Measuring Contraceptive Use Patterns Among Teenage and Adult Women

By Dana A. Glei

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Context: Measures of contraceptive use at one point in time do not account for its changing nature. A measure that addresses the pattern of method use over time may better predict the cumulative risk of unintended pregnancy.

Methods: Women at risk of unintended pregnancy were selected from the 1995 National Survey of Family Growth, and their contraceptive use patterns were compared across age-groups. Survival analysis was used to validate women's long-term use pattern as an indicator of pregnancy risk, and multivariate regression analyses were used to explore potential covariates of current patterns of contraceptive use.

Results: More than two-thirds of women aged 15-19 report long-term uninterrupted contraceptive use, but they are more likely to report sporadic use and less likely to report uninterrupted use of a very effective method than are women aged 25-34. Compared with women aged 25-34, women aged 20-24 have higher rates of sporadic use and lower rates of effective uninterrupted use. Among teenagers, nonusers are 12 times as likely as uninterrupted effective users to experience an unintended pregnancy within 12 months at risk. Women in less stable relationships, those having more infrequent intercourse and women who have recently experienced nonvoluntary intercourse for the first time are more likely than others to have a high-risk contraceptive pattern. Women aged 17 and younger whose current partner is more than three years older are significantly less likely to practice contraception than are their peers whose partner is closer in age.

Conclusions: Long-term contraceptive use pattern is a valid predictor of unintended pregnancy risk. Policies aimed at reducing unintended pregnancies should target women who do not practice contraception and those who are sporadic users. Women in unstable relationships, those having infrequent sex and women who experience sexual coercion need access to methods, such as emergency contraception, that can be used sporadically or after unprotected intercourse.

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Although public concern over unintended pregnancies has focused mainly on teenagers, women aged 20-24 have a higher rate of unintended pregnancy than do women in any other age-group; moreover, even among women aged 25 and older, one-third to one-half of all pregnancies are unintended.[1] Patterns of ineffective contraceptive use are largely responsible for these high rates; yet, while teenagers often are labeled as erratic contraceptive users, researchers find that adult women also

use contraceptives imperfectly.[2]

Alternating periods of use and nonuse are an important dimension of erratic contraceptive behavior. Common measures of contraceptive use, however, ignore its dynamic nature. Measures such as use at first intercourse, use at most recent intercourse and use of an effective method all classify women as users or nonusers based on a single dimension that overstates effective contraceptive use among occasional users. Such measures also do not capture the differential cumulative risk of unintended pregnancy associated with patterns of long-term contraceptive use. Moreover, no studies of long-term contraceptive use have compared teenagers and adult women.

Given these limits, it is all the more troubling that researchers seldom validate measures of contraceptive use. With the exception of contraceptive failure analyses, studies often assess risk factors related to poor contraceptive use, but fail to demonstrate that their measures actually predict risk of unintended pregnancy.

In this article, data from the 1995 National Survey of Family Growth (NSFG) are used to address these issues by introducing a new measure—contraceptive use pattern—that takes into account nonuse, sporadic use or consistent method use over a period of many months. This measure is validated by examining the association between contraceptive use pattern and subsequent unintended pregnancy and comparing the results to the relationship between use pattern and contraceptive use at first intercourse.

This article investigates the extent to which teenage women are erratic contraceptive users, and how their contraceptive use patterns compare with those of adult women. Relationship stability and level of sexual experience, which have been identified as key factors in contraceptive use,[3] are also examined. Moreover, data on unwanted sexual experiences (collected for the first time in the 1995 NSFG) are used to explore the relationship between sexual coercion and contraceptive use. Multivariate analyses then examine the characteristics that may place subgroups of women at high risk of unintended pregnancy.

BACKGROUND

Relationship Stability

Studies of contraceptive behavior usually focus on factors specific to either the male or female partner. But the dynamics of the relationship are also an important factor influencing method use. In particular, couples in unstable relationships may be less likely than others to plan sexual intimacy, and they often may not be prepared with a method. This is especially true of adolescent relationships,[4] which are likely to be relatively short-lived. In addition, teenagers may delay seeking contraceptives because they are awaiting a closer relationship with their partner.[5]

Moreover, each sexual relationship will involve negotiating contraceptive use with the new partner, a task that many find difficult. Couples, especially teenage couples, often perceive sexual intimacy as an expression of trust, and may perceive discussing contraception as implying a lack of trust.

SEXUAL EXPERIENCE

Sexual experience influences contraceptive behavior in several ways. First, inexperience may translate into lack of knowledge. Second, during the months after first intercourse, contraceptive use may be poor because a woman does not implicitly acknowledge or plan for her sexual activity. Finally, those who have recently initiated sexual activity are likely to have intercourse less frequently and less predictably, and infrequent intercourse is associated with less-consistent contraceptive use.[6] Further, when intercourse is infrequent, some teenagers say they do not need prescription methods because their current method is "good enough," and they will seek prescription methods later on, in anticipation of more frequent intercourse.[7]

SEXUAL COERCION

Recently, public attention has focused on the role of sexual coercion in adolescent sexual behavior. One in five women report having ever experienced nonvoluntary intercourse,[8] nearly 75% of which first occurred while they were teenagers. Very young teenagers may be particularly vulnerable; nearly half of all nonvoluntary sexual experiences occur before age 14.[9]

Sexual coercion constrains women's control over sex and thus has a direct link both with contraceptive use and an increased risk of unintended pregnancy. National data indicate that one in four young women experience sexual abuse prior to age 18; however, the proportion among pregnant teens is about twice as high.[10] Moreover, women who report that their first sexual experience was unwanted are less likely to have used contraceptives at first intercourse than are those who report their first intercourse as wanted.[11]

Finally, the sexual relationships of teenage women whose partners are substantially older may be characterized by power inequality, and possibly sexual coercion. Coercive undertones associated with age differences between a woman and her partner may affect the negotiation of contraceptive use when those differences imply distinct stages in life.[12]

DATA AND METHODS

The analyses presented in this article are based on data from Cycle 5 of the NSFG, a nationally representative sample of women aged 15-44. The NSFG used a multistage sampling design and oversampled black and Hispanic women. Interviews were conducted in person with 10,847 women between January and October 1995. The survey had an overall response rate of 79%. The calendar method was used to collect retrospective histories of sexual activity, pregnancy and contraceptive use. Sensitive questions about abortion and nonvoluntary intercourse were administered via audio computer-assisted self-interviewing.

SAMPLE

To identify only those women most likely to be at risk of unintended pregnancy, the following groups were excluded from all analyses: women who either were noncontraceptively sterile or whose sole partner was noncontraceptively sterile, or who had impaired fecundity (n=1,480); women who had never had sexual intercourse (n=915); women with a current pregnancy that was intended[*] (n=280) or of unknown

intention status (n=2); women who were trying to get pregnant at the time of the interview (n=212); and women who reported either no male partner or no sexual intercourse in the last year (n=737). Thus, the total sample included 7,221 women at risk of unintended pregnancy.

In addition, the following women were excluded from the analysis of long-term contraceptive use pattern: women who had missing data on sexual activity (n=234); those not at risk of pregnancy[‡] (n=22); and women whose pregnancy in the past year was intended (n=135) or of unknown intention status (n=2). These exclusions left 6,828 women in the sample.

For the analysis of current contraceptive use pattern, the following subgroups of women were excluded: women who engaged in no heterosexual activity in the past three months (n=401); those missing data on sexual activity (n=227); those not at risk in the past three months (n=282); women with a pregnancy in the past three months that was intended (n=4) or of unknown intention status (n=1); and those missing data on key independent variables (n=151). These exclusions left 6,155 women in the sample for this analysis.

Women who were contraceptively sterilized were not excluded from this study. Since first-year failure rates for female sterilization have been found to be higher than was commonly thought,[13] these women are still considered at slight risk of unintended pregnancy. However, because large numbers of women become sterilized in their later reproductive years, the analyses are repeated excluding these women (n=2,933), and important differences in the findings are noted.

MEASURES

All measures are based on self-report at the time of the interview. The key dependent variables are long-term contraceptive use pattern (measured over the past year) and current contraceptive use pattern (measured over the past three months). Current use pattern provides a close temporal match to potential explanatory variables measured at the time of the interview and examined in the logistic regression analysis.

Contraceptive use patterns are evaluated only during months in which a woman is at risk of unintended pregnancy (i.e., sexually active and not pregnant or postpartum).[‡] Since many women are not at risk for all 12 months in a year, contraceptive use patterns for these women are evaluated based on the subset of months at risk.

Women's contraceptive use behavior is categorized into one of four patterns. Women who report using a contraceptive method during every month they are at risk of unintended pregnancy are termed "uninterrupted users." This group includes "uninterrupted effective users"—women who use a very effective method (i.e., sterilization, the implant, the injectable, an IUD or oral contraceptives) during every month they are at risk and "uninterrupted other users"—those who use some other method[§] during at least one of the months they are at risk (even if a very effective method is used during the other months). If a respondent reports dual method use in a given month, the most effective method is coded.[14] Women who use no method during any month in which they are at risk are termed "nonusers," while those who use any method during some, but not all, months in which they are at risk are considered "sporadic users."

STATISTICAL ANALYSIS

Both long-term and current contraceptive use patterns are compared using simple cross-tabulations across age-groups. Significant differences in proportions are tested with logit models that take account of clustering in the data and that include dummy variables for age-group. (Women aged 25-34 are the comparison group.)

Long-term contraceptive use pattern is validated as an indicator of pregnancy risk using Kaplan-Meier survival analyses to estimate the proportion of women experiencing an unintended (unwanted or mistimed) pregnancy within a 12-month period at risk. Contraceptive use pattern among women with an unintended pregnancy is evaluated for the period prior to conception.

For comparison, survival analyses are performed for method use at first intercourse, a common measure of contraceptive behavior. Never-married women aged 15-19 who initiated intercourse at age 15 or older are grouped according to contraceptive use at first intercourse, and the proportion with an unintended pregnancy within 12 months after first intercourse is estimated. This analysis is restricted to never-married teens, who are least likely to intend pregnancy, because it is impossible to isolate those at risk of unintended pregnancy in the 12 months after first intercourse. Those who first had intercourse prior to menarche or who are noncontraceptively sterile, are subfecund or have impaired fecundity are excluded.

Multivariate logistic regression is used to explore potential covariates of current contraceptive use pattern. Continuation-ratio logits[15] are used to model the probability of any contraceptive use during periods at risk, the conditional probability of uninterrupted use given contraceptive use and the conditional probability of effective method use given uninterrupted use. Relationship stability is indicated by relationship status, relationship length and number of partners in the past year. Relationship length is represented by a dummy variable indicating whether the respondent has been with the current sexual partner for more than three months. Number of sexual partners in the past year is included in the logged form, since this distribution is positively skewed, and outliers may unduly influence the estimation of parameters; taking the natural logarithm reduces this possibility. Sexual experience is represented by a dummy variable for first intercourse in the prior six months and frequency of intercourse in the last three months. Measures of sexual coercion include a dummy variable for lifetime nonvoluntary sexual experience, an additional dummy for having recently experienced nonvoluntary intercourse for the first time** and a dummy for having a current sexual partner who is more than three years older.

Social and demographic controls include race and ethnicity, family economic status, mother's educational attainment and whether the respondent wants another child within the next two years. Family economic status is measured by income as a percentage of poverty level, which takes into account household size. Because income also tends to be positively skewed, the natural logarithm is applied to this measure as well.

Variables of interest that are significant in the initial multivariate models are explored in subsequent models that allow interactions with age-group. Final models include those interactions that improve the fit of the model. In these models, predicted

probabilities are estimated rather than coefficients or odds ratios, because they show explicitly how an effect varies across groups, and because they indicate whether statistically significant results are substantively large. For each outcome variable, the average predicted probabilities for the sample are estimated by age-group. Then, the expected probabilities with different levels of the covariates are estimated individually, leaving the other covariates at their observed values. Covariates that are statistically significant or are found to interact with age are presented.

All analyses use the constructed probability weights provided by the National Center for Health Statistics, which sponsored the survey. With data from sources using a complex sampling design, ordinary statistical techniques tend to underestimate standard errors. Therefore, robust standard errors are calculated using survey estimation techniques in STATA that account for dependence in the data due to clustering and sampling by strata.

DATA LIMITATIONS

There are a number of important limitations to these data. First, long-term contraceptive use pattern does not necessarily imply consistency of use on a day-to-day basis. If a woman reports using a method during a given month, she is classified as a user of that method in that month; data on the consistency of use during that month are not available for all 12 months prior to the interview. Second, while it is important to consider pregnancy risk to validate the measure of contraceptive use pattern, analyses of pregnancy should be regarded with caution, because of the high levels of abortion underreporting in survey data.[16] Third, while this analysis was meant to include only women who did not want to get pregnant, some women may be ambivalent about preventing pregnancy, while others very clearly want to avoid it; these differences in degree almost certainly affect contraceptive diligence.[17] Finally, the omission of males from this study is a drawback. However, the NSFG does not survey men, and pregnancy underreporting is even more problematic among males, making it difficult to assess the impact of contraceptive use pattern.

RESULTS

Long-Term Contraceptive Use Pattern

Teenagers aged 15-17, but not those aged 18-19, reported higher levels of nonuse than did adult women aged 25-34 (Table 1). Nonetheless, only about 8% of younger teenagers reported long-term nonuse of contraceptives, compared with 2-5% of women in all other age-groups.

Table 1. Percentage distributions (and standard errors) of women aged 15-44 who are at risk of unintended pregnancy, by contraceptive use pattern during past year, according to age-group, 1995 National Survey of Family Growth

Age-group	Uninterrupted use		Sporadic use	Nonuse	Total	N
	Effective method	Other method				
Total	61.4 (0.6)	29.6 (0.6)	5.6 (0.3)	3.5 (0.2)	100.0	6,828
15-17	23.3 (2.6)*	48.6 (3.3)*	20.5 (2.6)*	7.5 (1.8)*	100.0	252
18-19	31.3 (3.2)*	45.5 (3.6)*	18.4 (2.5)*	4.8 (1.2)	100.0	322
20-24	52.2 (1.8)*	34.3 (1.8)*	9.2 (1.0)*	4.2 (0.6)	100.0	1,000
25-34	62.4 (1.1)	30.1 (1.1)	3.8 (0.4)	3.6 (0.4)	100.0	2,643

| >=35 | 72.9 (1.0)* | 22.6 (1.0)* | 2.2 (0.3)* | 2.4 (0.3)* | 100.0 | 2,611 |

*Significantly different from women aged 25-34 at p<.05. *Notes:* Percentages are weighted. Ns are unweighted.

More than two-thirds of 15-19-year-olds were long-term uninterrupted users. However, teenagers were significantly more likely to be sporadic users and less likely to be uninterrupted effective users than were women aged 25 and older: Some 18-21% of teenagers were sporadic users, compared with 4% of women aged 25-34. Twenty-three percent of teenagers younger than 18 and 31% of those aged 18-19 were uninterrupted effective users, compared with 52% of women aged 20-24 and 62-73% of those aged 25 and older. Some 75-80% of women younger than 25 who were uninterrupted effective users were using oral contraceptives rather than long-acting methods, compared with less than half of women aged 25-34 (not shown).

Women aged 20-24 were significantly less likely to be uninterrupted effective users and significantly more likely to be sporadic users than were women aged 25-34. High levels of uninterrupted effective use among women aged 25 and older were due in part to their use of sterilization. When sterilized women were excluded from the analysis, the proportion of women aged 25 and older who were uninterrupted effective users decreased substantially, to 47% of those aged 25-34 and 26% of those aged 35 and older. In addition, differences in nonuse by age-group were no longer significant. Teenagers were still significantly more likely to be sporadic users and less likely to be uninterrupted effective users than were women aged 25-34, however, although women aged 20-24 no longer differed significantly from women aged 25-34.

CURRENT CONTRACEPTIVE USE PATTERN

There was a high degree of concordance between long-term and current contraceptive use patterns. With the exception of long-term sporadic users (who were distributed fairly uniformly across patterns of current use), 94-100% of women classified in a particular category for long-term contraceptive use were classified in that same category for current use.

In general, higher levels of contraceptive nonuse and lower levels of sporadic use were observed with the measure of current contraceptive use pattern than with the long-term measure, particularly among teenagers. Differences among age-groups, however, were similar: Teenagers and women aged 20-24 were both more likely to report sporadic use than women aged 25 and older and less likely to report uninterrupted effective use (Table 2). Teenagers younger than 18 were more likely to be nonusers than were women aged 25-34. However, the level of nonuse among those aged 18-19 was nearly identical to the level among adults aged 20-24. The vast majority of teenagers (80% of those aged 15-17 and 91% of those aged 18-19) were uninterrupted users over the three-month period.

Age-group	Uninterrupted use		Sporadic use	Nonuse	Total	N
	Effective method	Other method				
Total	66.5 (0.06)	28.2 (0.6)	1.7 (0.2)	3.6 (0.2)	100.0	6,155
15-17	31.9 (3.4)*	48.3 (3.9)*	9.5 (2.1)*	10.2 (2.3)*	100.0	184

Table 2. Percentage distributions (and standard errors) of women aged 15-44 who are at risk of unintended pregnancy, by contraceptive use pattern during past three months, according to age-group

|						
18-19	46.5 (4.0)*	44.4 (4.1)*	4.0 (1.3)*	5.1 (1.6)	100.0	257
20-24	59.2 (1.8)*	32.6 (1.7)*	3.3 (0.6)*	5.0 (0.7)*	100.0	873
25-34	67.1 (1.2)	28.4 (1.1)	1.2 (0.2)	3.3 (0.4)	100.0	2,403
>=35	74.3 (1.1)*	22.3 (1.0)*	0.6 (0.2)*	2.7 (0.3)	100.0	2,438

*Significantly different from women aged 25-34 at p<.05. *Notes:* Percentages are weighted. Ns are unweighted.

When sterilized women were excluded from the analysis, the proportion of uninterrupted effective users among women aged 25 and older decreased significantly (not shown). However, other findings remained the same: Nonuse was higher among teenagers younger than 18 than it was among 25-34-year-olds, while uninterrupted effective use was lower and sporadic use higher among all women aged 15-24 than among those aged 25-34.

MEASURE VALIDITY

Levels of unintended pregnancy are highest among women who are long-term contraceptive nonusers, and become progressively lower among women who are sporadic users, uninterrupted other users and uninterrupted effective users, respectively (Figure 1). For example, among teenagers, 73% of nonusers reported a subsequent pregnancy within 12 months at risk, compared with 19% of sporadic users, nearly 10% of uninterrupted other users and only 6% of uninterrupted effective users.

Figure 1. Percentage of women aged 15-44 with an unintended pregnancy occurring within 12 months at risk, by age, according to contraceptive use pattern
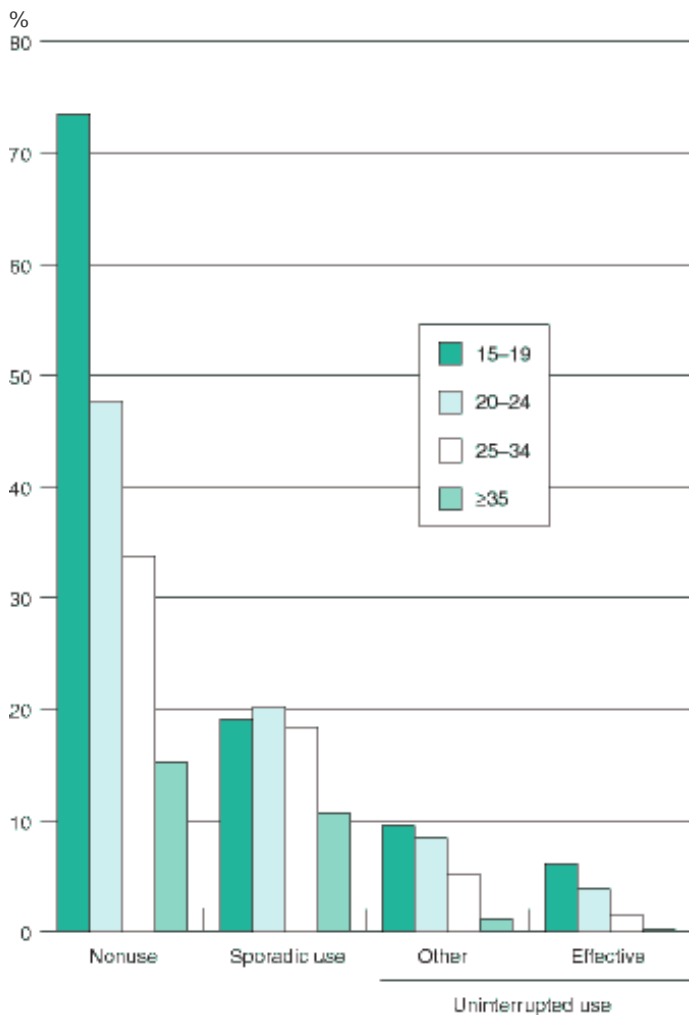
The relatively small difference between uninterrupted effective users and uninterrupted users who choose other methods is somewhat surprising. However, among the uninterrupted users, pill users had much higher rates of unintended pregnancy than users of long-acting methods: Among teenagers, 7% of pill users experienced an unintended pregnancy within 12 months at risk, compared with 3% of those using long-acting methods (not shown).

Long-term contraceptive use pattern was more strongly associated with unintended pregnancy than was contraceptive use at first intercourse (Figure 2). Among never-married teenagers who initiated intercourse between ages 15 and 19, one-half of those who did not use a contraceptive at first intercourse experienced a pregnancy within 12 months, compared with 13% of those who did. Long-term contraceptive use pattern over the 12-month period following first intercourse, however, provides greater differentiation of pregnancy risk. Among the same group of women, 85% of long-term nonusers became pregnant within 12 months at risk after first intercourse, compared with 33% of sporadic users and fewer than 15% of uninterrupted users.

Figure 2. Among never-married women aged 15-19 who initiated intercourse after age 15, percentage with an unintended pregnancy after first voluntary intercourse, by contraceptive use at first intercourse and by long-term contraceptive use pattern
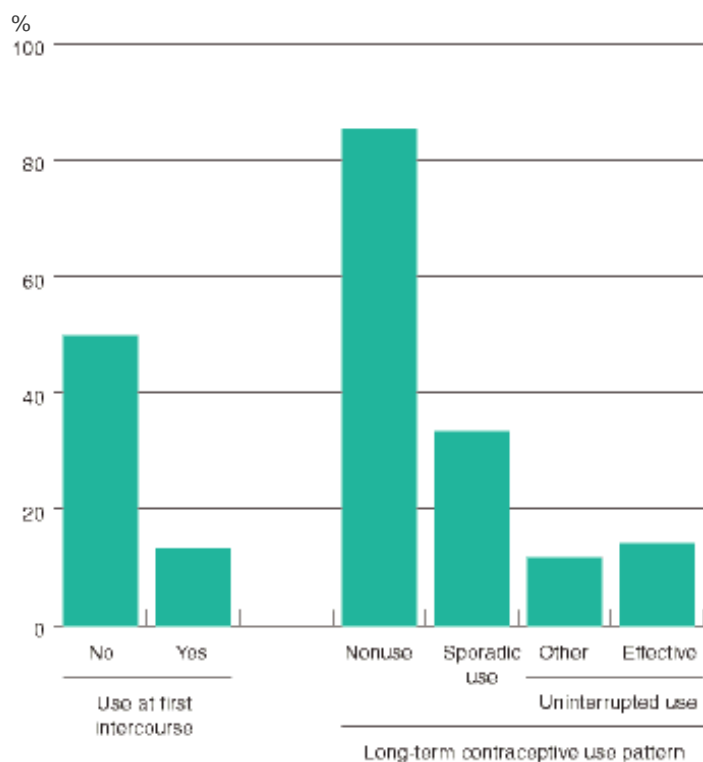
There was some agreement between current contraceptive use pattern and consistency of method use in the last three months. Nearly half of uninterrupted users rely on a method for which consistency of use is not applicable (i.e., sterilization, the implant or an IUD). However, among the remaining uninterrupted users, nearly 70% report consistent use (i.e., always using the method or never missing a pill in the three-month period), and an additional 14% report semiconsistent use (i.e., using the method more than half of the time or missing only one pill in three months). Similar figures among sporadic users are 41% and 12%, respectively, with an additional 22% reporting consistent pill use but no method use at all during at least one month.

MULTIVARIATE ANALYSES

In the first multivariate model, which compared current contraceptive users (uninterrupted and sporadic users) with nonusers (Table 3), teenagers younger than 18 had 71% lower odds of contraceptive use than women aged 25-34. Those aged 18-19 and those aged 20-24 also had lower odds of contraceptive use than older women. The coefficient for older teenagers, however, was not statistically significant, probably due to smaller sample size.

| Characteristic	Use vs. nonuse		Uninterrupted vs. sporadic use		Uninterrupted effective vs. other use	
Table 3. Odds ratios and t-ratios from logistic regression showing contraceptive use pattern during past three months among women aged 15-44 who are at risk of unintended pregnancy, by selected characteristics						
	Odds ratio	t-ratio	Odds ratio	t-ratio	Odds ratio	t-ratio
Age-group						
15-17	0.29*	-3.65	0.18*	-4.28	0.38*	-4.46
18-19	0.68	-1.15	0.45*	-2.00	0.56*	-2.94
20-24	0.63*	-2.33	0.40*	-2.75	0.79*	-2.18
25-34	1.00	na	1.00	na	1.00	na
>=35	0.97	-0.14	1.57	1.26	1.18	1.81
Relationship stability						
Married	0.96	-0.18	2.11	1.96	1.39*	3.51
Cohabiting	1.15	0.45	1.40	0.78	1.42*	2.55
Single	1.00	na	1.00	na	1.00	na
Log of no. of partners in past year†	1.27	0.87	0.83	-1.03	0.91	-1.31
Log of no. of partners squared†	0.83*	-2.05	na	na	na	na
With current partner <3 months	0.95	-0.17	0.84	0.84	-1.00	
With current partner >=3 months	1.00	na	1.00	na	1.00	na
Sexual experience						
First sex within last 6 months	2.97	1.26	1.29	0.48	0.27*	-3.60
First sex >6 months ago	1.00	na	1.00	na	1.00	na
Frequency of sex						
>=once a week	2.98*	5.24	2.53*	3.14	1.94*	6.62
2-3 times a month	2.69*	3.81	1.54	1.55	1.40*	3.25
<=once a month	1.00	na	1.00	na	1.00	na
Sexual coercion						
Ever had nonvoluntary sex	0.72	-1.77	0.80	-0.90	1.22*	2.27
Never had nonvoluntary sex	1.00	na	1.00	na	1.00	na
Recent first nonvoluntary sex	0.34*	-2.11	0.79	-0.34	0.46*	-2.23
No recent first nonvoluntary sex	1.00	na	1.00	na	1.00	na
Current partner >3 years older	0.64*	-2.44	1.02	0.07	1.11	1.27
Missing data for current partner	0.52*	-2.51	0.57	-1.75	1.10	0.73
Current partner <=3 years older	1.00	na	1.00	na	1.00	na

Control variables						
Race/ethnicity						
Non-Hispanic black	0.79	-1.15	0.91	-0.31	1.15	1.35
Non-Hispanic other	0.91	-0.22	0.39	-1.84	0.45*	-4.79
Hispanic	0.95	-0.22	0.75	-0.91	0.76*	-2.12
Non-Hispanic white	1.00	na	1.00	na	1.00	na
Log of income as a % of poverty‡	1.11	1.25	0.72*	-2.41	0.71*	-6.72
Mother's educational attainment	1.05*	2.31	1.03	0.91	0.96*	-2.88
Wants a child within next 2 years	0.35*	-6.12	0.59	-1.62	0.41*	-9.55
Does not want a child in next 2 years	1.00	na	1.00	na	1.00	na
Missing data for controls imputed	0.67	-0.88	1.21	0.25	0.52*	-2.41
N	6,155		5,918		5,813	

*p<.05. †The relationship between contraceptive use and the number of sexual partners in the past year takes a quadratic form, indicated by the significant coefficient on the squared term. The negative sign of the term suggests that the curve is convex. To determine the point at which it peaks, the function is differentiated with respect to logarithm of the number of partners, the derivative is set equal to zero, and solved for the logarithm of the number of partners. The figure is exponentiated to translate it into the number of partners. The curve peaks at 1.9 partners (see Figure 3). ‡A change from 100% of poverty to 200% of poverty corresponds to a 0.69 increase in the log of income as a percentage of the poverty level.

The logged number of sexual partners in the past year and its quadratic term suggest that the likelihood of contraceptive use initially increases with the number of partners. The effect peaks at 1.9 partners and then begins to decline, indicating that having more than two partners decreases the odds of contraceptive use (Figure 3).

Figure 3. Predicted probability of current contraceptive use, according to number of sexual partners, by age-group

Number of partners
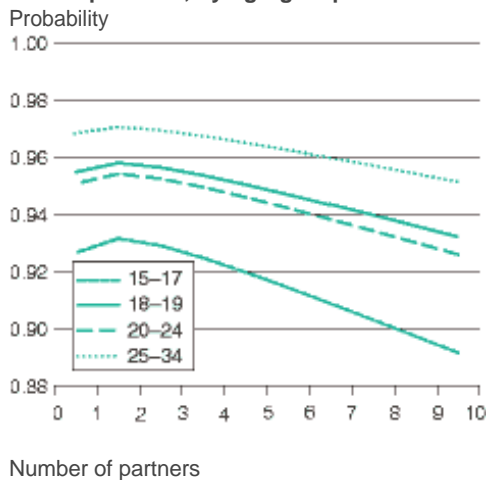
Frequency of intercourse was a strong predictor of contraceptive use. Among women who had intercourse at least once a week, the odds of using contraceptives were nearly three times as high as those among women having sex once a month or less. Women who had recently experienced nonvoluntary intercourse for the first time had 66% lower odds of using contraceptives than did those who had not had such an experience. Women with a current partner more than three years their senior had 36% lower odds of practicing contraception than did women who had partners close in age to or

younger than themselves.

In the model comparing uninterrupted use to sporadic use among contraceptive users (Table 3), women aged 15-17 had 82% lower odds of uninterrupted use than those aged 25-34, while women aged 18-19 and those aged 20-24 had 55-60% lower odds than the reference group. Women who had intercourse at least once a week had greater than two and a half times the odds of uninterrupted rather than sporadic contraceptive use than women who had intercourse no more than once a month.

Finally, the comparison of uninterrupted use of effective methods versus use of other methods (among uninterrupted users) indicates that teenagers and women aged 20-24 were less likely to use effective methods rather than other methods than were women aged 25-34. High levels of sterilization among women aged 25 and older explain this finding, however: Among uninterrupted users, more than one-third of women aged 25-34 and two-thirds of those aged 35 and older were contraceptively sterilized. When these women were excluded from the model, the effect among teenagers was no longer significant, and women aged 20-24 were more likely than women aged 25-34 to be using effective methods rather than other methods (not shown).

Married and cohabiting women were more likely to use effective rather than other methods than were single women. Women having intercourse at least once a week had nearly twice the odds of effective rather than other use as those having intercourse less than once a month. Women who had recently initiated intercourse had 73% lower odds of effective use than women who had become sexually active less recently. Having recently experienced nonvoluntary intercourse for the first time lowered the odds of using an effective rather than some other method by 54%. Contrary to expectations, having ever experienced nonvoluntary intercourse was positively related to using an effective rather than some other method.

INTERACTION EFFECTS

Effects related to relationship stability, sexual experience and sexual coercion may differ across age-groups. Consequently, potential interactions between age-groups and selected characteristics were explored. Predicted probabilities based on these models are presented in Table 4: a model predicting any contraceptive use and including an interaction between age-group and current partners age; a model predicting uninterrupted use among contraceptive users and including interactions between age-group and marital status; and a model predicting effective use among uninterrupted users and including interactions between age-group and history of nonvoluntary intercourse.

Table 4. Logistic regression results showing predicted probabilities of contraceptive use, uninterrupted use and effective use, by age-group, according to selected characteristics				
Characteristic	15-17	18-19	20-24	25-34
Contraceptive use				
Sample average	0.92	0.95	0.95	0.97
Sex <=once a month	0.85	0.90	0.89	0.93
Sex >=once a week	0.94	0.96	0.96	0.97
Recent first nonvoluntary sex	0.79	0.86	0.85	0.90
Current partner >3 years older	0.67	0.94	0.94	0.96

Uninterrupted use†				
Sample average	0.94	0.98	0.98	0.99
Married	0.90	0.96	0.96	0.99
Single	0.91	0.96	0.96	0.98
Sex <=once a month	0.91	0.96	0.96	0.98
Sex >=once a week	0.96	0.98	0.98	0.99
Effective use‡				
Sample average	0.51	0.60	0.69	0.71
Married	0.54	0.62	0.71	0.73
Cohabiting	0.54	0.63	0.72	0.74
Single	0.46	0.54	0.64	0.66
First sex within last 6 months	0.23	0.30	0.40	0.42
Sex <=once a month	0.40	0.48	0.58	0.61
Sex >=once a week	0.55	0.64	0.72	0.74
Ever experienced nonvoluntary sex	0.53	0.62	0.60	0.77
Recent nonvoluntary sex for first time	0.37	0.46	0.44	0.63
†Among women who report contraceptive use. ‡Among women who report uninterrupted use.				

On average, the vast majority of women are expected to use contraceptives, regardless of age: The predicted probabilities ranged from 92% among 15-17-year olds to 97% among women aged 25-34. Among all women, having intercourse at least once a week was associated with a higher probability of contraceptive use than having less frequent sex; the effect was largest among the youngest adolescents.

The effect of partner's age on contraceptive use was found to be driven largely by teenagers younger than 18: Having a partner more than three years older substantially decreased the probability of contraceptive use in this age-group (67%), but had little effect among women 18 and older (94-96%). Other potential interactions did not significantly improve the fit of the model; excluding sterilized women from the model eliminated significant age-group differences in nonuse, but did not otherwise substantively change the results (not shown).

In the model estimating uninterrupted use, there were significant interactions between age-group and relationship status, although the magnitudes of the effects were very small. Relative to those not in union, the likelihood of uninterrupted use among married women was similar among all women aged 18 and older; however, married teenagers aged 15-17 were somewhat less likely to report uninterrupted use, probably due in part to characteristics that select women into marriage at very young ages. Excluding sterilized women from the analysis had little effect on the results (not shown).

Age-group interactions clarify somewhat the positive association between history of nonvoluntary intercourse and effective method use. Having ever experienced nonvoluntary sex increased the probability of using an effective rather than some other contraceptive method among women aged 25-34, but decreased the probability among women aged 20-24 with a similar history. Bivariate analyses among adult women aged 25-34 who were uninterrupted users revealed that 45% of those who had ever experienced nonvoluntary intercourse were contraceptively sterilized, compared with only 31% of those who had never experienced nonvoluntary sex (not shown). When sterilized women were excluded from the model, lifetime nonvoluntary sexual

experience was significant only among women aged 20-24, who were less likely to use effective methods rather than to use other methods. In addition, married and cohabiting women no longer significantly differed from single women, indicating that more effective use among women in stable unions was due to sterilization.

ALTERNATIVE SPECIFICATIONS

A potential problem in measuring contraceptive use pattern is differential exposure to the risk of unintended pregnancy. For example, women with a full 12 months of exposure are more likely to be classified as sporadic users than are women with shorter periods of exposure, simply because they are assessed over a longer period of time. This problem disproportionately affects two groups: women who got pregnant in the past year and those who had first intercourse in the past year. To assess the sensitivity of results to differential exposure, two alternative specifications were estimated.

First, the start of exposure was extended back two years prior to the interview, thus allowing for up to 12 months of exposure.[††] This specification increased exposure for women who had become pregnant in the past year; however, it did not affect those who had recently initiated intercourse. Using this specification, more women were classified as long-term sporadic users, and sporadic use increased by 5-6 percentage points among teenagers and women aged 20-24 and by nearly three percentage points among women aged 25-34.

The second specification also allowed up to 12 months of exposure but restricted the sample to women with at least three months of exposure. This method addressed the bias associated with including women who had recently become sexually active. Results showed higher levels of sporadic use and lower levels of nonuse than in the original specification. However, this specification introduced bias by disproportionately excluding these recent initiators.

Although length of exposure was less problematic for the three-month measure because of the short time period, alternative multivariate models of current contraceptive use pattern also were estimated. First, exposure was extended an additional month, for up to three months of exposure in a four-month period. Second, these same models were reestimated with the sample restricted to women with at least two months of exposure. The substantive results were relatively unchanged.[‡‡]

DISCUSSION

Long-term contraceptive use patterns indicate that contrary to public perception, teenagers as a group are not sporadic method users. In fact, a substantial majority use a method without interruption for extended periods. Nonetheless, teenagers are more likely to report sporadic contraceptive use and are less likely than adult women to be uninterrupted users of effective methods.

Very effective methods such as the pill, the injectable and the implant are ideal for women who have regular intercourse and expect to continue to do so in the future. But because these methods either require an initial medical visit or provide ongoing, long-term protection, teenagers, who are likely to have unanticipated, infrequent or irregular patterns of sexual activity, may find them less suitable. Thus, adolescent women face somewhat limited contraceptive choices. Moreover, most young women

who use one of the more effective methods choose oral contraceptives, which require ongoing user initiative to ensure effectiveness.

Women aged 20-24 are more than twice as likely to report long-term sporadic use during months at risk of unintended pregnancy than are women aged 25-34; in fact, they are no more likely to currently use contraceptives than are those aged 18-19. The tendency for policymakers and researchers to focus solely on teenagers neglects the concerns and experience of young adult women, the group with the highest rates of unintended pregnancies and abortions. Clearly, if unintended pregnancy and abortion are among society's chief concerns, attention should not be focused solely on teenagers.

Long-term contraceptive use pattern may be better than age as a predictor of unintended pregnancy risk. Nonusers (because of their high risk) and sporadic users (because of their moderately high risk combined with their large numbers) contribute significantly to the high rate of unintended pregnancies. Policies targeting the reduction of unintended pregnancy will maximize their impact by focusing on these two groups.

Multivariate analyses identified why certain groups may be at high risk for unintended pregnancy. Women who are married or in a cohabiting relationship are more likely to be uninterrupted effective contraceptive users than are those who are not in long-term stable relationships. In addition, frequency of intercourse has a consistent and strong positive association with contraceptive use, and couples with regular and predictable intercourse have more method options. Increased coital frequency may also reflect a woman's greater comfort with her own sexual activity and with the process of negotiating, obtaining and using contraceptives. Finally, women who experience nonvoluntary intercourse and young teenagers having significantly older partners are less likely to use contraceptives.

Condoms appear to be a good choice for women who have sex infrequently or who have frequent periods in which they do not have intercourse. However, while condoms may be relatively easy to obtain and use and offer protection against sexually transmitted infections, they require male cooperation and must be on hand at the time of intercourse. Condom use may be incompatible with unanticipated sex, and may be impossible in coercive situations. In these circumstances, emergency contraception is an excellent and cost-effective back-up method, reducing the chance of pregnancy by 74% when started within three days after unprotected sex.[18] Unfortunately, a national survey of men and women aged 18-44 found that despite increased publicity, one-third of women and about one-half of men had never heard of this method.[19]

While women and men need to be aware that preventing pregnancy after sex is possible, knowing about such options is not enough. Couples also must recognize the risk of pregnancy even with infrequent intercourse; otherwise, there is little incentive to seek preventive measures, even after the fact.

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*Intended pregnancies are those for which the respondent reported that the pregnancy occurred at the right time, that it should have occurred later or that she was indifferent to the timing of the pregnancy.

†Women not at risk of pregnancy are those who in a given month are already pregnant, are postpartum (i.e., gave birth in the last two months) or have not yet reached menarche. Since the date of conception is unknown for those currently pregnant (n=132), these women are coded as not at risk in the seven months prior to the

interview.

‡Periods of sexual activity are based on the respondent's report of months of nonintercourse. Although there may be some recall bias for these data, the calendar method employed in the NSFG allows the respondent to align nonintercourse months relative to months of contraceptive use and reported pregnancies. Therefore, data on months of intercourse relative to months of contraceptive use are expected to be quite good.

§Other methods include the male condom, the female condom, emergency contraceptive pills, the diaphragm, the cervical cap, spermicidal foam, jelly, cream or suppository, the sponge, periodic abstinence and withdrawal or some other method.

**Respondents who reported nonvoluntary sexual experience were asked, "How old were you the very first time you were forced by a man to have sexual intercourse against your will?" Although the ideal measure would be recency of any nonvoluntary intercourse, all that can be determined from these data is whether the respondent recently experienced nonvoluntary intercourse for the first time (i.e., in her previous or current age-year).

†† Exposure is measured by counting backward from the date of the interview until either 12 months of risk have accumulated or a point 24 months prior to the interview is reached.

‡‡ In only one case did a result that had been significant become nonsignificant, and the magnitude of the coefficients changed slightly.