Reproductive Health Characteristics of Marijuana And Cocaine Users: Results from the 2002 National Survey of Family Growth

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CONTEXT: *Illicit drug use is associated with risky sexual behaviors in adolescents and young adults. However, few studies have examined these associations among drug users of all reproductive ages, using a control group of nonusers.*

METHODS: *Associations between marijuana and cocaine use, and outcomes related to sexual behaviors and reproductive health, were assessed using data from the 2002 National Survey of Family Growth. Overall, 4,928 men and 7,643 women aged 15–44 were interviewed. Chi-square tests, t tests and multivariable logistic regression analyses were used; in supplementary analyses, men and women were stratified by age-group (25 or younger, and older than 25), to capture the understudied older adults who use drugs.*

RESULTS: *Twenty-seven percent of men and 16% of women reported use of marijuana or cocaine in the last year. Drug users were younger than nonusers at first vaginal sex (mean, 15.2–16.1 vs. 17.3–17.5 years) and were more likely to have engaged in risky sexual behaviors in the last year, including having had sex with a nonmonogamous partner (odds ratios, 3.3–5.2 for men and 2.9–6.5 for women), while high on alcohol or drugs (10.1–18.0 and 8.1–24.2), or in exchange for money or drugs (2.7–2.8 and 2.3–9.2). They also were more likely to have undergone STD testing or treatment. Drug use was associated with risky sexual behaviors in both age-groups.*

CONCLUSION: *Programs aimed at reducing sexual risks among drug users should address the behaviors of men and women of all reproductive ages.*

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In the 2008 National Survey on Drug Use and Health, 14% of Americans aged 12 and older reported illicit drug use in the past year.[1] Use of marijuana was reported most frequently, followed by use of cocaine, hallucinogens, stimulants and heroin. Men reported drug use more often than women (16% vs. 12%). The prevalence of reported use was highest among 18–25-year-olds (34%), but a substantial proportion of Americans aged 26 or older (10%) reported drug use as well. Associations between illicit drug use, risky sexual behaviors and reproductive health have been studied predominantly in adolescents and young adults (age 25 or younger) or in selected subpopulations. Findings from these studies may apply to older drug users; however, nationally representative data on this population are scarce.

Cross-sectional as well as longitudinal studies have shown associations between illicit drug use among young people and early sexual intercourse,[2–4] multiple sexual partners[4–6] and inconsistent condom use.[6–8] These risky sexual behaviors put drug-using youth at increased risk for STDs (including HIV) and unplanned pregnancies, which may have serious long-term health, social and economic consequences. For example, having multiple sexual partners—especially when condoms are not used correctly or consistently—increases the risk of contracting STDs; and an untreated STD may lead to pelvic inflammatory disease (PID) and infertility.[9] The direct medical cost of STDs among U.S. 15–24-year-olds was estimated to be $6.5 billion in 2000.[10] Moreover, every new sexual partner increases the risk of acquiring a genital human papillomavirus infection,[11] which may cause genital warts and cervical cancer.[12]

Different models have been proposed to elucidate the associations between drug use and risky sexual behaviors. One model emphasizes that individual personality characteristics leading to risk-taking in general may play a role in the relationship between drug (including alcohol) use among adolescents and young adults.[13,14] Another model explores whether drug-induced impairment of judgment[15] or self-control[16] is associated with risky sexual behaviors; however, studies that considered the timing of drug use in relation to sexual risk-taking do not support this hypothesis.[14,17]

Drug use also could directly affect reproductive health. Cannabinoids, the psychotropic ingredients in marijuana, may decrease testosterone secretion and semen quality and subsequently impair male fertility.[18,19] In animal models, marijuana and its main psychoactive ingredient (commonly abbreviated as THC) disrupt the menstrual cycle and female hormonal secretion. These effects have been inconsistent in humans, however, probably because the timing of marijuana use in relation to the menstrual

cycle has varied.[20] Chronic cocaine use has been associated with menstrual cycle abnormalities in rhesus monkeys.[21] Although prenatal marijuana use does not seem to be associated with preterm birth or low birth weight,[22,23] cocaine use has been linked to multiple pregnancy complications, including premature rupture of membranes, placental abruption and low birth weight.[24] Prenatal illicit drug exposure also has been associated with some birth defects, such as anencephaly and cleft palate, and long-term developmental problems.[25,26]

Substance abuse and responsible sexual behavior have been identified by Healthy People 2010 as leading health indicators for the United States.[27] Since drug use may have a profound impact on both sexual behavior and reproductive health, a deeper understanding of their potential associations is needed to strengthen programs focusing on STD prevention. The primary aim of this study is to describe the reproductive health characteristics, risky sexual behaviors and STD experiences associated with illicit drug use among U.S. men and women of reproductive age (15–44). Supplementary analyses assess these associations separately among younger (aged 15–25) and older (aged 26–44) individuals.

METHODS

Data and Study Population

Data for this descriptive study come from the 2002 National Survey of Family Growth (NSFG),[28] a U.S. population-based survey conducted by the National Center for Health Statistics. The NSFG sampling design has been described in detail elsewhere.[29] In brief, a multistage national probability sample of households was selected throughout the 50 states and the District of Columbia; from each chosen household, one eligible person aged 15–44 was randomly selected for an interview. Blacks, Hispanics and teenagers were oversampled to produce accurate national estimates. From March 2002 to February 2003, trained female investigators conducted in-person interviews with 4,928 men and 7,643 women. Computer-assisted personal interviewing was used to gather information about fertility, contraceptive use, sources and types of family planning services, and maternal and child health. Different interviews, containing gender-specific questions, were used for men and women. Audio computer-assisted self-interviewing (ACASI) was used to collect the most sensitive information, including data on illicit drug use and STD risk behaviors, to give respondents privacy. The overall response rates were 78% for men and 80% for women.

Measures

•***Illicit drug use.*** All respondents were asked how often they had smoked marijuana, had used cocaine or crack or had injected nonprescription drugs during the last 12 months. Response options were "never," "once or twice," "several times," "about once a month," "about once a week" and "about once a day." We defined exposure to drugs as use of one or more of these substances at least once during the previous year. Because of the relatively low prevalence of cocaine and crack use, we combined both into one group (cocaine). Data on the frequency of cocaine, crack and injection-drug use were not included in the NSFG data file that was available for statistical analyses; therefore, we dichotomized each of the drug use measures into either "used during the last 12 months" or "did not use during the last 12 months." Respondents were considered nonusers if they reported no use of any of these drugs in the last 12 months.

•***Outcomes.*** The NSFG assessed a broad range of reproductive health outcomes. Because we focused on characteristics that may directly affect pregnancy rates and outcomes, and because a small number of respondents reported same-sex sexual activities, our analyses included characteristics pertaining only to heterosexual sex. We examined data on three categories of outcomes: basic reproductive health characteristics, risky sexual behaviors and experiences with STDs. Basic reproductive health characteristics included age at first vaginal intercourse, the lifetime number of opposite-sex partners (categorized as 0, 1, 2–4, 5–10, and 11 or more) and the number of partners in the last 12 months (categorized as 0, 1, 2, and 3 or more). For male respondents, we included information about pregnancy involvement and intention to have children (or more children). For female respondents, we examined data on parity and intention to have children (or more children). For outcomes regarding pregnancy history, we used ACASI data if available.

Four ACASI items measured specific risky sexual behaviors during the last 12 months: "Did you have sex with any females/males who were also having sex with other people at around the same time?"; "How often were you 'high' on alcohol or drugs when you had sex with a female/male?"; "Have you had sex with a female/male who takes or shoots street drugs using a needle?"; and "Has a female/male given you money or drugs to have sex with her/him?" In addition, respondents were asked whether they had used a condom at last vaginal intercourse; been tested or treated for an STD in the last 12 months; ever received a diagnosis of genital herpes, genital warts or syphilis; and, for females, ever been treated for PID. For respondents aged 24 or younger, attitudes toward condom use were evaluated by two questions in the personal interview: "What is the chance that if you/your partner used a condom during sex, you would feel less physical pleasure?" and "What is the chance that it would be embarrassing for you and a new partner to discuss using a condom?" The response options for both questions were "no chance," "a little chance," "a 50–50 chance," "a pretty good chance" and "an almost certain chance." We dichotomized responses into "no or little chance" and "at least a 50–50 chance."

Data on current contraceptive use (i.e., during the last three months) were available only for female respondents.

This measure included only women at risk for an unintended pregnancy; women who were seeking pregnancy, pregnant, postpartum or infertile, as well as those who had not had intercourse in the previous three months, were excluded. We categorized methods into four groups, as recommended by Steiner et al.:[30] most effective (sterilization, implants, injectables or IUDs), effective (pills, patches or rings), least effective (barrier methods, natural methods or spermicides) and no method.

•***Covariates.*** We examined differences in several demographic and socioeconomic characteristics between respondents who used and did not use drugs. From the personal interview, we included age at interview (15–19, 20–29, 30–39 and 40–44), race and ethnicity (Hispanic, non-Hispanic white, non-Hispanic black or other), level of education (less than 12 years or 12 years or more) and whether the respondent was currently married or cohabiting. Place of residence (central city, other metropolitan area, nonmetropolitan area) was based on the respondent's address at the time of interview. The National Center for Health Statistics provided respondents' household income as a percentage of the federal poverty level (0–99%, 100–499%, or 500% or more), calculated from the total household income from all sources in the 12 months prior to the interview and census data on average threshold incomes specific to family size.[31] Data on self-reported general health status ("excellent," "very good," "good" or "fair/poor") were available from the ACASI file.

Analytic Approach

We excluded the sample's 352 pregnant women from our analyses, because pregnancy may have influenced their reporting of drug use and therefore biased our results. Addiction to illicit substances is ground for termination of parental rights in some states,[32] and since it is easier to conceal illicit drug use than pregnancy, we assumed that underreporting of illicit drug use would be more common among pregnant than among nonpregnant women. Respondents with missing information on the drug use variables (35 men and 32 women) were excluded also. Thus, our analytic sample consisted of 4,893 men and 7,261 nonpregnant women. Because this sample contained only 32 men and 22 women who had used injec-

TABLE 1. Percentage distributions of U.S. men and nonpregnant women aged 15–44, by marijuana and cocaine use in the last 12 months, according to demographic and socioeconomic characteristics, 2002 National Survey of Family Growth

Characteristic	Men						Women					
	N	Neither	Marijuana only	Cocaine only	Both	Total	N	Neither	Marijuana only	Cocaine only	Both	Total
All	**4,893**	**73**	**19**	**1**	**6**	**100**	**7,261**	**84**	**13**	**1**	**3**	**100**
Age												
15–19	1,115	65***	29***	0	6	100	1,111	71***	25***	0	4***	100
20–29	1,634	67***	23***	2	8*	100	2,466	78***	18***	1	3**	100
30–39 (ref)	1,460	81	12	2	6	100	2,493	90	8	1	2	100
40–44	684	78	18*	1	3	100	1,191	91	7	1	2	100
Race or ethnicity												
White (ref)	2,583	72	20	1	7	100	3,954	82	15	1	3	100
Black	920	73	22	1	4*	100	1,455	85	14	0*	1*	100
Hispanic	1,120	77*	15**	2*	6	100	1,489	89***	9***	1	3	100
Other	270	77	16	1	6	100	363	83	11	1	4	100
Years of education												
<12	1,354	70*	23**	1	6	100	1,624	79***	18***	0	3	100
≥12 (ref)	3,539	74	18	1	6	100	5,637	85	12	1	2	100
Residence												
Central city (ref)	1,878	69	22	2	7	100	2,731	81	16	1	3	100
Other metropolitan	2,281	73*	20	1*	6	100	3,434	86***	11***	1	2	100
Nonmetropolitan	734	82***	14***	1	4**	100	1,096	83	14	0*	3	100
% of poverty level												
0–99	768	66***	24**	1	9**	100	1,522	80**	16**	1	3	100
100–499 (ref)	3,278	76	18	1	5	100	4,868	85	12	0	2	100
≥500	847	69*	22	1	8*	100	871	81*	15	1	3	100
Currently married/cohabiting												
Yes (ref)	1,601	82	13	1	4	100	3,521	90	8	0	2	100
No	3,292	65***	26***	2	8***	100	3,740	76***	20***	1**	4***	100
General health												
Excellent (ref)	1,717	78	17	1	4	100	2,117	87	12	0	2	100
Very good	1,886	73**	19	1	7**	100	2,854	84**	14*	0	2	100
Good	1,022	69***	22**	2	7**	100	1,717	80***	15*	1*	5***	100
Fair/poor	266	66**	25*	1	8*	100	570	85	12	1	3*	100

*p<.05. **p<.01. ***p<.001. *Notes:* Ns are unweighted; percentages are weighted. Percentages may not add to 100 because of rounding. Differences were assessed by Pearson's chi-square tests. ref=reference group.

tion drugs, their reproductive health characteristics could not be studied accurately. Therefore, we report results only for marijuana and cocaine users.

To produce prevalence estimates for demographic, socioeconomic and basic reproductive health characteristics, drug use was classified into four mutually exclusive groups: none, marijuana use only, cocaine use only and use of both drugs. We conducted Pearson's chi-square tests (for the categorical variables) and t tests (for age at first vaginal intercourse, a continuous variable) to examine differences in drug use across the characteristics and reproductive health outcomes of interest.

We conducted multivariable logistic regression analyses to study the associations between marijuana and cocaine use in the last 12 months and our outcome measures while controlling for the following demographic and socioeconomic covariates: age, race and ethnicity, education, residence and household income. In supplementary analyses, we stratified the analyses by age at interview—25 or younger, and older than 25. We assessed statistical significance by calculating p values in univariate analyses and 95% confidence intervals in multivariable analyses. No adjustments were made for the multiple comparisons performed. Because the NSFG used complex sampling designs, weighted analyses were necessary to adjust for different sampling rates, response rates and coverage rates to calculate unbiased national estimates. To account for the complex sampling design, we used the Complex Samples Module in SPSS version 17.0 for Windows in all analyses.

RESULTS

Descriptive Analyses

Twenty-seven percent of men and 16% of women aged 15–44 reported drug use in the last 12 months (Table 1). Marijuana use was reported more frequently than cocaine use, by an estimated 25% of men and 16% of women. Prevalence of marijuana use was higher among 15–29-year-old men and women than among those aged 30–39; it was lower among Hispanics than among whites. Drug use was more commonly reported by respondents with fewer than 12 years of education than among those with 12 years or more; its prevalence was elevated among people living in a central city and among those in the lowest and highest household income categories. Smaller proportions of respondents who were married or cohabiting than of those who were not reported drug use. Overall, respondents whose health status ranged from very good to fair or poor reported drug use more frequently than did those in excellent health.

The prevalence of drug use was higher among respondents who had ever had vaginal intercourse than among those who had not—for men, 28% vs. 18%; and for women, 17% vs. 11% (Table 2). Drug users had their first vaginal intercourse at a younger age than nonusers (means, 15.2–16.1 vs. 17.3–17.5 years). Drug use also was far more common among respondents who had had 11 or more sexual partners of the opposite sex than among those who had had only 2–4. Its prevalence was higher among men who had had two or more partners (50%) than among those who had had one (22%) in the last year. Drug use also was more prevalent among women who had had two or more partners (36% and 46%) than among those who had had one (13%). The prevalence of reported drug use was lower among men who had been involved in a pregnancy than among men who had not (20% vs. 32%). Similarly, drug use—particularly marijuana use—was less

TABLE 2. Selected reproductive health characteristics of men and women aged 15–44, by marijuana and cocaine use in the last 12 months

Characteristic	N	Neither	Marijuana only	Cocaine only	Both	Total
MEN						
Ever had vaginal sex						
Yes	3,975	72	20	2	7	100
No	892	82***	16*	0**	2**	100
Mean age at first sex	3,945	17.3	15.8***	16.1*	15.6***	
Lifetime no. of female partners						
0	720	84**	14*	0	2**	100
1	554	84*	12*	0*	4	100
2–4 (ref)	1,047	77	18	1	4	100
5–10	1,153	72	21	2*	6	100
≥11	1,295	62***	25***	3**	11**	100
No. of female partners in last 12 mos.						
0	1,127	81	15	1	3	100
1 (ref)	2,475	78	17	1	4	100
2	537	50***	36***	1	13***	100
≥3	714	50***	31***	3***	16***	100
Involved in ≥1 pregnancy						
Yes	1,762	80	14	1	5	100
No	3,131	68***	24***	1	7**	100
Intends to have (more) children						
Yes	3,117	70	22	1	7	100
No	1,739	78***	16***	1	5	100
WOMEN						
Ever had vaginal sex						
Yes	6,282	83	14	1	3	100
No	951	89**	11*	0*	1**	100
Mean age at first sex	6,255	17.5	15.9***	15.3***	15.2***	
Lifetime no. of male partners						
0	730	93***	7**	0	0*	100
1	1,505	91***	8***	0	1*	100
2–4 (ref)	2,062	85	13	0	2	100
5–10	1,928	81*	15	1*	3**	100
≥11	914	66***	24***	2***	9***	100
No. of male partners in last 12 mos.						
0	1,317	90*	9	0	0*	100
1 (ref)	4,753	87	11	0	2	100
2	635	64***	27***	1***	7***	100
≥3	524	54***	30***	2***	13***	100
Parity						
0	3,037	75	21	1	4	100
≥1	4,181	90***	8***	1	2***	100
Intends to have (more) children						
Yes	3,457	79	18	1	3	100
No	3,705	88***	10***	1	2	100

*p<.05. **p<.01. ***p<.001. *Notes:* Unless otherwise noted, data are percentages. Ns are unweighted; percentages and means are weighted. Percentages may not add to 100 because of rounding. Differences were assessed by Pearson's chi-square tests or, for mean age at first sex, t tests. ref=reference group.

TABLE 3. Adjusted odds ratios (and 95% confidence intervals) from multivariable logistic regression analyses assessing associations between selected reproductive health outcomes and marijuana or cocaine use in the last 12 months

Outcome	Men		Women	
	Marijuana	Cocaine	Marijuana	Cocaine
Used condom at last vaginal sex†	0.9 (0.7–1.1)	0.8 (0.6–1.0)	1.0 (0.8–1.2)	0.9 (0.6–1.3)
Current contraceptive method‡				
Most effective (ref)	u	u	1.0	1.0
Effective	u	u	1.0 (0.8–1.4)	1.0 (0.6–1.6)
Least effective	u	u	1.2 (0.9–1.6)	1.0 (0.6–1.6)
None	u	u	1.5 (1.1–2.2)	1.5 (1.0–2.4)
Not applicable	u	u	0.8 (0.6–1.0)	0.6 (0.4–0.9)
Risky sexual behaviors in last 12 mos.§				
Sex with nonmonogamous partner	3.3 (2.5–4.2)	5.2 (3.9–7.0)	2.9 (2.3–3.7)	6.5 (4.4–9.5)
Sex while high on alcohol or drugs	10.1 (8.2–12.4)	18.0 (10.8–30.0)	8.1 (6.5–10.2)	24.2 (15.4–38.1)
Sex with injection-drug user	0.9 (0.5–1.7)	1.8 (0.9–3.7)	0.8 (0.5–1.3)	2.8 (1.2–6.5)
Received money or drugs for sex	2.7 (1.3–5.7)	2.8 (1.1–7.1)	2.3 (1.3–4.0)	9.2 (3.5–24.1)
Experience with STDs				
Tested for STD in last 12 mos.	2.1 (1.5–2.8)	2.5 (1.7–3.7)	2.5 (2.1–2.9)	3.6 (2.5–5.2)
Treated for STD in last 12 mos.	4.3 (2.7–7.0)	7.0 (3.9–12.6)	2.5 (1.8–3.5)	4.0 (2.0–8.1)
Ever had genital herpes	2.4 (1.2–4.5)	1.3 (0.5–3.1)	1.5 (1.0–2.1)	2.5 (1.5–4.0)
Ever had genital warts	2.6 (1.5–4.6)	2.1 (1.2–3.6)	2.0 (1.4–3.0)	2.6 (1.6–4.4)
Ever had syphilis	4.3 (1.9–9.6)	11.6 (3.8–35.8)	3.1 (1.0–9.7)	5.6 (1.9–16.7)
Ever treated for PID	na	na	1.7 (1.2–2.2)	1.7 (0.9–3.3)
Attitudes toward condom use††				
Reduce pleasure	1.5 (1.2–1.9)	1.8 (1.2–2.6)	1.0 (0.8–1.2)	1.3 (0.8–2.3)
Embarrassing to discuss with new partner	0.4 (0.3–0.6)	0.4 (0.2–0.7)	0.4 (0.3–0.6)	0.5 (0.2–1.3)

†Based on those who ever had vaginal intercourse. ‡Most effective methods are sterilization, implants, injectables and IUDs; effective methods are pills, patches and rings; least effective methods are barrier methods, natural methods and spermicides. §Based on those who reported any opposite-sex partners in last 12 months. ††Assessed only among respondents younger than 25. Categories shown refer to respondents who believe there is at least a 50% chance of this outcome. *Notes:* All data are weighted. Odds ratios are adjusted for age at interview, race and ethnicity, level of education, residence and household income. ref=reference group. u=unavailable. na=not applicable. PID=pelvic inflammatory disease. All outcomes except current contraceptive method are dichotomous.

prevalent among women who had had a live birth than among those who had not (8% vs. 21%). Some 22% of men and 18% of women who intended to have children (or more children) reported using only marijuana in the last 12 months, compared with 16% of men and 10% of women who did not. These descriptive analyses were not adjusted for age, which may have confounded the results.

Multivariable Analyses

In the multivariable analyses, men and women who used drugs were as likely as nonusers to have used a condom at last vaginal intercourse (Table 3). However, females who used marijuana or cocaine were more likely than nonusers to report no current contraceptive method rather than a most effective method (odds ratio, 1.5 for each). In the last 12 months, men and women who used drugs were much more likely than nonusers to have had sex with a nonmonogamous partner (3.3–5.2 for men and 2.9–6.5 for women), while high on alcohol or drugs (10.1–18.0 and 8.1–24.2) or in exchange for money or drugs (2.7–2.8 and 2.3–9.2). Female cocaine users were more likely than nonusers to have had sex with an injection-drug user (2.8); this association did not reach statistical significance for men (1.8).

Men and women who used drugs were more likely than nonusers to have been tested or treated for STDs in the last 12 months; the strongest associations were found for cocaine users. In general, drug users also were more likely than nonusers to ever have received a diagnosis of genital herpes, genital warts or syphilis (odds ratios, 2.1–11.6 for men and 1.5–5.6 for women); the exception was that male cocaine users' lifetime prevalence of genital herpes was comparable to that of nonusers. Women who used marijuana were significantly more likely than nonusers to ever have received treatment for PID (1.7).

Among respondents aged 15–24, men who used drugs were more likely than nonusers to think that they would feel less physical pleasure if they used a condom during sex (odds ratios, 1.5 and 1.8 for marijuana and cocaine users, respectively). This association was not present among female respondents. However, all 15–24-year-olds who used drugs—except for female cocaine users—were less likely than nonusers to think that it would be embarrassing to discuss condom use with a new partner (0.4 for each).

Age-Stratified Analyses

Among 15–25-year-old male respondents, marijuana and cocaine users were more likely than nonusers to ever have had vaginal intercourse (84% and 93% vs. 59%), but among older men no such difference was evident (Table 4). Among both young and older women, those who used marijuana and cocaine were more likely than nonusers to ever have had vaginal intercourse; the difference was especially pronounced among young women (85% and 94% vs. 62%). In both age-groups, male and female drug users were, on average, younger at first intercourse and had had more opposite-sex partners ever and in the last 12 months than nonusers.

Young male cocaine users, but not those older than 25, were less likely than nonusers to have used a condom at last vaginal intercourse (odds ratio, 0.5—Table 5, page 170). Among both young and older men, drug users were more likely than nonusers to have had a nonmonogamous partner (2.7–3.7 for young men and 3.5–6.0 for older men) and to have had sex while high on alcohol or drugs (9.6–28.2 and 12.5–14.5). In addition, older men who used marijuana and cocaine, but not their younger counterparts, were more likely than nonusers to have received money or drugs for sex (2.9 and 3.9, respectively). Men in both age-groups who used drugs were more likely than nonusers to have been tested or treated for an STD in the last 12 months (2.1–10.8 for younger men and 2.0–3.8 for older men). Young and older male marijuana users had received diagnoses of genital warts or syphilis more often than nonusers (3.7–5.6 and 2.5–3.9), as had older cocaine users (2.1–12.5). Younger male marijuana users also received diagnoses of herpes more often than nonusers (5.6), although for older users the finding was marginal (2.0).

Both young and older female drug users also exhibited patterns of sexual risk-taking and STD experiences (Table 6, page 170). Current contraceptive use varied little, except that young female cocaine users were more likely than nonusers to be using no contraceptive method rather than a most effective method (odds ratio, 2.7). In both age-groups, women who used drugs were more likely than nonusers to have had sex with a nonmonogamous partner (2.8–5.3 for younger women and 2.9–7.1 for older women) or while high on alcohol or drugs (7.1–24.1 and 10.9–25.5). The odds of exchanging sex for money or drugs were higher among young users of marijuana or cocaine (3.3–12.5) than among nonusers; however, among older women, only cocaine users had higher odds (7.1). Young women who used cocaine were more likely than nonusers to have had a sexual partner who injected drugs (3.1). Having been tested or treated for STDs in the last 12 months was associated with drug use among women in both age-groups (2.3–3.4 for younger women and 2.3–5.6 for older women), as was having a history of genital herpes or genital warts (2.4–8.2 and 1.5–2.7). Having had treatment for PID was associated with marijuana use for both age-groups (1.6 and 1.8). A history of syphilis was strongly associated with drug use among older women (3.6 for marijuana and 6.1 for cocaine), but this association could not be estimated accurately in the younger age-group because of sparse data.

TABLE 4. Percentage of men and women, by age-group and by marijuana or cocaine use in the last 12 months, according to selected reproductive health characteristics

Characteristic	15–25			26–44		
	Neither	Marijuana	Cocaine	Neither	Marijuana	Cocaine
MEN						
Ever had vaginal sex	59	84***	93***	95	95	97
Mean age at first sex	16.4	15.6***	15.5***	17.5	15.9***	15.9***
Lifetime no. of female partners						
0	34	10***	3***	5	5	3
1	21	14**	13	11	2*	2
2–4 (ref)	25	29	24	23	11	9
5–10	13	27**	27*	31	27*	25
≥11	8	21***	32***	30	56***	62***
No. of female partners in last 12 mos.						
0	41	16***	9***	11	11	10
1 (ref)	42	40	40	78	64	54
2	8	19***	14*	4	12***	16***
≥3	9	26***	36***	6	13***	20***
WOMEN						
Ever had vaginal sex	62	85***	94***	96	98*	99*
Mean age at first sex	16.6	15.8***	15.3***	17.8	15.7***	15.1***
Lifetime no. of male partners						
0	30	8***	2***	4	1	0
1	28	18***	8**	22	5**	3
2–4 (ref)	24	35	24	32	15	10
5–10	14	26	34***	30	36***	27**
≥11	4	14***	31***	12	43***	61***
No. of male partners in last 12 mos.						
0	37	14***	4**	11	6	3
1 (ref)	50	44	33	80	68	49
2	8	19***	21***	5	13***	23***
≥3	6	23***	42***	4	12***	26***

*p<.05. **p<.01. ***p<.001. *Note:* Unless otherwise noted, data are percentages. All data are weighted. Differences were assessed by Pearson's chi-square tests or, for mean age at first sex, t tests. ref=reference group.

DISCUSSION

Our results confirm that a substantial proportion of U.S. men and women of reproductive age used illicit drugs in the last year. A greater proportion of marijuana and cocaine users than of nonusers had unfavorable reproductive health characteristics and therefore higher odds of sexual health problems. Some differences in the patterns of reproductive health characteristics appeared between the two age-groups, but most associations between drug use and risky sexual behaviors and experiences with STDs occurred among both young and older men and women.

Although no direct linkage could be proven, marijuana and cocaine users generally began sexual activity earlier than nonusers. This association suggests that the element of risk-taking may explain the link between drug use and many dangerous sexual behaviors, as has been suggested previously.[13,14] Early sexual activity may lead to problems for the individual as well as society: Younger adolescents are less likely than older adolescents to use contraceptives at first vaginal intercourse because of a lack of sexual knowledge. Thus, they are at increased risk for unintended pregnancy.[33] In the United States, approximately 50% of unintended pregnancies end in an induced abortion.[34] Unintended pregnancies ending in an unplanned birth are associated with an increased risk of exposure to behaviors, such as smoking and late initiation of prenatal care, that could jeopardize the health of both mother and child.[35]

Compared with individuals who did not use drugs, both marijuana and cocaine users reported higher numbers of partners of the opposite sex ever and in the last 12 months, which raised their risk of acquiring an STD or a genital human papillomavirus infection. Indeed, these individuals reported a higher lifetime prevalence of genital warts, suggesting an increased exposure to the human papillomavirus;[12] they also were more likely than nonusers to have been tested or treated for STDs in the last year, although it is uncertain which event came first, since the data are cross-sectional. These differences may result from drug users' higher number of sexual partners, as well as other high-risk sexual behaviors, such as exchanging sex for money or drugs. Although published data on STDs among drug users are sparse, the STD prevalence we observed among cocaine users is comparable with the rates reported by Semaan et al.[36]

Drug use overall was not associated with the likelihood of having used a condom at last vaginal intercourse, although young male cocaine users were less likely than young nonusers to have used a condom. Males aged 15–24 who used drugs thought they would feel less physical pleasure if they used a condom during sex, which may explain the lower rates of condom use in this group. This

TABLE 5. Adjusted odds ratios (and 95% confidence intervals) from multivariable logistic regression analyses assessing associations between men's reproductive health outcomes and marijuana or cocaine use in the last 12 months, by age-group

Outcome	15–25		26–44	
	Marijuana	Cocaine	Marijuana	Cocaine
Used condom at last vaginal sex†	0.8 (0.6–1.1)	0.5 (0.3–0.8)	0.9 (0.7–1.2)	1.0 (0.6–1.5)
Risky sexual behaviors in last 12 mos.‡				
Sex with nonmonogamous partner	2.7 (2.0–3.6)	3.7 (2.6–5.4)	3.5 (2.4–5.1)	6.0 (3.7–9.7)
Sex while high on alcohol or drugs	9.6 (7.1–12.9)	28.2 (14.7–54.3)	12.5 (9.0–17.3)	14.5 (7.5–28.3)
Sex with injection-drug user	0.6 (0.2–1.5)	1.0 (0.2–4.0)	1.2 (0.5–2.7)	2.3 (1.0–5.2)
Received money or drugs for sex	2.2 (0.9–5.0)	1.1 (0.2–6.0)	2.9 (1.1–7.6)	3.9 (1.2–12.4)
Experience with STDs				
Tested for STD in last 12 mos.	2.1 (1.5–2.8)	2.5 (1.5–4.2)	2.0 (1.2–3.4)	2.3 (1.2–4.3)
Treated for STD in last 12 mos.	4.6 (2.4–8.7)	10.8 (4.7–24.8)	3.8 (2.0–7.5)	3.4 (1.8–6.2)
Ever had genital herpes	5.6 (1.9–16.4)	4.4 (0.8–25.5)	2.0 (0.9–4.2)	1.0 (0.3–2.9)
Ever had genital warts	3.7 (1.2–11.1)	3.0 (0.6–15.3)	2.5 (1.4–4.7)	2.1 (1.1–4.1)
Ever had syphilis	5.6 (1.2–27.0)	§	3.9 (1.7–9.2)	12.5 (3.6–43.1)

†Based on those who ever had vaginal intercourse. ‡Based on those who reported any female sexual partners in last 12 months. §Could not be estimated reliably because of sparse data. *Notes:* All data are weighted. Odds ratios are adjusted for age at interview, race and ethnicity, level of education, residence and household income. All outcomes are dichotomous.

TABLE 6. Adjusted odds ratios (and 95% confidence intervals) from multivariable logistic regression analyses assessing associations between women's reproductive health outcomes and marijuana or cocaine in the last 12 months, by age-group

Outcome	15–25		26–44	
	Marijuana	Cocaine	Marijuana	Cocaine
Used condom at last vaginal sex†	0.9 (0.7–1.1)	0.7 (0.4–1.2)	0.9 (0.7–1.1)	1.1 (0.6–1.8)
Current contraceptive method				
Most effective (ref)	1.0	1.0	1.0	1.0
Effective	1.2 (0.8–1.9)	1.6 (0.6–4.3)	0.8 (0.6–1.2)	0.8 (0.4–1.4)
Least effective	1.4 (0.9–2.2)	1.8 (0.8–4.2)	0.9 (0.7–1.3)	0.6 (0.3–1.0)
None	1.2 (0.7–2.1)	2.7 (1.2–5.9)	1.4 (0.8–2.2)	0.9 (0.4–1.8)
Inapplicable	0.6 (0.4–0.9)	0.6 (0.2–1.8)	0.8 (0.5–1.1)	0.5 (0.2–1.0)
Risky sexual behaviors in last 12 mos.‡				
Sex with nonmonogamous partner	2.8 (2.1–3.8)	5.3 (3.1–9.0)	2.9 (2.1–4.2)	7.1 (3.8–13.3)
Sex while high on alcohol or drugs	7.1 (5.0–9.9)	24.1 (12.9–44.8)	10.9 (7.5–15.9)	25.5 (14.8–43.8)
Sex with injection-drug user	0.9 (0.4–1.9)	3.1 (1.1–8.8)	0.5 (0.2–1.1)	2.2 (0.6–8.1)
Received money or drugs for sex	3.3 (1.6–6.8)	12.5 (4.4–35.4)	1.5 (0.7–2.9)	7.1 (2.4–21.5)
Experience with STDs				
Tested for STD in last 12 mos.	2.7 (2.1–3.4)	3.4 (2.1–5.4)	2.3 (1.7–3.0)	3.8 (2.0–7.0)
Treated for STD in last 12 mos.	2.3 (1.5–3.8)	3.3 (1.6–6.9)	2.8 (1.8–4.3)	5.6 (2.3–13.5)
Ever had genital herpes	2.4 (1.0–5.6)	4.8 (1.6–14.1)	1.5 (1.0–2.3)	2.7 (1.4–5.1)
Ever had genital warts	4.2 (2.5–7.2)	8.2 (3.9–17.1)	1.9 (1.1–3.0)	2.0 (1.0–4.1)
Ever had syphilis	§	§	3.6 (1.2–11.1)	6.1 (1.9–19.0)
Ever treated for PID	1.6 (1.0–2.7)	2.0 (0.9–4.7)	1.8 (1.2–2.6)	1.8 (0.8–4.0)

†Based on those who ever had vaginal sex. ‡Based on those who reported any male sexual partners in last 12 months. §Could not be estimated reliably because of sparse data. *Notes:* All data are weighted. Odds ratios are adjusted for age at interview, race and ethnicity, level of education, place of residence and household income. ref=reference group. PID=pelvic inflammatory disease. All outcomes except current contraceptive method are dichotomous.

supposition should be tackled in STD prevention programs to increase condom use. Our finding that young people who use drugs are less likely to be embarrassed discussing condom use with a new partner suggests that increasing condom use is an attainable goal. Why the odds of using no contraceptive method were elevated among young female cocaine users remains a question, but efforts should be made to reduce this difference.

Our results suggest that marijuana and cocaine use may serve as proxies for past and current sexual behaviors that increase the risk of unintended pregnancies and STDs throughout the reproductive age span. Integrating sex education into drug rehabilitation programs could help to decrease the prevalence of risky sexual behaviors among participants and lead to major public health improvements. In fact, HIV interventions in drug treatment programs have led to clinically relevant reductions in risk behaviors, especially when the intensity of the intervention has been high (i.e., practicing rather than describing condom use skills) and the intervention has been delivered near the end of drug treatment.[37–39] However, in the United States, only about half of substance abuse treatment programs exclusively for adolescents have adopted HIV risk assessment and prevention services.[40]

Future research should examine the associations between drug use and sexual risk-taking so that tailored and more effective prevention programs can be developed. Research also should target associations between drug use and reproductive health, to support the prevention of problems, such as diminished fertility and negative pregnancy outcomes.

Limitations

This study has several limitations. The cross-sectional design made it impossible to determine the order of events or to address causality. Additionally, self-reported illicit drug use leads to misclassification, since some respondents falsely deny drug use for fear of prosecution or judgment.[41] However, using ACASI to collect data on drug use and other sensitive topics presumably yielded more reliable results than personal interviews would have.[42] Computer-assisted modes of data collection are probably the best methods for collecting data on illicit drug use in the absence of biological sampling. The reproductive health characteristics of injection-drug users could not reliably be estimated because of the low prevalence of reported use. Because the NSFG did not assess medical records or clinical documentation, data on STD testing and treatment were susceptible to misclassification bias as well, although the degree of underreporting of having received STD services may have been decreased substantially through the use of ACASI.[43] Finally, we could not study associations between drug use and unintended pregnancies and induced abortions, as only 60% of induced abortions were reported in the NSFG.[44]

Conclusions

Many U.S. men and women throughout the reproductive age range use illicit drugs, and the prevalence of risky sexual behaviors is elevated among those who do. Thus, STD prevention programs for people who use drugs should span the reproductive years and not focus solely on adolescence or young adulthood. At the same time, these programs may consider creating age-specific mes-

sages, since patterns of reproductive health characteristics, including sexual risk-taking, differed slightly by age-group. Interventions should target the prevention of STDs and HIV; they also should target preventing pregnancies among drug users, especially unintended pregnancies, since prenatal exposure to illicit drugs may be detrimental to the health of both mother and child.

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