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Sexual behaviors among club drug users: prevalence and reliability

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Abstract

HIV prevention efforts require a focus on reducing high risk sexual behavior. Because these are self-reported, assessments that reduce memory bias and improve elicitation of data are needed. As part of a multi-site psychometric study of club drug use, abuse, and dependence, data were collected with a test-retest design that measured the reliability of the Washington University Risk Behavior Assessment for Club Drugs (WU-RBA-CD). Reliability was assessed separately by sex via kappa coefficients and intraclass correlation coefficients (ICC); z tests compared coefficients by sex. A total of 603 participants were interviewed by independent assessors with 5 days in between interviews. Reliability for all 51 items of the sexual activity section of the WU-RBA-CD ranged from .23 to 1.00; 71% (n = 36) of items resulted in moderate to high reliability (.55–1.00). Number of lifetime sex partners was consistently reported for same-sex partners for both men and women and opposite-sex partners. Items with high reliability included reporting ever being under the influence of ecstasy (.87) or GHB (.87) while having sex. Items with lower reliability included those that queried the determinants of condom use (.45–.82) and about behaviors and attitudes experienced while using drugs (.23–.87). Very few sex differences were revealed in the reliability of reported sexual activities. Overall, the WU-RBA-CD performed with fairly high reliability rates. Assessing situations of when, how, and why individuals use condoms may offer the clearest evaluation of determinants of sexual behaviors, yet those items are not as reliable.

Introduction

As part of the response to HIV prevention efforts, public health professionals have developed methods to assess high risk behaviors for HIV infection. To measure both the risk for and effectiveness of HIV prevention efforts, reliable and valid assessments are needed. The development of appropriate measures has evolved throughout the HIV epidemic as risk behaviors have changed and different populations have become infected. Primarily, measurement error can be attributed to memory error, poor item content, flawed administration of instruments, as well as many other factors (Fenton, Johnson, McManus, & Erens, 2001; Johnson et al., 2000; Schroder, Carey, & Vanable, 2003a, 2003b).

Drug-using populations are frequently thought to be unreliable concerning their self-reported measures of risk behaviors, yet data do not support this claim (Goldstein et al., 1995; Klinkenberg et al., 2002; McElrath, Chitwood, Griffin, & Comerford, 1994; Needle et al., 1995; Petry, 2001; Twitchell, Huber, Reback, & Shoptaw, 2002). Studies among drug using populations report moderate to high reliability in reports of sex and drug-related behaviors, which used test-retest and inter-rater reliability methods (Compton, Cottler, Dorsey, Spitznagel, & Mager, 1996; Cottler et al., 1997, 1998b; Goldstein et al., 1995; Horton, Compton, & Cottler, 2000).

Memory error, recall bias, and poor question construction are consistently documented as factors of measurement error and, in turn, they contribute to the limitations of study findings. Specific to sexual behaviors, memory error is found to be dependent on length of reference intervals, behavior measures, and frequencies of the targeted behavior (Schroder et al., 2003a). Assessments must balance the length of time an individual is able to recall accurately and the length of time that is representative of the individuals' practices. Two to three months reference intervals are often justified as an intermediate length of time that assesses risk behaviors more appropriately (Kauth, Lawrence, & Kelly, 1991; Schroder et al., 2003a). Alternatively, longer reference intervals offer opportunities to assess behaviors that would influence overall levels of sexual risk, if reliably reported. Self-reported sexual behaviors have been found to be more reliable when response options are dichotomous. The limitation of dichotomous items is that they only capture whether or not the behavior occurred and not the trend of the behavior over time, which may limit a thorough assessment of current level of risk (Tourangeau & Smith, 1996). Research has suggested that indicators, such as age at first sex, are strong predictors of risk and are reliable (Catania, Gibson, Chitwood, & Coates, 1990).

Assessing risk by using frequencies are scrutinized due to research suggesting that as frequency of behaviors increase, the accuracy of reporting that target behavior decreases (Schroder et al., 2003b). With higher frequency behaviors, rough estimates tend to be provided. For example, number of sex partners is "rounded" to increments of five or ten with higher frequencies (Tourangeau & Smith, 1996). Although the actual count will offer more data for risk analysis, a valid count may be difficult to obtain both due to the reference interval and to challenges in recalling the actual frequency (Schroder et al., 2003b). High frequency behaviors may encourage adopting a shorter recall period. Low frequency behaviors seem to be more memorable and are more likely to be reported even if that behavior did not occur during the specified timeframe. Incidence data are reported to be more reliable, except when referring to behaviors that may not be engaged in regularly. Research suggests directly querying the frequency of these low frequency behaviors, thereby learning how often one is engaging in the activity. This method offers an opportunity for individuals to perceive this behavior as more common and increase comfort to respond honestly, unlike a dichotomous measure regarding their engagement in behaviors in which they may not typically engage (Durant & Carey, 2000; Schroder et al., 2003b; Tourangeau & Smith, 1996).

Social desirability has also been documented as a significant contributor to recall bias as individuals may respond in a manner that assumes a more socially conservative response when assessing sexual behaviors, which incorrectly minimizes the level of risk (Fenton et al., 2001; Schroder et al., 2003b). Research has found that reporting of sexual behaviors differs by sex and may influence biases in responses. This has most commonly been found in questions concerning number of opposite-sex partners with men reporting higher frequency than women. This has been documented in situations where communities would converge with number of sex partners due to a finite group of sex partner possibilities (Catania et al., 1990, 1995; Tourangeau & Smith, 1996). Other items which seem to reveal sex-based biases include frequency of self-stimulation, oral sex with an opposite sex partner, and frequency of unprotected sex (Tourangeau & Smith, 1996). It is unclear that sex differences exist consistently based on behavior or which sex gives more accurate reports (Catania et al., 1990, 1995; Durant & Carey, 2000).

With these challenges to reliability and validity, it is necessary that the field continues to develop assessments that are reliable for the most sensitive behaviors, so that risk can be accurately assessed. One of the most widely used assessments of sexual behaviors, the NIDA Risk Behavior Assessment (RBA), was validated and originally used in a multi-city

study of a drug-using population (Needle et al., 1995). Versions of the RBA continue to be used to assess levels of risk behaviors associated with sex, drug use, attitudes, and beliefs about associated behaviors varying populations (Cottler et al., 1998a; Dowling-Guyer, 1994; Inciardi, Surratt, Kurtz, & Weaver, 2005; Needle et al., 1995; Twitchell et al., 2002). In the present study, revisions to the RBA were made to enrich diagnostic data collected for a club drug (ecstasy, rohypnol, ketamine, and/or GHB) use, abuse, and dependence study. As part of that study, reliability data were generated and the current analyses assessed reliability of reports of sexual behaviors from the revised version of the RBA by sex.

Method

Participants

The data come from a tri-city study of club drug use, abuse, and dependence conducted in St. Louis, Miami, and Sydney. The study was a nosological assessment of the constructs and relevance of DSM-IV criteria for ecstasy, ketamine, rohypnol, and GHB. In addition, behaviors and attitudes associated with club drug use were evaluated. The analyses presented test the reliability of the sexual behavior measures of the Washington University Risk Behavior Assessment (WU-RBA) between sexes.

Each study site utilized identical research protocols. Interested participants contacted researchers after they were recruited through flyer distributions in high volume areas such as community centers, dance clubs, and in school newspapers. The flyers were designed to recruit current club drug users to participate in a research study. Eligible individuals were 15 years of age and older who had used ecstasy more than five times lifetime and at least once in the past 12 months, who spoke English. A total of 927 club drug users were screened and eligible at all three sites. Approximately 300 (35%) of these participants did not return for retest interviews. Two participants identified as transgendered and were not included for the sex-based comparisons. The study design was developed to make eligible participants who reported recent ecstasy use, at the time a commonly used club drug. This created an opportunity to examine the role of multi-drug use among an ecstasy-using sample.

A total of 603 individuals from St. Louis ($n = 278$), Miami ($n = 182$), and Sydney ($n = 143$) completed test-retest interviews. Over one-third of the sample was non-White (36%) and female (40%); the mean age was 23.3 years ($SD = 5.15$; range, 16–59). Specific demographic characteristics by study site are described in Table 1. The interviews and protocol procedures were approved by the Washington University Human Research Protection Office, University of Delaware (for the Miami site, where co-investigators were affiliated), and the University of New South Wales Human Research Ethics Committee.

Measures

Demographic characteristics were collected during the initial interview. These included age, sex, and race/ethnicity. The Washington University Risk Behavior Assessment (WU-RBA-CD) was modified from the NIDA's Risk Behavior Assessment, which was originally developed for use in cooperative agreement studies of HIV risk behaviors (Coyle, 1998; Needle et al., 1995). This assessment was originally designed to collect self-reported sexual behaviors, HIV risk perceptions, patterns of drug use, and influence of drug use on sexual behaviors among an adult population. The revised RBA included questions related to situations where club drugs are used and the impact they may have on sex partner selection, types of sexual acts, condom use while using club drugs, and sexual pleasure while using club drugs. In addition, attitudes regarding condom use, age of first sex, ever oral/vaginal/anal sex, forced sex, number of sex partners in the past 3 months, trading sex for club drugs/

housing/food/money, and condom use consistency were measured. Specific items are included in Tables 3 and 4.

In addition, the Club Drug-Substance Abuse Module (CD-SAM) was modified from the CIDI-Substance Abuse Module (SAM) version developed by Washington University for the DSM-IV field trials (Cottler & Helzer, 1989; Cottler et al., 1995; Horton et al., 2000). Diagnostic items were added to the CD-SAM specific to club drugs that mimicked question patterns of other drug use, abuse, and dependence diagnoses. This enhanced the existing comprehensive assessment of use and physical, psychological, and withdrawal symptoms listed for illicit drugs covered in the SAM. These data were included to describe the lifetime drug-using patterns of the sample.

Procedure

Data were collected between 2002 and 2005. Intensive training and certification on administering the instruments and the overall interview protocol were required for all interviewers. Interviewer training typically consisted of 3–5 days of training on the instruments and testing with volunteer participants. Informed consent was given for participation in the study. For individuals under 18 years of age, parental informed consent was provided. Initial and retest interviews were conducted with independent raters and completed between 5 and 7 days after the initial interview. This protocol aimed to limit recall of their previous responses and not encounter many true score changes. Participants were remunerated for each of their interviews.

Data analyses were conducted with SAS (version 9.1) and STATA (version 8.0). Descriptive and bivariate analyses were conducted to provide the prevalence rates of lifetime substance use disorders, as assessed by the CD-SAM. Test-retest reliability analyses were conducted in two ways: kappa coefficients were conducted for the dichotomous variables and intraclass correlation coefficients (ICC) were conducted for the continuous variables. The kappa statistic ranges from –1.00, which signifies total disagreement, to 1.00, signifying total agreement. Typically, kappa values less than 0.40 indicate marginal agreement, 0.40–0.60 indicate moderate agreement, 0.60–0.75 indicate good agreement, and values greater than 0.75 indicate excellent agreement (Bishop, Fienberg, & Holland, 1975). The ICC was calculated by obtaining the difference in the error for each of the mean squares and divided by the sum of those errors. Similarly, ICC range from –1.00 to 1.00 with values less than 0.40 indicating poor agreement, 0.40–0.75 indicating moderate to good agreement, and values greater than 0.75 indicating excellent agreement (Fleiss, 1986). Z statistical tests were conducted to compare the reliability coefficients by sex.

Results

Drug Use Patterns

High proportions of the sample reported lifetime use of opiates (30%), hallucinogens (26%), ecstasy (25%), ketamine (22%), cannabis (23%), cocaine (21%), alcohol (17%), GHB (10%), rohypnol (6%), and amphetamines (5%). Although not shown, sex comparisons by drug use were conducted by χ^2 tests revealed that more women reported using cannabis than men (33.1% vs. 17.6%; $p < .001$). Other drug use was not significantly different by sex.

Sexual Behavior Patterns by Sex

Sex differences in reported sexual behaviors were measured by the WU-RBA-CD. ANOVAs were conducted for categorical and continuous variables; χ^2 analyses were conducted for dichotomous variables. As shown in Table 2, women more often than men reported ever having vaginal sex ($p = .02$), although 94.9% of men in sample also endorsed

having vaginal sex. Most of the sample reported having had oral sex (98.2%) and significantly more men reported having anal sex than women (49.0% vs. 40.8%; $p = .05$). Men reported their first sexual encounter at a younger age than women (15.0 vs. 15.5 years; $p = .01$). The mean number of lifetime male sex partners for men was 7.0 (SD = 57.1) and for women 12.7 (SD = 15.7). The number of lifetime female sex partners differed significantly ($p < .001$) between sex, with men reporting a mean of 24.8 (SD = 76.4) lifetime female sex partners and women reporting a mean of 1.7 (SD = 3.9) female sex partners. Men reported having three or more sex partners within the past three months more often than women ($p < .001$).

There were no significant sex differences in reports of condom use for oral sex, 3.8% reporting almost always or always using condoms during oral sex. Men reported more consistent condom use during anal sex ($p = .02$) and vaginal sex ($p < .03$).

Most of the sample (92.5%) reported consenting to sex the first time, of those who had sex; yet, 9.7% of women reported more often than men that they had not consented to sex the first time ($p = 0.01$). Further, 16.4% of the sample reported having experienced forced sexual contact with a dating partner; women more often than men reported this behavior (23.0% vs. 8.6%; $p < .001$).

There were no significant differences between sex for those who had traded sex for club drugs (4.8%) or club drugs traded for sex (3.8%). Men reported more often than women having exchanged club drugs for money, food, clothing or housing (32.1% vs. 13.3%; $p < .001$). In response to questions about sexual repertoire and perceptions of pleasure from drugs, the majority of the sample that had reported using ecstasy (76.0%), ketamine (41.5%), GHB (61.5%), and/or rohypnol (36.1%) reported that it made sex more pleasant. Most participants reported that the club drug they had used during sex had no effect on their partner selection (ecstasy [67.5%], ketamine [63.1%], GHB [57.7%] or rohypnol [55.6%]). Participants reported similar sexual experiences across sites and by sex when using ecstasy (62.8%), ketamine (60.0%), GHB (56.4%) or rohypnol (63.9%). Participants responded similarly when asked about the likelihood of using condoms when using the specific drugs ecstasy (69.2%), ketamine (80.0%), GHB (64.1%) or rohypnol (72.2%).

Reliability of Self-Reported Sexual Activities

We found that the standard kappa and ICC reliability categories were less relevant in this study as many of our items were found to be very reliable; therefore, we utilized more stringent reliability categories where kappas and ICCs between .80 and 1.00 were identified as highly reliable, scores of 0.55–0.79 were moderately reliable, and items < 0.55 had low reliability. Shown in Tables 3 and 4 are the 51 items and the reliability coefficients assessed. The test-retest reliability analyses ranged from a low of 0.36 to a high of 1.00. Overall, 16 (31.4%) items resulted in high reliability, 22 (43.1%) with moderate reliability, and 12 (23.5%) items resulted in low reliability. Rates of reliability were compared between sites with no significant differences.

Reliability of Items Related to Sexual Initiation

Rates of reliability for most items related to the initiation of sexual activities ranged from 0.80 to 1.00. Of the 11 items related to sexual initiation, there was one item with significant sex differences. These items included: ever having vaginal sex (0.91), ever having anal sex (0.92), having been pregnant (0.96), consenting the first time to have sex (0.80), and attraction to men (0.99) and women (0.97). There were no significant sex differences among these items. However, men, compared to women, were less reliable in their reports of their lifetime female sex partners (0.79 vs. 0.99) and women were less reliable than men in their

reports of number of lifetime male sex partners (0.90 vs. 1.00). Both men (1.00) and women (0.99) were highly reliable in their reports of lifetime number of same-sex partners.

Reliability of Condom-Related Items

Many of the items associated with the determinants of condom use resulted in reliability coefficients ranging between 0.55 and 0.79. There were no sex differences in reliability among of the 16 items measuring condom-related behaviors. These determinants included items about condoms causing less sensation (0.62), costing too much (0.67), being too drunk or high to use condoms (0.69), not having a condom available (0.66), having a partner object (0.57), and not thinking about it (0.55). Not using condoms for religious reasons was never misreported by any participant, (no participant endorsed this item). Participants were unreliable regarding other reasons for not using a condom such as: being afraid to ask their partner (0.54) to use a condom, thinking they or their partners could be infected with an STI or HIV (0.48), believing that barrier methods did not taste good during oral sex (0.52), or not wanting to take the time to put a condom on (0.45). Consistent reports, regardless of sex, in the frequency of use of condoms during sex varied, but all were reliable: vaginal sex had an ICC of 0.71, anal sex had an ICC of 0.55, and oral sex had an ICC of 0.82.

Reliability of Sex-Related Substance Using Behaviors

Items related to sexual behaviors and attitudes during concomitant club drug use resulted in a range of reliability. Of the 24 items pertaining to sex-related substance-using behaviors, there were three items that were significantly different in reliability by sex. Numbers of times someone had either been given club drugs (0.99) or had given club drugs (0.97) in exchange for sex were highly consistent and reliable. The number of times someone had traded club drugs for exchange of food, money, place to stay, or clothes resulted in an ICC of 0.83. Rates of reliability when queried about having sex while using ecstasy or GHB were also high ($\kappa = 0.87$), and for rohypnol and ketamine, moderately reliable (0.68 and 0.70). Men were less reliable than women (0.83 vs. 0.96) when reporting the number of times they exchanged club drugs for food, housing or clothing.

Participants were asked if their partner selectivity changed with each drug use, which tended to have low reliability: being more selective with a sex partner under the influence of ecstasy had a reliability coefficient of 0.56, rohypnol 0.51, ketamine 0.60, and GHB 0.42. Women were more reliable in their responses to whether ketamine made them more selective in their sex partners (0.94). The level of pleasure related to sex when using club drugs ranged from 0.39–0.67. Specifically, women were less reliable than men regarding GHB's effect on sexual pleasure (0.04 vs. 0.67). Participants were moderately reliable when they were queried if they had more varied sexual acts when on ketamine (0.57), ecstasy (0.62), GHB (0.70), and rohypnol (0.72). The reliability for whether participants were more likely to use condoms while using each club drug resulted with lower reliability with kappa coefficients for ketamine (0.23), ecstasy (0.52), GHB (0.41), and rohypnol (0.63). Other significant differences did not occur between men and women for items related to sex- and drug- using patterns.

Discussion

This study aimed to assess the reliability of a self-reported HIV risk behavior instrument that was modeled after one used in numerous studies with drug abusers (RBA). However, for this study, the RBA was revised to assess contextual factors related to club drug use, abuse, and dependence in three different communities: the Miami club scene, the St. Louis rave scene, and the Sydney rave and club scene. For the first time, reliability of club drug use

patterns and sexual behaviors reported by club drug users have been collected using identical methods across multiple sites.

The findings of this geographically diverse study population revealed that these club drug users, regardless of location, were highly reliable reporters of their behaviors. There were also very few differences in reliability of responses by sex. Similar to previous research (Catania et al., 1990; Fenton et al., 2001; Schroder et al., 2003a; Tourangeau & Smith, 1996), the rates of reliability regarding sexual debut (ever having oral, vaginal or anal sex and age of sexual initiation) were highly reliable. Items that queried participants on their condom use attitudes and beliefs, such as whether they would take the time to put one on, were high or drunk, or had a condom to use had moderate levels of reliability and no differences by sex in reliability. Items where further development and research needs to be conducted include challenges with measuring condom use negotiation and perceived susceptibility of STD/HIV. There was perfect agreement for both men and women regarding condom use where attitudes were well-established, such as not using a condom because one's religion doesn't allow it.

Sex differences in reliability did occur when reporting number of lifetime sex partners. There was near perfect agreement for number of lifetime same-sex partners, yet significant differences in reliability between sexes in number of lifetime opposite-sex partners. The study did not assess sexual orientation, just number of male and female sex partners for all participants. This is a limitation of the study findings, as reported behaviors differ from self-identified sexual orientation. Other studies have found that same-sex partners tend to be a low frequency behavior, and therefore individuals would know exactly how many same-sex partners they have had (Tourangeau & Smith, 1996). This may also be an effect of "rounding," memory error, or being cognitively unable to accurately report for those with a higher number of sex partners (Bogart et al., 2007; Schroder et al., 2003a; Tourangeau & Smith, 1996).

The assessments of specific club drugs and their effect on sexual behavior during use were moderately reliable and require further examination. Social desirability and its role on low frequency behaviors may have affected the reliability of responses to these items (Durant & Carey, 2000; Fenton et al., 2001; Schroder et al., 2003a; Tourangeau & Smith, 1996). Additionally, these items had lower prevalence rates, as expected with lower frequency behaviors. Yet, it is a well-documented limitation of the kappa statistic that when there are low prevalence rates, rates of reliability are lower as well (Byrt, Bishop, & Carlin, 1993; Spitznagel & Helzer, 1985; Viera & Garrett, 2005). Specifically, women had markedly higher rates of reliability on items regarding selectivity of sex partners when using ketamine and number of times they reported exchanging club drugs, while men had significantly higher rates of reliability in responding to whether GHB enhanced sexual pleasure. All of these items had less than 4% of the overall sample endorsing using GHB or ketamine.

While these findings revealed high reliability among most of the items by sex and across study sites, some of the confidence intervals associated with the ICC or kappa statistics of each item were very wide. These wide confidence intervals more often occurred with the items that had smaller sample sizes, an expected effect similar to that discussed previously. Some items had unexpectedly low kappa scores, which tends to occur when there is low variability in responses. When near perfect agreement with little or no variance occurs, kappa scores are lower than anticipated. Therefore, the lower kappa scores were superficially low, such as ever having oral sex (0.61), consented to sex (0.68), and experienced forced sex (0.64).

Future areas of methodological research should focus on improving questions with low reliability and developing additional risk assessments. Examining beliefs that influence condom use offers insight to determining level of risk, yet those beliefs are assumed to be static. These findings suggest that beliefs that influence condom use are not static, are to be determined at the time of sexual activity, and often, dependent on partners. Items querying type of sex partner, specific sex partner, and shorter recall time frames may yield more insight than broader assessments of risk (Kauth et al., 1991; Schroder et al., 2003a, 2003b; Tourangeau & Smith, 1996).

This study was conducted to assess the reliability of club drug abuse and dependence criteria; the investigators also developed an opportunity to assess sex- and drug-using behaviors in these populations. Studies such as these are important as they serve as opportunities to promote the quality of assessments in the field that measure risk behaviors and evaluate change in behaviors. Based on these results, it is clear that few sex differences in reliability exist, and that self-reported measures are reliable measures of risk with carefully implemented assessments and protocols. Through these test-retest reliability analyses, the WU-RBA-CD was found to be a highly reliable measure of sexual behaviors that may be used by others.

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References

- Bishop, Y.M.; Fienberg, S.; Holland, P. Discrete multivariate analyses. Cambridge: MIT Press; 1975.
- Bogart LM, Walt LC, Pavlovic JD, Ober AJ, Brown N, Kalichman SC. Cognitive strategies affecting recall of sexual behavior among high-risk men and women. *Health Psychology*. 2007; 26:787–793. CrossRefPubMed. [PubMed: 18020852]
- Byrt T, Bishop J, Carlin JB. Bias, prevalence and kappa. *Journal of Clinical Epidemiology*. 1993; 46:423–429. CrossRefPubMed. [PubMed: 8501467]
- Catania JA, Binson D, Dolcini MM, Stall R, Choi KH, Pollack LM, et al. Risk factors for HIV and other sexually transmitted diseases and prevention practices among US heterosexual adults: changes from 1990 to 1992. *American Journal of Public Health*. 1995; 85:1492–1499. CrossRefPubMed. [PubMed: 7485660]
- Catania JA, Gibson DR, Chitwood DD, Coates TJ. Methodological problems in AIDS behavioral research: Influences on measurement error and participation biases in studies of sexual behavior. *Psychological Bulletin*. 1990; 108:339–362. CrossRefPubMed. [PubMed: 2270232]
- Compton WM, Cottler LB, Dorsey KB, Spitznagel EL, Mager DE. Comparing assessments of DSM-IV substance dependence disorders using CIDI-SAM and SCAN. *Drug & Alcohol Dependence*. 1996; 41:179–187. CrossRef. [PubMed: 8842630]
- Cottler LB, Compton WM, Ben Abdallah A, Cunningham-Williams R, Abram F, Fichtenbaum C, et al. Peer-delivered interventions reduce HIV risk behaviors among out-of-treatment drug abusers. *Public Health Reports*. 1998a; 113(Suppl. 1):31–41. PubMed. [PubMed: 9722808]
- Cottler LB, Grant BF, Blaine J, Mavreas V, Pull C, Hasin D, et al. Concordance of DSM-IV alcohol and drug use disorder criteria and diagnoses as measured by AUDADIS-ADR, CIDI and SCAN. *Drug & Alcohol Dependence*. 1997; 47:195–205. CrossRef. [PubMed: 9306045]
- Cottler LB, Helzer JE. Diagnostic agreement between DSM-III and DSM-III-R dependence disorders. *NIDA Research Monograph*. 1989; 95:380–381. PubMed. [PubMed: 2641001]

- Cottler LB, Leukefeld C, Hoffman J, Desmond D, Wechsberg W, Inciardi JA, et al. Effectiveness of HIV risk reduction initiatives among out-of-treatment non-injection drug users. *Journal of Psychoactive Drugs*. 1998b; 30:279–290. PubMed. [PubMed: 9798794]
- Cottler LB, Schuckit MA, Helzer JE, Crowley T, Woody G, Nathan P, et al. The DSM-IV field trial for substance use disorders: Major results. *Drug & Alcohol Dependence*. 1995; 38:59–69. CrossRef. [PubMed: 7648998]
- Coyle SL. Women's drug use and HIV risk: Findings from NIDA's cooperative agreement for community-based outreach/intervention research program. *Women & Health*. 1998; 27:1–18. CrossRef.
- Dowling-Guyer S. Reliability of drug users' self-reported HIV risk behaviors and validity of self-reported recent drug use. *Assessment*. 1994; 1:383–392.
- Durant LE, Carey MP. Self-administered questionnaires versus face-to-face interviews in assessing sexual behavior in young women. *Archives of Sexual Behavior*. 2000; 29:309–322. CrossRefPubMed. [PubMed: 10948721]
- Fenton KA, Johnson AM, McManus S, Erens B. Measuring sexual behavior: Methodological challenges in survey research. *Sexually Transmitted Infections*. 2001; 77:84–92. CrossRefPubMed. [PubMed: 11287683]
- Fleiss, J. The design and analysis of clinical experiments. New York: Wiley; 1986.
- Goldstein M, Friedman S, Neaigus A, Jose B, Ildefonso G, Curtis R. Self-reports of HIV risk behavior by injecting drug users: Are they reliable? *Addiction*. 1995; 90:1097–1104. CrossRefPubMed. [PubMed: 7549778]
- Horton J, Compton W, Cottler LB. Reliability of substance use disorder diagnoses among African-Americans and Caucasians. *Drug & Alcohol Dependence*. 2000; 57:203–209. CrossRef. [PubMed: 10661671]
- Inciardi JA, Surratt HL, Kurtz SP, Weaver JC. The effect of serostatus on HIV risk behaviour change among women sex workers in Miami, Florida. *AIDS Care*. 2005; 17:88–104. CrossRef.
- Johnson M, Fisher DG, Montoya I, Booth R, Rhoades F, Andersen M, et al. Reliability and validity of not-in-treatment drug users' follow-up self-reports. *AIDS and Behavior*. 2000; 4:373–380. CrossRef.
- Kauth MR, Lawrence JS, Kelly JA. Reliability of retrospective assessments of sexual HIV risk behavior: A comparison of biweekly, three-month, and twelve-month self-reports. *AIDS Education & Prevention*. 1991; 3:207–214. [PubMed: 1834142]
- Klinkenberg D, Calsyn R, Morse G, McCudden S, Richmond T, Burger G. Consistency of recall of sexual and drugs-using behaviors for homeless persons with dual diagnosis. *AIDS and Behavior*. 2002; 6:295–302. CrossRef.
- McElrath K, Chitwood D, Griffin D, Comerford M. The consistency of self-reported HIV risk behavior among injection drug users. *American Journal of Public Health*. 1994; 84:1965–1970. [PubMed: 7998638]
- Needle R, Weatherby N, Chitwood D, Brown B, Cesari H, Booth R, et al. Reliability of self-reported HIV risk behaviors of drug users. *Psychology of Addictive Behaviors*. 1995; 9:242–250. CrossRef.
- Petry N. Reliability of drug users' self-reported HIV risk behaviors using a brief, 11-item scale. *Substance Use & Misuse*. 2001; 36:1731–1747. CrossRef. [PubMed: 11758820]
- Schroder KE, Carey MP, Venable PA. Methodological challenges in research on sexual risk behavior: II. Accuracy of self-reports. *Annals of Behavioral Medicine*. 2003a; 26:104–133. CrossRefPubMed. [PubMed: 14534028]
- Schroder KE, Carey MP, Venable PA. Methodological challenges in research on sexual risk behavior: I. Item content, scaling, and data analytical options. *Annals of Behavioral Medicine*. 2003b; 26:76–103. CrossRefPubMed. [PubMed: 14534027]
- Spitznagel EL, Helzer J. A proposed solution to the base rate problem in the kappa statistic. *Archives of General Psychiatry*. 1985; 42:725–728. PubMed. [PubMed: 4015315]
- Tourangeau R, Smith TW. Asking sensitive questions: The impact of data collection mode, question format, and question context. *Public Opinion Quarterly*. 1996; 60:275–304. CrossRef.
- Twitchell G, Huber A, Reback C, Shoptaw S. Comparison of general and detailed HIV risk assessments among methamphetamine abusers. *AIDS and Behavior*. 2002; 6:153–162. CrossRef.

Viera A, Garrett JM. Understanding interobserver agreement: The kappa statistic. *Family Medicine*. 2005; 37:360–363. PubMed. [PubMed: 15883903]

Table 1

Demographic characteristics by study site (N = 603)

	St. Louis (n = 278)		Miami (n = 182)		Sydney (n = 143)		p
	M	SD	M	SD	M	SD	
Age (in years)	23.3	5.5	23.5	4.9	22.9	4.8	ns
Number of ecstasy pills (lifetime)	186.4	541.4	224.9	528.7	234	348.4	ns
Female	43.50%		39.00%		40.70%		ns
Race/ethnicity							ns
African American	15.10%		2.20%		0.00%		
Asian	1.80%		1.60%		12.00%		
Caucasian	74.90%		32.80%		82.40%		
Hispanic or Latino	2.50%		56.30%		0.00%		
Other	5.70%		7.10%		5.60%		

Table 2

Differences in sexual behaviors among club drug users by sex as conducted by ANOVAS

	Male		Female		p
	M	SD	M	SD	
Lifetime number of sex partners					
Male partners	7	57	13	16	0
Female partners	25	76	1.7	3.9	0
Age at first sex (in years)	15	2.8	16	2.1	0.01
	n	%	n	%	p
Ever had vaginal sex	335	95	246	98	0.02
Ever had oral sex	348	99	245	98	
Ever had anal sex	173	49	102	41	0.05
Ever have been pregnant	–	–	69	28	
Did not consent to sex first time	16	4.6	24	9.7	0.01
Ever experienced forced sexual contact	30	8.6	57	23	0
Gave club drugs for sex	9	2.5	4	1.6	
Been given club drugs for sex	13	3.7	8	3.2	
Traded club drugs for money, food, clothing or housing	113	32	33	13	0
Never use condom for vaginal sex	51	15	56	23	0.03
Never use condom for oral sex	282	81	214	87	
Never use condom for anal sex	72	41	50	48	0.02
Sexual behaviors while using club drugs					
Had sex on ecstasy (n = 450)	266	76	196	79	
On ketamine (n = 47)	39	11	26	11	
On GHB (n = 68)	52	15	24	9.7	
On rohypnol (n = 24)	19	5.4	14	5.7	
Sex is more pleasant when using ecstasy (n = 450)	200	75	131	67	
Using ketamine (n = 47)	15	39	8	31	
Using GHB (n = 68)	33	66	15	63	
Using rohypnol (n = 24)	8	50	4	29	

	Male		Female		p
	M	SD	M	SD	
More selective about sex partners when using ecstasy (n = 450)	25	9.4	17	8.7	
Using ketamine (n = 47)	2	5.1	4	15	
Using GHB (n = 68)	3	5.8	1	4.2	
Using rohypnol (n = 24)	1	5.3	0	0	
More varied sex acts when using ecstasy (n = 450)	81	31	55	28	
Using ketamine (n = 47)	8	21	5	19	
Using GHB (n = 68)	13	27	8	33	
Using rohypnol (n = 24)	4	25	2	14	
More likely to use condoms when using ecstasy (n = 450)	17	6.4	12	6.1	
Using ketamine (n = 47)	1	2.6	3	12	
Using GHB (n = 68)	0	0	4	17	0.02
Using rohypnol (n = 24)	1	5.3	2	14	

Table 3

Kappa test-retest reliability results of sexual activity items by sex

Items	Male (N = 353)					Female (N = 248)					95% confidence interval	Reliability coefficient t	95% confidence interval	M-F Z Test
	Responses			Time 1	Time 2	Responses			Time 1	Time 2				
	No	Yes	Time 2			No	Yes	Time 2						
Have you ever had vaginal sex?	No	18	2	0.94	(0.87–1.00)	No	2	0	0.66	(0.23–1.00)	1.24			
	Yes	0	333		(0.86–0.95)	Yes	2	246						
Have you ever had anal sex?	No	172	9	0.9		No	143	2	0.94	(0.90–0.98)	1.23			
	Yes	8	164			Yes	5	100						
Have you ever had oral sex?	No	4	4	0.61	(0.29–0.92)	No	2	1	0.49	(0.06–0.92)	0.43			
	Yes	1	344			Yes	3	244						
Have you ever been sexually attracted to men?	No	283	0	0.97	(0.94–1.00)	No	3	0	0.86	(0.57–1.0)	0.82			
	Yes	3	66			Yes	1	246						
Have you ever been sexually attracted to women?	No	19	1	0.97	(0.92–1.00)	No	118	4	0.96	(0.93–0.99)	0.4			
	Yes	0	333			Yes	1	127						
Have you ever been pregnant?	No	n/a	n/a	n/a	n/a	No	176	2	0.96	(0.92–1.00)				
	Yes	n/a	n/a	n/a	n/a	Yes	2	67						
In the past 3 months have you had 3 or more sex partners?	No	286	10	0.78	(0.69–0.88)	No	226	7	0.71	(0.53–0.89)	0.71			
	Yes	8	39			Yes	2	12						
The first time you had sex, did you consent to it?	No	10	3	0.68	(0.48–0.88)	No	23	5	0.87	(0.77–0.97)	1.71			
	Yes	6	331			Yes	1	219						
Have you ever experienced forced sexual content with a dating partner?	No	307	8	0.64	(0.50–0.78)	No	175	10	0.71	(0.61–0.82)	0.8			
	Yes	13	22			Yes	16	47						
Have you ever traded club drugs to get money, food clothes, or a place to stay?	No	203	20	0.64	(0.56–0.73)	No	194	7	0.59	(0.45–.072)	0.72			
	Yes	36	91			Yes	21	26						
Have you ever been under the influence of Ecstasy while you were having any kind of sex?	No	75	8	0.85	(0.79–0.92)	No	46	2	0.9	(0.83–0.97)	1			
	Yes	11	256			Yes	6	194						
Have you ever been under the influence of GHB while you were having any kind of sex?	No	292	7	0.84	(0.76–0.92)	No	221	0	0.93	(0.86–1.00)	1.7			
	Yes	7	44			Yes	3	24						

Items	Male (N = 353)						Female (N = 248)						
	Responses				Reliability coefficient t	95% confidence interval	Responses				Reliability coefficient t	95% confidence interval	M-F Z Test
	Time 1		Time 2				Time 1		Time 2				
	No	Yes	No	Yes			No	Yes	No	Yes			
Have you ever been under the influence of ketamine while you were having any kind of sex?	No	300	11		0.66	(0.54–0.79)	No	216	6	0.74	(0.60–0.88)	0.76	
	Yes	12	27				Yes	6	20				
Have you ever been under the influence of rohypnol while you were having any kind of sex?	No	323	6		0.63	(0.45–0.81)	No	230	3	0.74	(0.56–0.93)	0.84	
	Yes	8	13				Yes	4	11				
You didn't use a condom because condoms or other barrier protection caused less sensation	No	141	27		0.62	(0.53–0.70)	No	125	16	0.61	(0.50–0.71)	0.14	
	Yes	36	126				Yes	28	68				
You didn't use a condom because your religion did not allow you to	No	328	2		1		No	0	238	1			
	Yes	0	0				Yes	0	0				
You didn't use a condom because condoms or other barrier protection cost too much	No	314	2		0.65	(0.43–0.88)	No	227	2	0.7	(0.44–0.95)	0.24	
	Yes	6	8				Yes	3	6				
You didn't use a condom because you were too drunk or high	No	221	23		0.67	(0.58–0.76)	No	158	11	0.72	(0.62–0.82)	0.64	
	Yes	19	67				Yes	16	53				
You didn't use a condom because you didn't have one available	No	168	28		0.61	(0.53–0.70)	No	136	16	0.72	(0.62–0.81)	1.61	
	Yes	33	101				Yes	15	71				
You didn't use a condom because a partner objected	No	277	17		0.57	(0.43–0.71)	No	206	6	0.57	(0.39–0.74)	0.05	
	Yes	12	24				Yes	12	14				
You didn't use a condom because you didn't think about it	No	175	44		0.51	(0.42–0.61)	No	136	27	0.6	(0.49–0.70)	1.15	
	Yes	30	81				Yes	16	59				
You didn't use a condom because you think you or your partner could be infected with HIV or an STD	No	133	37		0.53	(0.43–0.62)	No	71	26	0.42	(0.30–0.53)	1.48	
	Yes	41	119				Yes	43	98				
You didn't use a condom because you were afraid to ask your partner	No	322	4		0.39	(0.00–0.78)	No	225	3	0.61	(0.35–0.88)	0.94	
	Yes	2	2				Yes	4	6				
You didn't use a condom because condoms or other barrier protection didn't taste good during oral sex	No	236	35		0.5	(0.38–0.61)	No	165	17	0.55	(0.42–0.67)	0.56	
	Yes	19	40				Yes	21	35				
You didn't use a condom because you or your partners didn't want to take the time to put one on	No	258	18		0.47	(0.33–0.60)	No	188	14	0.43	(0.27–0.59)	0.07	
	Yes	27	27				Yes	19	17				

Items	Male (N = 353)					Female (N = 248)					M-F Z Test
	Responses			Reliability coefficient t	95% confidence interval	Responses			Reliability coefficient t	95% confidence interval	
	Time 1	Time 2				Time 1	Time 2				
		No	Yes				No	Yes			
You didn't use a condom because of another reason	No	224	16	0.52	(0.42–0.63)	No	140	20	0.59	(0.48–0.69)	0.46
	Yes	41	49			Yes	23	55			

Table 4
Intraclass correlation coefficient test-retest reliability results of sexual activity items by sex

Items	Male (N = 353)			Female (N = 248)			M-F Z Test
	n	Reliability coefficient t	95% Confidence interval	n	Reliability coefficient t	95% confidence interval	
How old were you the first time you had sex of any kind?	350	0.8	(0.63–0.97)	248	0.83	(0.67–0.99)	0.25
In your lifetime, how many of your sex partners were male?	349	1		248	0.9	(0.83–0.96)	3.07*
In your lifetime, how many of your sex partners were female?	341	0.79	(0.69–0.89)	248	0.99	(0.99–1.00)	3.93*
In the last 12 months, how often have you used a condom or other barrier protection when having anal sex?	164	0.62	(0.24–0.99)	100	0.45	(0.02–0.88)	0.57
In the last 12 months, how often have you used a condom or other barrier protection when having oral sex?	344	0.85	(0.64–1.07)	244	0.77	(0.45–1.09)	0.43
In the last 12 months, how often have you used a condom or other barrier protection when having vaginal sex?	333	0.73	(0.47–0.99)	246	0.69	(0.40–0.99)	0.18
How many times have you been given a club drug like ecstasy, ketamine, GHB, or rohypnol in exchange for having sex?	350	0.99	(0.96–1.01)	248	0.94	(0.82–1.06)	0.75
How many times have you given a club drug like ecstasy, ketamine, GHB, or rohypnol in exchange for sex?	350	0.97	(0.91–1.02)	248	0.95	(0.83–1.06)	0.28
How many times have you traded club drugs in exchange for money, food, a place to stay, or clothes?	88	0.83	(0.72–0.95)	26	0.96	(0.92–1.01)	2.15*
When using ecstasy was sex more pleasant?	256	0.68	(0.20–1.15)	194	0.66	(0.17–1.15)	0.05
When using ecstasy have you been more likely to use a condom?	256	0.4	(0.00–0.95)	194	0.7	(0.22–1.18)	0.81
When using ecstasy were you more selective about whom you had sex with?	256	0.49	(0.00–1.03)	194	0.62	(0.11–1.13)	0.34
When using ecstasy have you engaged in more varied sex acts?	256	0.58	(0.00–1.20)	194	0.57	(0.00–1.17)	0.03
When using ketamine was sex more pleasant?	27	0.5	(0.00–1.08)	20	0.45	(0.00–1.17)	0.1
When using ketamine have you been more likely to use a condom?	27	0	(0.00–0.35)	20	0.61	(0.01–1.19)	1.73
When using ketamine were you more selective about who you had sex with?	27	0.26	(0.00–0.88)	20	0.94	(0.77–1.11)	2.07*
When using ketamine have you engaged in more varied sex acts?	27	0.33	(0.00–0.95)	20	0.84	(0.45–1.23)	1.37
When using GHB was sex more pleasant?	44	0.67	(0.22–1.13)	24	0.04	(0.00–0.42)	2.07*
When using GHB were you more selective about who you had sex with?	44	0.63	(0.05–1.20)	24	0.23	(0.00–0.90)	0.88
When using GHB have you been more likely to use a condom?	44	0.26	(0.00–0.86)	24	0.44	(0.00–1.08)	0.08

Items	Male (N = 353)			Female (N = 248)			M-F Z Test
	n	Reliability coefficient t	95% Confidence interval	n	Reliability coefficient t	95% confidence interval	
When using GHB have you engaged in more varied sex acts?	44	0.59	(0.02–1.1 5)	24	0.87	(0.57–1.1 6)	0.86
When using rohypnol was sex more pleasant?	13	0.14	(0.00–0.8 5)	11	1		
When using rohypnol have you been more likely to use a condom?	13	0.45	(0.00–1.2 8)	11	0.78	(0.32–1.2 3)	0.04
When using rohypnol were you more selective about who you had sex with?	13	0.2	(0.00–0.9 4)	11	0.73	(0.11–1.3 5)	1.09
When using rohypnol have you engaged in more varied sex acts?	13	0.61	(0.00–1.2 3)	11	0.79	(0.26–1.3 2)	0.43

* Z test statistically significant