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Sexual Partnership Patterns as a Behavioral Risk Factor For Sexually Transmitted Diseases

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Context: Women's and men's number of sexual partners and protective practices such as condom use can have a direct effect on their risk of contracting sexually transmitted diseases (STDs), including HIV.

Methods: The 1988 and 1995 cycles of the National Survey of Family Growth and five rounds of the General Social Survey conducted from 1988 to 1996 are used to examine women's and men's numbers of recent sexual partners. Levels of direct risk for STDs (two or more partners in the past year) and the social and demographic correlates of multiple partnership are analyzed among women and men. In addition, women's indirect risk for STDs (their partners' involvement with other partners in the past year) is used to estimate their overall risk of STDs through multiple partnerships.

Results: At least three-quarters of sexually active U.S. women and men in the late 1980s and mid-1990s had had only one sexual partner in the preceding 12 months. Moreover, there is no indication that the proportion with more than one partner in the past year changed substantially over that period. Nevertheless, combining women's and men's partnership reports suggests that about 17 million women aged 15-44—34% of those sexually active in the past year—were at risk for STDs because of direct exposure to multiple partners (5.4 million), indirect exposure (6.3 million) or both direct and indirect exposure (5.5 million). In all, 21% of women were at direct risk and 23% were at indirect risk. In comparison, among men aged 18-44, 24% were at direct risk for STDs and an unknown proportion were at indirect risk. Multivariate analyses indicated that unmarried individuals, women younger than 40 and men aged 20-29, blacks and women in the South were all at elevated risk for STDs because of multiple partnership. Overall, in 1995, 19% of sexually active women aged 15-44 had used condoms to protect against STDs over the preceding year, and 19% of those sexually active in the three months before the survey were current condom users. Condom use specifically for STD prevention was more common among women reporting both direct and indirect risk for STDs (58%) and among those at direct risk (46%) than among other women; women whose partners put them at indirect risk only were less likely to be current or recent condom users than women who were not at risk or were only at direct risk.

Conclusions: There is a continuing need to educate people regarding their risk for STDs, to increase the use of existing barrier methods and to develop new methods that protect against STD infection. In addition, if we are to develop a better understanding of the extent of STD risk through multiple partnership, the collection of information on number of partners and relationships between partners must be expanded and improved.

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Sexually transmitted diseases (STDs), including HIV, continue to impair the reproductive health of American women and men. An estimated 15 million new cases of STDs occur each year.¹ The short-term and long-term consequences of contracting an STD—from painful side effects to higher risks of other diseases and even death—have been well-documented.² In many cases, the burden of these infections falls disproportionately on women, minorities and the young.³

Several factors affect the chance that an individual will encounter an infected sexual partner and, if so, become infected with an STD. Some are biological and epidemiologic, such as the prevalence of particular STDs in communities, the STD status of partners, the ease with which specific organisms are transmitted, the effectiveness and availability of medical treatment and the susceptibility of uninfected partners. Some are behavioral, such as multiple sexual partners, the type of sexual intercourse or behavior practiced, and the use of a condom or some other protective measure. The more sexual partners a person has, the greater his or her likelihood of encountering a partner who is infected with and may transmit an STD. An individual who has only one partner can also be placed at risk indirectly, through his or her partner's actions. For example, if a person's only partner has other partners, he or she may become infected and pass the STD on to his or her monogamous partner.

The correct and consistent use of latex condoms has been shown to be very effective in preventing transmission of STDs, including HIV.⁴ It is relevant, therefore, to consider condom use in analyses of the impact of partnership patterns on STD risk.

Several studies have examined women's and men's recent partners and the relationships among number of partners, use of condoms and demographic characteristics. Data from the 1988 round of the National Survey of Family Growth (NSFG) showed that 3% of sexually active women aged 15-44 reported more than one partner during the three-month period preceding the survey.⁵ Information from the National AIDS Behavioral Surveys, which were conducted in 1990-1991, indicated that 7% of sexually active women and 13% of sexually active men aged 18-75 had had two or more partners in the past year.⁶ Analyses of the 1992 National Health and Social Life Survey (NHSLS) revealed that 14% of women and 26% of sexually active men aged 18 and older reported having had multiple partners in the past year.⁷ Finally, published tabulations of the Youth Risk Behavior Survey examined another measure of sexual partnership and showed that in 1995, about one in five male high school students and one in seven female students reported having had four or more sexual partners in their lifetime.⁸

In the three studies that surveyed adults, marital status proved to be a dominant predictor of multiple partnership: Unmarried people were more likely to have had more than one partner in the past year than were married individuals. One of these studies also reported that cohabiting individuals were more likely than married women and men, but less likely than those not married and not cohabiting, to have had multiple partners.⁹

The studies of adults disagreed on the importance of age: All suggested that younger individuals were more likely to have had multiple recent partners. In one, however, the effect of age disappeared once the effects of marital status and other social and

demographic variables were taken into account,¹⁰ while in another the inverse relationship between age and likelihood of multiple partners continued to be significant in multivariate analyses.¹¹

All of these studies acknowledge the condom's important role in STD prevention by examining the condom use of individuals at different levels of risk. One showed that people with a higher number of partners were more likely to have used a condom at last sex than were those with fewer partners; this association became nonsignificant once other variables were controlled for.¹² Similar findings were reported for current condom use in another study: An association between multiple partnership and condom use was evident in bivariate analyses, but disappeared in the multivariate context.¹³ However, in that study, current condom users with multiple partners were less likely to report condom use at last intercourse than were those who had only one partner; this may have been due to the additional difficulty of negotiating condom use with more than one partner.¹⁴ This finding was corroborated by another recent study, which found that those at increased risk for HIV were not more likely to use condoms than were individuals at lower risk.¹⁵

In this article, we explore STD risk and preventive behavior as reported by women surveyed in the NSFG, supplemented by information from women and men surveyed in the General Social Survey (GSS). We present an updated look at women's and men's potential risk of infection with STDs through vaginal heterosexual intercourse, measured primarily by their number of sexual partners in the one-year period before they were interviewed.

While lifetime number of partners is a risk factor for becoming infected with incurable viral STDs such as HIV and herpes, the number of partners over a shorter period is also a risk factor for acquiring new viral STDs. Moreover, recent partnership may be a better indicator of the risk of becoming infected with curable bacterial STDs such as chlamydia and gonorrhea.¹⁶ For these STDs, the probability that an infection is diagnosed, treated and cured in a relatively short period of time is low, and thus a temporal concentration of partners can increase the risk of transmission between them. Additionally, having multiple partnerships over a shorter period of time is associated with having sexual partners who are less well-known and who are themselves more likely to have multiple partners.¹⁷

We therefore focus our analysis on the number of sex partners that respondents had in the 12 months preceding the survey. We then refine this measure of risk for women (relevant data are not available for men) by estimating the extent to which their sexual partners in the past year had other partners. We also examine the social and demographic correlates of STD risk in a multivariate context to determine which are most strongly associated with the risk of disease. Finally, we examine condom use as reported by women at different levels of risk and socioeconomic status.

DATA AND METHODS

To examine time trends in partnership patterns, we used two nationally representative data sets that have a relatively standard series of questions over time. We analyzed data from the 1988 and 1995 rounds of the NSFG, as well as data from five rounds of the GSS conducted between 1988 and 1996. The NSFG is a household interview that

surveyed 8,450 women aged 15-44 in 1988 and 10,847 women in 1995. The GSS surveyed both men and women ages 18 and older, also through personal household interviews; sample sizes between 1988 and 1996 ranged from 1,372 to 2,992.

Some people are reluctant to report information on their sexual behavior. Therefore, the NSFG and the GSS used self-administered questions on recent sexual partners, to afford respondents more privacy in hopes of improving response rates and validity. In the 1995 NSFG, respondents were also asked in the interviewer-administered portion of the survey about their number of partners in the past year, which provides an opportunity to compare reports from the two sections of the survey. Most (but not all) respondents provided information about partners in both sections.* After comparing women's reports of their sexual experience and numbers of partners in the NSFG interview with their responses on the self-administered part of that survey, we combined the responses to these two sets of questions by using the higher number of sexual partners on either question to form the variable for more detailed analyses.†

NUMBER OF PARTNERS

Since 1988, the GSS has asked each respondent to report the number of people with whom he or she had had sex in the 12 months preceding the interview.‡ The 1995 NSFG also asked its respondents to report their number of (male) partners in the past 12 months.§ This represents a change from the 1988 NSFG, which asked respondents for their number of partners in the last *three* months. Consequently, we can compare the 1995 NSFG to the GSS, but we cannot conduct time-trend analysis of recent partnership using the 1988 and 1995 rounds of the NSFG.

While the 1995 NSFG specifically instructed interviewers to consider only heterosexual vaginal intercourse, the GSS did not ask respondents to identify the gender of specific partners. However, respondents were asked whether their partners had been exclusively male, exclusively female or of both sexes. About 2% of sexually active women and 3% of sexually active men reported some same-sex partners in the past year; we excluded these individuals from the analysis. Few respondents to either survey provided no information on their number of partners (2% in the 1995 NSFG and 2% in the 1994 and 1996 GSS data).

MEASURES OF RISK

Our primary measure of STD risk was having had two or more sexual partners in the past year—referred to here as "multiple partnership." We considered a person to be at *direct* risk for STDs if he or she had had two or more partners during the 12 months preceding the interview, and at *indirect* risk if at least one of the person's partners had had one or more other partners in this time period.** Both of these measures were reported in the NSFG, while in the GSS respondents were asked only about their own number of partners.

CONDOM USE

Condom use was measured in several ways in the NSFG.†† One question asked whether the woman and her partner had used condoms for *STD prevention* over the past 12 months. Another set of questions asked about *current* contraceptive use (i.e., the method used during the month of interview). Respondents who had ever had voluntary

intercourse and who had had sex in the three months preceding the interview were initially instructed to report any method they used to prevent pregnancy or STDs, but individual questions referred only to birth control, suggesting that for the most part women reported use only for contraceptive purposes.¹⁸

Finally, respondents who had had sex in the three months preceding the interview date were also asked what method or methods they used at *last* intercourse. This measure is not synonymous with current use. For example, some individuals reported that the condom was their "current" method but that they did not use it at last intercourse. (Such reports are usually taken to indicate inconsistent use.) Others reported condom use at last intercourse, even though they were not "currently" using that method.

For each measure of condom use, we examined use according to the STD risk categories described above, classifying women by whether they were not at risk or were at direct risk, at indirect risk or at both direct and indirect risk due to multiple partnership.

The reference periods are somewhat inconsistent here, as our measure of STD risk covers a 12-month period and the last two condom measures focus on the month of interview and on the three months preceding the interview. However, we judged it appropriate to make this comparison, since individuals are typically advised to use condoms not only if they currently have multiple partners, but also if they or their partner has had another partner, until they have been determined not to carry an STD.

ANALYTIC METHODS

We conducted bivariate analyses by cross-tabulating variables of interest and performing t-tests of the differences between group means and proportions. We performed tabulations using statistical software that accounted for the complex multistage designs of both surveys, resulting in more accurate standard errors.¹¹

Since the age and marital status composition of the U.S. population changes over time, we calculated distributions of partners twice: once using the weighted data from each data set, and once by standardizing the distributions by marital status and age-group. We used the March 1995 Current Population Survey as our standard population. The resulting standardized distributions varied only minimally from the actual distributions (typically by about 1% for each subgroup), so we show here only the actual distributions.

Our outcome variables in the multivariate models were dichotomous (e.g., a woman was or was not at direct risk, or did or did not use the condom), so we used logistic regression to model the odds that these outcomes would occur to individuals with various characteristics. We chose our independent variables based on a review of the literature, and we included other variables that we believed were theoretically relevant. We included all relevant predictors in our initial models, and then used likelihood-ratio tests to remove variables that did not contribute significantly to the fit of the model. Like the bivariate tabulations, the multivariate modeling took into account the complex survey design of the NSFG and of the GSS.

QUALITY OF DATA ON SEXUAL BEHAVIOR

The data collection approaches and questions used in both the 1995 NSFG and the GSS

are among the best available on the topic of sexual behavior in the context of a large national sample survey. Nevertheless, these surveys may underestimate the prevalence of multiple sex partners in the past year among women. For example, women may be reluctant to report their sexual activity and number of partners, or they may wish to conform with general social expectations or with the expectations of the interviewer. At the same time, social expectations and values are changing, and the extent of underreporting of sexual behavior may be decreasing.

Males, on the other hand, are believed to overreport their sexual behavior.¹⁹ Several studies have indicated that men are more likely than women to have had more than one partner in the recent past.²⁰ The primary reason for this discrepancy may be that men overreport their partners while women underreport them. Some critics have used this finding to question the overall reliability of data on sexual partners.²¹ However, according to one analyst, this difference can occur when a small proportion of individuals report a very large number of partners, and survey data on sexual behavior are in large part valid.²²

These estimates may also be low because even with better interviewing techniques, such as computer-assisted self-interview, sensitive behaviors still most likely are underreported. For example, recent work comparing abortion reporting in the 1995 NSFG to national abortion data concluded that only 45% of abortions occurring in 1991-1994 were actually reported in the NSFG face-to-face interview.²³ Even when data from computer-assisted self-interviews were taken into account, this proportion rose only to 59%.

While we have no external data against which to evaluate the accuracy of women's reports, it is likely that some women do not provide a complete report of their own sexual behavior or of their partners' sex partners. Even so, the current data are the best available, as it is not feasible to obtain absolutely accurate data on these aspects of sexual behavior. Ideally, future rounds of these surveys will ask both men and women about indirect risk as well as about direct risk, thereby enabling better cross-comparisons of men's and women's reports, and thus more accurate estimates.

FINDINGS

Recent Partners

Roughly nine in 10 women and men aged 18-44 had had sex in the last year (Table 1). The vast majority of these individuals reported having had only one partner—80-86% of women and 76% of men who had had sex in the mid-1990s. However, in the mid-1990s, about one in 10 sexually active women and men had had sex with two partners in the past year; moreover, depending on the survey, 5-10% of women and 14% of men had had three or more partners.

Table 1. Percentage of women and men aged 18-44 who had had sexual intercourse in the past year, and among those who had, percentage distribution by number of partners in the past year, 1988 and 1995 National Survey of Family Growth (NSFG) and 1988-1996 General Social Survey (GSS)

Sex and data set	% who had sex	No. of partners in past year			Total
		1	2	>=3	

Women					
1988 NSFG	86.6	u	u	u	u
1995 NSFG	89.2***	79.7	10.6	9.7	100.0
1988/1989/1990 GSS	91.1	85.9	9.2	4.9	100.0
1994/1996 GSS	90.9	86.3	8.8	4.9	100.0
Men					
1988/1989/1990 GSS	90.1	72.6	9.2	18.2	100.0
1994/1996 GSS	91.6	75.8	10.3	13.9*	100.0
*Significantly different from earlier time period at p<.05. ***Significantly different from earlier time period at p<.001. Note: u=unavailable.					

The distribution of number of partners in the past 12 months among sexually experienced individuals has remained largely stable over time, particularly for women. The only change is a decrease from the late 1980s to the period 1994-1996 in the proportion of men who reported three or more partners.

Women in the 1995 NSFG were significantly more likely to report multiple partners over the past year than were women in the 1994 and 1996 GSS (p<.001). This may have been due to the nature of each survey: Most of the NSFG questions are in the area of fertility and family planning, so its respondents may be more comfortable providing information about sexual partners than are respondents to the sexual behavior section of the GSS, which asks about a broader range of topics.

We also examined men's and women's lifetime number of partners (not shown). Sexually experienced women have become increasingly likely to have had more than one partner. Comparing the late 1980s with the mid-1990s, both the NSFG data and the GSS data indicate that the proportion of sexually active women who had only one lifetime partner decreased (from 33-40% to 25-28%) and the proportion who had six or more partners increased (from 19-24% to 29-32%). The same trend, however, does not appear to hold for men.

DIRECT AND INDIRECT RISK

In the 1995 NSFG, 21% of women aged 15-44 [§§](#) had had more than one partner in the past 12 months—with nearly 12% reporting that they themselves had had more than one partner, and almost 10% saying that both they and their partner had had other partners (Table 2). Moreover, 15% reported that a partner in the past 12 months had had at least one other partner at around the same time—again, with nearly 10% of women reporting that both they and their partner had had other partners and around 5% saying that only their partner had had at least one other partner. Combining the two types of risk, 27% of women of reproductive age reported behavior (either their own or their partner's) that put them directly or indirectly at risk of STDs.

Table 2. Among women aged 15-44 and men aged 18-44 who had had sexual intercourse in the past 12 months, percentage who were at risk of STD infection, by selected characteristics, according to type of reported risk, 1995 NSFG (women) and 1994 and 1996 GSS (men)

Characteristic	Women					Men
	N	Both direct and indirect	Direct risk only†	Indirect risk only‡	Any risk	Direct risk only†

		risk				
Total	50,827	9.7	11.7	5.5	26.9	24.2
Marital status						
Married (ref)	29,510	2.3	4.3	3.2	9.8	5.4
<1 year	1,842	4.4	9.7**	8.2**	22.3***	u
>=1 year	27,669	2.1	3.9	2.9	8.9	u
Unmarried	21,316	19.9***	21.9***	8.7***	50.6***	47.5***
Cohabiting	4,187	10.8***	16.1***	4.8	31.7***	u
Formerly married	4,980	21.9***	22.2***	9.2***	53.3***	45.0***
Never married	12,149	22.3***	23.8***	9.9***	56.0***	48.3***
Age						
15-17	2,187	20.4***	22.5***	10.4**	53.3***	ns
18-19	2,512	24.0***	24.3***	6.2	54.5***	42.0**
20-24	7,644	16.0***	19.0***	7.0**	42.0***	43.1***
25-29	9,031	9.2***	13.0***	5.9*	28.2***	30.9***
30-34	10,182	7.2***	9.7***	5.4	22.3***	18.4*
35-39	10,327	7.0***	6.4	4.4	17.7**	18.5**
40-44 (ref)	8,837	3.9	6.1	4.1	14.1	10.8
Poverty status (% of poverty level)						
0-99%	6,868	15.5***	18.7***	8.1**	42.4***	u
100-199%	10,381	12.6***	14.2***	6.2*	33.0***	u
>=200% (ref)	33,578	7.6	9.5	4.8	21.8	u
Residential status						
Metropolitan area (ref)	40,304	9.8	11.7	5.8	27.4	26.7
Nonmetropolitan	10,523	9.0	11.6	4.4*	24.9	21.7
Race/ethnicity						
White non-Hispanic/other (ref)	38,312	8.0	10.2	4.7	22.9	22.1
Black non-Hispanic	7,016	18.7***	20.6***	9.7***	48.9***	40.3***
Hispanic	5,499	9.9	10.3	6.0	26.2*	u§
Education						
<high school	8,539	13.0***	19.2***	8.2***	40.5***	28.2*
High school/GED	19,236	9.8	10.7	5.3	25.7**	26.5**
>=some college (ref)	23,051	8.3	9.7	4.7	22.8	17.9
Region						
Northeast (ref)	9,819	8.1	12.4	4.9	25.4	24.5
Midwest	12,367	9.2	10.6	5.8	25.6	20.8
South	17,158	11.1***	13.3	5.4	29.7**	25.9
West	11,484	9.4	9.8**	6.0	25.2	25.0
Employment						
Full-time/part-time (ref)	31,151	9.2	10.8	5.2	25.2	21.4
Other	19,675	10.4	13.0**	6.1	29.4***	42.0***
Parity						
0	17,379	13.9***	16.9***	6.9***	37.7***	36.5***
>=1 (ref)	33,448	7.5	9.0	4.8	21.2	13.7
Religion						

None	6,249	14.0***	13.7	7.1	34.9***	36.6***
Protestant (ref)	26,726	9.9	11.9	5.8	27.5	19.9
Catholic	15,001	7.9**	10.4	4.6	22.8***	24.1
Other	2,852	7.8	12.0	4.8	24.6	23.0
Childbearing intentions						
Want no more	27,965	7.5***	8.9***	4.6***	21.1***	u
Want more/don't know/partners disagree (ref)	22,861	12.3	15.0	6.6	34.0	u
*Significantly different from reference category at $p < .05$. **Significantly different from reference category at $p < .01$. ***Significantly different from reference category at $p < .001$. †Direct risk means an individual had more than one sex partner in the past year. ‡Indirect risk means at least one sex partner in the past year had another partner at around the same time. §The GSS does not categorize Hispanics separately, so for men, the "white non-Hispanic/other" and "black non-Hispanic" categories do in fact include Hispanics. Notes: u=unavailable. ns=not surveyed. ref=reference category.						

Married women were least likely to report having been exposed to the risk of STDs, although one in 10 said that they had had more than one partner in the last year or that their partner had done so. As might be expected, women married for less than one year reported higher exposure to risk over the past year than those who had been married for more than one year. The proportions of women at risk for STDs were highest—greater than 50%—among noncohabiting formerly married and never-married women and among adolescents (almost all of whom were unmarried).

The proportions at risk were significantly higher among lower income women, as well as among women who were black or Hispanic. Women residing in the South were also at higher risk, as were those with less education, women not working full-time or part-time, and nulliparous women. Women with no religious affiliation also appeared to be at higher risk.

Overall, 24% of men in the GSS reported having had more than one partner in the past year, a level slightly higher than the proportion of women who reported doing so (21%), but much higher than the proportion of women who said that their male partners had had sex with other women (15%). Group differences among men were largely similar to those among women: Unmarried and younger men were much more likely to report multiple partners, as were men who were black, who had less education, who were not working, who had no children or who reported having no religious affiliation. The importance of employment status in the bivariate context is particularly notable for men, as those who were not working were twice as likely to report multiple partners in the past year. This difference may be related to age and race, since younger men and black men were less likely to be employed as well.

MULTIVARIATE ANALYSES OF RISK

To examine the associations between risk status and demographic characteristics in a multivariate context, we fit several logistic regression models, using women's reported direct and indirect risk from the 1995 NSFG and men's reported direct risk from the 1994 and 1996 GSS surveys as outcome variables. Consistent with the bivariate analyses, the effects of marital status are significant and pronounced. The odds of having had more than one partner in the past year were more than 10 times as great for formerly married women as they were for currently married women, and were nearly

16 times as great for formerly married men as for married men (Table 3). Cohabiting women were more likely than currently married women but less likely than unmarried women to be at risk.

Table 3. Among women aged 15-44 who had had sexual intercourse in the past 12 months, odds of having been directly or indirectly at risk of STDs in the past year, and among men aged 18-44 who had had sexual intercourse in the past 12 months, odds of having been directly at risk, all by characteristic, 1995 NSFG (women) and 1994 and 1996 GSS (men)

Characteristic	Women		Men
	Direct	Indirect	Direct
risk†	risk‡	risk†	
Marital status			
Married (ref)	1.00	1.00	1.00
Cohabiting	4.10***	2.73***	u
Formerly married	10.67***	7.19***	15.79***
Never married	7.96***	6.42***	11.31***
Age			
15-17	1.84**	1.70*	ns
18-19	3.15***	1.88***	1.65
20-24	2.72***	1.79***	2.88*
25-29	2.06***	1.52**	2.63*
30-34	1.78***	1.53**	1.69
35-39	1.39**	1.42*	1.85*
40-44 (ref)	1.00	1.00	1.00
Race/ethnicity			
White non-Hispanic/other (ref)	1.00	1.00	1.00
Black non-Hispanic	1.60***	1.60***	2.20**
Hispanic	0.93	1.19	u§
Education			
<high school	1.31*	1.04	1.09
High school/GED	1.16*	1.16	0.94
>=some college (ref)	1.00	1.00	1.00
Region			
Northeast (ref)	1.00	1.00	1.00
Midwest	0.94	1.21	0.80
South	1.23*	1.26*	1.06
West	1.08	1.42*	0.99
Religion			
None	1.17	1.25	1.87*
Protestant (ref)	1.00	1.00	1.00
Catholic	1.02	0.90	1.15
Other	1.11	0.92	1.13

*Significantly different from reference category at $p < .05$.

**Significantly different from reference category at $p < .01$.

***Significantly different from reference category at $p < .001$.

†Direct risk means an individual had more than one sex partner in the past year. ‡Indirect risk means at least one sex partner in the past year had another partner at around the same time. §The

GSS does not categorize Hispanics separately, so for men, the "white non-Hispanic/other" and "black non-Hispanic" categories do in fact include Hispanics. Notes: u=unavailable. ns=not surveyed. ref=reference category.

The relationships between age and risk seen in the bivariate analyses also hold in the multivariate models, particularly for women: Younger individuals were at higher risk than those in older age-groups. The odds of being at direct risk were 1.6 times as great for black non-Hispanic women as they were for white non-Hispanic women, but STD risk among Hispanic women was not significantly different from that among white non-Hispanic women.^{†*} The odds of being at direct risk of STDs were twice as great for black men as they were for men who were white or of other races.

Having no religious affiliation, which was associated with higher risk in the bivariate analysis, was no longer significant for women in the multivariate context, although it continued to be associated with higher risk in men. Among women, region of residence continued to be significant, with Southern women more likely to be at direct risk than women who lived in the Northeast. Women who lived in the West and the South also exhibited higher levels of indirect risk than those in the Northeast.

Poverty status, metropolitan residence, employment status and parity failed to show a significant effect in the multivariate analysis. This suggests that the effects seen in Table 2 were actually the result of demographic and other characteristics associated with these variables, rather than being related to the direct impact of these variables themselves.

ADJUSTING WOMEN'S REPORTS OF RISK

The NSFG and the GSS provide complementary measures of the extent to which sexually active men had more than one female partner in the past year: Women in the NSFG reported whether their male partners had multiple partners, while men in the GSS reported directly whether they had multiple partners. The percentage of men reporting multiple partners over the past year was substantially higher than the percentage of women reporting that their partners had other partners during the past year, however. This suggests that women underreport whether their partners had other partners, either because they are reluctant to report the information or because they do not know about their partners' behavior.^{††}

We therefore used men's reporting of their own partners in the past year from the GSS to adjust women's reports of their partners' behaviors. Because we do not have full information on the social or demographic characteristics of female and male partners, we made this adjustment only for women, both overall and according to marital status and age. In the former case, we condensed the survey samples into married and unmarried groups, and we made the simplifying assumption that the behavior of married men, as reported in the GSS, reflected the proportions having multiple partners among the men with whom married women were having sex, and that the unmarried men in the GSS described the partners of unmarried women. We also assumed that women's partners were on average two years older than the women themselves.^{†§24} Therefore, we assumed that the proportion of men aged 18-46 in the GSS who had multiple partners reflected the behavior of the partners of women aged 15-44 in the NSFG, and we matched each age-group of women with an age-group of men who were two years older.^{†*}

Some 15.2% of women aged 15-44 reported in the NSFG that a man they had had sex with in the past year also had had sex with another woman at around the same time (Table 2). In contrast, 23.2% of men aged 18-46 who were surveyed in the GSS said they had had sex with two or more women in the past year (not shown). We assumed that the difference between these two numbers (8.0%) represents the proportion of women who erroneously reported that their partner or partners were monogamous throughout the past year.

We can calculate from Table 2 that the group of women who reported in the NSFG that their partner or partners had not had other sexual partners in the past year is comprised of women who said they had had sex with more than one man in the past year but that their partners were monogamous (13.8%) and of women who said that both they and their partners were monogamous (86.2%). We assumed that the 8.0% of women who incorrectly reported only monogamous partners were distributed between these two groups of women according to these proportions. Thus, 1.1% of the women (13.8% of 8.0%) were at both direct and indirect STD risk, even though they reported only their direct risk, and the remaining 6.9% of women (86.2% of 8.0%) were at indirect risk for STDs, because even though they reported only one monogamous partner, that partner actually had had sex with other women in the past year.

To calculate the adjusted proportion of women at direct or indirect risk of STDs, we added the 6.9% of women who reported no risk but who we estimated had a partner with other sexual partners to the 26.9% of women who actually reported that either they or their partner had had another partner in the past year. The result was an estimated actual STD risk proportion of 33.8% of sexually active women (Table 4). Eleven percent were at direct risk only, 12% were at indirect risk only and 11% were at both direct and indirect risk. These figures imply that 17.2 million women were at risk of STD infection in 1995 because of multiple sexual partnerships—5.4 million women at direct risk only, 6.3 million at indirect risk only and 5.5 million at both direct and indirect risk.

Table 4. Percentage distribution of women aged 15-44 who had had sexual intercourse in the past 12 months, by adjusted risk of STD infection, and among women classified as at risk, percentage distribution by self-reported risk, all according to selected characteristics, 1995 NSFG and 1994-1996 GSS

Characteristic	All women						At-risk women		
	Not at risk	At risk				Total	Some self-reported risk	No self-reported risk	Total
		Both direct and indirect	Direct only†	Indirect only‡	Any				
Total	66.2	10.8	10.6	12.4	33.8	100.0	79.5	20.5	100.0
Marital status									
Married	90.2	2.3	4.3	3.2	9.8	100.0	100.0§	0.0	100.0
Unmarried	36.2	25.8	16.1	21.9	63.8	100.0	79.3	20.7	100.0
Age									
15-17	39.1	24.1	18.8	18.0	60.9	100.0	87.6	12.4	100.0
18-19	33.0	30.7	17.6	18.7	67.0	100.0	81.3	18.7	100.0
20-24	46.7	19.7	15.3	18.3	53.3	100.0	78.8	21.2	100.0
25-29	65.4	10.4	11.9	12.3	34.6	100.0	81.5	18.5	100.0

30-34	71.4	8.0	8.9	11.7	28.6	100.0	77.8	22.2	100.0
35-39	78.0	7.3	6.1	8.6	22.0	100.0	80.8	19.2	100.0
40-44	85.9	3.9	6.1	4.1	14.1	100.0	100.0§	0.0	100.0

†Direct risk means an individual had more than one sex partner in the past year.
‡Indirect risk means at least one sex partner in the past year had another partner in the past year. §Since reported levels of men's partners were virtually identical in these groups, we made no adjustment.

The adjusted proportions at risk of STDs from multiple partnership are higher, and the differences between them and the women's own reports in the NSFG are substantially wider, for unmarried and for younger women. From the combined estimate, we calculated that almost two-thirds of unmarried women and adolescents were at risk for STDs in the past year, as were more than half of women aged 20-24. Adjustment had no effect on the percentage of married women at risk or on the percentage of women aged 40-44 at risk (most of whom were married). This is because in the NSFG and the GSS, the reported percentages of married men who had more than one partner were similarly low for these groups.

Comparing these adjusted estimates with women's own reporting in the NSFG indicates that roughly 20% of women at risk of STDs through multiple sexual partners (3.5 million women) reported, and presumably thought, that they were in mutually monogamous relationships throughout the prior year.

RISK STATUS AND CONDOM USE

• *Condom use by risk status.* Approximately 19% of women who had been sexually active in the past year reported having used condoms to prevent STDs at some time during that year (Table 5).^{†‡} Women who reported in the NSFG that they were at risk of STDs because of multiple partnerships were much more likely to report use of condoms for this purpose than women who were not at risk of STDs (23-58% vs. 9%). Also, among those at reported risk for STDs, women who were at direct risk of contracting an STD were more likely to have used condoms for STD prevention than women who were at indirect STD risk alone ($p < .001$). The highest level of condom use (58%) was among women who reported both direct and indirect STD risk.

Table 5. Percentage of sexually active women using the condom, by measure of condom use, according to reported STD risk group, 1995 NSFG

Risk group	Used for STD prevention in past year†	Currently using‡ (in month of interview)	Used at last sex‡	
			All	Current users
All	18.9	19.4	16.9	67.6
No STD risk (ref)	9.1	17.3	14.8	70.3
Direct risk only§	45.5***	27.3***	26.2***	68.5
Indirect risk only††	23.1***	16.0	11.6	49.2***
Both	57.9***	28.6***	25.4***	59.5***

***Significantly different from the reference group at $p < .001$.

†Among women who had had intercourse in the 12 months prior to the interview. ‡Among women who had had intercourse in the three months prior to the interview. §Direct risk means that an individual had more than one sex partner in the past year.

††Indirect risk means that at least one sex partner in the past year had another partner at around the same time. Note: ref=reference group.

Of all women who were sexually active in the three months before interview, 19% said they were currently using the condom. Thirteen percent used it as their only method and 7% used the condom together with or alternating with another contraceptive method (not shown). Women at direct risk only were similar to those at both direct and indirect risk in their levels of current condom use and in their levels of condom use at last sex. They were more likely to be currently using the condom than either women who reported no STD risk or women reporting only indirect STD risk, whose levels of current condom use and condom use at last sex were relatively similar.

While the condom's effectiveness for both STD prevention and contraception depends on its correct and consistent use, only about two-thirds of current condom users said that their partner used a condom the last time they had sex. The level of use was significantly lower for women whose partners had other partners (50-60%) than for women at no risk or at direct risk only (about 70%).

• *Predictors of current and recent condom use.* Even after we controlled for the effects of relevant social and demographic factors, the odds of having used a condom for STD prevention were more than three times as great for women at direct risk for STDs as they were for women not at risk (Table 6). The effects of direct and indirect risk appear to be cumulative, as women at both types of risk were more likely to have used condoms for STD prevention than were women at only direct or at only indirect risk. However, being at indirect STD risk alone did not significantly increase the chance of condom use ($p=.08$).

Table 6. Among women aged 15-44 who had had sexual intercourse in the past 12 months, odds of using a condom, by measure of condom use, according to characteristics, 1995 NSFG

Characteristic	Used for STD prevention in past year	Currently using (in month of interview)	Used at last sex	
			All	Current users
Type of reported STD risk				
None (ref)	1.00	1.00	1.00	1.00
Direct only†	3.33***	1.18	1.27*	1.17
Indirect only‡	1.28	0.71	0.56**	0.49**
Both	4.88***	1.20	1.12	0.75
Marital status				
Married (ref)	1.00	1.00	1.00	1.00
Cohabiting	3.94***	1.16	1.02	0.81
Formerly married	11.02***	1.66***	1.46**	0.49***
Never married	9.82***	2.15***	2.37***	0.82
Age				
15-17	2.63***	2.56***	4.59***	1.19
18-19	2.43***	2.50***	3.17***	1.10
20-24	1.73***	2.11***	2.10***	1.05
25-29	1.61***	1.88***	1.81***	0.87
30-34	1.31*	1.58***	1.37**	0.72
35-39	1.25	1.41**	1.31*	0.97
40-44 (ref)	1.00	1.00	1.00	1.00

Poverty status (% of poverty level)				
0-99%	0.82	0.71**	0.69**	0.66*
100-199%	0.90	0.85	0.92	0.93
>=200% (ref)	1.00	1.00	1.00	1.00
Residential status				
Metropolitan (ref)	1.00	1.00	1.00	1.00
Nonmetropolitan	0.92	0.78**	0.79*	0.90
Race/ethnicity				
White non-Hispanic/other (ref)	1.00	1.00	1.00	1.00
Black non-Hispanic	1.55***	1.09	0.99	1.08
Hispanic	0.97	0.87	0.85	0.90
Education				
<high school	0.80	0.60***	0.48***	0.73
High school/GED	0.98	0.65***	0.61***	0.81
>=some college (ref)	1.00	1.00	1.00	1.00
Region				
Northeast (ref)	1.00	1.00	1.00	1.00
Midwest	0.79*	0.82*	0.76**	0.88
South	0.93	0.77***	0.70***	1.03
West	0.99	0.77**	0.75**	0.94
Parity				
0	1.40***	1.10	1.11	0.93
>=1 (ref)	1.00	1.00	1.00	1.00
Religion				
None	1.27*	1.07	1.11	0.91
Protestant (ref)	1.00	1.00	1.00	1.00
Catholic	0.94	1.24**	1.17*	1.05
Other	1.37	1.83***	1.41*	0.64*
*Significantly different from reference category at p<.05. **Significantly different from reference category at p<.01. ***Significantly different from reference category at p<.001. †Direct risk means an individual had more than one sex partner in the past year. ‡Indirect risk means at least one past year sex partner had another partner around the same time. <i>Note:</i> ref=reference group.				

Unmarried women were more likely to have used condoms for STD prevention, with cohabiting women being more likely than those who were married but less likely than those who were not in a union. Younger women and black women were more likely than others to report condom use for STD prevention. Interestingly, women with no children also were more likely to report condom use, even after the effects of marital status and age were controlled. Employment status was not a significant predictor in this or any other condom model (not shown).

Differences in current condom use according to STD risk status were much smaller and not statistically significant. Women at indirect risk only were marginally less likely to currently use the condom than were those at no STD risk (p=.055). The relationship between marital status and current condom use was statistically significant, but was not as strong as it was for condom use for STD prevention; the inverse relationship seen between age and use in the past year held for current use as well.

However, some factors not significant in the analysis of use for STD prevention were important determinants of current condom use: Women whose income was less than poverty level, nonmetropolitan residents and less-educated women were less likely to be current condom users than were women with an income more than twice the poverty level, metropolitan residents and women with at least some college education. Race or ethnicity and parity were not significant predictors. Women in the Northeast were more likely to be current condom users than were women in other regions, and Catholics and women of other religions were more likely than Protestant women to be current users.

The predictors of use at last sex mirror those of current use, but are stronger. The effects of indirect and direct risk are opposing: Women with multiple partners were more likely to have used condoms at last sex, but women whose partners had other partners were less likely to have done so. Women at both direct and indirect risk (the group of women at highest risk) were no more likely to have used the condom at last sex than were women not at any STD risk.

Analysis of condom use at last sex among those who reported themselves to be current users (taken to be an indicator of "consistency" of condom use) also indicates that indirect risk of STDs is negatively associated with consistent use. The odds of "consistent" use were only half as great for women at indirect STD risk alone as they were for those not at indirect risk. The indirect risk variable does not absorb any effect of direct risk: When indirect risk is excluded from the model, direct risk alone remains not significant, and when direct risk is excluded, indirect risk continues to be significant (not shown). This lack of any relationship between consistent use and direct risk of STDs within the past 12 months differs from a previous finding in 1988 that current condom users who were at direct risk of STDs within the past three months were less likely to use condoms at last intercourse than women who were not at direct risk of STDs.²⁵ Formerly married current condom users were also less likely to be consistent users than were married women.

DISCUSSION

Having multiple sexual partners or having a partner who has multiple partners over a relatively short period of time are key behavioral factors that contribute to individuals' risk for STDs. Our data on the number of partners in the past 12 months suggest that the popular perception that partnership levels are increasing rapidly is incorrect: During the period studied, neither men nor women reported an increase in their number of partners in the past year, and the proportion of men with three or more partners even decreased; moreover, the large majority of sexually active men and women report having had only one partner in the past year.

At the same time, many American women and men appear to be at high risk of contracting STDs through exposure to multiple partners. We estimated that 34% of sexually active women aged 15-44—more than 17 million women—are at risk for STDs because they or their partner had other partners in the past year. The full extent of men's STD risk is unknown, but at least 13 million—24% of sexually active men aged 18-44—are at direct risk.

Levels vary substantially by subgroup, with unmarried individuals, young people and

blacks much more likely to have had two or more partners in the past year. In addition, our analysis suggests that a sizable proportion of women who report that they are in mutually monogamous relationships are in fact at risk of STDs because of their partners' involvement with other sexual partners. All groups except married women appear to have underreported their indirect risk. Unmarried women underestimated the extent to which their partners have other partners by about 35%, either because they did not know of or did not report these partners.

Regarding condom use, many of the same groups of women who were at elevated risk for STDs—younger, unmarried and black women, for example—also were more likely to have used condoms for STD prevention at some time in the recent past. Those who specifically reported that either they or their partners engaged in multiple relationships were also more likely to have reported condom use for STD prevention in the past. Individuals at indirect STD risk alone were less likely to currently use condoms or to have used one at last sex, however, than were women at direct risk.

One possible interpretation of this finding is that the two types of exposure to multiple partners (direct and indirect) have different impacts on an individual's perception of her own risk. People who have had multiple partners may be more aware of their risk level, and thus may desire more strongly to use condoms. In contrast, perceptions of risk may not seem as salient, and the impetus to use condoms may not be as strong, if a person's risk is based on his or her partner's behavior. Less condom use among women at indirect risk may also reflect greater inequity in the power balance between partners or less willingness by men with outside partners both to acknowledge that their pattern of sexual behavior may increase the STD risk of all of their partners and to take preventive action, such as using the condom. However, our analysis cannot address these issues.

Our data have several limitations. They describe only two aspects of the behavioral determinants of STD risk—number of sex partners and use of the condom. Thus, our analyses estimate the extent to which individuals are exposed to the risk of STDs based on these two key determining behaviors, but not on all such behaviors. In addition, these analyses measure the risk of exposure to STDs, not actual exposure to infection. Only heterosexual relationships are measured and only vaginal intercourse is considered. Both of these restrictions mean that inferences about the level of STD risk based on the data presented will be conservative. The limited data available do not allow us to determine patterns of sexual relationships; for example, we do not know whether individuals who reported multiple partners in the past year had serial relationships or contemporaneous relationships. In addition, we do not know the infection status of respondents, or whether they were practicing other high-risk behaviors that could also affect STD transmission (e.g., using drugs intravenously).²⁶

The biological factors that also contribute to STD risk and transmission are not covered here, and may interact with the behavioral risk factors that are the focus of this analysis. For example, exposure to STD risk from multiple sexual partners in a community where the prevalence of STDs is high would result in a more rapid rate of transmission than would similar behavioral risk in low-prevalence communities.

There are other potential limitations as well. For example, while available data on

condom use currently and at last intercourse are useful indicators of the extent of protection against STDs, information is not available on whether the condom was used with each partner or whether it was used consistently. Moreover, even in a monogamous relationship, unprotected sex may be risky if one partner contracted an STD some time before and continues to carry the infection. Nevertheless, in the absence of more comprehensive information, the available data are useful as indicators of behavioral risk for STDs.

Overall levels of risk among women and men in these surveys were high, while condom use among those at risk was relatively low. This suggests a need for continued and increased emphasis on public education about STDs and about HIV and AIDS, about risk factors, and about preventive measures that can be taken, particularly the use of the male and female condom. Attention to these issues in the context of comprehensive sexuality education is especially important, given the higher levels of risk of STDs faced by adolescents. These results also provide support for programmatic approaches to improving access to condoms—e.g., through condom distribution programs directed at high-risk groups and at those who are less able to pay for condoms, such as adolescents and young adults, clients of STD clinics, low-income individuals and other disadvantaged groups. Additionally, it will be important to develop and test other methods of preventing STDs—in particular, methods that can be used by women, such as microbicides and other new female barrier methods.

The analysis also offers some insight into the importance of interview technique in sexuality research. While differences between interviewer-collected and self-administered reports of lifetime partners were small, women were more likely to report a high number of partners in the past year on the self-administered portion of the NSFG than in the face-to-face interview. Respondents may therefore perceive that reporting recent sensitive behaviors is more stigmatizing. This finding underscores the importance of using self-administered surveys and of developing better and more accurate methods for obtaining sensitive information.

Our work also points to a need to better understand and better define STD risk and risky sexual behavior, as well as to better educate the public about the specific risks that having multiple sexual partners can bring. For example, individuals probably understand more clearly that the risk of transmitting an STD, whether viral or bacterial, is increased in multiple contemporaneous sexual relationships than they comprehend that the risk of contracting viral STDs is likely higher among individuals who have had multiple partners, but in serial relationships. Providers need to incorporate improved definitions in their counseling and public education efforts if clients are to grasp the consequences of their behavior and engage in preventive action to reduce their STD risk.

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*We used the NSFG's specific questions on number of partners rather than calculate numbers of partners in the past year from the NSFG's other sexual history questions. Women who reported in the NSFG interview that they had never had voluntary sex or had not had sex in the past 12 months were not subsequently asked about their number of partners in the face-to-face interview, but all women were asked for partner information in the self-administered part of the survey.

†Women in the 1995 NSFG were much more likely to report multiple partners during the past 12 months in the self-administered portion of the survey than in the face-to-face interview (21% vs. 12% of women who had

sex in the last year, respectively; $p < .001$). Data presented here combine responses to both parts of the survey. The combined measure was virtually identical to the self-administered measure, suggesting that the self-administered measure alone may be sufficient for use in this kind of analysis.

‡ The GSS question on recent partners was phrased: "How many sex partners have you had in the last 12 months?"

§ In the face-to-face section, NSFG respondents were asked: "During the last 12 months, that is, since [interview month], how many men, if any, have you had sexual intercourse with? Please count every sexual partner, even those you had sex with only once." In the self-administered section, the question was identical except that the word "male" preceded the words "sexual partner."

**A more expansive definition of indirect risk would include women who reported that their partners used injecting drugs. We excluded this factor from our definition in order to create a standard comparison with men's reports of their own partners in the GSS. The effect of this exclusion is small, since only 1.3% of all sexually active women reported only that their partners used injecting drugs (and that their partners had not had other partners).

‡ For contraceptive use for STD prevention, we used the NSFG variable USECONPR, counting women who reported any use of condoms for STD prevention over the past year. Current condom use was constructed from women's reports of up to four methods used in the month of interview (MTHINTM1-MTHINTM4); we counted anyone who reported currently using the condom, whether alone or with another method. Condom use at last intercourse was based on women's reports of up to four methods used at last intercourse (MTHLSTS1-MTHLSTS4).

‡ We primarily used the svy series of commands in Stata 6.0. NSFG analyses accounted for both survey strata and primary sampling units, as well as respondents' sample weights; the GSS analyses accounted for primary sampling units and sample weights.

§ This figure differs from the 20.3% of women in Table 1 who reported two (10.6%) or three or more (9.7%) partners, because Table 1 excludes women aged 15-17, whose higher likelihood of having had multiple partners raises the proportion for women aged 15-44 to 21.3%.

‡ Non-Hispanic women of other races comprised 6% of the 1995 NSFG sample and 5% of the GSS sample, and are grouped with white women in this analysis.

‡ It is also possible that the discrepancy is based partly on variation between the two surveys in the definition of men's partners. Women in the NSFG were asked: "During the past 12 months, did you have ANY male sexual partners who were also having sex with other female partners around that same time?" In the GSS, men were asked to report their total number of partners over the past year. It is likely that the actual number of other partners that a woman's partner had "around that same time" is fewer than the total number of partners he had over the course of the year, since a man who had two partners some months apart would be counted under the GSS measure but not under the NSFG measure. Because we are interested in men's exposure to any more than one partner over the past year (as we are for women), rather than their behavior around the time they were having sex with any particular woman, the GSS estimate is more appropriate for this analysis; this argues for using GSS figures in the adjusted estimates that we calculate in this section.

‡ The median age difference in the NSFG is one year, and the mean difference is 2.1 years. We recognize that women and men in each age-group have partners from a wide range of ages, but making this assumption enables us to make estimates for specific age-groups.

‡ For women aged 15-17, the comparison group is men aged 18-19, since 17-year-old men were not surveyed in the GSS.

‡ This and subsequent analyses are based on the NSFG alone, and not on the combined estimates developed in the previous section, since it is not possible to perform individual-level analyses using combined data.