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Associations between Sociodemographic Characteristics and Substance Use Disorder Severity among Methamphetamine-using Men Who Have Sex with Men

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Abstract

Background: Men who have sex with men (MSM) have elevated rates of substance use disorders (SUDs) and differences across sociodemographic sub-groups of MSM are associated with a greater risk of deleterious outcomes. Although studies have shown that MSM report greater rates of polysubstance use relative to other adult populations, the associations between sociodemographic characteristics and both acute substance use and substance use severity among methamphetamine-using MSM are unknown.

Objectives: The present study examines associations between sociodemographic characteristics and (a) recent substance use and (b) SUD severity.

Method: From March 2014 - January 2016, 286 methamphetamine-using MSM were recruited to complete a baseline Audio Computer Assisted Self Interview (ACASI) assessment and the SCID

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Contributors

The first author wrote the first draft of the manuscript. The second author conducted the statistical analyses and provided extensive revisions to the manuscript drafts. The third author provided additional revisions and feedback to the manuscript. The fourth author designed the study, developed the protocol, and provided revisions and feedback to the manuscript. All authors approve the final version of the manuscript for submission.

Conflicts of interest

All authors declare that they have no conflicts of interest.

MINI. Multivariable analyses employed generalized structural equation modeling (GSEM) given the non-continuous nature of the endogenous variables.

Results: All measured sociodemographic characteristics except gay self-identification were significantly associated with recent substance use (all $p \leq 0.05$), and all characteristics except current homelessness were significantly associated with diagnostic SUD severity (all $p \leq 0.05$). However, nuanced risks were observed in participants' use of specific substances regarding recent substance use and substance use severity.

Conclusion: These results suggest that multiple factors contribute to the risks of SUD severity among methamphetamine-using MSM. As such, these results are useful in the tailoring of clinical and psychosocial intervention strategies that serve this and other high-risk populations.

Keywords

substance use disorder; men who have sex with men; methamphetamine; HIV

Introduction

Recent epidemiological estimates suggest that approximately 20.2 million adults in the United States reported a substance use disorder (SUD) in the past 12 months (Lipari & van Horn, 2017). Data from the 2016 National Survey on Drug Use and Health (NSDUH) show that 54.6% of adults aged 18–25 have used alcohol in the past 30 days, and 23.2% have used illicit substances in the same period (Substance Abuse and Mental Health Services Administration [SAMHSA], 2017). Furthermore, the 2016 NSDUH revealed that 57.1% of adults aged 26 and older used alcohol and 8.9% used illicit substances in the past 30 days. Recent SUD estimates suggest a prevalence of approximately 23.2% among adults aged 18–25 and 8.9% among adults aged 26 or older (SAMHSA, 2017).

Men who have sex with men (MSM) account for 2.9%−6.9% of the United States population (Purcell et al., 2012); however, they have consistently demonstrated elevated risks of substance use and SUD compared to other adult populations (Kerridge et al., 2017) and relative to heterosexual males (Green & Feinstein, 2012; Lee et al., 2015). For example, substance use prevalence rates demonstrate disparities in alcohol (MSM: 16.4%−75.3%; non-MSM: 13.7%−26.8%), marijuana (MSM: 13.2%−56.2%; non-MSM: 6.2%−10.7%), and other drug use (MSM: 16.8%−47.0%; non-MSM: 4.5%−45.1%) (Flentje, Heck, & Sorensen, 2015; McCabe, Hughes, Bostwick, West, & Boyd, 2009; Newcomb, Ryan, Greene, Garofalo, Mustanski, 2014; Parsons, Halkitis, & Bimbi, 2006). Indeed, among subgroups of MSM in the United States, drug types commonly used include alcohol, marijuana, inhalants, and methamphetamine (Boone, Cook, & Wilson, 2013; Medley et al., 2016; Skeer et al., 2012). Other MSM groups from international samples have reported using substances such as cocaine, inhalants, hallucinogens, and sedatives (Balán et al., 2013; Daskalopoulou et al., 2014), suggesting that MSM from various geographical locations use a range of substances.

MSM are also at a greater risk for a SUD relative to non-MSM males. For example, whereas the prevalence of past-year SUD for methamphetamine, alcohol, and marijuana in other adult populations were 0.2%, 6.8%, and 1.5% respectively (Lipari & van Horn, 2017), the

rates among MSM have been estimated at 0.5%−2.6% for methamphetamine, 9.8%−11.5% for alcohol, and 4.1%−36.6% for marijuana (Lee et al., 2015; McCabe, Hughes, Bostwick, West, & Boyd, 2009; Medley, Lipari, Bose, Cribb, Kroutil, & McHenry, 2016). MSM have also demonstrated elevated rates of "club drug" use (Kubicek et al., 2007), which include cocaine, methamphetamine, gamma-hydroxybutyrate (GHB), amyl nitrite (inhalants or "poppers"), ketamine, and 3,4-methylendioxy-methamphetamine (MDMA or "Ecstasy"). Among MSM, lifetime use of club drugs is estimated at 40–50% among studied MSM subpopulations (Fernández et al., 2005; Kipke et al., 2007) with 13%−24% of MSM endorsing club drug use other than methamphetamine (Rudy, Shoptaw, Lazzar, Bolan, Tilekar, & Kerndt, 2009).

Epidemiological studies have estimated that the prevalence of methamphetamine use is between 20.7%−27.4% among populations of MSM (Reback, Fletcher, Shoptaw, & Grella, 2013; Skeer et al., 2012) compared to 0.2%−0.3% in other adult populations (SAMHSA, 2017). In the United States, particularly the Western United States, methamphetamine use has become deeply integrated into the sexual lives and identities of MSM (Reback, 1997; Kipke et al., 2009; Shrem & Halkitis, 2008). Among MSM, methamphetamine use has been associated with condomless anal intercourse (Mayer et al., 2013; Rajasingham et al., 2012), a greater risk of HIV infection (Freeman et al., 2011; Halkitis, Levy, & Solomon 2016), and other detrimental health outcomes (Shoptaw & Reback, 2006; Hides et al., 2015; Northrop & Yamamoto, 2015). Crucial differences across sociodemographic sub-groups of MSM have also been identified, which are associated with a greater risk of these deleterious outcomes.

Substance Use among Sociodemographic Subgroups of MSM

Examinations of prevalence and contributing factors of SUD and SUD severity in methamphetamine-using MSM necessitates that research delineates and highlights subgroup disparities to support evidence-driven clinical and community-based practices. Specifically, investigating differential risks by characteristics such as race/ethnicity, age, HIV status, sexual identity, housing status, and income can provide a more nuanced understanding of SUD and severity risks in this population.

Racial/Ethnic Identity and Sexual Identity—Non-gay-identified MSM have demonstrated lower odds of substance use during sex compared to gay-identified MSM (Friedman, Kurtz, Buttram, Wei, Silvestre, & Stall, 2014; Sewell et al., 2017), though important variation exists between gay-identity, sexual risk, and racial/ethnic identity. African American/Black MSM have been observed to be less likely to use substances relative to their Caucasian/White counterparts (Millett et al., 2007; Millett et al., 2012; Newcomb, Ryan, Greene, Garofalo, & Mustanski, 2014); however, those who have sex with men and women reported more frequent use of alcohol, marijuana, crack cocaine, and powder cocaine (Friedman, Kurtz, Buttram, Wei, Silvestre, & Stall, 2014; Sewell et al., 2017; Dyer et al., 2013). Young Hispanic/Latino MSM have demonstrated greater odds of using inhalants relative to Caucasian/White MSM (Newcomb et al., 2014), and a greater percentage of Hispanic/Latino MSM report past six-month methamphetamine and polydrug use compared to African American/Black and Asian/Pacific Islander MSM (Paul, Boylan, Gregorich, Ayala, & Choi, 2014). Caucasian/White MSM have greater risks of

methamphetamine (Hatfield, Horvath, Jacoby, & Rosser, 2009; Wohl, Frye, & Johnson, 2008) and hallucinogen use (Grov, Bimbi, Nanin, & Parsons, 2006) compared to MSM of color.

Age and HIV Serostatus—As with many populations, younger MSM are at greater risk of substance use relative to older MSM (Salomon et al., 2009; Colfax et al., 2005; Marshall et al., 2015). These findings may be explained by the minority stress model (Meyer, 1995, 2003), which posits that young sexual minority populations are exposed to greater amounts of stress and thus exhibit higher levels of substance use. Differences in substance use risk have also been observed with regard to HIV serostatus. Specifically, HIV-positive MSM report higher prevalence rates of substance use than HIV-negative MSM (Purcell, Parsons, Halkitis, Mizuno, & Woods, 2001). Sexual risk behaviors such as condomless anal intercourse with substance use exacerbate rates of HIV transmission and/or sexually transmitted infections (Hegazi et al., 2017; Rajasingham et al., 2012), perhaps accounting for the often-observed associations between substance use and HIV infection among MSM.

Education, Housing Status, and Substance Use Disorder—Although the literature remains limited that elucidates the associations between education and SUD prevalence and severity among sexual minority adults, burgeoning research sheds light into the link between education and SUD diagnoses among MSM. Recent research shows that among sexual minority (i.e., lesbian, gay, bisexual) adults, lower levels of attained education (e.g., having less than a high school education) is associated with greater odds of alcohol use during sex (Eaton et al., 2015) and being diagnosed with any SUD (Slater et al., 2017). However, research focusing exclusively on MSM demonstrated that higher education levels were associated with greater odds of developing a lifetime alcohol use disorder (Lee et al., 2015).

Similarly, the current literature has not fully examined the relationship between housing status and SUD or SUD severity, and the extant literature does not provide clear conclusions on the links between these factors. Whereas current and prior homelessness has been found to be associated with elevated substance use risk (Clatts, Goldsamt, Yi, & Gwadz, 2005), more recent research reported no relationship between alcohol use disorder and housing status (Asana et al., 2018). Still, Ayvaci, Obini, Pollio, & North (2017) found that cocaine use, but not cocaine use disorder, was associated with poorer housing status (i.e., marginal housing or homelessness). Among MSM, prior research suggests links between housing status and substance use, such that marginal housing or homelessness has been associated with illicit substance use (Dickson-Gomez, McAuliffe, Convey, Weeks, & Owczarzak, 2011). Furthermore, the existing literature has not examined the links between education and housing status, and SUD severity.

New Substance Use Disorder Diagnostic Categories

Since the DSM-5 was published in 2013, “substance use disorder” has replaced the terms “substance abuse/dependence,” and the previously dichotomous “presence/absence” diagnostic categories have been replaced with the ordinal “none, mild, moderate, severe” categories to characterize levels of diagnostic magnitude. These changes were made for several reasons. First, the DSM-IV assumed abuse and dependence were related dimensions

while placing them in a diagnostic hierarchy such that “abuse should not be diagnosed when dependence is present” (Hasin et al., 2013, p. 835). This diagnostic practice created further challenges because some substance abuse symptoms suggested clinically severe problems, but diagnostic criteria prevented some of those symptoms to be accurately reflected in diagnoses (Hasin et al., 2013). Second, the dichotomous presence/absence operationalization of SUD prevented some individuals with clinically significant symptoms from meeting diagnostic criteria for substance abuse/dependence or SUD. Third, Hasin and colleagues noted that the DSM-IV diagnostic thresholds have come under scrutiny, particularly that the threshold of two or more criteria was too low. To address these concerns, a criterion count for severity was created in the DSM-5 (i.e., “mild”: two to three criteria; “moderate”: four to five criteria; “severe”: six or more criteria). These changes within the DSM-5 suggest that a defining characteristic of SUDs is that as substance use frequency increases, SUD severity increases correspondingly (American Psychiatric Association, 2013).

The Present Study

Whereas recent research focused on the odds of being diagnosed with drug and alcohol use disorders for sexual minorities more broadly (Kerridge et al., 2017), little is known regarding acute and specific substance use, risks of SUD, and risk factors of SUD severity across substances among polysubstance-using MSM, particularly among MSM who use methamphetamine in addition to other substances. Given the greater risks, it is critical for research to investigate risk factors of substance use and specific SUD severity, particularly among methamphetamine-using MSM. Such investigations could inform the implementation of individualized interventions that prioritize associated risk factors for substance use and substance use disorder severity. Thus, the present study examined associations between sociodemographic characteristics, recent substance use, and SUD severity among methamphetamine-using MSM using the new DSM-5 criteria. Within this aim, we hypothesized that: (a) gay identity, Caucasian/White identity, lower education, HIV-positive serostatus, age, and unstable housing status would be associated with a greater relative risk of recent SUD; and, (b) the aforementioned sociodemographic characteristics would be associated with increased SUD severity. Information garnered from this examination will provide greater knowledge of the factors that influence both the recency and severity of specific substance use and, thus, better inform future intervention development and implementation.

Method

Participants

The current analysis examined data from all participants in a randomized controlled trial (N = 286) to reduce methamphetamine use and HIV sexual risk among non-treatment-seeking methamphetamine using MSM in Los Angeles, CA. Participants were enrolled from March 2014 through January 2016. Eligibility criteria for the randomized controlled trial were self-identified MSM who had used methamphetamine within the previous three months, were between the ages of 18 and 65 years, had condomless anal intercourse (insertive or receptive) with a non-primary male partner in the previous six months, were not currently in treatment or seeking methamphetamine use treatment, and were able and willing to provide

informed consent and comply with study requirements. Individuals were excluded if they did not meet all criteria, were unable to understand the Informed Consent Form (i.e., unable to pass a consent quiz), or were determined to have a more serious psychiatric condition (SCID verified) that was beyond the safe enrollment of the study procedures.

Procedure

All research activities occurred at a community research center in the Hollywood area of Los Angeles County, California. Participants responded to a community-wide recruitment effort that included street- and venue-based outreach (e.g., sex clubs, bathhouses, dance clubs, stroll streets, bars), print media (e.g., magazines), online social media site advertisement and geolocation-based dating apps, flyers and posters distribution, and participant referral. Potential participants who inquired about the study were screened for eligibility and scheduled for an intake, including all baseline evaluations, within 24–48 hours of their initial inquiry. Following screening and informed consent, participants completed a baseline Audio Computer Assisted Self Interview (ACASI) assessment that included the Behavioral Risk Assessment-Lite. At the completion of the ACASI assessment, participants were administered the SCID by a highly trained research assistant. All study procedures were approved by two Institutional Review Boards.

Measures and Variables

The dependent variables for the current analyses were 1) recent (i.e., past 30 days) substance use, and 2) current SUD severity.

Recent substance use.—Recent substance use was measured using the Behavior Risk Assessment-Lite (BRA-Lite). The BRA-Lite is a reduced version of the Behavioral Risk Assessment developed by the senior author (Author citation removed from peer review). For each substance assessed for recent substance use (i.e., alcohol, cocaine, crack, methamphetamine, GHB, marijuana, synthetic marijuana, downers, uppers, and poppers), participants were asked how many days in the past 30 days they used that specific substance.

SUD severity.—The Structured Clinical Interview for the Diagnostic Statistical Manual of Mental Disorders—Fifth Edition (SCID; First, Williams, Karg, & Spitzer 2016) assessed current (i.e., past 12 months) SUD severities, from none (0), mild (1), moderate (2), to severe (3). Substances assessed for SUD severity included alcohol, marijuana (including synthetic marijuana), methamphetamine, cocaine (including crack cocaine), non-methamphetamine stimulants (e.g., amphetamines, “uppers”), hallucinogens, inhalants (e.g., poppers), opiates, and non-opiate sedatives (e.g., downers, GHB).

Sociodemographic variables.—Sociodemographic predictors were assessed using the BRA-Lite. Sociodemographic characteristics included sexual identity (i.e., gay, bisexual, heterosexual), race/ethnicity, age, self-reported HIV status, education level (e.g., less than high school, high school/GED, some college, college degree), and housing status (e.g., rent or own home, living with friends or relatives, homeless shelter, living on the street).

Statistical Analysis

Baseline data were used in this analysis. Multivariable analyses employed generalized structural equation modelling (GSEM) given the non-continuous nature of the endogenous variables and the desire to estimate all pathways simultaneously; simultaneous estimation of pathways via GSEM allowed for post-hoc tests of significance on multiple sets of associations, similar in logic to Seemingly Unrelated Regression Equation analyses for continuous outcomes. Counted outcomes (i.e., rates of substance use) were analyzed using the negative binomial family and log link function, and results are reported in their exponentiated form (i.e., incidence rate ratios [IRRs]), which indicate the expected factor change in the rate of occurrence of that outcome for each one-unit increase in the predictor variable. Ordinal outcomes (i.e., SUD severity) were analyzed using the ordinal family and logit link function, and results are reported in their exponentiated form (i.e., relative risk ratios [RRRs]), which indicate the expected factor change in the odds of being in the highest ordinal category relative to the combined lower categories for each one-unit change in the predictor variable. Given the use of GSEM models for simultaneous pathway estimation, partial proportional odds variations of the ordinal model were not available. All analyses employed robust estimation of the variance-covariance matrix, implying limited risk of results being disproportionately influenced by outliers. All analyses were carried out using Stata v13SE, all significance tests were two-tailed, and results were flagged as significant beginning at $\alpha \leq 0.05$.

Results

The sample comprised 286 methamphetamine-using MSM with a mean age of 42 years (SD = 11 years). The sample was racially and ethnically diverse, with an overwhelming majority (80.4%, $n = 230$) comprising MSM of color. Across all racial/ethnic groups, African American/Black MSM represented the largest percentage of participants at 43.7% ($n = 125$), followed by Hispanic/Latino MSM (25.2%, $n = 72$), Moreover, 19.6% (n = 56) of the sample identified as Caucasian/White and the remaining 11.5% (n = 33) identified as other race/ethnicity. Approximately two-thirds (67.1%, $n = 192$) of the sample identified as gay, and 41.3% ($n = 118$) self-reported a HIV-positive serostatus.

Sociodemographic Characteristics and Recent Substance Use

Table 1 provides the estimated partial associations between participant sociodemographic characteristics and rates of recent substance use. As the omnibus tests of significance in the far-right column indicate, all measured sociodemographic characteristics except gay self-identification were significantly associated with recent substance use (all $p \leq 0.05$). Examination of specific coefficient estimates revealed nuanced associations. A majority of sociodemographic characteristics were significantly associated with reduced rates of specific substance use. An HIV-positive status was significantly associated with lower rates of alcohol (IRR = 0.32), powder cocaine (IRR = 0.45), crack cocaine (IRR = 0.26), and downers (e.g., benzodiazepines and barbiturates; IRR = 0.38) use relative to a HIV-negative status.

Additionally, lower educational attainment, i.e., having less than a high school education, was associated with recent synthetic marijuana use at a significantly higher rate (IRR = 3.39) than having a high school education or more. Identifying as Caucasian/White was significantly associated with greater rates of recent methamphetamine (IRR = 1.42) and GHB (IRR = 4.15) use relative to Non-Caucasian/Non-White MSM.

Sociodemographic Characteristics and SUD Severity

Table 2 provides the estimated partial associations between participant sociodemographic characteristics and ordinal SUD severity. As the omnibus tests of significance in the far-right column indicate, all measured sociodemographic characteristics except current homelessness were significantly associated with diagnostic SUD severity (all $p \leq 0.05$). Closer analyses of specific SUD severity showed nuanced variations in relative risk related to sociodemographic characteristics. Although most significant associations showed lower relative risks of specific SUD severity, several characteristics were associated with greater relative risks. Specifically, we found that for every one-year increase in age, there was a 4% greater severity of cocaine use disorder (RRR = 1.04). Moreover, a Caucasian/White identity and having less than a high school education were associated with higher levels of hallucinogen use disorder severity (RRRs = 2.32 and 2.90, respectively). Having less than a high school education was also associated with lower levels of stimulant use disorder severity (RRR = 3.22). Having a positive HIV serostatus was associated with higher levels of inhalant use disorder severity (RRR = 1.81).

Discussion

This study examined associations between sociodemographic characteristics, rate of recent substance use, and SUD severity among a sample of methamphetamine-using MSM. In contrast with prior studies, this study found no significant differences between gay-identified and non-gay-identified MSM with respect to their rate of substance use. However, prior postestimation analysis from another sample simultaneously testing the significance of multiple model pathways revealed a significant association between reporting a gay sexual identity and SUD severity among MSM (Kerridge et al., 2017).

The relative risks for recent methamphetamine use, recent GHB use, and hallucinogen use disorder severity were significantly higher among Caucasian/White MSM compared to the non-Caucasian/non-White participants. They were also more likely to present with more severe alcohol, powder and crack cocaine, inhalant, and opiate substance use disorders. However, Caucasian/White MSM were less likely than their non-Caucasian/non-White counterparts to use alcohol, powder cocaine, and crack cocaine. Consistent with previous studies (Grov, Bimbi, Nanin, & Parson, 2006; Hatfield, Horvath, Jacoby, & Rosser, 2009; Wohl, Frye, & Johnson, 2008), our results suggest that methamphetamine-using MSM of color have a lower risk of recent substance use. However, because our sample comprised only methamphetamine-using MSM, it is possible that MSM of color did not use methamphetamine as frequently as their Caucasian/White counterparts. Additionally, the racial/ethnic differences in substance use risks may be due to varying preferences in the types of substances used in Los Angeles. For example, non-Caucasian/non-White MSM in

our sample may use other substances for recreational use, such as crack cocaine, which is consistent with samples from prior research (Hatfield, Horvath, Jacoby, & Rosser, 2009). Moreover, broader factors affecting MSM of color in Los Angeles, such as discrimination and institutional racism (Meyer 2003), may also influence the differential substances use risks between Caucasian/White MSM and their non-Caucasian/non-White peers. For example, discriminatory social practices may prevent MSM of color from entering venues (e.g., nightclubs, dance clubs, commercial sex venues) at which methamphetamine use is common.

HIV-positive participants demonstrated lesser odds of recent substance use and SUD severity substance use severity compared to HIV-negative participants, particularly regarding alcohol, cocaine, and downers (e.g., benzodiazepines, barbiturates). However, they showed greater relative risk of inhalant (e.g., poppers) use disorder compared to their HIV-negative peers. These findings were inconsistent with prior research demonstrating that substance use was common among HIV-positive MSM, which has also been associated with lower adherence to HIV medication (Mayer, Skeer, O'Cleirigh, Goshe, & Safren, 2014; Woolf-King, Neilands, Dilworth, Carrico, & Johnson, 2014) and health-related quality of life (Tran, Nguyen, Do, Nguyen, & Maher, 2014). However, our results are the first to demonstrate negative associations between a HIV-positive serostatus and specific substance use for alcohol, powder cocaine, crack cocaine, and downers specifically among methamphetamine-using MSM. Furthermore, the results are the first to show greater risks of inhalant use disorder among HIV-positive MSM. These results, coupled with racial/ethnic differences in HIV care retention (Millett et al., 2012), highlight the importance of understanding the variability of specific substance use risks and disorder severity within subsamples of HIV-positive MSM. Given the disparities in HIV acquisition (Sifakis et al., 2007; Sullivan et al., 2014) and other sexually transmitted infections (Kelley et al., 2015; Newman & Berman, 2008) among MSM of color, it is especially critical to understand how risks and severity for specific substances exacerbate these health disparities. For example, future interventions targeting HIV-positive MSM should highlight multifaceted strategies that prioritize poly-SUD with HIV care and adherence.

We found differential risks for recent substance use and substance use severity in our sample regarding age, educational attainment, and housing status. Specifically, we found that older MSM were more likely to endorse recent cocaine use but less likely to report marijuana, inhalant, sedative, or hallucinogen use disorder severity. The results from this study are in accordance with prior research indicating that younger MSM are more likely to use substances (Colfax et al., 2005; Marshall et al., 2015; Salomon et al., 2009); however, our results did show older MSM endorsing greater relative risk of recent crack cocaine use and having a greater risk of cocaine use disorder. Recent research suggests that trends in cocaine use among adults in other populations have significantly increased in those aged 50 and older (John & Wu, 2017), and some MSM aged 45 and older have been found to have a greater risk of cocaine use disorder compared to adults aged 18–29 (Kerridge et al., 2019). Given the differences in specific SUDs observed in our sample, and, in light of the existing literature in cocaine use disorder among MSM, more investigations in the risk characteristics of specific SUD (e.g., cocaine use disorder) and severity are warranted.

Moreover, MSM who attained less than a high school education presented with a greater relative risk for recent synthetic marijuana use and for both stimulant and hallucinogen use disorder severity. These results are similar to prior work showing that having less than a high school education is linked to greater odds of a SUD diagnosis of any kind (Slater et al., 2017) except alcohol use disorder (Lee et al., 2015). We also found that homeless MSM presented lesser relative risk for recent GHB and poppers use but no significant relative risk for any SUD severity. In our sample, methamphetamine-using, homeless MSM may not have had access to the local venues and settings in which club drugs (e.g., GHB and poppers) are used frequently, such as bars, nightclubs, and parties. Although other research has found a significant association between homelessness and illicit substance use among MSM (Dickson-Gomez, McAuliffe, Convey, Weeks, & Owczarzak, 2011), prior research examining crude relationships between housing status and drug use suggests that some subgroups of MSM with unstable housing have significantly greater odds of recent club drug use compared to those with stable housing (Kipke, Weiss, & Wong, 2007). Our study is the first to examine relative risk of substance use severity of any kind among homeless, methamphetamine-using MSM.

Limitations and Conclusions

These findings should be interpreted in light of the study limitations. The cross-sectional design does not allow for causal inferences of SUD severity based on co-factors such as housing status, education level, or age. Additionally, given that methamphetamine use in the previous three months was a study eligibility criterion, findings may not be generalizable to non-methamphetamine using MSM or even other subgroups of methamphetamine-using or substance-using MSM. Furthermore, the participants volunteered for the study, i.e., a risk-reduction intervention for methamphetamine-using MSM, which might also explain some of the variations in results from prior studies. Finally, this study was conducted in Los Angeles, an urban West Coast city; thus, these findings may not be generalizable to other geographical regions including rural locations.

Despite these limitations, this study is the first to examine associations between sociodemographic characteristics, rates of substance use, and specific SUD severity across multiple substances among methamphetamine-using MSM. Understanding sociodemographic variations that contribute to differences in rates of substance use provide insight into the relative risks of SUD within the context of DSM-5 diagnostic criteria. However, further research is needed to examine both the overall and specific SUD risks within the DSM-5 framework. Overall, these results suggest that multiple sociodemographic characteristics were associated with the risks of SUD severity among methamphetamine-using MSM and thus warrant further investigation. These results highlight the importance of future research considering multiple personal and social characteristics as potential influencing factors of SUD severity. In doing so, these results may inform the tailoring of clinical and psychosocial intervention strategies to better serve this and other high-risk populations across various sociodemographic characteristics.

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Table 1

Negative Binomial Regressions of Recent Substance Use on Participant Sociodemographics (N = 286)

	Alcohol	Cocaine	Crack	Methamphetamine	GHB	Marijuana	Synthetic Marijuana	Downers	Uppers	Poppers	Omnibus
	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)	$\chi^2(9)$
Non-Gay Identified (reference)	--	--	--	--	--	--	--	--	--	--	--
Gay Identified	1.45 (.33)	0.60 (0.16)	0.69 (0.23)	0.82 (0.09)	0.99 (0.48)	0.76 (0.12)	0.45 (0.22)	0.93 (0.51)	0.74 (0.17)	1.40 (0.46)	16.43
Non-Caucasian/White (reference)	--	--	--	--	--	--	--	--	--	--	--
Caucasian/White	**0.43 (.13)** **	**0.41 (0.15)** *	**0.30 (0.12)** **	**1.42 (0.18)** **	**4.15 (1.65)** ***	1.10 (0.21)	0.80 (0.63)	2.29 (1.39)	1.29 (0.35)	0.96 (0.28)	**34.63** ***
HIV-Negative (reference)	--	--	--	--	--	--	--	--	--	--	--
HIV-Positive	**0.32 (0.07)** ***	**0.45 (0.13)** **	**0.26 (0.08)** ***	1.10 (0.13)	1.63 (0.59)	0.86 (0.15)	0.76 (0.46)	**0.38 (0.19)** *	1.39 (0.31)	1.56 (0.41)	**57.34** ***
High School or more (reference)	--	--	--	--	--	--	--	--	--	--	--
Less than HS	1.15 (0.31)	1.58 (0.48)	0.93 (0.36)	0.83 (0.12)	0.41 (0.22)	1.18 (0.20)	**3.39 (1.67)** *	0.93 (0.54)	0.99 (0.26)	1.21 (0.54)	**20.70** *
Housed or Marginally housed (reference)	--	--	--	--	--	--	--	--	--	--	--
Homeless	1.12 (0.28)	1.48 (0.57)	1.83 (0.69)	1.06 (0.13)	**0.42 (0.18)** *	1.03 (0.17)	0.54 (0.29)	2.25 (1.19)	1.50 (0.33)	**0.50 (0.16)** *	**24.15** **
Age (years)	0.99 (0.01)	1.02 (0.01)	**1.05 (0.02)** ***	**0.98 (0.01)** ***	**0.95 (0.02)** **	**0.98 (0.01)** *	**0.96 (0.02)** *	1.01 (0.02)	0.98 (0.01)	**0.96 (0.01)** **	**35.92** ***

* $p \leq 0.05$;

** $p \leq 0.01$;

*** $p \leq 0.001$

Table 2

Ordinal Logistic Regressions of Substance Use Disorder Severity on Participant Sociodemographics (N = 286)

Sociodemographic characteristic	Alcohol RRR (SE)	Marijuana RRR (SE)	Methamphetamine RRR (SE)	Cocaine RRR (SE)	Stimulants RRR (SE)	Hallucinogens RRR (SE)	Inhalants RRR (SE)	Opiates RRR (SE)	Sedatives RRR (SE)	Omnibus $\chi^2(8)$
Non-Gay Identified (reference)	--	--	--	--	--	--	--	--	--	--
Gay Identified	1.28 (0.37)	**0.45 (0.12)** **	1.15 (0.31)	0.70 (0.21)	2.98 (2.47)	0.74 (0.39)	1.54 (0.66)	0.54 (0.28)	1.29 (0.74)	**22.0** **
Non-Caucasian/White (reference)	--	--	--	--	--	--	--	--	--	--
Caucasian/White	**0.34 (0.13)** **	0.70 (0.25)	1.12 (0.33)	**0.25 (0.11)** **	1.05 (0.88)	**2.32 (1.13)†**	**0.27 (0.17)** *	**0.16 (0.16)†**	0.51 (0.40)	**29.4** ***
HIV-Negative (reference)	--	--	--	--	--	--	--	--	--	--
HIV-Positive	**0.49 (0.13)** **	0.72 (0.18)	1.09 (0.30)	**0.44 (0.13)** **	0.29 (0.25)	1.58 (0.76)	**1.81 (0.66)†**	0.41 (0.24)	0.87 (0.44)	**21.5** **
High School or more (reference)	--	--	--	--	--	--	--	--	--	--
Less than HS	1.57 (0.49)	1.31 (0.45)	0.78 (0.27)	1.48 (0.50)	**3.22 (2.19)†**	**2.90 (1.52)** *	0.81 (0.34)	1.57 (0.92)	0.64 (0.41)	**16.5** *
Housed or marginally housed (reference)	--	--	--	--	--	--	--	--	--	--
Homeless	1.27 (0.37)	0.76 (0.21)	1.51 (0.45)	0.69 (0.22)	1.40 (0.98)	0.54 (0.36)	0.92 (0.39)	1.84 (0.93)	0.86 (0.49)	8.8
Age (years)	0.99 (0.01)	**0.97 (0.01)** **	0.98 (0.01)	**1.04 (0.01)** **	1.00 (0.03)	**0.95 (0.02)** *	**0.97 (0.02)†**	1.01 (0.02)	**0.94 (0.02)** **	**41.3** ***

* $p \leq 0.05$;

** $p \leq 0.01$;

*** $p \leq 0.001$

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