



Short communication

Partner-level substance use associated with increased sexual risk behaviors among men who have sex with men in San Francisco, CA

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ABSTRACT

Background: Substance use is highly prevalent among men who have sex with men (MSM) and is associated with individual-level sexual risk behaviors. However, few studies have explored the relationship between substance use and HIV risk behaviors within partnerships.

Methods: We examined partner-level data between MSM participants (n = 23) and their sexual partners (n = 52). We used multivariable generalized estimating equations (GEE) logistic regression to assess the relationship between partner-level substance use during their last sexual encounter with each partner, and engaging in condomless anal intercourse (CAI) and serodiscordant CAI.

Results: In multivariable analyses, participants had significantly higher adjusted odds ratio (AOR) of CAI when the participant (AOR = 22.2, 95%CI = 2.5–199.5) or their partners used any drugs (AOR = 21.8, 95%CI = 3.3–144.3); their partners (AOR = 5.7, 95%CI = 1.7–19.3) or both participant and partner had concordant use of methamphetamine (AOR = 10.5, 95%CI = 2.2–50.6); or when both used poppers (AOR = 11.4, 95%CI = 1.5–87). There were higher odds of SDCAI if the participant binge drank (AOR = 4, 95%CI = 1.01–15.8), used more than one substance (AOR = 15.8, 95%CI = 1.9–133), or used other drugs (AOR = 4.8, 95%CI = 1.3–18.4); if their partner used poppers (AOR = 7.6, 95%CI = 1.5–37.6), or used more than one substance (AOR = 7.9, 95%CI = 1.9–34.1); and when both participant and partner had concordant use of poppers (AOR = 4.4, 95%CI = 1.2–16.8).

Conclusions: This study observed significant relationship between substance use and HIV risk behaviors within partnerships. Specifically, when either the participant, the partner, or both used any drugs there was an increased odds of sexual risk behaviors. Findings suggest that partner-level substance use behaviors should be taken in account when developing sexual risk reduction interventions.

1. Introduction

The use of methamphetamine (meth), cocaine, heavy episodic use of alcohol (binge drinking) and other illicit substance use are associated with HIV-related sexual risk behaviors and are highly prevalent among men who have sex with men (MSM) (Finlayson et al., 2011; Lambert et al., 2011; Sanchez et al., 2006). These sexual behaviors may include condomless anal intercourse (CAI) and serodiscordant condomless anal intercourse (SDCAI), which are estimated to have the highest risk per contact for HIV transmission (Vittinghoff et al., 1999); a serodiscordant partnering occurs when someone has a sexual partner with a different or unknown HIV status. Additionally, using substances can impair judgment and increase sexual desire, which are thought to contribute to risk-taking behaviors among substance using MSM (SUMSM) (Colfax

and Guzman, 2006; Drumright et al., 2006), many of whom use substances concurrently with sex (Sanchez et al., 2006).

Substance use patterns have been shown to be influenced by partnership dynamics in qualitative studies. For example, a qualitative study among women previously observed that closer relationships with partners were associated with needle sharing (MacRae and Aalto, 2000). Other qualitative studies among drug users in primary relationships found that these relationships can involve the pooling of resources and sharing of drugs, leading to an increase in drug use between partners (Rhodes and Quirk, 1998; Simmons and Singer, 2006). Furthermore, substance users in partnerships may continue using substances because not using substances may negatively impact their relationship with their substance-using partners (Rhodes and Quirk, 1998). Among MSM, although participant and event-level analyses

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have observed the relationship between substance use and increased HIV-related sexual risk behaviors (Colfax and Guzman, 2006; Drumright et al., 2006), few studies have investigated this association in the context of sexual partnerships. Previous partner-level studies on MSM found associations with stimulant use and increased sexual behaviors (Gamarel et al., 2015). Furthermore, data suggest that substance use can influence sexual agreements and sexual behaviors within partnerships (Mitchell et al., 2014; Parsons and Starks, 2014). However, partner-level associations exploring different classes of substance use and polysubstance use have yet to be investigated among MSM. To address these gaps in literature, we assessed the relationship between partner-level substance use and HIV-related sexual risk behaviors using partner-level data. We aim to complement existing individual-level data by exploring data on how partner-level substances are associated with sexual risk and substances and provide a basis for partner-level HIV and substance use prevention interventions.

2. Material and methods

2.1. Study sample

Data used for this analysis comes from the baseline visit of a research study conducted in San Francisco among non-dependent MSM in an 8-week pharmacotherapy trial to reduce methamphetamine and heavy alcohol use comparing naltrexone versus placebo (Santos et al., 2016; ClinicalTrials.gov Identifier: NCT01723384). The trial enrolled 30 participants, however, we excluded seven participants whom had no sexual partners within the last 6 months—for a total sample size of 23. Enrolled participants were recruited by street and community outreach and through STD and HIV clinics, needle exchanges, and bars and events that MSM frequent. All participants provided an informed consent and study procedures were approved by the Committee on Human Research at University of California, San Francisco (Study Number:12-09809).

2.2. Data collection and measures

Participants reported the following information for up to 4 of their most recent sexual partners within the last 6 months on standardized audio computer-assisted self-interviews (ACASI): drug use prior to their last sexual encounter, partner type (i.e., primary, non-primary), perceived HIV status, and sexual behaviors. All substance use and sexual behaviors were assessed within the context of the most recent anal intercourse encounter (AI). Our primary outcomes in this analysis were condomless anal intercourse (CAI) and serodiscordant condomless anal intercourse (SDCAI). CAI was defined as not using a condom during anal intercourse from start to finish. Serodiscordant was defined as either an HIV-negative participant with an HIV-positive or unknown status partner, or an HIV-positive participant with an HIV-negative or unknown status partner. Alcohol intoxication was assessed with the question, “Were you drunk or buzzed on alcohol within 2 h before or during your most recent anal sex encounter with [your partner]?” Binge alcohol use, defined as 5 or more alcoholic drinks at a single occasion, was assessed with a follow up to the previous question, “How many drinks did you have? By a drink, I mean a 12oz. can or glass of beer, a 4 oz. glass of wine, a 1 1/2 oz. shot of liquor, or a mixed drink with that amount of liquor.” Primary partner was defined as, “someone you have lived with or have seen a lot, and to whom you have felt a special emotional attachment”, and non-primary partners as, “not someone you have lived with or have seen a lot, and to whom you have not felt a special emotional attachment,” consistent with a prior intervention trial among SUMSM (Mansergh et al., 2010). Poly-substance use was defined as using any combination of 2 or more of the following substances: alcohol, cocaine, methamphetamine, poppers and other drugs such as ecstasy and heroin.

2.3. Statistical analysis

We created a dataset of all sexual partnerships that were reported by study participants. The unit of analysis for all statistical analyses was a partnership composed of a study participant and their reported sexual partner. All analyses were conducted using Stata Version 14 (StataCorp. College Station, TX), unless stated otherwise.

2.3.1. Newman’s assortativity coefficients

We calculated assortativity in substance using sexual partnerships by any drug use, alcohol use to intoxication, cocaine (powdered or crack) use, methamphetamine use, and poppers use using Newman’s assortativity coefficients (NC). Newman’s coefficient characterizes the degree of mixing or non-mixing—with coefficients ranging from -1 (highest level of disassortativity/mixing) to 1 (highest level of assortativity/non-mixing), respectively—of characteristics between entities that are connected within a network and has previously been applied to studies of sexual partnerships among groups at high risk of HIV (Bohl et al., 2011; Wilson et al., 2014). Consistent with prior studies, Newman’s coefficients and 95% confidence intervals were calculated from tabulations in Microsoft Excel for the entire study sample (Bohl et al., 2011; Wilson et al., 2014). The coefficient estimates were not included as a covariate in the multivariable models because each characteristic coefficient was calculated from the entire participant-level dataset (i.e., the values are the same for all partnerships).

2.3.2. Multivariable analysis

We assessed substance use as a predictor of CAI and SDCAI using multivariable logistic regression models fit with generalized estimating equations (GEE) to account for clustering of partnerships by participant. The multivariable GEE logistic regression models accounted for clustering by participant and analyzed the associations between: 1) participants’ substance use with CAI and SDCAI, 2) the partners’ substance use with CAI and SDCAI; and 3) concordant substance use within partnerships with CAI and SDCAI. Models with the outcomes of CAI were adjusted for partnership type and serodiscordance; those models with the outcome of SDCAI were only adjusted for partnership type.

3. Results

3.1. Partnership-level characteristics

Partnership-level characteristics for all partnerships ($n = 52$) are presented in Table 1a. Approximately 29% of partnerships were reported as being a primary partnership. The majority of partnerships were concordant with regards to HIV-status (57.7%), any drug use (92.3%), alcohol use to intoxication (73.1%), cocaine use (51.9%), methamphetamine use (76.9%) and poly-substance use (75%).

3.2. Newman’s assortativity

Based on the Newman’s assortativity coefficients, any drug use was the behavior with the highest assortativity (NC = 0.67, 95%CI = 0.54, 0.95), followed by methamphetamine (NC = 0.61, 95%CI = 0.44, 0.78), cocaine (NC = 0.56, 95%CI = 0.44, 0.69), alcohol use to intoxication (NC = 0.55, 95%CI = 0.37, 0.73), poppers (NC = 0.49, 95%CI = 0.37, 0.61) and by HIV-status (NC = 0.37, 95%CI = 0.24, 0.5).

3.3. Multivariable analysis

The results of the multivariable analyses are summarized in Fig. 1.

3.3.1. Condomless anal intercourse (CAI)

In multivariable GEE logistic regression models assessing the relationship between the participants’ substance use and CAI, there

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