

Original research article

# Discontinuation and resumption of contraceptive use: results from the 2002 National Survey of Family Growth<sup>☆</sup>

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## Abstract

**Background:** Discontinuation of contraceptive use that is not immediately followed by resumption of use of another method while a woman is at risk is a common cause of unintended pregnancy.

**Study design:** We provide new estimates of discontinuation for the pill, injectable, male condom, withdrawal and fertility-awareness-based methods, and identify socioeconomic characteristics associated with discontinuation for the pill, male condom and withdrawal. We provide new estimates of resumption of use by prior method used and identify socioeconomic characteristics associated with resumption of use. Estimates are obtained using the 2002 National Survey of Family Growth, supplemented by the 2001 Abortion Patient Survey to correct for underreporting of abortion.

**Results:** The fraction of method use segments discontinued for method-related reasons within 1 year was highest for the male condom (57%), withdrawal (54%) and fertility-awareness-based methods (53%), and lowest for the pill (33%), with the injectable in-between (44%). However, contraception was abandoned altogether in only 25% of cases. The probability of resuming use of a contraceptive was 72% in the initial month of exposure to the risk of an unintended pregnancy; this rose to 76% by the third month.

**Conclusion:** The risk of discontinuation of use of reversible methods of contraception for method-related reasons, including a change of method, is very high, but fortunately the risk of abandoning use of contraception altogether is far lower, and most spells of exposure to risk of an unintended pregnancy following discontinuation are protected from the start by a switch to another method.

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## 1. Introduction

In an ideal world, every woman would find a contraceptive method suited to her age, union status and desire for future births, and she would use that method until she was no longer exposed to risk of an unintended pregnancy, or until changing life circumstances led her to choose a different method. Having found the right method, she would always

use that method correctly and consistently and reduce her risk of unintended pregnancy to its theoretical minimum.

However, in the real world, failure to prevent pregnancy, difficulty in using methods consistently and correctly, dissatisfaction with available methods, and partner opposition to methods are among the reasons that women abandon contraceptive methods. Imperfect or incorrect use of contraception often leads to contraceptive failure and, consequently, an abortion or an unintended birth. In addition, when women stop using a contraceptive method, they often do not immediately begin to use another method, exposing themselves to the risk of unintended pregnancies during periods of nonuse.

Unintended pregnancies accounted for 49% of all pregnancies in 2001. Of these unintended pregnancies, 48% occurred while the woman was using contraception [1].

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The other 52% of unintended pregnancies occurred at a time when the woman was not using contraception in the month she conceived. Since 98% of all American women of reproductive age who have ever had intercourse have used contraception at some point in their lives [2], it is clear that a large proportion of these nonusers had abandoned contraception at some time in the past and did not resume use despite having no intention to get pregnant at the time.

Clearly, reducing both the high rate of contraceptive failure [3] and the rate of discontinuation of contraceptive use would serve to ensure that a greater proportion of pregnancies would be intended. Our analysis is designed to clarify the dynamics of contraceptive discontinuation and resumption of use among American women of reproductive age during the early part of the 21st century. This paper presents the most recent information available on contraceptive discontinuation, using data from the 2002 National Survey of Family Growth (NSFG), conducted by the National Center for Health Statistics. It updates an earlier analysis that used comparable data for the early 1990s, from the 1995 NSFG [4], and also uses comparable analytical methods. As a result, it provides the opportunity to assess whether rates of contraceptive discontinuation and resumption of use have changed over recent years.

For the 2002 NSFG, 7643 women were interviewed in person, a sample representing the civilian, noninstitutionalized household population of all women aged 15–44 years in the United States; women under age 25, blacks and Hispanics were oversampled. In addition to the face-to-face interview, some sensitive topics were covered with a computer-assisted, self-administered questionnaire, completed after the main interview. Detailed questions about children and pregnancies, marriage and partners, contraceptive use and intentions for future pregnancies were asked. The survey response rate was 80%.

According to the 2002 NSFG, there were fewer than 3.05 million abortions in the USA from 1997 to 2001. We know this is an underestimate, because in that same period, the Guttmacher Institute, using reports from abortion providers, estimates that there were nearly 6.5 million abortions [5]. Many women do not want to disclose, or even think about, their past abortions. The NSFG seeks to elicit a complete report by allowing women to enter information about prior abortions and other sensitive topics directly into a computer, but this procedure has not been sufficient to induce women to report a complete and accurate abortion history [5]. We have supplemented the NSFG data with data from the 2001 Abortion Patient Survey (APS) conducted by the Guttmacher Institute. This is a nationally representative self-administered survey of women who were patients in abortion clinics.

We calculate single-decrement life-table probabilities of discontinuing use of a method of contraception for any reason, and for method-related reasons (defined below), as well as the probability of abandoning contraceptive use altogether after starting use of a reversible method. These

probabilities are presented based on NSFG data alone and using the supplemental APS data to adjust for unreported abortions. We also calculate multiple-decrement probabilities of resuming use of contraception after discontinuation. We use hazard models to examine the characteristics associated with the discontinuation of use for method-related reasons and with the resumption of contraceptive use after discontinuation.

## 2. Data and methods

### 2.1. The survey

The 2002 NSFG (Cycle 6 in the NSFG survey series) contains a history of all of the respondents' past pregnancies, with details about the pregnancy outcome, contraceptive method use in the interval preceding the pregnancy and the woman's desire for future pregnancies in the period before each conception. In addition, the interviewer compiled with the respondent a very detailed month-by-month calendar of all methods used between January 1, 1999, and the date of the interview. New to this round of the NSFG is a monthly calendar of sexual activity that covers the same period as the contraceptive calendar. Previously, there were questions about a maximum of four periods of sexual inactivity during the period prior to the survey. Finally, there is a detailed history of marriages and cohabiting relationships.

Such a complex survey cannot fail to have some lacunae. If the survey is too long, respondent and interviewer fatigue negatively affect the quality of the data. Cycle 6 of the NSFG is estimated, on average, to have taken 80 min to complete. The previous NSFG survey, conducted in 1995, had an average response time of 103 min. In Cycle 6, the detailed work and schooling histories were dropped. The marriage and cohabitation histories were simplified by omitting questions regarding temporary separations. (The more detailed history of sexual inactivity presumably compensates for the omission of periods of temporary breaks in unions.) Women were no longer asked to report the last method they had used in each pregnancy interval before the calendar period. We had used some of these questions to construct variables that we found to be significantly associated with discontinuation and resumption of use in an earlier analysis using the 1995 NSFG survey [4].

### 2.2. Definitions and construction of variables

For our analysis of discontinuation of method use, we constructed new data sets from the NSFG method-use calendar, creating one record for each new segment of contraceptive use found in the calendar. Since our analysis is confined to the first year of use, we eliminated all segments where a woman had already been using a method for a year or more on January 1, 1999. If a method was being used on January 1, 1999, but for less than a year, the segment is entered into our analysis at the duration reported on that date.

Thus, our data are left truncated. We also eliminated a few segments where the duration of use on January 1, 1999, could not be determined. Because some women might have been pregnant, but unaware of that fact at the date of interview, we terminated observation at the end of the second month preceding the interview; e.g., if a woman was interviewed in May 2002, we included events and exposure through the end of March 2002. We included segments of use of contraceptive sterilization, either of the woman or her partner, in our data. We do not analyze discontinuation of sterilization, but when we ignore switching of method as a reason for discontinuation, a change from a nonpermanent method to sterilization does not terminate a segment. Also, our analysis of resumption of use includes sterilization among the methods that may be chosen as the next method.

Women were not asked directly why they terminated use of contraception. If a woman began using a new method immediately after discontinuing use, we assumed she stopped using the first method because it was unsatisfactory or inappropriate to her situation. If a method was used continuously before and after conception of a pregnancy, it was assumed that there was a contraceptive failure. In this case, we terminated exposure at the date of conception. If use was stopped in the month of conception, the woman was asked whether she had actually stopped before getting pregnant, and if she said she had not stopped, we defined this pregnancy as a contraceptive failure. If a woman reported that she had not been using contraception at time of conception because she had been trying to get pregnant, we assumed that the last method (if any) used before that pregnancy had been stopped so that she could get pregnant. Likewise, if a woman reported that she was not using contraception at the time of interview because she was trying to become pregnant, we assumed that the last method used in the open pregnancy interval was stopped so that she could get pregnant. By comparing the date of discontinuation with the calendar of sexual activity, we can infer when use was stopped because there was no exposure to risk. Likewise, we assumed there was no exposure to risk following use that stopped when a woman became noncontraceptively sterile. There is a residual category of use that was stopped for reasons that we could not determine from the data available in the calendar. We call this event “stopped, other”. We also defined as “stopped, other” those cases where a woman stopped using in the month of conception and reported, when asked, that she had indeed stopped before getting pregnant, but that her reason for stopping was not because she wanted to get pregnant.

We categorize reasons for discontinuing as either method related or not method related. For our purposes, only stopping to have a wanted pregnancy or stopping because of no longer being exposed to the risk of pregnancy is considered non–method related. All other discontinuations are defined to be method-related: this group of all method-related discontinuations includes the “stopped, other” category, because even though we do not know the specific

reason why use was stopped, we know that the woman was sexually active at the time she stopped and did not report that she was trying to get pregnant, so we infer that there must have been some problem with the method she had been using. Women who switched from one method to another without any intervening gap of nonuse are also considered to have stopped for method-related reasons: we infer that women who did so found the first method unsatisfactory or unsuitable to their circumstances for some reason.

We consider also an alternative definition of method-related discontinuation, which we call “abandonment” of contraception. In this version of the analysis, a segment of method use begins with the use of a method after a pregnancy or a period of nonuse, or with the start of use of the method being used on January 1, 1999. The segment continues as long as the woman continues to use any method of contraception; in other words, switching methods is considered to be continuing use. Women may discontinue for non–method-related reasons (seeking pregnancy or non-exposure), or for method-related reasons, which include only contraceptive failure and stopping for unknown reasons when the woman was sexually active and not trying to get pregnant. We analyze all segments that begin with the use of a nonpermanent method of contraception. However, if a woman switched to sterilization after beginning use of a nonpermanent method, the period of subsequent sterilization is included in the segment. Abandonment of contraception cannot be measured for specific methods obviously, because each spell may contain multiple methods.

Our analysis examines three measures of discontinuation: all discontinuations (method- and non–method-related discontinuations combined); all method-related discontinuations (switching methods, contraceptive failures and stopping for any other reason); and abandonment of contraception (stopping all method use because of contraceptive failure or for any reason other than nonexposure or trying to get pregnant).

For the analysis of discontinuation, we used the APS data to define a corrected count of the number of contraceptive failures, in order to assess the impact of the underreporting of abortion on our estimates. To define this corrected count, we eliminated those contraceptive failures in the NSFG that led to abortion and substituted from the APS survey all abortions for the same group that had been preceded by contraceptive failure. A more detailed explanation of the adjustment procedure is given elsewhere [3].

Our analysis is potentially affected by the lack of a complete abortion history and by adjustment of abortion data, in several ways:

- Women may not report pregnancies that led to abortion. In this case, they might either:
  - Report continuous method use throughout the pregnancy and after. This would mean that instead of two segments of contraceptive use, we would observe one longer segment and we would not

observe at all the contraceptive failure leading to the pregnancy. Consequently, we would underestimate discontinuation using only NSFG data. The substitution of APS failures leading to abortion for NSFG failures leading to abortion would correct the numerator of the failure rate, although the denominator would still be overstated at the longer durations and understated at the earlier durations. The total amount of exposure would probably be overstated, since it is unlikely that method use would have continued throughout the pregnancy.

- Report a gap in method use, which would not affect our estimate of discontinuation based on NSFG data alone, although if a contraceptive failure led to the pregnancy, it would be reported as some other sort of event, such as “stopped for other reasons.” Then, our substituting of APS failures leading to abortion for NSFG failures leading to abortion would lead to our including two distinct events for the same spell of exposure and, hence, to an overestimation of discontinuation.
- Women may report the pregnancy but say that it ended in miscarriage. In this case, the estimates of contraceptive discontinuation based on the NSFG alone are not affected, since both events and the exposure would be the same. However, the correction using APS data would again result in an overstatement of discontinuation.

For the analysis of resumption of contraceptive use, we created spells of nonuse beginning with the first time we observe a woman discontinuing a method in the calendar. If she was not sexually active at the time she stopped using contraception, we assumed that her exposure began the next time, if ever, she resumed sexual activity. If she stopped because of a contraceptive failure or to have a wanted pregnancy, we assumed her exposure began in the first month after that pregnancy ended in which she was both sexually active and not trying to get pregnant. Women who stopped for unknown reasons are eligible immediately, as these women were by definition both sexually active and not trying to get pregnant at the time they stopped using.

We observed a segment of nonuse after discontinuation, beginning when the woman was first exposed to the risk of unintended pregnancy, and until resumption of another method, or until a conception or the cut-off date prior to interview. If a woman switched methods, she contributed a segment of nonuse that began and ended at the same duration. In fact, the majority of the women who resume use in the first month of nonuse are women who changed methods.

For both the discontinuation and resumption of use analyses, we created variables that pertain to the woman’s characteristics and her experience at the time of method use (for discontinuation) or at time of reentry into risk after discontinuation (for resumption of use). Race and ethnicity

(Hispanic, non-Hispanic black, non-Hispanic white/other) are fixed characteristics. Poverty cannot be determined at the time of use, as there is no economic status history in the NSFG. We would not expect poverty status to change drastically during the time period of our analysis, so we use poverty status at the time of interview. We defined poverty as having an income of less than 200% of the officially defined poverty level, after testing various cut-off points using univariate life tables.

We define age and the number of children the woman has had at the start of each segment. (For analyses of discontinuation, a segment begins when use begins, even if that is before January 1, 1999, when observation of exposure begins. For analyses of resumption of use, a spell begins as soon as a woman is exposed to risk after discontinuation of a method.) We determine marital status and union status using the calendars of marriages and cohabitations. We defined both union status and formal marital status during each month of method use and include union or marital status as a time-varying covariate in our models. We determine the woman’s intentions regarding future pregnancies at the time of method use from the questions that were asked about the circumstances surrounding each pregnancy.

As in the case of poverty status, insurance coverage at time of use cannot be determined. There are several variables in the survey regarding continuity and type of insurance coverage at time of interview and in the year prior to interview. We created a series of binary variables indicating whether a woman was ever covered by Medicaid in the year prior to interview; whether she was covered only by private health insurance in that year; or whether she had other types of medical coverage, including combinations of Medicaid and private insurance; or whether she had no insurance coverage at all. We also created variables indicating whether the woman had continuous coverage in the year prior to interview, whether she had gaps in coverage or whether she had no health insurance coverage at all in the prior year. Although the continuity does not refer to the entire period of the analysis, we would expect it to indicate a situation of precarious insurance coverage.

In our analysis of the 1995 NSFG, we found work/study status to be significant in a number of our models. However, there is no work or schooling history in this round of the NSFG. We could have used status at interview, but, especially for young women, the status at interview may have no relation to the status 3 years earlier. In the earlier analysis, we also found previous method used to be significant in some models, but this likewise had to be dropped for our analysis of discontinuation because the 2002 NSFG has no information about the previous method for women who were using a method on January 1, 1999, when the calendar begins. For segments following discontinuation, we know the prior method used, because it is the method the woman was using at the time she discontinued. For our analysis of resumption of use, we also defined a variable

indicating whether the previous method used was discontinued because of contraceptive failure.

### 2.3. *Quality of the 2002 NSFG calendar data*

The quality of the NSFG data has improved in many respects since the 1995 survey. The 1995 data had several problems related to mistaken skip patterns; there were also several crucial questions that were not asked in that survey, or not asked of all the respondents. The 2002 NSFG data are almost entirely complete, so we have not had to limit our sample artificially because of omissions in the data.

On the other hand, there is more internal inconsistency in the 2002 survey than in past surveys. In part, this may be the result of a decision not to force internal consistency at the expense of an accurate representation of what the respondent reported. Whatever the reason, there are, for example, conceptions reported at a time when the woman was already pregnant. There are also women who report conceiving before first having intercourse and divorcing before ever marrying. Altogether, about 2% of the cases have pregnancy dates that are inconsistent with other dates in the pregnancy history. However, the rate of inconsistency is greater in the period before 1999 than for the most recent period; in the period 1999–2002 which is the focus of the present analysis, there are 15 pregnancies (0.5% of all pregnancies reported during this period), reported by 14 respondents, that have dates that are inconsistent with other dates in the pregnancy history. Errors in the dates of pregnancies could affect our calculated length of contraceptive use, but we do not expect that they have a material effect on our results, given the small number of occurrences.

There is also evidence of incomplete reporting of contraceptive methods. Women were asked the date they first used contraception, and they were also asked about every type of contraceptive method they had ever used. Altogether, 813 respondents reported a date of first contraceptive use later than January 1, 1999. For these respondents, every method they ever used should be found in the calendar of method use after 1999. For 548 of these women, all of the methods they had ever used are indeed found in the calendar. For the other 265 women (33%), at least one method they had used is missing from the calendar. Among women who first used contraception after January 1, 1999, 5% of those who reported ever use of the pill did not report any period of pill use in the contraceptive calendar; by comparison, this proportion is 69% for fertility-awareness-based methods, 58% for barrier methods other than the condom and 45% for withdrawal. The number of use segments affected is a small proportion of all segments of use of any given method in the calendar that is being analyzed. On the other hand, these are women who had been using contraception for only a short time and would be expected to have fewer problems of recall than women who used many methods for decades. For these longer-term users, we have no way of knowing whether they have neglected to report method use during the calendar, so

the magnitude of the total underreporting is unknown. If women who neglect to report method use are atypical in some way that is associated with the propensity to discontinue or resume method use, our results will be affected for those methods that lack data for a substantial proportion of all use segments.

### 2.4. *Analytical methods*

We estimated the proportion of method use segments that were discontinued for all reasons and for all method-related reasons, and where contraception was abandoned altogether, using standard life-table procedures. For this analysis, we used weighted data, scaling the record weights within group to correspond to the number of spells entering the analysis. The confidence intervals were calculated using the Peto method for survival data [6]. This yields a conservative estimate of significance and is especially indicated when there are long temporal gaps in the series of events. There were not many such gaps in our discontinuation analyses, but these gaps were evident in our analyses of resumption of use. We also calculated the standard errors using the standard Greenwood method. The standard errors were not materially different according to the two methods, so we decided to use the more conservative Peto estimate.

In our analysis of overall discontinuation, each segment either ends in the event of interest or is censored. However, when we analyze method-related discontinuation and abandonment of contraception, we consider stopping to have a wanted pregnancy or because of nonexposure to risk of pregnancy to be competing risks that prevent us from observing the event of interest. As an example, a woman who stopped because she was not exposed might have experienced a contraceptive failure if she had remained exposed and continued to use. Single-decrement life tables calculate the probability that an event would occur in the absence of competing risks. Usually, an adjustment for competing risks assumes that half of the women who experienced the competing event were exposed to risk of the event of interest in their final month, while the other half were not exposed. This is a fairly good approximation of the probability of one event occurring in the presence of risk of another event. However, when there is a large disparity between the risks of the two events, this approximation distorts the estimate. In our analysis, the risk of discontinuation because of nonexposure or desire for pregnancy is much less than the risk of discontinuation or abandonment for method-related reasons. For this reason, we used the exact calculation of risk, as described by Trussell and Menken [7].

For our analysis of resumption of method use, we calculated multiple-decrement life tables in order to estimate the probability of resuming use of particular methods, both separately and combined. In these life tables, the probabilities of the various outcomes are additive, so that they can be summed to the total probability of all outcomes. In addition to resumption of contraceptive use, other outcomes

are pregnancy during the nonuse interval and permanent nonexposure (noncontraceptive sterilization). In fact, there were no cases of noncontraceptive sterilization during a nonuse period that entered our analysis. Those that did occur during the calendar period occurred at times the woman was not exposed to risk for other reasons, e.g., when she was not sexually active. Temporary nonexposure to risk because of sexual inactivity during a risk spell was subtracted from the total length of exposure if the woman became exposed again before the interview. If not, the nonuse segment was censored at the duration of nonuse at the time she ceased sexual activity. If use was stopped *during* a period of sexual inactivity, the spell does not enter the analysis until sexual activity is resumed. If the respondent is interviewed before that happens, the nonuse spell does not enter our analysis at all.

We are more interested in understanding the dynamics of method-related discontinuation than of total discontinuation, since discontinuing use in order to have a wanted pregnancy or because of nonexposure will not lead to unintended pregnancies. The characteristics associated with resumption of use after discontinuation are also pertinent to our understanding of the reasons why women who are sexually active and do not intend to become pregnant are not using contraception. To understand better these dynamics, we examined the factors associated with method-related discontinuation and resumption of use using Cox proportional hazard models.

Our goal was to find the simplest models that capture the observed variation in the propensity to discontinue for method-related reasons or to resume use after discontinuation. We started by estimating an initial model with all factors. We next estimated a model with only those factors with at least one category having a relative risk that is significantly different from 1.0 at the 5% level. Finally, we combined categories with similar relative risks to produce the most parsimonious model. At each stage, we performed a likelihood ratio test to ensure that the restricted model fits the data as well as the prior less restricted model.

For this analysis, we used unweighted data so that we could employ standard likelihood ratio tests. The NSFG oversampled black and Hispanic women, as well as women aged less than 25 at the time of survey, in order to have a large enough sample size to analyze subgroups of the population. Since there is a differential probability of using certain methods by race and age, our model estimates could potentially be distorted by differing proportions of over-sampled groups in the various method categories. To guard against this bias, we included age, race and Hispanic ethnicity in every model and retained them in the model until the final step, only dropping them in the end if they were not significant.

We chose the initial category breakdowns by examining survival curves for the underlying variables. For example, we included in the initial model for the pill the age categories 12–19, 20–29 and 30+, while for withdrawal, we initially

used the categories 12–19, 20–24 and 25+. The reason is that the survival curves showed that for the pill, the 25- to 29-age category was virtually indistinguishable from the 20–24 category, while for withdrawal it was virtually indistinguishable from the 30+ group.

Our data files were created using the SAS statistical programming language [8]. A SAS macro program was written to calculate the multiple-decrement and associated single-decrement life tables. We used the SAS PHREG procedure to fit the Cox proportional hazards models.

### 3. Results

#### 3.1. Overall discontinuation

Using the 2002 NSFG data alone, we find that 67.4% of all methods used have already been discontinued by the end of 12 months (Table 1). Using our correction for underreporting of abortion would raise that estimate very slightly to 67.9%. Thus, underreporting of abortion has little impact on estimates of contraceptive discontinuation overall. In the case of some methods, the abortion-corrected estimates of discontinuation are smaller than the uncorrected estimates. But, in all cases, the adjustment for abortion underreporting was trivial. The probabilities shown hereafter, unless otherwise stated, are corrected for underreporting of abortion.

#### 3.2. Overall discontinuation of specific methods

We calculated life-table probabilities separately for pill, male condom, injectable, withdrawal and fertility-awareness-based methods (Table 1); the only injectable contraceptive currently available in the United States is DMPA, so our analyses of injectable use were therefore restricted to uses of this form of injectable. Other methods with an insufficient number of uses to permit estimation of separate life table

Table 1  
Probability of discontinuing contraceptive use for any reason within 6 and 12 months of use; uncorrected and corrected for abortion underreporting

Method	n <sup>a</sup>	Six months		Twelve months	
		%	95% CI	%	95% CI
<i>Uncorrected</i>					
Injectable	716	35.0	(31.3–38.9)	55.7	(51.6–59.7)
Pill	2543	30.8	(28.9–32.8)	46.8	(44.6–49.0)
Male condom	3847	68.6	(67.0–70.1)	81.1	(79.7–82.5)
Withdrawal	848	61.7	(58.2–65.0)	75.1	(71.7–78.2)
Fertility-awareness	236	61.0	(54.1–67.5)	70.4	(62.9–77.0)
All methods	9038	53.6	(52.5–54.7)	67.4	(66.3–68.5)
<i>Corrected</i>					
Injectable	716	34.5	(30.8–38.3)	55.3	(51.2–59.3)
Pill	2543	31.1	(29.2–33.1)	47.4	(45.2–49.6)
Male condom	3847	69.0	(67.4–70.5)	81.9	(80.5–83.2)
Withdrawal	848	60.9	(57.4–64.4)	74.9	(71.5–78.1)
Fertility-awareness	236	61.1	(54.3–67.5)	71.3	(64.0–77.7)
All methods	9038	53.7	(52.6–54.8)	67.9	(66.8–69.0)

<sup>a</sup> Number of segments.

are spermicides, the diaphragm and the IUD, as well as other methods that are little used; these methods are included in the total, though not shown separately. Altogether we have 9038 method segments in our discontinuation analysis. The methods that are most likely to be discontinued are male condom (81.9% discontinuing in the first year), withdrawal (74.9%) and fertility-awareness-based methods (71.3%). The least likely to be discontinued are the pill (47.4%) and injectable (55.3%). Seventy-nine percent of all discontinuations in the first year occur in the first 6 months of use. Use of fertility-awareness-based methods is likely to be discontinued very early; 86% of first-year discontinuation of these methods occurs in the first 6 months. Injectable use is the least likely to be discontinued in the early months of use; the injectable is by its nature a long-term method, so this is to be expected.

### 3.3. Method-related discontinuation

When we confine our analysis to discontinuation for method-related reasons, using NSFG data alone, we find that 46.3% of method segments end in the first year of use. Using the correction for underreporting of abortion raises the rate to 47.1% (Table 2). The male condom is the method most likely to be discontinued (57.1%). By comparison, similar levels of method-related reasons for discontinuation in the first year of use are found for withdrawal (54.2%) and fertility-awareness-based methods (53.2%). Lower levels of discontinuation for method-related reasons are found for the pill (32.7%) and for the injectable (44.0%).

Among the method-related reasons for discontinuing contraception, we include change of method, when a method

was discontinued and immediately replaced by another method. The reasoning is that the original method must have been either unsatisfactory, or perhaps just unsuited to changed life situations. In either case, some characteristic of the original method necessitated or precipitated the change. For all methods combined, the concept of abandonment of all contraception is an alternative way of considering discontinuation. In this case, we consider that a segment of contraceptive use does not end with a change of method, but continues until all method use is discontinued.

We include this alternative analysis in Table 2, only for all methods combined, since a segment may include sequential use of multiple methods. Method-related reasons for abandonment of contraception include only contraceptive failure and stopping of all method use for unknown reasons. All segments that begin with use of a reversible method are included in the analysis and continue as long as any method, including sterilization, is being used. Since changing to use of a different method does not initiate a new segment, the total number of segments is 6662 rather than 9038.

We observe that 23.1% of all reversible method use ends with the abandonment of all use of contraception within 1 year of beginning use. Correcting for the underreporting of abortion raises the percentage to 24.6%. The discontinuation of use of particular methods is almost twice as likely as the abandonment of all contraception.

### 3.4. Factors that affect method-related discontinuation

We used multivariate models to examine the factors associated with discontinuation of specific methods for all method-related reasons. We find that pill use was 23% more likely to be discontinued if the user was 12–19 years old, and 20% less likely to be discontinued by women aged 30 or more, compared to use by women aged 20–29 (Table 3). Pill use during periods of cohabitation was 27% more likely to be discontinued than use during periods of formal marriage or when not in union. If the user was non-Hispanic black, pill use was 21% more likely to be discontinued than if the user was of other ethnic or racial backgrounds. During periods when the user had no children, pill use was 54% less likely to be discontinued than when the user had children. Coverage by Medicaid in the year prior to interview was associated with a 60% higher risk of method-related discontinuation of pill use compared to coverage by private insurance, no insurance or other types of medical insurance coverage, including a mix of private and public coverage. On the other hand, having continuous coverage by medical insurance (either Medicaid or private coverage) during the year prior to interview reduced the risk of method-related discontinuation of the pill by 25%, compared to having no medical insurance coverage in the year prior to interview, or to a history of gaps in coverage during that year. Poverty level at time of interview was not a significant factor in the risk of pill discontinuation.

Table 2  
Probability of method-related discontinuation of contraceptive use at 6 and 12 months of use, by method; uncorrected and corrected for abortion underreporting

Method	n <sup>a</sup>	Six months		Twelve months	
		%	95% CI	%	95% CI
<i>Uncorrected</i>					
Injectable	716	26.0	(22.5–29.9)	44.6	(40.1–49.1)
Pill	2543	19.2	(17.5–21.0)	31.9	(29.6–34.3)
Male condom	3847	40.6	(38.4–42.9)	55.2	(52.4–57.9)
Withdrawal	848	39.0	(34.8–43.5)	54.4	(49.3–59.4)
Fertility-awareness	236	40.1	(32.2–48.7)	51.8	(41.9–61.5)
All methods	9038	32.8	(31.5–34.0)	46.3	(44.8–47.8)
Abandonment of all method use <sup>b</sup>	6662	15.3	(14.2–16.5)	23.1	(21.6–24.7)
<i>Corrected</i>					
Injectable	716	25.4	(21.9–29.2)	44.0	(39.5–48.6)
Pill	2543	19.5	(17.8–21.4)	32.7	(30.4–35.0)
Male condom	3847	41.3	(39.1–43.6)	57.1	(54.4–59.7)
Withdrawal	848	38.0	(33.7–42.4)	54.2	(49.1–59.2)
Fertility-awareness	236	40.3	(32.3–48.8)	53.2	(43.5–62.7)
All methods	9038	32.9	(31.7–34.1)	47.1	(45.6–48.6)
Abandonment of all method use <sup>b</sup>	6662	15.8	(14.7–17.1)	24.6	(23.0–26.2)

<sup>a</sup> Number of segments.

<sup>b</sup> Segments ending in a method switch are treated as continuous spells of use.

Table 3  
Cox proportional hazard models of method-related discontinuation of contraceptive use within 12 months

Factor	Hazard ratio	P=1.0	95% CI
<i>Pill</i>			
Age <20	1.226	.0146	(1.041–1.444)
Age 30+	0.798	.0136	(0.668–0.955)
Black	1.206	.0256	(1.023–1.421)
Nulliparous	0.464	<.0001	(0.396–0.543)
Cohabiting	1.267	.0060	(1.070–1.499)
Medicaid	1.595	<.0001	(1.323–1.924)
Continuous coverage	0.752	.0001	(0.651–0.869)
<i>Condom</i>			
Age <20	1.424	<.0001	(1.247–1.625)
Age 30+	0.767	.0006	(0.659–0.892)
Wants no more children	0.874	.0478	(0.766–0.999)
Nulliparous	0.734	<.0001	(0.649–0.831)
Married	0.850	.0335	(0.732–0.987)
Cohabiting	1.260	.0026	(1.084–1.464)
<i>Withdrawal</i>			
Age <20	1.441	.0061	(1.110–1.872)
Age 25+	0.690	.0047	(0.533–0.892)
Hispanic	0.719	.0161	(0.550–0.941)
Poor <sup>a</sup>	1.245	.0435	(1.006–1.540)
Married	0.706	.0085	(0.545–0.915)
<i>All reversible methods combined</i>			
Age <20	1.149	.0026	(1.050–1.258)
Age 25+	0.813	<.0001	(0.747–0.885)
Married	0.876	.0024	(0.805–0.954)
Nulliparous	0.757	<.0001	(0.696–0.822)
Medicaid	1.261	<.0001	(1.135–1.400)
Private insurance	0.892	.0082	(0.820–0.971)

<sup>a</sup> Less than 200% of the poverty level.

Condom use by teenagers was 42% more likely to be discontinued than condom use by women aged 20–29, and condom use by women aged 30 or more was 23% less likely to be discontinued. Use during periods when women wanted no more children was 13% less likely to be discontinued than when women wanted to have a child at some time in the future, although not immediately. Use by nulliparous women was 27% less likely to be terminated than use by women with at least one child. Finally, use during periods of cohabitation was 26% more likely to be discontinued, while use during marriage was 15% less likely to be discontinued than use by women who were neither married nor cohabiting.

The factor most associated with method-related discontinuation during withdrawal use was age, with use by teens 44% more likely to end in method-related discontinuation and use by women aged 25 or more 31% less likely to be discontinued, compared with use by women aged 20–24. Method-related discontinuation of withdrawal was 28% less likely to occur when the user was Hispanic than among women of other ethnicities, while method-related discontinuation by poor women was 25% more likely to occur than among women who had incomes above 200% of poverty

level at time of interview. Use of withdrawal was 29% less likely to be discontinued during marriage than during periods preceding and following formal marriage.

Overall, considering all segments of method use combined, we find that contraceptive use was 15% more likely to be discontinued for method-related reasons if the user was 12–19 years old, and 19% less likely to be discontinued by women aged 25 or more, compared to use by women aged 20–24 (Table 3). Use during marriage was 12% less likely to be discontinued than use during periods of cohabitation or when not in union. Methods used during periods when the user had no children were 24% less likely to be discontinued than those used by parous women. Coverage by Medicaid in the year prior to interview was associated with a 26% higher risk of method-related discontinuation, while coverage only by private insurance reduced the risk by 11%, with respect to no insurance coverage or coverage by a mix of private and public coverage.

### 3.5. Resuming contraceptive use

In our resumption of use analyses, we calculated life tables separately by the method used at the time of discontinuation. The methods with sufficient cases to sustain separate analyses were pill, male condom, injectable and withdrawal. Altogether, there are 7106 segments of nonuse in our resumption of use analysis. This number is lower than the number in the discontinuation of use analysis because many segments of discontinuation never enter the risk pool. For example, a segment that ended in contraceptive failure shortly before the interview may not enter our analysis because exposure to risk occurs only when the pregnancy ends. On the other hand, we also have segments of nonuse following periods of use that were *not* in the discontinuation analysis; if a method had been used for more than a year at the start of the calendar period, the segment would not enter our discontinuation analysis, but if that method were discontinued during the calendar period, we would observe the subsequent period of nonuse.

We find that by the end of the first year, 80.3% of periods of nonuse following discontinuation of use of a contraceptive method had ended with resumption of use of some type of contraceptive (Table 4). A very high proportion of resumption occurs in the first month that a woman is exposed to risk of unintended pregnancy after discontinuation. Overall, 71.5% of nonuse intervals had already ended in resumption of use in less than 1 month, either because of a change in method or because of resumption of contraceptive use immediately following a pregnancy.

Former injectable use segments were most likely to be followed by pill use (24.2% within 1 year), while 21.2% switched to condom and 12.2% resumed use of the injectable. In all, 75.7% of nonuse segments following use of the injectable were resolved by resumed use of some method within a year; 65.3% of them ended with resumed method use within the first month.



Table 4

Cumulative probability of resuming use of specific contraceptive methods or any contraception after discontinuing contraceptive use, by prior method used; with probabilities of becoming pregnant while not using and of being still at risk of unintended pregnancy

Duration	Male+female sterilization	Injectable	Pill	Condom	Withdrawal	Other	All	95% CI	Pregnant	At risk
<i>Previous method: all methods (n=7106)</i>										
1 month	0.042	0.034	0.160	0.298	0.080	0.102	0.715	(0.702–0.803)	0.118	0.167
3 months	0.044	0.035	0.169	0.321	0.086	0.106	0.762	(0.748–0.818)	0.140	0.098
6 months	0.045	0.037	0.174	0.333	0.089	0.107	0.786	(0.770–0.826)	0.149	0.065
12 months	0.047	0.038	0.179	0.341	0.090	0.109	0.803	(0.783–0.832)	0.155	0.042
<i>Previous method: injectable (n=534)</i>										
1 month	0.050	0.089	0.224	0.180	0.057	0.055	0.653	(0.601–0.785)	0.116	0.230
3 months	0.055	0.102	0.226	0.196	0.058	0.055	0.693	(0.636–0.798)	0.151	0.157
6 months	0.057	0.114	0.231	0.205	0.058	0.056	0.722	(0.655–0.809)	0.164	0.114
12 months	0.064	0.122	0.242	0.212	0.058	0.059	0.757	(0.670–0.822)	0.184	0.059
<i>Previous method: pill (n=1927)</i>										
1 month	0.054	0.049	0.148	0.248	0.054	0.079	0.631	(0.599–0.776)	0.165	0.204
3 months	0.056	0.051	0.174	0.258	0.057	0.082	0.678	(0.643–0.792)	0.192	0.130
6 months	0.058	0.054	0.184	0.265	0.059	0.082	0.702	(0.663–0.801)	0.209	0.089
12 months	0.060	0.054	0.192	0.269	0.059	0.085	0.718	(0.669–0.807)	0.217	0.065
<i>Previous method: male condom (n=3115)</i>										
1 month	0.034	0.027	0.161	0.392	0.060	0.087	0.761	(0.745–0.818)	0.086	0.153
3 months	0.035	0.027	0.166	0.432	0.062	0.088	0.810	(0.793–0.833)	0.105	0.085
6 months	0.036	0.027	0.169	0.451	0.063	0.089	0.835	(0.815–0.841)	0.111	0.054
12 months	0.037	0.027	0.172	0.464	0.064	0.089	0.853	(0.829–0.848)	0.116	0.032
<i>Previous method: withdrawal (n=695)</i>										
1 month	0.041	0.016	0.153	0.171	0.259	0.082	0.723	(0.679–0.808)	0.139	0.138
3 months	0.043	0.016	0.154	0.191	0.296	0.082	0.782	(0.725–0.829)	0.155	0.062
6 months	0.043	0.021	0.155	0.196	0.308	0.082	0.805	(0.737–0.838)	0.159	0.036
12 months	0.043	0.021	0.157	0.201	0.312	0.083	0.817	na	0.163	0.020

na: CI cannot be computed.

Among segments following discontinuation of pill use, 71.8% resulted in resumed use within a year, with the largest proportion (26.9%) followed by condom use while 19.2% resumed using the pill after a period of nonuse; 63.1% of segments resulted in resumption of some method of contraceptive within 1 month.

Discontinuation of condom use was followed by resumption of use of some method within the year in 85.3% of the cases; 76.1% of all segments were ended by resumption of use within 1 month. Within 12 months of discontinuation, resumed use of condom was most common (46.4% of cases), followed by switching to pill use in 17.2% of cases.

Eighty-two percent of segments of former withdrawal use ended in resumption of use of contraception within a year; 72.3% had ended in resumption of use within the first month. In fact, all the discontinued withdrawal use in our sample ended either in resumed method use or in pregnancy (if not censored by the cutoff date) within 10 months of discontinuation. Resumed use of withdrawal was most common (31.2%), followed by switches to use of the condom (20.1%) and pill (15.7%).

Altogether, 15.5% of all discontinuations of use were followed by pregnancy within a year. The percentage of

discontinuations that ended in pregnancy was highest for the pill (21.7%), followed by the injectable (18.4%), withdrawal (16.3%) and condom (11.6%).

### 3.6. Factors that affect resumption of use

We used multivariate models to examine the factors associated with resumption of use of *any* method of contraception again after a period of nonuse. We found that if method use was discontinued during a period when desired family size had already been achieved, the probability of resumption of use was 10% higher than for discontinuation during periods when more children were desired at some future time (Table 5). Method discontinuation by nulliparous women was 24% more likely to result in resumed use of contraception than that by women with children. Discontinuation during periods when the user was married or in a cohabiting union was 16% less likely to end in resumption of use than when the user was neither married nor cohabiting. Discontinuation of the pill or the injectable was 13% less likely to be followed by resumption of method use than was discontinuation of nonhormonal methods. Finally, exclusively private insurance coverage in the year prior to the interview was

Table 5  
Cox proportional hazard model of resumption of contraceptive use within 12 months after discontinuation

Factor	Hazard ratio	P=1.0	95% CI
Wants no more children	1.101	.001	(1.040–1.166)
Nulliparous	1.242	<.0001	(1.168–1.320)
Married or cohabiting	0.866	<.0001	(0.817–0.918)
Previous method hormonal	0.872	<.0001	(0.824–0.923)
Previous method failed	0.897	.0268	(0.814–0.988)
Private insurance	1.095	.0017	(1.035–1.159)

associated with a 10% higher probability of resuming method use, compared to Medicaid coverage, no coverage or other types of insurance coverage, including mixes of private and public insurance.

### 3.7. Sensitivity analyses

In all of our analyses, the unit of observation is a segment of use (observed during the first year) or a segment of nonuse following discontinuation of a contraceptive method. In other words, some respondents contribute no experience at all, while others have multiple observed segments of use and discontinuation. There may be unobserved characteristics of women that would affect the propensity to discontinue and resume use, and, if so, those women who are more likely to discontinue would be likely to contribute more segments of both use and nonuse to our sample. Thus probabilities of both discontinuation and resumption of use among *women* might be lower than probabilities based on segments of use and nonuse.

Even though we are analyzing segments of use and nonuse, it is always tempting, sometimes even unconsciously, to extrapolate the results to women. To see just how much an interpretation based on women rather than segments of use or nonuse would be mistaken, we tried an alternative analysis using only the first segment of use and the first spell of nonuse contributed by each woman. We found that the rate of discontinuation by method was either the same as or only very slightly lower than in the analysis where women contributed multiple segments of use, and in no case was the difference substantial. The overall probability of discontinuation for the first segment in our analysis period was 45.5% as compared to 46.3% for all spells observed during the calendar period. In the analysis of resumption of use by prior method used, when only the first segment of discontinuation for each woman was included, we found that the probability of resumption of use was lower (73.6%) if we considered only first segments than if we considered all segments (80.3%). There is little qualitative difference between the two results, and in the case of resumption of use it is even clearer that the unit of interest to family planning providers and clinicians is not a woman but a spell, because nonuse is contingent on a spell of use that was discontinued. Aside from the fact that each woman is

represented only once, the analysis based on one spell per woman is also displaced in time to a somewhat earlier period.

## 4. Discussion

Discontinuation of method use in the United States is very high: overall, 68% of method use is discontinued by the end of 12 months. We found that 46.3% (uncorrected) or 47.1% (corrected for underreporting of abortion) of reversible contraceptive method use segments end in the first year of use for method-related reasons. The difference between 68% and 47% is due to discontinuation because the woman has decided she wants to become pregnant, or because she is sterile or no longer sexually active — reasons that have nothing to do with dissatisfaction with contraception or with the particular method being used. If we consider switching of methods to be continuing use of contraception rather than discontinuation, we find that only 25% of segments of reversible contraceptive method use end with abandonment of use of contraception altogether within a year while still at risk of an unintended pregnancy; a change of method often does not imply dissatisfaction with the method, but occurs because a different method is more appropriate to changing life situations.

Correcting for underreporting of abortion makes little difference in estimates of discontinuation. Kost et al. [3] found in their related study that correcting for unreported abortions increased the estimate of contraceptive failure in the first year of use from 11.1% to 12.4%. Because contraceptive failures constitute under 20% of all discontinuations, any correction that affects only contraceptive failures is not likely to have much of an effect on the estimate of all discontinuations. Contrary to expectation, we found that the corrected estimates were sometimes lower than the uncorrected estimates, as they were also in the case of contraceptive failure [3]. This anomaly is likely due to differential reporting of the method being used at time of conception in the NSFG and APS surveys.

In a previous analysis using the 1995 NSFG [4], we did not correct for abortion reporting and estimated a first-year probability of method-related discontinuation of 44%, compared with a 46% uncorrected probability in the present analysis. At that time, the most likely method to be discontinued for method-related reasons was withdrawal (57%), followed by fertility-awareness-based methods (49%), the condom (47%) and injectables (44%), with the pill (32%) being the least likely to be discontinued. In comparison, in the 2002 survey, the male condom was the method most likely to be discontinued (55% uncorrected), with similar levels for withdrawal (54%) and fertility-awareness-based methods (53%). As in the case of earlier estimates based on the 1995 NSFG, lower levels of discontinuation for method-related reasons were found for the injectable (44%) and the pill (33%). Thus, the

probability of method-related discontinuation in the first year of use was similar in the two periods for all reversible methods combined, withdrawal, fertility-awareness-based methods, the injectable and the pill; it rose significantly for the male condom.

The probability that contraceptive use will be abandoned altogether is much lower than the probability of discontinuation of use of specific methods. Only 24.6% of contraceptive segments are abandoned within a year for method-related reasons. Abandonment implies either that contraceptive use failed to prevent a pregnancy or that use was ended for no apparent reason at a time when the user was both sexually active and not seeking to get pregnant.

It is puzzling to note that pill use was much more likely to be discontinued when the user is covered by Medicaid, because Medicaid covers hormonal contraceptives. Continuous coverage during the year prior to the interview substantially reduced the probability that pill use would be discontinued. In our sample, Medicaid beneficiaries were more than twice as likely as respondents with private coverage to have gaps in coverage in the year prior to interview, but this does not explain the positive relationship between being on Medicaid and discontinuation, because continuity of coverage was controlled. However, it is likely that when there *is* a gap in coverage, women who rely on Medicaid are particularly unable to continue to pay for oral contraceptives. In addition, it is possible that other unobserved factors related to Medicaid coverage are the cause of this unexpected effect. Compared to women who have private insurance, the logistics of obtaining hormonal contraceptives are likely to be more difficult for women on Medicaid, because of the difficulties that economically disadvantaged women have in accessing health care in general [9]. For example, for women on Medicaid (who are low income), obtaining contraceptive supplies on a regular basis may be problematic, because transportation to a drugstore can be difficult, and drugstore opening hours may not be convenient given their work schedule. Informal evidence from providers suggests that access is becoming increasingly difficult for women on Medicaid: many clinic providers have commented that they often no longer stock supplies and instead provide prescriptions; if they do give supplies at the time of the visit, they are more likely to give a 3-month supply compared to the prior practice of giving a 6- or 12-month supply at the time of the visit (Gold R., personal communication, April 25, 2008). However, research is needed to measure the extent to which these changes have occurred and to understand how they impact on women's ability to access contraceptive supplies without interruption. Although it is a limitation of these analyses that type of coverage and continuity of coverage are measured only for the year prior to interview, these measures are a reasonable proxy for the situation during the period for which discontinuation is measured (the period from January 1999 to the month of interview in 2002).

It might appear that Medicaid eligibility is a proxy for poverty, but poverty status at time of interview was included in the models and was not a significant factor in discontinuation of pill use. We also tested in alternative models various cut-offs for the definition of poverty, but these variables were only significant for discontinuation of pill use in models where type of insurance coverage was not included. Similarly, in a 2004 national survey of women of reproductive age who are at risk of unintended pregnancy, Frost et al. [10] found that women covered by Medicaid were more than twice as likely to experience gaps in all methods of contraceptive use combined than women relying on other forms of insurance coverage, while there was virtually no direct impact of poverty status on women's pattern of contraceptive use.

It is interesting to see that withdrawal use, which has no monetary cost, is more likely to be discontinued if the user is poor. Withdrawal is the only method, moreover, where poverty was significantly related with discontinuation when we controlled for type of insurance coverage. We speculate that withdrawal, for poor women, is a stop-gap method which is abandoned whenever there is a possibility of obtaining some other type of contraception. Findings from Frost and Darroch [11] support this hypothesis: of women who reported that they would like to change their method if cost were not an issue, significantly higher proportions were using condoms and other nonprescription methods (withdrawal and periodic abstinence).

There appears to have been almost no change between 1995 and 2002 in the probability of resuming contraceptive use following discontinuation. In our current analysis, we found that by the end of the first year, 80% of periods of nonuse following discontinuation of use of a contraceptive method had ended with resumption of use of some type of contraceptive. In our earlier analysis based on the 1995 NSFG, we found that 82% of segments of nonuse had resulted in resumption of contraceptive use [4]. The absence of any significant improvement in resumption of method use is paralleled by little change in contraceptive failure rates over the same time period [3], and these trends are consistent with stability in the unintended pregnancy rate in the United States [1].

Discontinuation of condom use was more likely to be followed by return to use of the same method (46%) than discontinuation of any other method: only 2% of injectable discontinuations were followed by resumption of injectable use; 19% of pill discontinuation led to resumption of pill; and 31% of withdrawal discontinuations to resumption of withdrawal. The much higher probability of return to condom use after discontinuation, while other method discontinuations are more often followed by a different method, together with the finding that condom use was more likely than use of any other method to be discontinued for method-related reasons, suggests that condoms are used somewhat sporadically. It is possible that some periods of sexual inactivity are not reported, in which case discontinuation related to sexual

inactivity would be incorrectly interpreted as method-related discontinuation and resumption of use after a period of exposure to risk of unwanted pregnancy. Indeed, Frost and Darroch [11] found that women who reported a lower frequency of sexual intercourse were more likely to be condom users than women who had a higher frequency of intercourse.

Altogether, 15.5% of all discontinuations of use were followed by pregnancy within a year. In contrast, 85% of women using reversible contraceptives are expected to become pregnant within a year if they abandon contraception altogether [12]. Thus, our estimate seems to be unbelievably low. But the two estimates are not directly comparable. Ours is a multiple-decrement analysis, so pregnancy cannot occur once use has resumed. If we examine the associated single-decrement probability of pregnancy in the first year following discontinuation, we find that there is a 46% probability of pregnancy in the first year among those who are not using a method for a year and at risk of pregnancy. This lower than expected probability is not due to periods of known sexual inactivity, because we remove from exposure all reported periods of sexual inactivity. We must infer that the women in our sample who have discontinued using contraception have a low coital frequency, are vastly underreporting periods of sexual inactivity or have low fecundity or some combination of these factors. This suspicion is reinforced by the finding in the 1982 NSFG that only about 40% of married couples who were not using contraception (but who still wanted to avoid pregnancy) became pregnant within 1 year [13]. This is not much different from our 46% probability of unintended pregnancy during sexually active nonuse following discontinuation of contraception, if other outcomes of nonuse are eliminated.

If this low probability is related to sporadic sexual activity, it may partially explain the episodic nature of condom use we observe in the survey. In fact, the percent of nonuse segments that end in pregnancy is lower following use of those methods (withdrawal and condom) that might be chosen by women who perceive themselves to have little risk of unintended pregnancy and is higher following use of the more effective methods (pill and injectable), which might be chosen by women who have regular sexual activity and a higher exposure to risk of unplanned pregnancy. This finding is true whether we consider the multiple-decrement or single-decrement probabilities of pregnancy within 1 year. (The associated single-decrement probability of pregnancy following discontinuation of condom use was 40.1%; following withdrawal use, it was 43.2%. Following pill use, the single-decrement probability of pregnancy was 51.2%, and it was 50.5% for injectable use.)

In our earlier analysis of the 1995 NSFG, we found that being a full-time student was associated with a higher rate of resumption of use, and that nonuse during periods when women were neither working nor in school was less likely to end in resumption of method use after discontinuing [4]. We do not have the possibility of testing these characteristics in

the 2002 NSFG survey, as the questions needed to construct the variables were dropped from the survey. Also, age of the user was a significant predictor in the 1995 NSFG, but we found it was not significant in the 2002 survey; race/ethnicity also is no longer a significant predictor.

In our current analysis, if contraception was discontinued due to contraceptive failure, there was a 10% lower probability of resuming use than when discontinuation was not related to contraceptive failure. This is an unexpected finding, as in our earlier analysis, we found that women who had experienced a contraceptive failure were 31% *more* likely to resume use. A cogent argument could be made for either finding: experiencing a failure and delaying resumption of contraception may both be related to some unobserved characteristic that leads to a casual attitude towards contraception; or, conversely, women who experience a failure may be more motivated to insure their protection by resuming use quickly. Clearly, more research is needed to understand contraceptive use following a failure.

In summary, discontinuation of contraceptive use for method-related reasons has not declined since 1995 and remains high among women of reproductive age in the United States. However, the probability of abandonment of all forms of contraception is only about half the probability of overall method-related discontinuation of specific methods, indicating that switching methods is the primary reason for method-related discontinuation. We do not have information in this study on the specific reasons underlying why women switched methods; however, these may include the woman or her partner being dissatisfied with the first method, being concerned about health issues, finding the first method too expensive or the partner refusing to continue to use the method (condom or withdrawal). Frost et al. [10] found that lack of health insurance was negatively associated with method switching (possibly because of the cost of visiting a provider to obtain a new method); being in a shorter-term relationship (less than 4 years' duration) was positively associated with switching; and dissatisfaction with the current method was positively associated with switching methods. Of these reasons for switching, two (cost and dissatisfaction) are method related; however, switching while in a short-term relationship is probably an indication of a change of method related to a changed life situation. Age of the user continues to be a very important factor in the discontinuation of use, although it is not a significant predictor of resumption of use. The differing patterns of discontinuation by age across methods would seem to indicate that methods such as withdrawal and condom are used more frequently by women who have sporadic sexual activity. The fact that use by married women is less likely to end for method-related reasons supports our interpretation that discontinuation is often related to being in relationships that are short-term or that have a low frequency of sexual activity, and the fact that nonuse following discontinuation of withdrawal and the condom is less likely to end with an

unplanned pregnancy than nonuse following other methods also bolsters this conclusion.

Type of insurance coverage, continuity of coverage and poverty are related to both discontinuation and resumption of use. Being on Medicaid leads to higher discontinuation rates, while having private insurance leads to both lower discontinuation and higher resumption rates. Lacking continuous insurance coverage is associated with higher discontinuation of the pill, a method that requires medical visits and a prescription to obtain supplies. Together, these findings suggest that poor access to contraception is an important barrier to continuous and consistent use for many women. The recent substantial increases in the number of women needing publicly funded contraceptive services [14] without a concomitant rise in funding underscores the importance of improving access to contraception.

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