/can't afford it anymore	4	15%	30	11%	.46
I haven't experienced any challenges taking PrEP	8	31%	81	29%	.83
Other reason(s)	7	27%	50	18%	.25

Chapter 5: Discussion

Despite increases in methamphetamine use and related mortality in the US, (9, 26, 99, 100) there is a paucity of knowledge about the correlates, consequences, and trends of methamphetamine use. While newspapers and editorials have highlighted the lack of attention paid to methamphetamine in the shadow of the opioid epidemic, (44, 101, 102) substance use research and health services continues to focus on opioid use, which has resulted in gaps in our understanding of methamphetamine use and fewer health services targeted to people who use methamphetamine. In an attempt to fill some of these gaps, we conducted the formative work described herein, using cross-sectional surveys and focus groups to better describe subgroups of people who use methamphetamine that may be at higher risk of certain comorbidities.

We identified multiple vulnerabilities and unmet health care needs among people who use methamphetamine across our studies. MSM who used methamphetamine and participated in the NHBS survey were approximately eight times as likely to be homeless and had significantly fewer years of education compared to participants who had not used methamphetamine. The majority of PWID who participated in the Washington state SEP survey reported unstable housing or homelessness, no income, and being concerned about a mental health issue. Homelessness is associated with multiple negative health outcomes,(103) including HIV acquisition.(104, 105) In 2018, an outbreak of 27 new HIV infections in Seattle, the highest number of new infections in a year in over a decade were concentrated in PWID who were homeless, highlighting the elevated HIV risk of this population.(37) Furthermore, there may be a unique relationship between methamphetamine use and homelessness. Ethnographic studies have described “functional” uses of methamphetamine among homeless individuals, where

methamphetamine is used to avoid interactions with police and citations that could occur when sleeping outside. (106)

Washington state SEP survey participants who used methamphetamine were also more likely to be MSM compared to their counterparts who primarily used opioids. A 2015 Denver sample of PWID who participated in NHBS, also found that participants who used methamphetamine were more likely to be MSM compared to PWID who used heroin.(106) Methamphetamine use among MSM has increasingly become prevalent in conjunction with sexual activities that have elevated risk for HIV.(107, 108) As King County epidemiological data has evidenced, MSM-PWID who use methamphetamine are at the highest risk of HIV in Seattle with approximately 45% infected with HIV.(36)

In addition to identifying vulnerabilities among MSM and PWID who use methamphetamine, we describe unmet health needs in these groups. The majority of the PWID who participated in the SEP survey were interested in reducing their methamphetamine use. However, while multiple effective FDA-approved pharmacological agents are available to treat opioid use disorder, none are approved for methamphetamine use disorder. The majority of the participants whose primary drug was an opioid cited methadone, suboxone, or naltrexone as the type of help they wanted to reduce their opioid use. There was no analogous answer option for participants who primarily used methamphetamine since no approved medication exists. Among the more limited types of help for respondents whose main drug is methamphetamine, mental health medications or care was endorsed the most, indicating that there are unmet needs for mental health care among PWID who use methamphetamine.

The limited PrEP uptake among MSM who use methamphetamine is also a gap in the provision of effective HIV prevention health services to this community. Our work identified

several barriers to PrEP engagement, most notably education and stigma. First, we found that fewer MSM who used methamphetamine had heard of PrEP and among those who had heard of it, fewer thought PrEP was effective. The main reason for not using PrEP among MSM who use methamphetamine was thinking they could not afford it. This was similar to our earlier work among MSM who use methamphetamine in Seattle which showed that the most commonly reported concern about PrEP was not being able to afford it, followed by not knowing enough about it. (43) Second, stigma was a prominent and persistent barrier of PrEP uptake, and was the most commonly discussed theme across our focus groups regarding reasons why MSM who use methamphetamine have low PrEP uptake.

It should be a public health priority to identify ways to address these vulnerabilities and fill the unmet health needs of MSM and PWID who use methamphetamine. First, housing must be a priority for people who use methamphetamine and are unhoused. Since people may use methamphetamine to help manage consequences of homelessness, a housing first model may be the optimal way to provide housing to this group so they do not need to cease their methamphetamine use prior to entering housing. Evaluations to date of the housing first model in Seattle have shown that residents have reduced alcohol use; (109, 110) however, evaluations have not been conducted regarding how housing first engages or impacts people who use methamphetamine specifically. These evaluations should be performed to inform how to optimize housing first interventions for people who use methamphetamine.

Second, there is a clear need for mental health care among PWID who use methamphetamine. In our sample half of the participants who primarily used methamphetamine reported being concerned about their mental health. While methamphetamine can exacerbate poor mental health it may also be used to help manage mental health conditions.(55) In order to

provide effective mental health services to people who use methamphetamine, it is critical that we understand this paradoxical relationship better. Qualitative interviews with PWID who use methamphetamine could help explore this relationship and inform how mental health services would be best delivered to PWID who use methamphetamine (e.g., at a SEP, through street-based outreach, by peers). Providing mental health services to PWID who use methamphetamine would not only help address concerns about mental health, but also may be an appealing component of methamphetamine reduction programs since mental health care or medications was the most frequently endorsed help PWID wanted to reduce their methamphetamine use.

Third, additional harm reduction programs for people who use methamphetamine should be piloted and evaluated, including programs providing methamphetamine pipes aimed to reduce the frequency of methamphetamine injection and associated consequences. Finding ways to promote less harmful substance use will help reduce the negative effects of methamphetamine use. While there are a small number of SEPs that provide safer smoking supplies to participants who use methamphetamine, no evaluation to date has demonstrated efficacy of these programs in the US. It should be a priority for the substance use research agenda to determine if pipe programs can help reduce harm to people who use methamphetamine. Evidence of benefit would be foundational for SEPs to grow their pipe programs.

Fourth, PrEP roll out must engage MSM and PWID who use methamphetamine and are exposed to HIV sexually or for whom access to clean needles alone does not eliminate their HIV risk. Despite the extremely high prevalence of HIV among local MSM-PWID who use methamphetamine and PrEP's efficacy, availability, and financial coverage in Seattle, there is limited PrEP uptake. We need to better understand who is not being reached by existing PrEP programs and how to reach them. This work needs to include transgender persons, who are

routinely excluded from research or are not targeted specifically, resulting in lack of representation. Studies have found a high prevalence of HIV and methamphetamine use among transgender individuals; (57, 58, 97, 98) it is critical that we include transgender persons in HIV research and tailor interventions to transgender persons. Furthermore, we need more research on how best to promote PrEP adherence and persistence among those individuals who use methamphetamine and do start PrEP, as low adherence and discontinuation have been seen among other groups of people who use methamphetamine and are periods of high risk for HIV acquisition.(96) In this vein, we have developed a pilot study informed by the focus groups conducted with the NEON peer educators that is assessing the acceptability and feasibility of daily text messaging and peer navigation to support PrEP use among MSM and transgender persons who use methamphetamine

The three studies described in this dissertation have several limitations. First, all of the data collected was self-reported and therefore prone to recall and social desirability biases. To try and mitigate the effects of bias, for two of our studies we collaborated with programs that have existing relationships and rapport with study participants (i.e., SEPs and Project NEON). Second, each study is cross-sectional, so we are unable to describe any causal effects or temporality between the exposure and outcome. For example, in the NHBS study, it is possible that participants who were categorized as MSM who use methamphetamine and took PrEP in the past year took PrEP before they ever had used methamphetamine. Third, our results may not be generalizable to other groups of PWID or MSM outside of the individuals who participated. This may include individuals who may not use harm reduction programs and thus may be at higher risk of the negative effects of methamphetamine, persons in other parts of the US, persons of color (since our study participants were predominantly white), sex workers, and transgender

persons. Future research among people who use methamphetamine should make targeted efforts to include these populations. Finally, we did not measure certain characteristics or behaviors that could influence our findings (e.g., frequency of methamphetamine use, differential concern about depression versus anxiety, most recent methamphetamine use).

In summary, in the shadow of the opioid epidemic, methamphetamine use is increasing across the country and in Washington State. Our formative work identified that PWID and MSM who use methamphetamine are impacted by several vulnerabilities and have many unmet health needs. Across our samples, homelessness, concerns about mental health, and less education were prevalent among people who use methamphetamine. These circumstances are associated with poorer health outcomes. PWID participants who used methamphetamine were more likely to be MSM, which is a group with an extremely high prevalence of HIV locally. Furthermore, MSM-PWID who use methamphetamine experience intersectional stigma, which exacerbates the vulnerabilities they face and is a persistent barrier to care, including PrEP engagement. Our results suggest that HIV and substance use research must broaden its focus to include people who use methamphetamine and their unique needs. We must better understand the relationship between methamphetamine and mental health as well as homelessness, including how methamphetamine may have protective benefits for people. If we continue to focus our substance use research and health services on people who use opioids and not on those who use methamphetamine this growing “epidemic” and its consequences will continue unabated.

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Supplemental Materials

Table 1. Participant Characteristics by Interest in Reducing or Stopping Methamphetamine Use, Including Respondents who Said They Were “Not Sure” (n=183)

Characteristics ⁺	All (183)		Not Interested (78)		Interested (86)		Not Sure (19)		p value
	n	(%)	n	(%)	n	(%)	n	(%)	
Age									.024
Median (IQR)	38	(30-49)	42	(34-51)	35	(29-45)	34	(29-43)	
Gender									.164
Male	110	60%	53	68%	46	53%	11	58%	
Female	73	40%	25	32%	40	47%	8	42%	
Race									.502
White	152	84%	68	87%	69	81%	15	79%	
Non-White	30	16%	10	13%	16	19%	4	21%	
MSM									
No	172	94%	73	94%	80	93%	19	100%	.739
Yes	11	6%	5	6%	6	7%	0	0%	
Insurance									.262
Uninsured	20	11%	9	12%	7	8%	4	21%	
Insured	163	89%	69	88%	79	92%	15	79%	
Insurance type									.168
Public/Government	156	96%	66	96%	77	97%	13	87%	
Private	5	3%	2	3%	1	1%	2	13%	
Other	2	1%	1	1%	1	1%	0	0%	
Urban/Rural									.03
Urban Core	104	57%	38	49%	49	57%	17	89%	
Suburban	13	7%	6	8%	6	7%	1	5%	
Large Town	52	28%	24	31%	27	31%	1	5%	
Small Town/Rural	14	8%	10	13%	4	5%	0	0%	
Housing									.08
Permanent	54	30%	30	38%	20	23%	4	21%	
Unstable/Homeless	129	70%	48	62%	66	77%	15	79%	
Legal monthly income before taxes (USD)									.215
None	100	55%	35	45%	53	62%	12	63%	
1st Tertile (\$1-729)	28	15%	13	17%	12	14%	3	16%	
2nd Tertile (\$730-1131)	28	15%	18	23%	9	11%	1	5%	
3rd Tertile (\$1132-6000)	26	14%	12	15%	11	13%	3	16%	
Jail									.598
Not in jail in last year	129	70%	56	72%	58	67%	15	79%	
In jail in last year	54	30%	22	28%	28	33%	4	21%	
Concerned about Mental									.002
Not at all	89	49%	49	63%	30	35%	10	53%	
Very/Somewhat	94	51%	29	37%	56	65%	9	47%	
Source of Care in Last Year									.089
ER	75	41%	33	43%	38	44%	4	21%	
Other	52	29%	20	26%	21	24%	11	58%	
None	54	30%	23	30%	27	31%	4	21%	

† There was 1 missing value for age, race, and income and there were 2 missing values for source of care in the last year.

Table 2. Substance Use Characteristics by Interest in Reducing or Stopping Methamphetamine Use, Including Respondents who Said They Were “Not Sure” (n=183)

Characteristics ^I	Total (183)		Not Interested (78)		Interested (86)		Not Sure (19)		<i>p</i> value
	n	(%)	n	(%)	n	(%)	n	(%)	
Route of ingestion									.02
Both smoke and inject	95	52%	41	53%	47	55%	7	37%	
Inject only	75	41%	36	46%	28	33%	11	58%	
Smoke only	12	7%	1	1%	10	12%	1	5%	
Overamp (self)									.14
Not in past 12 months	155	85%	65	84%	71	83%	19	100%	
In past 12 months	27	15%	12	16%	15	17%	0	0%	
Overamp (other)									.176
Not in past 12 months	135	74%	56	73%	61	71%	18	95%	
In past 12 months	47	26%	21	27%	25	29%	1	5%	
Injection-related infection ^H									.364
Not in past 12 months	120	71%	51	66%	54	72%	15	83%	
In past 12 months	50	29%	26	34%	21	28%	3	17%	
Used opiates or benzos									.436
Not in past 3 months	113	62%	49	63%	50	58%	14	74%	
In past 3 months	70	38%	29	37%	36	42%	5	26%	

^I There was 1 missing value for route of ingestion, overamp (self), and overamp (other).

^H Injection-related infections were only assessed of those reporting injection (n=170) and include having an abscess, skin or tissue infection like cellulitis or MRSA, or endocarditis.

Discussion Guide for Focus Groups with NEON Peer Educators

Introduction *(this section will be the same for each focus group)*

Thank you for participating in this activity. We are excited to continue our conversation about what transgender men and women and cisgender men who have sex with men who are using meth think about PrEP, what information they have heard about it, and whether or not there is an interest in using PrEP for HIV prevention in this community. As peer educators, your thoughts and opinions are very valuable and will help us understand how PrEP is being thought about among your contacts. We really appreciate you taking the time to talk with us today. This conversation should take approximately 1 hour.

We will audio-record the conversation. We are doing this so that we can listen to the recording and create a written transcript of the conversation. This way we can capture all of the details of the conversation. We ask that during this discussion you try not to use your real name or the real name of anyone else in this room, or the real name of any outreach contacts, to help ensure their confidentiality. In order to help us not use real names, we ask that you write a fake name on the paper that is sitting in front of you and then turn it around so it faces outwards so everyone in the room can see it. This way if someone wants to address you during the conversation, they can use that name. No names will be included on the transcript of this discussion, so if someone's real name is used during the discussion by mistake, it will not be recorded on the transcript. Once the transcript is completed, we will delete the audio recording. *[The facilitator will pause while the focus group participants write a name on the paper in front of them and place it facing outwards.]*

Please remember, that participating in this focus group discussion is completely voluntary. You may decide to not answer any of the questions that we ask and can leave at any time. Please also remember to be as honest as possible; there are no "right" or "wrong" answers. My job tonight is to help facilitate the discussion. I am eager to hear from everyone and learn from your experiences.

Does anyone have any questions or concerns about tonight's discussion? *[The facilitator will answer any questions that arise.]* Okay, thank you. I am going to start recording the discussion now. *[The facilitator will turn on the audio recorder.]*

Note: the following questions are a guide for the facilitator. Depending on the conversation, the facilitator may not ask a question, ask questions in a different order, or ask a question that is responsive to the conversation that may not be included in this guide. At all times the facilitator will be responsive to what the participants share and any questions that may arise. The prompts are included to help the facilitator narrow a question or ask it in a different way to help understandability or elicit responses.

Questions about Knowledge, Access, and Interest in PrEP to be Asked at all Focus Groups

- What information about PrEP do you think is out there among gay, bi, and transmale/female meth users in Seattle?
 - *Prompts:*
 - *Do you think people know what PrEP is?*
 - *Do you think people think it is safe? Effective?*
 - *Do you think it is safe? Effective?*
 - *Do you have any examples of conversations you have had with people about what PrEP is? Would you please describe them?*
- Where do you think that meth users are getting information about PrEP?
 - *Prompts:*
 - *NEON, Public Health Department, STD Clinic, their providers?*
 - *Online?*
- What information about PrEP do you think meth users particularly need? What would be the best way to provide this information?
- Do you think that PrEP could be a good HIV prevention strategy for gay, bi, and transmale/female meth users in Seattle?
 - *Prompts:*
 - *What are some reasons you would not want to promote PrEP?*
 - *What are some reasons you would want to promote PrEP?*
 - *What are some advantages and disadvantages of PrEP that you have heard from others about using PrEP?*
 - *Safety?*
 - *Concerns with taking PrEP and using at the same time?*
 - *Changes in risk behavior?*
 - *Being able to have continued access?*
 - *Stigma when meeting with a provider?*
- Do you think that meth users in Seattle are interested in taking PrEP? Why or why not?
 - *Prompts:*

- *Not being worried about HIV?*
 - *Preventing HIV is not a priority?*
 - *Using other HIV prevention strategies?*
- What other services should be provided at a PrEP clinic that serves meth users?

Focus Group # 1: Examples of Specific Questions (Brainstorm Materials)

- What information do you think that meth-users in Seattle need about PrEP?
 - *Prompts:*
 - *Information about its safety? Efficacy?*
 - *Information about where to get it? How to pay for it?*
 - *Information about how to use it once they start PrEP?*
- What would be the best materials to provide this information to meth users? What would they look like?
 - *Prompts:*
 - *Palm cards, flyers, brochures, posters?*
 - *What kind of images should be used? Color scheme?*
- Where should these materials be placed?
 - *Prompts:*
 - *Bathhouse/sex club?*
 - *Online? If so, what sites?*
 - *Other venues?*
- How should these materials be provided to meth users? To your contacts?
 - *Prompts:*
 - *Handed out in-person?*
 - *Placed somewhere for people to obtain on their own?*
 - *Provided with other harm reduction services and materials?*

Focus Group # 2: Examples of Specific Questions (Material Review)

- How do the materials we developed look?
 - *Prompts:*
 - *Do you like the way they appear?*
 - *Do you like the color? Format? Shape and size?*
- Does the content reflect the information you think meth users need about PrEP? Is it relevant?
 - *Prompt:*
 - *What information do you think these materials provide?*
 - *What information do you think is not covered that is needed?*
- Are the materials understandable?
 - *Prompt:*

- *Are there phrases or words that do not make sense to you?*
- *Could we say things in a more understandable way? If so, how?*

Focus Group # 3: Examples of Specific Questions (Experience Piloting Materials)

- Did you use the materials we developed? Did people take them?
 - *Prompts:*
 - *How often did you use them?*
 - *How many people do you think received them over the past 3 months?*
- What was your experience using the materials we developed?
 - *Prompts:*
 - *Did people give you any feedback about them? Ask any follow-up questions?*
 - *Did they help you in conversations with your contacts? How?*
- Do you think that anyone who took a card started PrEP?
- Would you make any changes or improvements to them based on your experience using them?
 - *Prompts:*
 - *Any content changes? Formatting?*
 - *Should they be placed somewhere else?*

Thank you very much for sharing your thoughts and opinions!