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Non-monosexual Partnerships: Information, Motivation and Self-Efficacy among Methamphetamine-Using Men Who Have Sex with Men Who Also Have Sex with Women or Transgender Persons

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Abstract

Objectives—Sex with more than one gender is associated with higher substance use, and sexual HIV risk.

Methods—We examined knowledge, motivation, and self-efficacy to engage in safer substance use and sexual behavior among methamphetamine-using U.S. men who have sex with more than one gender (N=343).

Results—Almost half(46.2%) of the men reported having sex with a man and a woman or transgender partner in the last 30 days. Compared to monosexual MSM, non-monosexual MSM reported greater condom use self-efficacy however, they reported more sexual partners who inject drugs.

Conclusion—We observed distinct differences between men who do or do not have sex with more than one gender.

Keywords

HIV prevention; MSM; bisexual; sexual behavior; drug use; methamphetamine; harm reduction; mono-sexual

Introduction

Men who have sex with men (MSM) who engage in sexual partnerships with more than one gender (i.e., non-monosexual partnerships) are a unique population (Gorbach, Murphy,

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Author Disclosure Statement

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Weiss, Hucks-Ortiz, & Shoptaw, 2009; Hightow et al., 2006; Montgomery, Mokotoff, Gentry, & Blair, 2003; Nakamura, Semple, Strathdee, & Patterson, 2011; Zule, Bobashev, Wechsberg, Costenbader, & Coomes, 2009) who could benefit from tailored harm reduction interventions to reduce HIV risk. Most research literature about MSM having sex with people of more than one gender reported results from studies that compared them to men who reported having sex with cisgender (i.e., designating a person whose sense of personal identity corresponds to the sex and gender assigned to him or her at birth) men and women (MSMW) or to men who reported only having sex with cisgender men (MSMO). Studies on MSM who report having sex with a transgender person (MSMT) is limited (Bockting, Miner, & Rosser, 2007; Mimiaga et al., 2009; Muñoz-Laboy, 2004; Sevelius, 2009).

HIV prevalence is lower among MSMW than MSMO (Des Jarlais, Arasteh, & Friedman, 2011; Mimiaga, et al., 2009; Tieu et al., 2012; Tobin, Davey-Rothwell, & Latkin, 2010). This may be, in part, due to lower rates of condomless anal sex by MSMW than by MSMO (Friedman, Wei et al., 2014; Nakamura et al., 2011; Rudolph et al., 2011; Tieu et al., 2012) as condom use decisions and negotiation strategies vary based upon the gender of the sexual partner (Hubach et al., 2014). Different substance use patterns could also explain part of the lower HIV prevalence among MSMW. Substance use—particularly “club drugs” (Kelly, Parsons, & Wells, 2006; Romanelli, Smith, & Pomeroy, 2003)—is a potential catalyst in the subsequent rise of HIV transmission among MSM (Colfax & Shoptaw, 2005; Friedman, Wei et al., 2014; Halkitis & Jerome, 2008; Halkitis, Wolitski, & Millett, 2013). Among club drugs, methamphetamine has made a significant impact on the physical and mental health of MSM (Urbina & Jones, 2004; Worth & Rawstorne, 2005). It has been shown to transcend racial and ethnic lines and developmental stages (Halkitis & Jerome, 2008; Lampinen, McGhee, & Martin, 2006). The physiological effects of methamphetamine include hypersexuality, enhanced sexual sensitivity, feelings of euphoria, lowered inhibitions, and increased energy (Bolding, Hart, Sherr, & Elford, 2006; Cruickshank & Dyer, 2009; Friedman, Wei et al., 2014; Homer et al., 2008); a combination that has the potential to increase risky sexual behavior. When methamphetamine-using MSMW are compared to methamphetamine-using MSMO, they are more likely to report injection drug use (Goodenow, Netherland, & Szalacha, 2002; Jeffries & Dodge, 2007) and to have sex under the influence of drugs (Jeffries & Dodge, 2007), but a lower likelihood of condomless anal sex (Nakamura et al., 2011).

Little is known about the HIV prevalence among men who have sex with men and transgender persons (MSMT). The limited research on MSMT does not always focus on HIV prevalence and risk factors. Rather, much of the research tries to theorize bisexual desires and behaviors of cisgender men or the experiences of their transgender partners (Iantaffi & Bockting, 2011; Muñoz-Laboy, 2004). Findings from studies that have focused on HIV prevention and risk factors indicate a high percentage of reported risky sex among MSMT than among MSM. For example, Mimiaga, et al. (2009) found 8% of the MSM participants in their sample reported oral, anal or vaginal sex with a transgender partner in the past 12 months; over half (56%) reported having had sexual intercourse without condom.

While studies of the sexual behavior of MSMT is limited, there has been research on the sexual behavior of transgender people who have sex with cisgender MSM (Bockting et al.,

2007; Sevelius, 2009). In one of these studies, transgender participants were 4 times less likely than cisgender MSM to have been tested for HIV even though attitudes towards condom use and self-reported condom use were similar (Bockting et al., 2007). Transgender men who have sex with cisgender men are at risk of HIV infection because of inconsistent condom use and receptive vaginal and anal sex (Reisner, Perkovich, & Mimiaga, 2010; Sevelius, 2009), frequently with gay-identified cisgender MSM (Rowniak, Chesla, Rose, & Holzemer, 2011).

Estimates of the prevalence of HIV among transgender women vary widely due to sampling bias in this population (Baral et al., 2013). A recent systematic review of HIV burden in transgender women indicates that this population is indeed at higher risk of HIV infection, with a 20–90 times elevated range in most of the world compared to the general population (Baral, Poteat, Guadamuz, & Beyrer, 2013). In a recent U.S. study (Operario, Nemoto, Iwamoto, & Moore, 2011), 41% reported an HIV positive status and 34% had sex without a condom with a male primary partner in the previous 3 months with drug and alcohol use being associated factors.

There is a historical conflation of transfeminine people within the category of MSM (AIDS, 2013). In addition, there is limited information in the literature to inform the development of HIV prevention programs for cisgender men partnering with transgender people (Operario, Burton, Underhill, & Sevelius, 2008), despite a higher burden of HIV in transgender populations. Thus, more research is needed to understand the risk behaviors and prevention needs of MSM who have sex with transgender people.

To inform the development of tailored interventions for MSM who have sex with more than one gender, researchers should consider the clustering of substance use and sexual risk taking as a significant factor in the transmission of HIV and other sexually transmitted infections (Friedman et al., 2014; Halkitis et al., 2013; Noor, Ross, Lai, & Risser, 2014; Patterson, Semple, Zians, & Strathdee, 2005; Purcell, Parsons, Halkitis, Mizuno, & Woods, 2001). Researchers should also identify factors associated with sexual partnerships among substance abusing MSM who have sex with more than one gender.

Studies examining factors associated with sexual partnerships among methamphetamine using MSM who have sex with more than one gender are sparse (Friedman et al., 2014; Friedman, Wei et al., 2014; Nakamura et al., 2011). Previous research with MSM, suggest men are most likely to perform a behavior when they have the necessary information, motivation, (which can include attitudes, perceived vulnerability, and perceived social support regarding a behavior), and self-efficacy to do it (Avants, Warburton, Hawkins, & Margolin, 2000; Fisher & Fisher, 1992; Scott-Sheldon et al., 2010). Depending on the behavior to be changed and the targeted population, the relevance of these constructs may vary (Fisher & Fisher, 1992). For example, knowledge of a behavior might be higher in one population than in another. Thus, it is necessary to identify the strength of constructs associated with a particular behavior prior to intervention development. Therefore, to reduce the aforementioned gap in the literature, and to appropriately inform the development of tailored interventions for substance-using MSM who have sex with more than one gender, in

the present study, we examined substance use and sexual constructs associated with sexual partnerships among methamphetamine-using MSM recruited throughout the U.S.

Methods

Participants, Study Design and Procedure

The ParTy study was a mixed method, cross-sectional, Internet-based study of methamphetamine-using U.S. men who have sex with men. The purpose of the study was to collect formative data to inform the content and design of a mobile-health intervention to reduce substance use and sexual HIV risk among methamphetamine-using MSM.

Participants were recruited with banner advertisements on our Facebook page (<https://www.facebook.com/ParTyResearchStudy>) and Twitter account (<https://twitter.com/partystudy>); and on mobile/desktop websites and mobile apps frequented by MSM to meet other men. When someone clicked on an advertisement formatted for a mobile website or app, they were directed to a university webpage and asked to provide their e-mail address. Persons who provided their e-mail address were sent the eligibility screener, consent, and if eligible, the link to the survey webpage. When someone clicked on an advertisements formatted for browsers, they were directed to the study webpage hosted on a dedicated university server with appropriate encryption to ensure data security; they were not asked to provide an email. The webpage included information about the study procedures and a link to the eligibility screener. Eligible respondents were invited to complete our consent protocol and the survey. Eligibility criteria included self-identifying as male, age 18 or older, living in the United States or one its territories, having sex with a man, and having used methamphetamine in the last 30 days.

Initially, 761 interested participants attempted to complete the survey; 458 enrollees passed the eligibility screener and completed the survey. We adapted a standard de-duplication, cross-validation and data cleaning protocol developed by our team to exclude participants with duplicate, fraudulent or suspicious surveys and impossible or nonsensical data patterns (Konstan, Rosser, Ross, Stanton, & Edwards, 2005; Pequegnat et al., 2007; Wilkerson et al., 2013). Ineligible or duplicate data were removed from the final data-set. This resulted in 343 (74.9 %) completed surveys deemed to be from unique valid participants.

Data collection took place between July and October 2012. Participating methamphetamine-using MSM responded to questions about recent substance use, sexual behavior, and various psychosocial measures. Participants were compensated \$25 for completing the survey. The median completion time was 21 min. The institutional review board of the senior author's university approved all study procedures.

Measures

Participants were asked to provide the number of male, female, and transgender partners with whom they had sex with in the last 30 days. Based on the responses, participants were classified into three distinct groups: those who reported sex with men only (MSMO), men and women (MSMW), men and transgender persons (MSMT). We excluded participants

who reported having sex with a man, a woman and a transgender person in the last 30 days (n=18) to create distinct categories.

To assess knowledge about safer substance use and sexual behavior, we asked participants to respond to a list of true/false questions that we developed in collaboration with members of our community advisory board that included current and former methamphetamine-using MSM, outreach workers who interact with methamphetamine-using MSM, and health department employees who fund programs targeting methamphetamine-using MSM. Participants were asked to respond to five substance use items and six safer sex items. The substance use items included statements such as, “if you don’t use bleach, rinsing out a needle three times with hot water will kill anything that is in the syringe (false),” and “you will not get addicted to meth if you only use it on weekends (false).” The sexual behavior items included statements such as, “if a person puts their penis inside your anus without a condom and pulls out before cumming, your risk of HIV is low (false),” and “an HIV-positive person with an undetectable viral load is less likely to give someone HIV (true).” We assigned separate sum scores to the number of correct responses to the safer substance use and safer sex items. The range for the substance use items was 0–5 and the range for the safer sex items was 0–6, with higher scores indicating increased knowledge.

In assessing attitudes, a proxy for motivation, we focused on the extent to which participants held positive attitudes toward methamphetamine use and condomless anal sex (CAS). To assess positive attitudes towards methamphetamine use, we collaborated with our community advisory board to develop seven items. Items were measured on 5-point Likert-type scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Items included statements such as, “I enjoy the high I get from meth” and “I have better sex when I use meth.” We conducted an exploratory factor analysis (EFA) with oblique rotation and a confirmatory factor analysis (CFA) on a 30–70 randomized split of the sample, respectively. The resulting four-item scale had modest fit¹ and internal consistency ($\alpha=.58$, 95% CI: 0.52–0.65). We averaged responses to the items creating a composite score. The range for the substance use items was 1–5 with higher scores indicating increased positive attitudes toward methamphetamine use.

To assess positive attitudes towards condomless anal sex, we used the Benefits of Barebacking Scale (Halkitis, Parsons, & Wilton, 2003), which has been previously validated and includes nine items with response options ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($\alpha=.71$, 95% CI: 0.66–0.75 in the current study). Items included statements such as, “barebacking increases intimacy between men,” and “barebacking is hotter than sex with condoms.” We averaged responses to the items creating a composite score. The range was 1–7 with higher scores indicating increased positive attitudes toward CAS.

To assess self-efficacy for safer substance use and sexual behavior, we asked participants to respond to a list of items that were developed in collaboration with members of our community advisory board. Items were measured on 5-point Likert-type scale with response

¹EFA- 1 factor 7 item: RMSEA[90% CI]: 0.16[0.10–0.22]; CFI:0.51;TLI:0.26
EFA- 1 factor 4 item: RMSEA[90% CI]: 0.09[0.00–0.27]; CFI:0.96;TLI:0.88
CFA- 1 factor 4 item: RMSEA[90% CI]: 0.11[0.05–0.19]; CFI:0.96;TLI:0.88

options ranging from 1 = *not at all sure* to 5 = *completely sure*. Participants were asked to indicate how sure they were able to engage in certain behaviors by responding to thirteen substance use and eleven sexual behavior items. The substance use items included statements such as, “use only one drug at a time,” and “only use drugs when other people are around to look out for you if you overdose.” The sexual behavior items included statements such as, “stop to use a condom even if you are very sexually aroused (horny),” and “use a condom without having it slip or break.” Exploratory and confirmatory factor analyses indicated a five-item scale for substance use² and six items scale for sexual behaviors³ self-efficacy. We averaged responses to the substance use and sexual behavior items, respectively. The range for both the substance use and sexual behavior items was 1–5, with higher scores indicating increased self-efficacy. The Cronbach’s alpha for safer substance use self-efficacy items was 0.85 (95% CI: 0.83–0.87) and for sexual self-efficacy items was 0.81 (95% CI: 0.78–0.84).

Socio-demographic and other variables that were examined included age, race/ethnicity, education, relationship status (single/in a relationship) residence in a rural or urban area, sexually transmitted infection (STI) status (diagnosis of syphilis, gonorrhea or chlamydia in the past year), HIV serostatus, age at first drug use, drug consequences and problem severity, total number of sexual partners in the last 30 days, total number of sexual partners who are injection drug users, and condomless anal sex with a male partner. Condomless anal sex was calculated from two separate Likert-type questions asking participants’ condom use with a male partner as a top or a bottom, with response options ranging from 1 = never to 5 = always. We identified participants as engaging in condomless anal sex (yes) if they reported not always use condom either as a top or a bottom. We used the 10-item version of the Drug Abuse Screening Test (DAST-10) to assess drug consequences and problem severity in the past year (Skinner, 1982). The Cronbach’s alpha for the DAST10 items was 0.63 (95% CI: 0.55–0.67).

Statistical analysis

In this analysis, our goal was to classify participants into meaningful and distinct groups based on the type of sexual partners with whom they had sex in last 30 days and then to identify personal characteristics, substance use, and sexual measures associated with the gender of their recent sexual partners (MSMO, MSMW, and MSMT). We carried out this analysis in three steps.

In the first step, various factor analyses and solutions were used to test the underlying dimensionality of the three newly developed scales: attitudes toward methamphetamine use, self-efficacy for safer substance use, and self-efficacy for safer sexual behavior. We randomly split our total sample (n=343) into two subsamples: subsample 1 (30% of the

²EFA- 1 factor 13 item: RMSEA[90% CI]: 0.13[0.10–0.16]; CFI:0.89;TLI:0.87

EFA- 1 factor 5 item: RMSEA[90% CI]: 0.06[0.00–0.19]; CFI:0.99;TLI:0.99

CFA- 1 factor 5 item: RMSEA[90% CI]: 0.06[0.00–0.11]; CFI:0.99;TLI:0.99

³EFA- 1 factor 11 item: RMSEA[90% CI]: 0.20[0.16–0.28]; CFI:0.45;TLI:0.32

EFA- 1 factor 6 item: RMSEA[90% CI]: 0.28[0.22–0.35]; CFI:0.61;TLI:0.34

EFA- 2 factor 6 item: RMSEA[90% CI]: 0.09[0.00–0.22]; CFI:0.98;TLI:0.92

CFA- 2 factor 6 item: RMSEA[90% CI]: 0.08[0.04–0.11]; CFI:0.98;TLI:0.96

CFA- 2 factor 6 item with cross loading: RMSEA[90% CI]: 0.06[0.00–0.10]; CFI:0.99;TLI:0.98

sample) and subsample 2 (70% of the sample). First, we conducted exploratory factor analyses (EFA) with oblique rotation using the subsample 1 data. We used Root Mean Square Error of Approximation (RMSEA; a smaller score is preferred), Comparative Fit Index (CFI; a score closer to 1 indicates better fit) and Tucker-Lewis Index (TLI, a score closer to 1 indicates better fit) to assess comparative model fit. After identifying the optimal solution in the exploratory factor analysis, we subjected the items to a confirmatory analysis using the subsample 2 data to assess the fit of the measurement model to the data. Based on the overall model fit indices and modification indices we further made necessary model revisions to identify the best fit model. All models were estimated using maximum likelihood estimator.

In the second step, we identified three distinct groups of participants: MSMO, MSMW and MSMT. We used summary statistics to describe the study sample, and Pearson's chi-square test (for categorical variables) and ANOVA (for continuous variables) to examine if the groups differed by selected personal characteristics and substance use and sexual measures.

In the final step, we assessed the association between sexual partnership, and individual-level and behavioral measures. We wanted to assess the relative contribution of each factor as well as the block of factors on non-mono sexual partnership. Therefore, we used a block regression strategy. Four separate multinomial regression models were run to identify factors associated with sexual partner gender (0=MSMO, 1= MSMW and 2=MSMT). Personal characteristics that were significant ($p < 0.05$) at the bivariate level were entered into the first regression model. In the second regression model, we included significant ($p < 0.05$) substance use variables and in the third model we included significant ($p < 0.05$) sexual variables. In the fourth (i.e., final) model we included the variables that were significant ($p < 0.05$) in the first three regression models. We calculated adjusted relative risk and respective 95% confidence interval with a robust variance estimator correcting the standard errors. These analyses and model-building procedures were constructed in a similar fashion to prior research with MSM (Mimiaga et al, 2011; Noor, Rampalli & Rosser, 2014). All statistical tests were two-tailed, data management, and regression analyses were conducted in Stata 13.1 (StataCorp., 2013) and factor analyses were conducted in MPlus 6.12 (Muthen & Muthen, 1998–2010).

Results

Personal characteristics

Participant characteristics are summarized in Table 1. In general, participants were young (mean=29 years), racially and ethnically diverse (52% racial-ethnic minority), educated (98% had some college education; 41% had a degree), and in a relationship with a man for more than 90 days (75%). Around 15% of the participants reported having a STI diagnosis in the last year and 5% of the sample reported that they were diagnosed with HIV.

Sexual partnership among MSM

In addition to having sex with a man in last 30 days, 7% of the participants reported having sex with a woman and 39% reported having sex with a transgender person (see Table 1).

Relative to MSMO, a greater proportion of MSMW and MSMT was younger (mean age: 26.2 and 27.1 vs. 31.7), racial/ethnic minority (69.6% and 73.2% vs. 33.1%) and single (57.1% and 28.7% vs. 17.3%). Regarding substance use behaviors, MSMW and MSMT reported a higher score on the DAST10 scale (7.4 and 6.5 vs. 6.1) and a lower score on safer substance use knowledge assessment (2.6 and 3.1 vs. 3.2) than MSMO. In addition, MSMW and MSMT reported higher scores on safer sexual knowledge assessment (4.4 and 3.6 vs. 3.2) and on safer sexual self-efficacy scale (4.5 and 4.1 vs. 4.0) than MSMO. They also reported higher proportions of injection drug using sexual partners (78.3% and 69.3% vs. 23.4%) than MSMO, though the average numbers of sexual partners in last 30 days were fewer (3.8 and 3.9 vs. 5.4).

Factors associated with non-monosexual partnerships among MSM

Results of the three primary adjusted regression models are presented in Table 2. Model 1 includes personal characteristics only, model 2 includes substance use variables only, and model 3 includes sexual variables only. Age, race/ethnicity, and STI diagnosis in the last year were significantly associated with non-monosexual partnerships. Among substance use and sexual behaviors, the DAST10 score, number of drug using days, and safer substance use self-efficacy, along with number of sexual partners, safer sexual knowledge, attitude towards condomless anal sex, safer sexual self-efficacy and having a sexual partner who injects drugs were significantly associated with sexual partnerships with more than one gender.

The final adjusted model results are presented in Table 3. MSMW and MSMT were more like to be younger compared to MSMO. Regarding substance use and sexual behaviors, MSMT were less likely to report higher safer substance self-efficacy compared to MSMO (RR=0.74, 95% CI: 0.64–0.86) and MSMW (RR=0.93, 95% CI: 0.90–0.97). They were also less likely to report higher safer sexual knowledge (RR=0.95, 95% CI: 0.92–0.99) and higher safer sexual self-efficacy (RR=0.89, 95% CI: 0.82–0.96) compared to MSMW but more likely to report higher safer sexual self-efficacy (RR=1.37, 95% CI: 1.08–1.74) compared to MSMO. Both MSMW (RR=3.67, 95% CI: 2.17–6.17) and MSMT (RR=1.77, 95% CI: 1.20–2.61) were more like to report having sex with an injection drug users in the last 30 days than MSMO but MSMW were less likely to report favorable attitude towards condomless anal sex (RR=0.47, 95% CI: 0.25–0.87) compared to MSMO.

Discussion

In addition to having sex with a male partner, close to half of our participants reported having sex with a woman or a transgender partner in the last thirty days. Eighteen participants reported that they were HIV-positive. Of those participants currently living with HIV, three reported recent sexual behavior with a female or transgender partner.

Overall, at the bivariate level, MSM who had sex with more than one gender were more likely than MSM who did not, to be younger, racial/ethnic minority, report a higher score on the DAST-10 scale but a lower score on safer substance use knowledge. In addition, they were more likely to report higher scores on safer sexual knowledge and on safer sexual self-efficacy scale but they were also more likely to report higher proportions of condomless anal

sex, and injection drug using sexual partners than MSMO, though the average numbers of sexual partners in last 30 days were fewer. Similar to previous studies (Friedman, Wei et al., 2014; Harawa et al., 2014; Latkin et al., 2011; Mimiaga, Reisner, Tetu et al., 2009; Tieu et al., 2012), HIV prevalence was lower in MSMW and MSMT than MSMO. However, the MSMW in our sample were more likely to report an STI diagnosis in the past year, supporting findings by Friedman et al. (2014) Men who engaged in non-monosexual partnerships reported a higher prevalence of HIV-risk behaviors, such as condomless anal sex and having sex with a person who injects drugs relative to MSMO. These findings support previous studies (Dodge, Jeffries, & Sandfort, 2008; Friedman et al., 2014; Jeffries & Dodge, 2007) indicating clustering of injection drug use and sexual risk among methamphetamine using MSM. This overlapping risk profile of substance use and sexual risk taking highlights the possibility for subsequent sexually transmitted infection among MSMW and MSMT.

The primary purpose of this study was to compare personal characteristics, safer substance use and sex knowledge; attitude towards methamphetamine use and towards condomless anal sex; and safer substance use and sexual self-efficacy between methamphetamine using MSM who do and do not form sexual partnerships with more than one gender. Overall, we observed distinct differences between MSMW and MSMT compared to MSMO; and between MSMW and MSMT on safer substance use and sexual behavior. Each group reported safer behaviors as well as riskier behaviors compared to the other two groups. Specifically, MSMT reported lower safer substance use self-efficacy than others; lower safer sex knowledge and safer sexual self-efficacy than MSMW, but higher safer sexual self-efficacy compared to MSMO.. They also reported more favorable attitude towards anal sex without condom but lower proportions of injecting drug using sexual partners compared to others. Thus, the key finding of this analysis is that methamphetamine-using MSM who do and do not form sexual partnerships with more than one gender are distinct subgroups who may require tailored harm reduction interventions. Each subgroups reported marked resilience as well as vulnerabilities to HIV infection. This is particularly true for MSMT whom could be at a higher risk of HIV infection due to their substance using behaviors. Further research is required to examine this more in depth.

A strength of this study is that our sample was recruited from across the U.S. and unlike the majority of online studies of MSM, was racially/ethnically diverse. However, there are four principal limitations to consider while interpreting the results. First, due to the cross-sectional nature of the study, causality cannot be assumed. Second, data are based upon a retrospective self-report and, as such, it is possible that we have under- or overestimated the true incidence. Third, this sample was a convenience sample recruited online and reported high substance use and sexual risk behaviors. Hence, the generalizability of findings is unknown. Fourth, we did not collect data about the sex assigned at birth and gender identity of the transgender partner. Therefore, it remains unknown whether the participant was engaging in sexual behavior with a transman and/or a transwoman. This is an important consideration should be addressed in future research.

The findings of this study have implications for intervention development. First, findings underscore the importance of developing targeted harm reduction programs that address both

sexual and drug-related risk behaviors simultaneously rather than treating them in silos. In particular, there appears to be a need for interventions to address the risks associated with injecting drugs or having a sexual partner who injects drugs. Second, findings identify marked differences in prevention needs of MSMO, MSMW and MSMT. Several previous studies group gay men with MSMW and MSMT rather than examining them separately. MSM who have sex with more than one gender might not relate to interventions that only focus on sex with men. Thus, it is important to consider MSMW and MSMT separately when developing tailored HIV-prevention interventions. Third, results show strengths as well as vulnerabilities among our participants. Thus, it is important for practitioners to continue encouraging methamphetamine-using MSM to maintain safer behaviors while encouraging uptake of risk-reduction interventions. We encourage researchers, planners and practitioners to pay more attention to the strength/resilience of substance users rather than only thinking in terms of deficiencies. We hope to see more research examining strength-based approach of harm reduction. Finally, as a majority of participating MSMW and MSMT were comparatively younger and single, engaging in non-monosexual partnerships may be a part of the phase of self-exploration, sexual adventurousness and identity establishment. Tailored intervention for younger MSM should focus on sexual identity formation and address issues associated with phases of coming out. Collectively, our findings inform an empirical basis for designing tailored and targeted prevention and treatment interventions encouraging methamphetamine-using MSM who do and do not form sexual partnerships with more than one gender to use both substance-use and sexual harm reduction strategies.

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Personal characteristics, substance use and sexual behaviors of methamphetamine-using MSM who have sex with people of more than one gender, partly study (N=325)

Table 1

Variable	Sexual Partnership				p-value
	MSMO	MSMW	MSMT		
	n (%)	mean±SD	175 (53.85)	23 (7.08)	127 (39.08)
Personal Characteristics:					
Age	29.54±5.53	31.73±5.71	26.17±3.21	27.14±4.18	<0.001
Race/Ethnicity					<0.001 ^a
Non-Hispanic white	158 (48.62)	117 (66.86)	7 (30.43)	34 (26.77)	
Non-Hispanic black	25 (7.69)	10 (5.7)	4 (17.39)	11 (8.66)	
Hispanic/Latino	61 (18.77)	15 (8.57)	3 (13.04)	39 (30.71)	
Native American	53 (16.31)	29 (16.57)	2 (8.70)	21 (16.54)	
Asian	28 (8.62)	4 (2.29)	7 (30.43)	22 (17.32)	
Education					<0.01 ^a
High school and some college	187 (57.54)	87 (49.71)	19 (82.61)	81 (63.78)	
Bachelor and above	138 (42.46)	88 (50.29)	4 (17.39)	46 (36.22)	
Long-term relationship status					<0.001
Single	77 (24.37)	30 (17.34)	12 (57.14)	35 (28.69)	
In a relationship	239 (75.63)	143 (82.66)	9 (42.86)	87 (71.31)	
HIV Status					0.02 ^a
HIV-	301 (94.41)	159 (91.38)	21 (95.45)	124 (98.41)	
HIV+	18 (5.59)	15 (8.62)	1 (4.55)	2 (1.59)	
Any STI ^b					<0.01
No	264 (81.23)	153 (87.43)	13 (56.52)	98 (77.17)	
Yes	49 (15.08)	18 (10.29)	7 (30.43)	24 (18.9)	
Current Employment Status					0.10 ^a
Not Employed	43 (13.27)	17 (9.71)	3 (13.04)	23 (18.25)	
Employed-Part/Full time	281 (86.73)	158 (90.29)	20 (86.96)	103 (81.75)	
Residence					0.93 ^a

Variable	Sexual Partnership				p-value
	MSMO	MSMW	MSMT		
	175 (53.85)	23 (7.08)	127 (39.08)		
n (%) / mean ± SD					
Rural/small town	20 (6.15)	1 (4.35)	7 (5.51)		
Medium/Large City	305 (93.85)	22 (95.65)	120 (94.49)		
Substance Use:					
DAST10 score	6.36±1.15	7.43±1.44	6.48±1.21		<0.001
Age at first drug use	18.67±3.08	18.45±4.61	18.87±2.85		0.64
Drug use days in last 30 days	6.47±5.24	4.78±6.24	5.40±4.41		<0.01
Safer substance use knowledge ^c	3.10±0.97	2.65±0.83	3.05±0.89		<0.05
Attitude towards methamphetamine ^d	3.93±0.49	3.75±0.24	4.07±0.44		<0.001
Safer substance use self- efficacy ^d	3.64±0.72	4.15±0.25	3.27±0.73		<0.001
Sexual Behaviors:					
Number of sexual partners in last 30 days	4.69±3.57	3.78±2.99	3.89±1.59		<0.01
Safer sexual knowledge ^e	3.42±1.17	4.35±1.03	3.62±0.87		<0.001
Attitude towards AWOC ^f	5.19±0.56	5.04±0.35	5.28±0.36		<0.05
Safer sexual self-efficacy ^d	4.09±0.55	4.53±0.27	4.11±0.33		<0.01
Number of IDU Sexual Partner in last 30 days					<0.001
None	178 (54.77)	5 (21.74)	39 (30.71)		
1 or more	147 (45.23)	18 (78.26)	88 (69.29)		
CAS in last 30 days					0.02 ^a
No	13 (4.04)	0 (0.0)	1 (0.80)		
Yes	209 (95.96)	22 (100.0)	124 (99.20)		

Note: STI: Sexually transmitted infection; IDU: Injection drug user; AWOC: Anal intercourse without condom; CAS: Condomless anal sex.

^aExact Test *p*-value

^bDiagnosis of Syphilis or Gonorrhea or Chlamydia in past year

^cRange: 0–5

^dRange: 1–5

^eRange: 0–6

Range: 1–7
f

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Table 2

Adjusted regression model of methamphetamine-using MSM who have sex with people of more than one gender, parTy study (N=325)

Variable	MSMW vs MSMO RR (95% CI)	MSMT vs MSMO RR (95% CI)	MSMT vs MSMW RR (95% CI)
Model 1: Personal Characteristics			
Age	0.88 ** (0.80–0.97)	0.94 *** (0.91–0.97)	1.00 (0.99–1.01)
Race/Ethnicity			
non-Hispanic white	Ref.	Ref.	Ref.
Men of Color	1.20 (0.33–43.11)	1.94 *** (1.35–2.79)	1.02 (0.95–1.09)
Education			
High school and some college	Ref.	Ref.	Ref.
Bachelor and above	0.23 (0.02–20.24)	0.86 (0.68–1.08)	1.03 (0.97–1.08)
Long-term relationship status			
Single	Ref.	Ref.	Ref.
In a relationship (90+ days)	0.74 (0.03–17.87)	0.90 (0.70–1.17)	1.06 (0.98–1.14)
HIV Status			
HIV–	Ref.	Ref.	Ref.
HIV+	1.41 (0.57–11.79)	0.55 (0.13–2.43)	0.85 (0.54–1.32)
Any STI			
No	Ref.	Ref.	Ref.
Yes	2.58 (0.56–3.42)	1.46 ** (1.17–1.81)	0.97 (0.89–1.05)
Model 2: Substance Use:			
DAST10	1.41 *** (1.25–1.59)	1.05 (0.96–1.16)	0.96 ** (0.94–0.99)
Drug use days in last 30 days	0.61 *** (0.55–0.69)	0.97 (0.94–1.01)	1.00 (0.99–1.01)
Safer Substance Use knowledge	0.96 (0.79–1.16)	0.97 (0.84–1.13)	1.02 (0.99–1.05)
Perceived attitude towards methamphetamine use	0.92 (0.46–1.83)	1.09 (0.83–1.43)	1.03 (0.98–1.09)
Safer substance use self-efficacy	7.25 *** (3.78–13.90)	0.64 *** (0.55–0.74)	0.91 *** (0.88–0.95)
Model 3: Sexual Behaviors			
Number of sexual partners in last 30 days	1.16 ** (1.07–1.26)	0.99 (0.97–1.02)	0.99 (0.97–1.01)

Variable	MSMW vs MSMO RR (95% CI)	MSMT vs MSMO RR (95% CI)	MSMT vs MSMW RR (95% CI)
Safer Sexual knowledge	0.95 (0.77–1.16)	0.91 (0.81–1.03)	0.95 ^{**} (0.91–0.98)
Perceived attitude towards AWOC	1.80 [*] (1.06–3.06)	1.11 (0.92–1.34)	1.07 (0.99–1.15)
Safer sexual self-efficacy	20.90 ^{***} (5.73–76.28)	1.29 ^{**} (1.07–1.56)	0.24 ^{***} (0.75–0.98)
Number of IDU sexual partner in last 30 days			
0	Ref.	Ref.	Ref.
1 or more	13.11 ^{**} (3.03–56.80)	3.36 ^{***} (2.40–5.41)	0.98 (0.93–1.04)

^{*} $P < 0.05$;

^{**} $P < 0.01$;

^{***} $P < 0.001$

Note: RR= Relative Risk; CI: Confidence Interval; STI: Sexually transmitted infection; IDU: Injection drug user; MSMO=Men who have sex with men only; MSMW=Men who have sex with women; MSMT=Men who have sex with transgender; AWOC: Anal intercourse without condom; Men of color includes 18.77% Hispanic 16.31% American Indian, 8.62% Asian, and 7.69% Black.

Model 1 adjusted for age, race/ethnicity, education, relationship status, sexually transmitted disease status and HIV status

Model 2 adjusted for DAST 10 score, number of days drug used, safer substance use knowledge, perceived attitude towards safer substance use and safer substance use skills

Model 3 adjusted for number of sexual partners having an injecting drug using sexual partner safer sexual knowledge, perceived attitude towards safer sexual behavior and safer sexual skills

Final regression model of methamphetamine-using MSM who have sex with people of more than one gender, parTy study (N=325)

Table 3

Variable	MSMW vs MSMO		MSMT vs MSMO		MSMT vs MSMW	
	RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
Personal Characteristics:						
Age	0.83 (0.74–0.94)	0.004	0.94 (0.92–0.97)	<0.001	1.00 (0.99–1.01)	0.22
Race/Ethnicity						
non-Hispanic white	Ref.		Ref.		Ref.	
Men of Color	1.25 (0.42–3.73)	0.91	1.31 (1.00–1.73)	0.05	1.02 (0.96–1.08)	0.49
Any STI						
No	Ref.		Ref.		Ref.	
Yes	1.96 (0.93–4.14)	0.07	1.18 (0.97–1.44)	0.10	0.97 (0.90–1.03)	0.32
Substance Use:						
DAST10	1.24 (0.91–1.70)	0.17	1.01 (0.94–1.09)	0.76	0.98 (0.96–1.00)	0.09
Drug use days in last 30 days	0.94 (0.86–1.02)	0.13	1.01 (0.98–1.03)	0.60	1.00 (0.99–1.01)	0.61
Safer substance use self-efficacy	2.40 (0.94–9.03)	0.19	0.74 (0.64–0.86)	<0.001	0.93 (0.90–0.97)	0.001
Sexual Behaviors						
Number of sexual partners in last 30 days	1.25 (0.97–1.61)	0.08	1.02 (0.99–1.05)	0.12	0.99 (0.97–1.01)	0.61
Safer Sexual knowledge	0.95 (0.65–1.39)	0.79	1.01 (0.90–1.13)	0.85	0.95 (0.92–0.99)	0.014
Perceived attitude towards AWOC	0.47 (0.25–0.87)	0.019	0.88 (0.75–1.03)	0.12	1.02 (0.92–0.99)	0.55
Safer sexual self-efficacy	4.91 (0.77–31.14)	0.09	1.37 (1.08–1.74)	0.009	0.89 (0.82–0.96)	0.003
Number of IDU sexual partner in last 30 days						
0	Ref.	<0.001	Ref.	0.004	Ref.	0.56
1 or more	3.67 (2.17–6.17)		1.77 (1.20–2.61)		0.98 (0.93–1.04)	

Note: RR= Relative Risk ; CI: Confidence Interval; STI: Sexually transmitted infection; IDU: Injection drug user; MSMO=Men who have sex with men only; MSMW=Men who have sex with women; MSMT=Men who have sex with transgender; AWOC: Anal intercourse without condom; Men of color includes 18.77% Hispanic 16.31% American Indian, 8.62% Asian, and 7.69% Black. Final Model adjusted for age, race/ethnicity, sexually transmitted infection status, DAST10 score, number of days drug used, , safer substance use skills, number of sexual partners, safer sexual knowledge, perceived attitude towards safer sexual behavior, safer sexual skills and having an injecting drug using sexual partner.