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Prevalence of recent illicit substance use and reporting bias among MSM and other urban males

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Abstract

This paper explores whether elevated rates of self-reported substance use among MSM compared to other males may be an artifact of reporting bias. Past month prevalence rates of marijuana, cocaine, heroin, methamphetamine, Ecstasy, and Ketamine use were compared between a sample of men who have sex with men (MSM), and a general household sample of men, all residing in Chicago. We compared rates of self-reported use, and corrected rates based on the results of drug-testing (urine and oral fluid tests). While MSM over 30 years old were significantly more likely than other men in this age group to report past month use of cocaine, test-corrected rates of use were equivalent. On the other hand, test-corrected estimates confirmed elevated rates of Ketamine and Ecstasy use in the MSM sample. Differential disclosure of substance use between MSM and other males may in some cases lead to distorted conclusions about differences in substance use between these groups. The use of biological testing in epidemiological studies of substance use can reduce the uncertainty of such comparisons.

Keywords

substance use; MSM; reporting bias

1. Introduction

While it is clear that many men who have sex with men (MSM) do not use illicit drugs, research shows that illicit substance use is prevalent in this population (Stall et al., 2001; Thiede et al., 2003), and prevalence rates for a variety of illicit substances have consistently been higher for MSM than for non-MSM in studies where direct comparisons are available (McCabe et al., 2005; Woody et al., 2001). Several recent studies indicate that “club drugs” (e.g., MDMA, amphetamines, and LSD) in particular may be used to a greater extent among MSM (Fendrich et al., 2003; McCabe et al., 2003; Stall et al., 2001). The tracking of emerging substance use trends within any particular population subgroup facilitates the targeting of community based

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prevention efforts and can also serve as a means of evaluating ongoing program activities. Within the context of MSM, research on substance use behavior has particular import because of purported associations with risky sexual behavior and practices which potentially increase the spread of HIV (Stall & Purcell, 2000).

An issue which has not been addressed is the extent to which differences in self-reported substance use may be an artifact of differential willingness to report the use of illicit substances. Some studies of MSM, including our own, systematically screen for gay identity or MSM behavior as a criteria for study inclusion. Subjects who are willing to disclose MSM behavior at screening may generally be more willing to share “private” information in research surveys. In addition, to the extent that substance use is relatively more prevalent among MSM, substance use may be more normative and this behavior may be relatively less “sensitive”. If the reports of elevated rates of substance use among MSM compared to men in general are artifactual, this has implications for studies relating substance use to risky sexual behavior. Greater willingness among MSM to disclose sensitive behaviors such as drug use and risky sex may lead to overestimation of the association between the two behaviors, as well as inflated differences between MSM and heterosexual men in both drug use and sexual behavior. The present study addresses this issue by examining self-reported rates of use of several substances, and corrected rates using the results of biological tests (urine and oral fluid) between MSM and community samples of adult respondents.

2. Methods

2.1. Sample & Procedure

This study employed two multi-stage area household probability samples of men in Chicago. The first was a sample of more than 600 Chicago residents, ages 18–40, conducted from June 2001 to January 2002, and described in detail elsewhere (Fendrich et al., 2004). Interviews were completed with 242 men; 92% of these men self-identified as being only heterosexual. The second sample was obtained as a supplement to the general population survey, and was concentrated in two postal zip codes in a part of the city known to have a high concentration of gay men. Interviews were conducted between September, 2002 and January 2003. Men who reported a history of consensual sex with other men or who identified themselves as gay or bisexual in a face-to-face screening were eligible to be selected. The age range for this sample was 18 to 55 years old. Interviews were completed with 216 self-identified MSM.

Substance abuse questions were administered by audio-computer-assisted self-interview (ACASI). Following the survey, subjects in the general household sample were invited to participate in three different drug tests (hair, saliva, and urine), while subjects in the MSM sample were invited to participate in saliva and urine testing. Biological specimens were tested for amphetamine, cocaine, heroin, and marijuana, and those screened positive were confirmed by GC/MS procedures. Supplemental tests were conducted on urine samples to detect (and confirm) the presence of two club drugs, Rohypnol and Ketamine. A usable urine or oral fluid specimen was obtained from 83% (n = 209) of men in the general household sample and 80% (n = 172) of men in the MSM sample.

Socio-demographic characteristics of the samples are shown in Table 1. Reflecting differences in the composition of these populations, the MSM sample included a greater proportion of men who were white, over 40 years old, college-educated, and earning more than \$70,000. Despite these differences, this study provides a rare opportunity to compare a sample of self-identified MSM with a general population sample of men obtained in a similar place and time, and with nearly identical methodology.

2.2. Data Analysis

2.2.1. Bivariate Analysis—Prevalence estimates based on self-reports were computed for past year, and past month use of cocaine, marijuana, methamphetamine, opiates (heroin), tranquilizers & sedatives, inhalants, MDMA/Ecstasy, Ketamine, GHB, Rohypnol, and LSD. Test-corrected estimates were computed for past month use of cocaine, heroin, Ecstasy, Ketamine, marijuana, and methamphetamine, using the results of urine and oral fluid tests. Prevalence estimates were stratified by age (18 to 30, and over 30 years), and sample weights and design effect adjustments were employed using the Stata svymean procedure (StataCorp, 2003).

Uncorrected and test-corrected prevalence rates were compared across the MSM and general household samples using Wald tests. Significance levels were adjusted for multiple comparisons using the Benjamini-Hochberg (Benjamini & Hochberg, 1995) procedure for controlling the false discovery rate.

2.2.2. Multivariate Analysis—Due to zero prevalence of several substances among general population males over 30, multivariate regression analyses could not be stratified by age. Logistic regression analyses were conducted on self-reported substance use, and test-corrected substance use, with sample as a predictor, and age, race (White vs. non-White), and education level as covariates. Age was entered as a continuous variable; education level was classified into three categories (High school or less, some college, and college graduate). We also tested the interaction of age and sample. The analyses included sample weights and design effect adjustments.

3. Results

3.1. Self-reported substance use prevalence

Prevalence estimates based on self-reported substance use are shown in Table 2 and Table 3. Significance levels are adjusted for 10 comparisons. No estimates are shown for Rohypnol as there was no reported use of this substance in either sample within the past year.

Young MSM were significantly more likely than young general population males to report past year use of Ecstasy ($F=15.57$, $p<.01$), inhalants ($F = 12.92$, $p < .01$), Ketamine, ($F = 6.90$, $p < .05$) methamphetamine ($F = 9.67$, $p < .05$), and tranquilizers/sedatives ($F = 8.64$, $p < .05$). MSM over 30 were more likely than general population males over 30 to report past year use of cocaine ($F = 7.54$, $p < .05$), Ecstasy ($F = 16.41$, $p < .01$), GHB ($F = 7.05$, $p < .05$), inhalants ($F = 35.56$, $p < .01$), Ketamine ($F = 6.79$, $p < .05$), LSD ($F = 8.96$, $p < .05$), marijuana ($F = 6.41$, $p < .05$), methamphetamine ($F = 12.45$, $p < .01$), and tranquilizers/sedatives ($F = 10.69$, $p < .01$).

No significant differences were found in past month reports of substance use between young MSM and young general population males. MSM over 30 were more likely than general population males to report past month use of cocaine ($F = 8.81$, $p < .05$), Ecstasy ($F = 7.08$, $p < .05$), inhalants ($F = 16.23$, $p < .01$), and Ketamine ($F = 8.48$, $p < .05$).

3.2. Test-corrected substance use prevalence

Test-corrected prevalence estimates, adjusting for underreporting of use, are shown in Table 4. Significance levels of the Wald test are adjusted for six comparisons.

Among men over 30 in the general household sample, the estimated past month prevalence of cocaine use increased substantially from 1.5% to 7.7%, whereas the estimated prevalence of past month cocaine use among MSM over 30 increased to a lesser degree from 8.8% to 10.6%.

When adjusted for differential underreporting, prevalence of past month cocaine use did not differ between the samples.

Past month prevalence of Ketamine among MSM over 30 increased from 4.1% by self-report to 8.2% when corrected for underreporting, resulting in an even greater difference between the samples. Past month prevalence of methamphetamine use among MSM increased slightly from 2.7% to 3.6%, resulting in a marginal difference ($p < .10$) between the samples.

3.3. Logistic Regression Analysis

In multivariate analyses adjusting for age, race, and education level (Table 5), MSM were significantly more likely than men in the general population sample to report use of cocaine (OR = 4.94, 95% CI 1.74 - 14.00), Ecstasy (OR = 29.32, 95% CI 2.58 - 332.72), Ketamine (OR = 21.84, 95% CI 1.87 - 255.53), and methamphetamine (OR = 27.11, 95% CI 2.08 - 353.15).

Looking at test-corrected rates, MSM were significantly more likely to report or test positive for Ecstasy (OR = 29.32, 95% CI 2.58 - 332.72), Ketamine (OR = 32.90, 95% CI 3.59 - 301.93) and methamphetamine (OR = 29.73, 95% CI 2.39 - 369.21). The samples did not differ on cocaine, heroin, or marijuana use.

Age by sample interaction effects were not significant for marijuana and cocaine. In both samples, cocaine use did not vary by age (OR = 1.03, 95% CI 0.98 - 1.08), while marijuana use was less likely among older men (OR = 0.95, 95% CI 0.92 - 0.98). Interaction effects could not be reliably estimated for other substances (heroin, methamphetamine, ecstasy, and ketamine) due to the low prevalence of use in the general population sample. As a supplemental analysis, we estimated age effects within the MSM sample only (controlling for race and education level). Only methamphetamine use was significantly less prevalent among older MSM (OR = 0.91, 95% CI 0.86 - 0.97).

4. Discussion

Higher rates of self-reported use in the past year, and in the past month were found among MSM compared to men in the general population sample for several substances. Differences in past month use were evident only among men over 30 years old, for cocaine, Ecstasy, inhalants, and Ketamine. When corrected for underreporting, Ecstasy and Ketamine use, but not cocaine use, appeared as more prevalent among older MSM. In multivariate analyses, adjusting for age, White race/ethnicity, and education level, methamphetamine use appeared significantly greater among MSM, in addition to Ecstasy and Ketamine use.

The effect of correcting for underreporting of use varied by substance. Cocaine use was more likely to be underreported in the general population sample than in the MSM sample; therefore, correcting for underreporting had a greater effect on the general population sample rates of use. On the other hand, no Ketamine use was detected among the males over 30 years old in the general population sample, while there was significant underreporting of Ketamine use among MSM. Correcting for underreporting of Ketamine use thus had a greater effect on MSM rates of use.

In supplemental analyses, we found that the ten subjects who failed to disclose Ketamine use were all interviewed within a span of two months. Three of the ten Ketamine “deniers” admitted to Ketamine use more than 30 days ago, and admitted to (and tested positive for) Ecstasy use in the past 30 days. At least some of the unreported Ketamine use may have been a result of unknowing ingestion - e.g. Ecstasy pills containing Ketamine. Alternatively, Ketamine use may be more stigmatized than cocaine use, perhaps due to its association with sexual behavior.

The finding that differences in substance use were more evident among older men suggests that while men in the general population tend to desist from drug use as they mature, MSM may be more likely to continue substance use into their middle years. Recent research suggests that one factor influencing the desistence of drug involvement in young adulthood is the acquisition of stable social roles in multiple domains such as work and romantic attachments (Schulenberg, Bryant, & O'Malley, 2004). Given societal pressures and prejudices, this stabilizing force may be less prevalent among MSM, making it less likely that their substance involvement will diminish. This is clearly an important avenue for future research as a better understanding of the source of these differences would provide crucial direction for prevention researchers.

In conclusion, the comparatively high rates of Ecstasy and Ketamine use observed among urban MSM in other studies (Clatts, Goldsamt, & Yi, 2005; Stall et al., 2001; Thiede et al., 2003) is replicated here. Moreover, our analyses of drug testing combined with self-reports suggests that these differences are not due to reporting bias.

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Table 1

Sample Characteristics

	Household Sample N=241		MSM Sample N=216	
	N	Percent	N	Percent
Age				
18–25	99	41%	22	10%
26–30	58	24%	30	14%
31–40	84	35%	82	38%
41 +	0	0%	82	38%
			$\chi^2 = 138.98, p < .001$	
Race/Ethnicity				
White	87	36%	170	79%
Black	74	31%	18	8%
Hispanic	48	20%	14	6%
Other	30	12%	14	6%
			$\chi^2 = 84.41, p < .001$	
Income				
\$20,000 or less	60	25%	26	12%
\$20–40,000	64	27%	48	22%
\$40–70,000	68	28%	68	31%
\$70,000 or more	38	16%	73	34%
			$\chi^2 = 26.29, p < .001$	
Education				
High School or less	91	38%	17	8%
Some college	62	26%	49	23%
College graduate	88	37%	150	69%
			$\chi^2 = 67.21, p < .001$	

Table 2
Comparing prevalence of self-reported past year substance use across samples stratified by age group

Substance	Age Group	Household Sample Weighted Estimate	Household Sample 95% Conf. Int. ¹	MSM Sample Weighted Estimate	MSM Sample 95% Conf. Int. ¹	F	df	p(Wald)	Adj p ²
Cocaine	18-30	0.103	(0.04 - 0.17)	0.235	(0.13 - 0.34)	4.94	1,56	0.030	
	>30	0.062	(0.01 - 0.11)	0.183	(0.11 - 0.26)	7.54	1,68	0.008	*
Ecstasy	18-30	0.050	(0.02 - 0.08)	0.343	(0.20 - 0.49)	15.57	1,56	0.000	**
	>30	0.000	(0.00 - 0.00)	0.137	(0.07 - 0.21)	16.41	1,68	0.000	**
GHB	18-30	0.000	(0.00 - 0.00)	0.123	(0.02 - 0.22)	5.92	1,56	0.018	
	>30	0.000	(0.00 - 0.00)	0.077	(0.02 - 0.13)	7.05	1,68	0.010	*
Heroin	18-30	0.000	(0.00 - 0.00)	0.044	(-0.03 - 0.11)	1.63	1,56	0.207	
	>30	0.000	(0.00 - 0.00)	0.005	(-0.00 - 0.01)	1.08	1,68	0.303	
Inhalants	18-30	0.050	(0.02 - 0.08)	0.255	(0.14 - 0.37)	12.92	1,56	0.001	**
	>30	0.008	(-0.01 - 0.02)	0.245	(0.17 - 0.32)	35.56	1,68	0.000	**
Ketamine	18-30	0.007	(-0.01 - 0.02)	0.132	(0.04 - 0.23)	6.9	1,56	0.011	*
	>30	0.000	(0.00 - 0.00)	0.072	(0.02 - 0.13)	6.79	1,68	0.011	*
LSD	18-30	0.082	(0.02 - 0.14)	0.162	(0.06 - 0.26)	1.99	1,56	0.164	
	>30	0.000	(0.00 - 0.00)	0.077	(0.03 - 0.13)	8.96	1,68	0.004	*
Marijuana	18-30	0.418	(0.34 - 0.50)	0.583	(0.44 - 0.73)	3.93	1,56	0.052	
	>30	0.208	(0.10 - 0.31)	0.382	(0.30 - 0.47)	6.41	1,68	0.014	*
Methamphetamine	18-30	0.011	(-0.00 - 0.03)	0.176	(0.07 - 0.28)	9.67	1,56	0.003	*
	>30	0.000	(0.00 - 0.00)	0.063	(0.03 - 0.10)	12.45	1,68	0.001	**
Tranquilizers/ sedatives	18-30	0.021	(-0.00 - 0.05)	0.191	(0.08 - 0.30)	8.64	1,56	0.005	*
	>30	0.015	(-0.00 - 0.03)	0.104	(0.05 - 0.16)	10.69	1,68	0.002	**

¹ Adjusted for design effects

² Benjamini-Hochberg adjusted p-values: * p<.05 ** p<.01

Table 3
Comparing prevalence of self-reported past month substance use across samples stratified by age group

Substance	Age Group	Household Sample		MSM Sample		F	df	p(Wald)	Adj p ²
		Weighted Estimate	95% Conf. Int. ¹	Weighted Estimate	95% Conf. Int. ¹				
Cocaine	18-30	0.046	(0.00 - 0.09)	0.044	(-0.01 - 0.10)	0.00	1,56	0.954	
	>30	0.015	(-0.00 - 0.03)	0.088	(0.04 - 0.13)	8.81	1,68	0.004	*
Ecstasy	18-30	0.007	(-0.01 - 0.02)	0.103	(0.03 - 0.18)	6.34	1,56	0.015	
	>30	0.000	(0.00 - 0.00)	0.05	(0.01 - 0.09)	7.08	1,68	0.010	*
GHB	18-30	0.000	(0.00 - 0.00)	0.029	(-0.02 - 0.08)	1.26	1,56	0.266	
	>30	0.000	(0.00 - 0.00)	0.023	(-0.00 - 0.05)	3.63	1,68	0.061	
Heroin	18-30	0.000	(0.00 - 0.00)	0.000	(0.00 - 0.00)	--	1,56		
	>30	0.000	(0.00 - 0.00)	0.000	(0.00 - 0.00)	--	1,68		
Inhalants	18-30	0.004	(-0.00 - 0.01)	0.074	(-0.01 - 0.16)	2.73	1,56	0.104	
	>30	0.008	(-0.01 - 0.02)	0.125	(0.07 - 0.18)	16.23	1,68	0.000	**
Ketamine	18-30	0.007	(-0.01 - 0.02)	0.029	(-0.02 - 0.08)	0.68	1,56	0.414	
	>30	0.000	(0.00 - 0.00)	0.041	(0.01 - 0.07)	8.48	1,68	0.005	*
LSD	18-30	0.011	(-0.00 - 0.03)	0.029	(-0.03 - 0.09)	0.38	1,56	0.541	
	>30	0.000	(0.00 - 0.00)	0.032	(0.00 - 0.06)	5.25	1,68	0.025	
Marijuana	18-30	0.291	(0.22 - 0.36)	0.314	(0.18 - 0.45)	0.09	1,56	0.764	
	>30	0.162	(0.08 - 0.24)	0.225	(0.15 - 0.30)	1.39	1,68	0.243	
Methamphetamine	18-30	0.007	(-0.01 - 0.02)	0.103	(0.02 - 0.18)	5.5	1,56	0.023	
	>30	0.000	(0.00 - 0.00)	0.027	(0.00 - 0.05)	5.26	1,68	0.025	
Tranquilizers/ sedatives	18-30	0.000	(0.00 - 0.00)	0.044	(0.00 - 0.09)	4.43	1,56	0.040	
	>30	0.008	(-0.01 - 0.02)	0.041	(-0.00 - 0.08)	2.26	1,68	0.137	

¹ Adjusted for design effects

² Benjamini-Hochberg adjusted p-values: * p<.05 ** p<.01

Table 4
Prevalence of test-corrected past month substance use by sample and age group

Substance	Age Group	Household Sample Weighted Estimate	Household Sample 95% Conf. Interval ¹	MSM Sample Weighted Estimate	MSM Sample 95% Conf. Interval ¹	F	df	p	Adj p ²
Cocaine	18-30	0.064	(0.02 - 0.11)	0.044	(-0.01 - 0.10)	0.31	1,56	0.579	
	>30	0.077	(0.01 - 0.14)	0.106	(0.06 - 0.16)	0.52	1,68	0.473	
Ecstasy	18-30	0.007	(-0.01 - 0.02)	0.103	(0.03 - 0.18)	6.34	1,56	0.015	
	>30	0.000	(0.00 - 0.00)	0.050	(0.01 - 0.09)	7.08	1,68	0.010	*
Heroin	18-30	0.000	(0.00 - 0.00)	0.059	(-0.02 - 0.13)	2.42	1,56	0.126	
	>30	0.038	(-0.01 - 0.09)	0.036	(0.00 - 0.07)	0.01	1,68	0.941	
Ketamine	18-30	0.007	(-0.01 - 0.02)	0.074	(-0.01 - 0.15)	2.73	1,56	0.104	
	>30	0.000	(0.00 - 0.00)	0.082	(0.04 - 0.12)	15.18	1,68	0.000	**
Marijuana	18-30	0.323	(0.24 - 0.40)	0.328	(0.19 - 0.47)	0.00	1,56	0.944	
	>30	0.185	(0.09 - 0.27)	0.272	(0.20 - 0.35)	2.22	1,68	0.141	
Methamphetamine	18-30	0.007	(-0.01 - 0.02)	0.103	(0.02 - 0.18)	5.50	1,56	0.023	
	>30	0.000	(0.00 - 0.00)	0.036	(0.01 - 0.06)	7.37	1,68	0.008	

¹ Adjusted for design effects

² Benjamini-Hochberg adjusted p-values: * p<.05 ** p<.01

Table 5
Adjusted odds ratios of past month substance use for MSM sample vs. household sample controlling for age, race, and education

	N=455					
	Self-report			Test-corrected		
	AOR	95% Conf. Int. ¹	p	Adj p ²	AOR	95% Conf. Int. ¹
Cocaine	4.94	(1.74 – 14.00)	0.003	*	2.15	(0.74 – 6.26)
Ecstasy	29.32	(2.58 – 332.72)	0.007	*	29.32	(2.58 – 332.72)
Heroin	--				1.64	(0.19 – 14.31)
Ketamine	21.84	(1.87 – 255.53)	0.015	*	32.9	(3.59 – 301.93)
Marijuana	1.88	(1.05 – 3.35)	0.033		2.04	(1.14 – 3.68)
Methamphetamine	27.11	(2.08 – 353.15)	0.012	*	29.73	(2.39 – 369.21)

-- Not estimable (no reported use)

¹ Adjusted for design effects

² Benjamini-Hochberg adjusted p-values: * p<.05 ** p<.025