

The Relationship of Substance Use to Sexual Activity Among Young Adults in the United States

By Karen L. Graves and Barbara C. Leigh

Data on substance use and sexual activity from a nationally representative, probability-based sample of young adults aged 18–30 in 1990 indicate that 86% of respondents had had sex in the previous 12 months, with three-fourths reporting no more than one sexual partner. Seventy-five percent of respondents had consumed alcohol in the past 12 months, 40% had smoked cigarettes and 20% had used marijuana. After adjustment for demographic factors, both sexual activity and a history of multiple partners were positively associated with some measures of substance use. Respondents who drank more frequently, those who were heavy drinkers, those who smoked cigarettes and those who used marijuana in the past year were more likely than others to be sexually active. Those who consumed five or more drinks at a sitting and those who used marijuana were more likely than others to have had more than one sexual partner. Heavy drinkers were also less likely to use condoms; however, the results showed no association between having sex under the influence of alcohol and engaging in unsafe sexual practices.

(Family Planning Perspectives, 27:18–22 & 33, 1995)

Sexual behavior is a key element in the transmission of human immunodeficiency virus (HIV) and AIDS. The use of alcohol or other drugs has been proposed as a contributing factor to sexual risk-taking. Because alcohol and drugs are thought to interfere with judgment and decision-making, it has been suggested that their use in conjunction with sexual activity might increase the probability that risky behavior will occur.¹

A number of studies have suggested a link between substance use and sexual behavior; people who drink more heavily are more likely to have multiple partners and less likely to use condoms. However, because many of these studies have consisted of convenience samples or have suffered from methodological inconsistencies, they have resulted in contradictory findings.² Study populations have been recruited from a variety of sources, including bars and bath houses,³ advertisements⁴ and gay organizations.⁵

Because such samples may not be representative of the general population of homosexuals or heterosexuals, these studies are limited in terms of their generalizability, not only in terms of prevalence estimates

of sexual behavior or substance use, but also in assessments of the relationship between the two. For example, samples recruited from bars might contain a larger proportion of people who regularly combine substance use and sex, or who engage in more risky sex in general, thus leading to an inflated estimate of the relationship of substance use to high-risk sex. Indeed, some studies have demonstrated a significant positive association between the frequency of bar-going and level of high-risk sex.⁶ Although there have been some analyses of substance use and sexual activity in the general population,⁷ only one study⁸ has included detailed measures of “safe” and “unsafe” sexual behavior and substance use.

Research on substance use and high-risk sex has also used a variety of measurement strategies. For example, risky sexual behavior has been conceptualized as the frequency of unprotected anal intercourse,⁹ the number of sexual partners,¹⁰ the general level of condom use¹¹ or a summary risk variable constructed from a number of types of behavior.¹² In some studies, alcohol use has not been distinguished from drug use;¹³ in others, alcohol and drug use has been defined as the number of substances used¹⁴ or has been measured using detailed quantity-frequency measures.¹⁵

This article examines the relationship between substance use and sexual behavior—in particular, types of behavior that may result in an increased risk of HIV—in a representative sample of young adults

aged 18–30. The focus of this research is on young adults because as a group they report high levels of both sexual activity and alcohol use. This study is part of a project designed to examine the link between drinking and sexual activity in a variety of populations.¹⁶

Methods

Subjects and Procedures

Data were collected as part of the 1990 National Alcohol Survey, a multistage area probability sample of the adult population of the 48 contiguous states within the United States. Field work for the survey was conducted by the Institute for Survey Research at Temple University between January and July 1990. The sample consisted of 5,970 randomly selected housing units in 100 primary sampling units.

Participants were selected using two different screening criteria. Approximately 55% (3,277) of the housing units were assigned a screening form that allowed one adult 18 years of age or older to be selected. Of these, 586 contained a respondent aged 18–30; 494 interviews were completed, for a response rate of 84%. The other 45% (2,693) of housing units were assigned a screening form that permitted one 12–30-year-old to be eligible for selection. In this sample, 627 of occupied housing units contained an eligible respondent aged 18–30, and 512 interviews were completed, for a response rate of 82%. In total, 1,006 interviews were obtained, for an overall response rate of 83%.

All interviews were conducted in person by an experienced survey interviewer. Detailed information was collected on alcohol and drug use, abuse and dependency. To minimize the reluctance of respondents to answer queries on sexual behavior, those questions were contained in a 20-page self-administered questionnaire. Respondents filled out this booklet themselves and placed it in a sealed envelope that was collected by the interviewer.

Materials

The interview instrument included sections on demographics, drinking habits, drug use and sexual behavior; only items relevant to our analysis are described here.

Karen L. Graves is a scientist and Barbara C. Leigh is a senior scientist with the Alcohol Research Group, California Pacific Medical Center Research Institute, Berkeley, Calif. The research described in this article was supported by Grant #AA08564 from the National Institute of Alcohol Abuse and Alcoholism to the California Pacific Medical Center Research Institute.

•*Demographics.* Standard demographic measures included gender, age, ethnicity, marital status and educational level.*

•*Drinking habits.* A summary measure for the frequency of drinking alcohol in the past year was derived from a set of questions that queried the respondent about consumption of beer, wine and liquor; the categories ranged from never to three or more times per day.

The frequency with which the respondent drank five or more drinks at one sitting was derived from two questions: The first asked about the frequency of alcohol use in the past year, and the second asked how often five or more drinks were consumed per occasion, with categories ranging from "never" to "nearly every time." (These questions were asked separately for beer, wine and liquor.)

In addition, respondents were asked how often they drank enough to feel drunk, with response categories ranging from "never" to "every day or nearly every day."

•*Drug use.* Respondents were asked how often in the previous year they had used a variety of legal and illegal drugs, such as amphetamines, cocaine or crack, depressants, heroin, methadone, opiate-based painkillers, marijuana, hallucinogens, cigarettes, and other kinds of tobacco. Response categories ranged from "never" to "once a week or more often."

•*Sexual activity.* Respondents were asked whether they had ever had sexual intercourse and whether they had had intercourse in the past year. Other items asked respondents to indicate their number of sexual partners, frequency of intercourse and frequency with which they had had sex in the previous year while under the influence of alcohol, as well as to indicate their self-identified sexual orientation.

•*Frequency of condom use.* These questions asked how often a respondent had used a condom during intercourse in the past year and how often in the past year the respondent had used a condom when having sex under the influence of alcohol ("not at all," "less than half the time," "about half the time," "more than half the time," "nearly every time" and "every time"). These items were presented twice, once with reference to the primary sexual partner (defined as a "partner to whom you are married or someone to whom you feel committed above anyone else") and a second time with reference to nonprimary sexual partners (defined as "someone you have had sex with other than a primary partner. This could include casual acquaintances, new partners, one-night stands, sex for pay, etc.").

Weighting

Percentages reported in this article are based on a weighting of the sample to attain a distribution of 18–30-year-olds representative of the 1990 national population. Because all housing units were selected with equal probability, it was not necessary to compensate with weights for unequal probabilities of selection of housing units. However, unequal probabilities of selection were introduced during the process of selecting members of individual housing units. The final weights compensated for the selection process and also included a poststratification weight based on a comparison of the sample to census data. The numbers reported in this article are based on the unweighted sample.

Statistical Analysis

The statistical methods consisted primarily of chi-square test procedures and logistic regression techniques. The Pearson chi-square statistic was used to assess simple bivariate relationships between substance use and gender and between substance use and sexual behavior.

Logistic regression techniques were first used to describe the association between the measures of sexual behavior (sexual activity in the past year, intercourse with multiple partners and condom use) and each of the substance-use variables (frequency of drinking, consumption of five or more drinks, drinking to intoxication, cigarette smoking and marijuana use), after adjusting for the effects of demographic variables, gender, age and marital status. (The adjusted associations between substance use and sexual behavior are likely to be confounded because the substance use variables were highly intercorrelated.)

Second, a logistic regression model was constructed for each of the three sexual behavior variables; these included demographic factors, cigarette and marijuana use, and two of the drinking variables—the frequency of alcohol consumption and heavy use of alcohol (five or more drinks per drinking occasion). No significant interactions were found in analyses where age, sex and marital status were allowed to interact with the substance-use variables.

Results

Sample Characteristics

Of the 1,006 individuals interviewed, 16 did not complete the self-administered questionnaire on sexual activity and another 16 were missing data on 17 or more of the 19 questions on current sexual activity. Compared with those with more

Table 1. Percentage distributions of U.S. adults aged 18–30, by measure of substance use over the preceding year, according to sex

| Substance use | All (N=974) | Men (N=426) | Women (N=548) |
|---------------------------------|-------------|-------------|---------------|
| Drinking | | | |
| Not in past year | 24.8 | 21.9 | 27.7*** |
| <monthly | 15.4 | 9.7 | 20.9 |
| Monthly | 25.9 | 22.4 | 29.2 |
| Weekly | 33.9 | 46.0 | 22.3 |
| Heavy drinking† | | | |
| Not in past year | 52.0 | 38.9 | 64.7*** |
| <monthly | 33.0 | 38.5 | 27.6 |
| ≥monthly | 15.0 | 22.6 | 7.7 |
| Drinking to intoxication | | | |
| Not in past year | 48.6 | 42.1 | 54.9*** |
| <monthly | 21.9 | 20.4 | 23.4 |
| ≥monthly | 29.4 | 37.5 | 21.7 |
| Cigarette use | | | |
| Not in past year | 57.5 | 57.3 | 57.7 |
| <monthly | 6.1 | 5.3 | 6.9 |
| ≥monthly | 36.4 | 37.5 | 35.4 |
| Marijuana use | | | |
| Not in past year | 79.1 | 70.5 | 87.5*** |
| <monthly | 13.6 | 18.3 | 9.1 |
| ≥monthly | 7.2 | 11.2 | 3.4 |
| Total | 100.0 | 100.0 | 100.0 |

***Difference between men and women is statistically significant at $p < .0001$. †In this and subsequent tables, heavy drinking is defined as the consumption of five or more drinks on at least one occasion in the preceding year.

complete data from the self-administered questionnaire, nonrespondents were more likely to be male, nonwhite, married, less educated and slightly older than respondents. There were no significant differences in demographic characteristics between the sample as a whole and the portion of the sample with more complete data. Thus, all analyses in this article are based on the 974 respondents who answered the sexual behavior questionnaire.

The sample of 974 respondents consisted of equal proportions of men and women; the mean age was 24.2 among the men and 24.4 among the women. The majority of respondents were white (72%), while 14% were black, 11% were Hispanic and 3% were of some other ethnicity. Nineteen percent had not completed high school, 44% had received a high school education and 37% reported having attended or graduated from college. There was a significant gender difference in marital status: Sixty-one percent of the men had never been married, compared with 43% of the women; similar proportions of men and women were separated or divorced (9% each).

*There were too few black and Hispanic respondents to permit meaningful comparisons to be made in this article. In addition, there were few significant variations by educational level, so this variable was also omitted from subsequent analyses.

Item nonresponse for the measures of current sexual behavior ranged from 4% for the question “Have you ever had sexual intercourse?” to 14% for the item “How often did you use a condom when you had sex (with a primary partner) while under the influence of alcohol?” Although such moderate levels of nonresponse present a problem for prevalence estimates, item nonresponse in this study was no higher than in other surveys that used self-administered questionnaires.¹⁷

Sexual Behavior

Ninety-seven percent of the sample reported that they were heterosexual. The majority (86%) had been sexually active in the previous 12 months; a small percentage (3%) said they had had sex in the past but were celibate in the previous year, and a larger percentage (11%) had never had intercourse. Approximately three-fourths of respondents had had either no partner or one partner in the past year. Men were more likely than women to have had multiple partners (32% of men vs. 16% of women), and a higher proportion of men than women (6% vs. 1%) said they had had five or more partners in the past year. Among sexually active respondents, 74% had had intercourse at least weekly, with 10% indicating they had had sex daily.

Drinking and Drug Use

The sample’s drinking and drug use patterns are shown in Table 1 (page 19). Use of alcohol in this age-group was high: Approximately 75% of the sample had used alcohol in the past year, 15% reported having had five or more drinks per occasion at least monthly, and 29% reported having drunk to intoxication at least monthly. The drinking patterns observed in this study are comparable to other recent estimates of alcohol consumption in this age-group.¹⁸

Cigarette smoking was reported by more than 40% of the sample, and marijuana (the most widely used illicit drug) had been used in the past year by 20% of respondents. The prevalence estimates for smoking and marijuana use are comparable to estimates obtained from a 1988 national household survey.¹⁹ Approximately 8% of respondents had used cocaine in the previous 12 months, and 3% had used hallucinogens (not shown). In general, with the exception of smoking, men reported more frequent substance use than women—a higher frequency of alcohol use, of heavy drinking and of drinking to intoxication, as well as greater use of marijuana.

Table 2. Percentage of respondents who had sexual intercourse or had two or more partners, and odds ratios after adjustment for demographic variables, by history of substance use

| Substance use | Bivariate analysis | | | | Multivariate analysis | | | |
|-----------------------|--------------------|------|-------------|------|-----------------------|--------------------|-------------|--------------------|
| | Sexual activity | | ≥2 partners | | Sexual activity | | ≥2 partners | |
| | N | % | N | % | Odds ratio | 95% conf. interval | Odds ratio | 95% conf. interval |
| Alcohol use | | | | | | | | |
| Never | 240 | 68.2 | 229 | 10.3 | 1.0 | ref | 1.0 | ref |
| <weekly | 420 | 88.9 | 408 | 19.2 | 3.9 | 2.43, 6.12 | 2.7 | 1.61, 4.51 |
| ≥weekly | 312 | 93.3 | 300 | 39.9 | 9.7 | 5.58, 16.88 | 5.6 | 2.36, 9.20 |
| Heavy drinking | | | | | | | | |
| Never | 526 | 77.7 | 502 | 11.3 | 1.0 | ref | 1.0 | ref |
| Sometimes | 448 | 93.5 | 436 | 37.5 | 6.5 | 4.10, 10.28 | 4.1 | 2.89, 5.94 |
| Intoxication | | | | | | | | |
| Never | 477 | 75.6 | 455 | 12.4 | 1.0 | ref | 1.0 | ref |
| Sometimes | 486 | 94.5 | 472 | 35.1 | 7.6 | 4.80, 12.19 | 3.7 | 2.59, 5.31 |
| Cigarette use | | | | | | | | |
| Never | 553 | 79.6 | 529 | 18.0 | 1.0 | ref | 1.0 | ref |
| Sometimes | 418 | 93.1 | 406 | 32.1 | 4.2 | 2.67, 6.62 | 2.4 | 1.71, 3.31 |
| Marijuana use | | | | | | | | |
| Never | 789 | 82.6 | 755 | 16.4 | 1.0 | ref | 1.0 | ref |
| Sometimes | 183 | 95.7 | 181 | 52.3 | 8.1 | 3.94, 16.69 | 4.3 | 3.02, 6.23 |

Note: All odds ratios shown are statistically significant at p<.001. In the calculation of odds ratios, each substance-use variable was adjusted for gender, age and being in a current relationship. ref=reference category.

Substance Use and Sexual Behavior

For analyses of the relationship of drinking to sexual behavior, most substance-use variables were coded to indicate whether the behavior was present or absent in the past year; the one exception was frequency of alcohol use, which was coded to indicate no use, less frequent (less than weekly) and frequent (at least weekly) use.

Bivariate analyses show that respondents who drank frequently, who reported often having five or more drinks per occasion and who sometimes drank to intoxication were more likely than the others to have had sex in the past year (Table 2), and were also more likely to have had two or more sexual partners in the past year. For example, 93% of those who drank at least weekly had had intercourse in the past year, compared with 68% of those who did not drink; similarly, 40% of those who drank at least weekly had had two or more partners, compared with 10% of those who did not drink. Likewise, respondents who smoked cigarettes and who used marijuana were more likely than those who did not to have had sex and to have had more than one partner.

After adjusting for age, gender and marital status, we still could observe strong positive associations between current sexual activity and all of the substance-use variables, and also between the likelihood of multiple sexual partners and the substance-use variables (Table 2). Those who used alcohol, cigarettes or marijuana, who were heavy drinkers or who drank to intoxication were 4–8 times as likely as oth-

ers to have been sexually active, and were 2–6 times as likely to have had more than one partner in the past year.

We observed no clear bivariate associations between substance use and the practice of consistent condom use (Table 3). However, the prevalence of consistent condom use (defined as always having used a condom with either a primary or a non-primary partner) among those sexually active in the past year was low (9%). After controlling for age, gender and marital sta-

Table 3. Percentage of respondents who had practiced consistent condom use in the past year, and odds ratios after adjustment for demographic variables, by history of substance use

| Substance use | N | % | Odds ratio | 95% conf. interval |
|-----------------------|-----|------|------------|--------------------|
| Alcohol use | | | | |
| Never | 174 | 10.6 | 1.0 | ref |
| <weekly | 378 | 6.4 | 0.5 | 0.27, 1.01 |
| ≥weekly | 293 | 9.7 | 0.8 | 0.40, 1.47 |
| Heavy drinking | | | | |
| Never | 429 | 9.9 | 1.0 | ref |
| Sometimes | 417 | 7.1 | 0.5* | 0.31, 0.89 |
| Intoxication | | | | |
| Never | 378 | 9.4 | 1.0 | ref |
| Sometimes | 459 | 7.8 | 0.7 | 0.41, 1.13 |
| Cigarette use | | | | |
| Never | 453 | 9.4 | 1.0 | ref |
| Sometimes | 391 | 7.3 | 0.7 | 0.92, 2.58 |
| Marijuana use | | | | |
| Never | 670 | 8.7 | 1.0 | ref |
| Sometimes | 175 | 7.6 | 0.7 | 0.35, 1.24 |

*Odds ratio is significantly different from 1.0 at p<.05. Note: Consistent condom use is defined as the use of a condom at each act of intercourse in the past year. In the calculation of odds ratios, each substance-use variable was adjusted for gender, age and being in a current relationship. ref=reference group.

tus, we found that condom use was negatively associated with heavy drinking: Those who sometimes consumed five or more drinks in one sitting were about half as likely as those who never drank that much to have been consistent condom users (an odds ratio of 0.5).

Logistic regression models were used to adjust for demographic covariates and to assess the independent effects of the substance use measures after accounting for joint effects. As can be seen in Table 4, when substance-use variables (cigarette, marijuana and alcohol use, and heavy drinking) were included in the model, we found that those who drank more frequently, those who were heavy drinkers, those who smoked cigarettes and those who used marijuana were all at least 2–3 times as likely as others to have been sexually active. The likelihood of having had multiple partners was twice as great among those who were heavy drinkers and approximately three times as great among those who used marijuana. Finally, the negative relationship between condom use and heavy drinking—less consistent use among heavy drinkers—persisted when other substance-use variables were included in the model.

Among the demographic variables, gender, relationship status and age all were important predictors of sexual behavior. As might be expected, sexual activity was highly associated with the availability of a sexual partner. The likelihood of having had multiple partners was significantly associated with being male and not being in a relationship. Finally, condom use was significantly related to having no regular sexual relationship and to being younger than 25 which may indicate a greater acceptance of condoms among younger age-groups.

Sex, Drinking and Condom Use

The belief that drinking at the time of sexual activity may interfere with judgment and decrease the likelihood of condom use is supported by the negative association we have observed between heavy drinking and consistent condom use, although there is no assurance that substance use and condom nonuse occurred on the same occasions. It is important, therefore, to investigate the relationship between condom use and drinking at the time of sexual activity.

We conducted two analyses to address this issue. In the first, we calculated a measure of the proportion of acts of intercourse that took place under the influence of alcohol, by dividing the estimated number of times respondents had sex under the influence of alcohol in the previous 12 months by the estimated total number of

Table 4. Odds ratios showing likelihood of three types of sexual behavior, by substance use and demographic characteristics

| Substance use and characteristic | Sexual activity† | | ≥2 partners‡ | | Condom use‡ | |
|----------------------------------|------------------|--------------------|--------------|--------------------|-------------|--------------------|
| | Odds ratio | 95% conf. interval | Odds ratio | 95% conf. interval | Odds ratio | 95% conf. interval |
| SUBSTANCE USE | | | | | | |
| Alcohol use | | | | | | |
| Never | 1.0 | ref | 1.0 | ref | 1.0 | ref |
| <weekly | 2.6*** | 1.55, 4.48 | 1.5 | 0.78, 1.82 | 0.7 | 0.74, 1.49 |
| ≥weekly | 3.4*** | 1.66, 7.07 | 1.9 | 0.97, 3.69 | 1.5 | 0.68, 3.50 |
| Heavy drinking | | | | | | |
| Never | 1.0 | ref | 1.0 | ref | 1.0 | ref |
| Sometimes | 2.1* | 1.10, 3.85 | 2.2** | 1.32, 3.53 | 0.5* | 0.25, 0.95 |
| Cigarette use | | | | | | |
| Never | 1.0 | ref | 1.0 | ref | 1.0 | ref |
| Sometimes | 2.2** | 1.35, 3.74 | 1.4 | 0.97, 2.04 | 0.7 | 0.42, 1.26 |
| Marijuana use | | | | | | |
| Never | 1.0 | ref | 1.0 | ref | 1.0 | ref |
| Sometimes | 3.5*** | 1.63, 7.50 | 2.8*** | 1.87, 4.10 | 0.8 | 0.40, 1.52 |
| DEMOGRAPHIC | | | | | | |
| Gender | | | | | | |
| Male | 1.0 | ref | 1.0 | ref | 1.0 | ref |
| Female | 1.2 | 0.79, 1.94 | 0.7* | 0.47, 0.98 | 1.0 | 0.56, 1.68 |
| Relationship status | | | | | | |
| Has no partner | 1.0 | ref | 1.0 | ref | 1.0 | ref |
| Has partner | 37.1*** | 12.6, 109.4 | 0.2*** | 0.12, 0.30 | 0.5* | 0.28, 0.93 |
| Age | | | | | | |
| <25 | 1.0 | ref | 1.0 | ref | 1.0 | ref |
| ≥25 | 1.1*** | 1.04, 1.17 | 1.0 | 0.92, 1.04 | 0.9* | 0.85, 0.99 |

*Odds ratio is significantly different from 1.0 at $p \leq .05$. **Odds ratio is significantly different from 1.0 at $p \leq .01$. ***Odds ratio is significantly different from 1.0 at $p \leq .001$. †In full sample. ‡In those sexually active. Note: ref=reference category.

times they had intercourse in the same time period. The level of alcohol use in conjunction with sex was higher among respondents who had more than one partner in the past year than among those with one partner only (28% of sex acts involving alcohol, compared with 12%).

This variable was then entered into a logistic regression model of consistent condom use; we tested the model separately for respondents with one sexual partner and for those with two or more partners. The proportion of times the respondent had sex under the influence of alcohol was positively associated with condom use, such that those who reported more episodes of sex while under the influence of alcohol were more likely to use condoms. This association was statistically significant ($p < .01$) for those with a single partner in the previous year and approached significance ($p = .06$) for those with more than one partner.

The second analysis utilized data regarding drinking and condom use with primary and nonprimary partners. Two comparisons were made. The first, a between-group analysis, compared condom use among those who said they had engaged in sex in the past year while under the influence of alcohol with condom use among those who had not used alcohol in

conjunction with sex. The results revealed no significant difference in overall levels of consistent condom use either with the primary partner (10.4% always using a condom under the influence of alcohol vs. 11.5% always using one when they had not been drinking) or in condom use with nonprimary partners (21.1% vs. 19.3%).

The second, a within-group analysis, examined whether condom use differed between sexual encounters in which drinking occurred and all sexual encounters. (This analysis was limited to 388 individuals who had had sex with a primary partner both under the influence and not under the influence of alcohol, and to 108 respondents who had had sex with nonprimary partners under such conditions.)

Condom use was consistently about twice as high when a nonprimary partner was involved than with the primary partner. When matched-pairs analyses (McNemar's test) were performed separately for condom use with primary and nonprimary partners, however, there were no statistically significant differences in condom use between situations that involved alcohol and all sexual encounters, either with the primary partner (10.7% in encounters involving alcohol vs. 10.4% in all encounters) or with nonprimary partners (19.4% vs. 21.1%). Among respondents with non-

primary partners, 95% who did not use condoms consistently when drinking were also nonusers of condoms in general, while 80% of consistent users in general were also consistent users when drinking.

Discussion

The findings of this analysis indicate that sexual activity in the past year was positively associated with alcohol and other drug use, and, with the exception of heavy drinking, most of these associations persisted after we adjusted for the effects of other substance-use variables. Fewer statistically significant associations remained, however, among those with multiple sexual partners: Those who reported having five or more drinks in one sitting and those who had used marijuana in the past year were more likely than others to have had more than one partner in the past year. These two behaviors could be considered indicators of a general lifestyle characterized by a tendency towards risk-taking or sensation-seeking activities.²⁰

When condom use (be it for contraception or for protection from sexually transmitted diseases) was considered, only those who drank more heavily reported less consistent use of condoms. This observation lends support to the suggestion that alcohol may inhibit the practice of safe sex. However, our results do not demonstrate whether substance use has a direct causal effect on the practice of using condoms. For example, people who are heavier substance users may be more likely to have high-risk sex (i.e., use condoms inconsistently), but do so mostly when they have not been drinking.²¹

Indeed, analyses directed at examining the association between condom use and substance use during the sexual encounter do not support the negative association between heavy drinking and condom use. Instead, we observed a positive association between condom use and the likelihood of having sex while under the influence of alcohol, indicating that respondents who had a greater number of sexual encounters under the influence of alcohol were more likely to use condoms than were others. Since drinking often takes place in settings where potential sexual partners are available, such situations may encourage individuals to be prepared to practice safe sex.

Our analysis focused only on alcohol use and did not consider the use of other drugs in conjunction with sexual behavior. However, we could not establish whether alcohol use and condom use took place on the same occasion—that is, we cannot know

from the data whether the times when an individual used alcohol and had sex were the same times when that individual engaged in protected sexual behavior.

Likewise, no differences in condom use (whether with a primary or a nonprimary partner) were observed between sexual encounters in general and encounters that included alcohol. It appears that individuals were either condom users or nonusers, and that alcohol may not have affected this use. We should note here, however, that in this age-group, the proportion of respondents who always used a condom was very low, with estimates ranging from 9% to 21%, depending on the subgroup analyzed. (This level was higher than has been reported among older adults, however.²²) The analysis as performed may possibly mask some sex differences in condom use, because women reported much lower frequency of use of condoms in conjunction with alcohol use.

Findings somewhat different from ours were obtained in an earlier study that explored the relationship between substance use and unsafe sexual behavior in a nationally representative sample of adults aged 18 and older.²³ Our results indicate that substance-use variables were more strongly related to measures of current sexual activity and multiple partners, possibly indicators of a general lifestyle, than to measures of condom use. The earlier study found no relationship between the frequency of alcohol use and condom use with nonprimary partners, while we have found a positive relationship. These differences may in part reflect that 18–30-year-olds are more sexually active, are more likely to use alcohol and drugs and to use them in conjunction with sex, are more aware of the disinhibiting effects of substance use, and are therefore more likely to protect themselves by using condoms.

Several limitations of this research should be noted. First, because the questionnaire was specifically designed to examine substance use, unsafe sex and the relationship between the two, the questionnaire items focused largely on a specific measure of situational risk—condom use. Other possible risk factors, such as trading sex for drugs or having sex with HIV-infected partners, were not assessed. Second, representative population samples such as that used in this study consist largely of low-risk individuals, with few drug users, homosexuals or people with multiple sexual partners.²⁴ Even though the analysis was limited to young adults, a group characterized by greater alcohol and drug use and greater variability in sexual behavior, only a few in-

dividuals had multiple partners or used condoms consistently, making statistical inference problematic.

In conclusion, this article describes one of the few studies to examine substance use and unsafe sexual activity in a representative sample of young adults using detailed measures of each type of behavior. Despite its limitations, it provides an important extension of previous research conducted on convenience samples. The results indicate that substance use and sexual activity are correlated. When condom use is examined in a situational context involving both alcohol and sex, though, the findings do not support the proposition that drinking during intercourse promotes unsafe sex. However, one must be cautious in interpreting these results, because no causal influence of substance use on sexual activity can be inferred from the data.

References

1. J. Howard et al., "An Overview of Prevention Research: Issues, Answers, and New Agendas," *Public Health Reports*, 103:674–683, 1988; and Public Health Service, *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*, U.S. Department of Health and Human Services (DHHS), Washington, D.C., 1991.
2. B. C. Leigh and R. Stall, "Substance Use and Risky Sexual Behavior for Exposure to HIV: Issues in Methodology, Interpretation and Prevention," *American Psychologist*, 48:1035–1045, 1993.
3. R. Stall et al., "Alcohol and Drug Use During Sexual Activity and Compliance with Safe Sex Guidelines for AIDS Behavioral Research Project," *Health Education Quarterly*, 13:359–371, 1986.
4. D. J. McKirnan and P. L. Peterson, "AIDS-Risk Behavior Among Homosexual Males: The Role of Attitudes and Substance Use," *Psychology and Health*, 3:161–171, 1989; and K. Siegel et al., "Factors Distinguishing Homosexual Males Practicing Risky and Safer Sex," *Social Science and Medicine*, 28:561–569, 1989.
5. J. L. Martin, "Drug Use and Unprotected Anal Intercourse Among Gay Men," *Health Psychology*, 9:450–465, 1990.
6. T. Rueffli, O. Yu and J. Barton, "Sexual Risk Taking in Smaller Cities: The Case of Buffalo, New York," *Journal of Sex Research*, 29:95–108, 1992.
7. L. B. Cottler, J. E. Helzer and J. E. Tipp, "Lifetime Patterns of Substance Abuse Among General Population Subjects Engaging in High Risk Sexual Behaviors: Implications for HIV Risk," *American Journal of Drug and Alcohol Abuse*, 16:207–222, 1990; D. A. Parker, T. C. Harford and I. M. Rosenstock, "Alcohol, Other Drugs and Sexual Risk-Taking Among Young Adults in the United States," paper presented at the Annual Epidemiology Symposium of the Kettil Bruun Society, Budapest, Hungary, June 3–8, 1990; and B. C. Leigh, "The Relationship of Alcohol and Drug Use to Sexual Activity in a U.S. National Sample," paper presented at the 36th International Congress on Alcohol and Drug Dependence, Glasgow, Scotland, Aug. 16–21, 1992.
8. Ibid.
9. J. McCusker et al., "Predictors of AIDS-Preventive Behavior Among Homosexually Active Men: A Longitudinal Study," *Journal of Sex Research*, 29:109–118, 1992. (continued on page 33)

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(continued from page 22)

dinal Study," *AIDS*, 3:443-448, 1989.

10. D. J. McKirnan and P. L. Peterson, 1989, op. cit. (see reference 4).

11. R. W. Hingson et al., "Beliefs About AIDS, Use of Alcohol and Drugs, and Unprotected Sex Among Massachusetts Adolescents," *American Journal of Public Health*, 80:295-299, 1990.

12. A. Biglan et al., "Social and Behavioral Factors Associated with High-Risk Sexual Behavior Among Adolescents," *Journal of Behavioral Medicine*, 13:245-261, 1990.

13. J. A. Kelly, J. S. St. Lawrence and T. L. Brasfield, "Predictors of Vulnerability to AIDS Risk Behavior Relapse," *Journal of Consulting and Clinical Psychology*, 59:163-166, 1991.

14. S. G. Ostrow et al., "Recreational Drug Use and Sexual Behavior Change in a Cohort of Homosexual Men," *AIDS*, 4:749-765, 1990.

15. B. C. Leigh, 1992, op. cit. (see reference 7); and M. Temple and B. C. Leigh, "Alcohol Consumption and Unsafe Sexual Behavior in Discrete Events," *Journal of Sex Research*, 29:207-219, 1992.

16. B. C. Leigh, 1992, op. cit. (see reference 7); M. Temple and B. C. Leigh, 1992, op. cit. (see reference 15); B. C. Leigh, "The Relationship of Substance Use During Sex to High-Risk Sexual Behavior," *Journal of Sex Research*,

27:199-213, 1990; and M. Temple, "Patterns of Sexuality in a High-Risk Sample: Results from a Survey of New Intakes at a County Jail," *Archives of Sexual Behavior*, 22:111-129, 1993.

17. T. Smith, "A Methodological Review of the Sexual Behavior Questions on the 1988 and 1989 GSS," General Social Survey Methodological Report No. 5, National Opinion Research Center, University of Chicago, 1989.

18. L. Midanik and W. B. Clark, "The Demographic Distribution of U. S. Drinking Patterns in 1990: Descriptions and Trends from 1984," *American Journal of Public Health*, 84:1218-1222, 1994.

19. National Institute on Drug Abuse, *National Household Survey on Drug Abuse: Main Findings 1988*, DHHS, Washington, D. C., 1990.

20. E. M. Adlaf and R. G. Smart, "Risk-Taking and Drug-Use Behaviour: An Examination," *Drug and Alcohol Dependence*, 11:287-296, 1983; and M. Zuckerman, *Sensation Seeking: Beyond the Optimal Level of Arousal*, Lawrence Erlbaum Associates, Hillsdale, N. J., 1979.

21. B. C. Leigh and R. Stall, 1993, op. cit. (see reference 2).

22. B. C. Leigh, M. Temple and K. Trocki, "Sexual Behavior of American Adults: Results from a U. S. National Survey," *American Journal of Public Health*, 83:1400-1408, 1993.

23. B. C. Leigh, 1992, op. cit. (see reference 7).

24. B. C. Leigh, M. Temple and K. Trocki, 1993, op. cit. (see reference 22); and T. W. Smith, "Adult Sexual Behavior in 1989: Number of Partners, Frequency of Intercourse and Risk of AIDS," *Family Planning Perspectives*, 23:102-107, 1991.