

Hormonal Contraceptive Use and Discontinuation Because of Dissatisfaction: Differences by Race and Education

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Abstract The unintended pregnancy rate in the United States remains high, and there are large race and education differences in unintended pregnancy and fertility. These differences make it important to study race and education differences in contraceptive behavior. Using nationally representative data from the 2002 National Survey of Family Growth, this study examines the effects of race and education on the likelihood that women have ever used particular types of hormonal contraception and have ever discontinued hormonal contraception because of dissatisfaction. The results show that blacks and Latinas were more likely to have used injectable contraceptives (“the shot”) and less likely to have used oral contraceptives (“the pill”) than were white women. Women with less education were more likely than college-educated women to have used the shot but there were no significant education differences in use of the pill. Among women who had ever used hormonal birth control, those with less than a college degree were more likely than college-educated women to discontinue the birth control because of dissatisfaction. However, net of education, this study found no significant racial/ethnic differences in discontinuation. The most commonly stated reason for discontinuation because of dissatisfaction was side effects.

Keywords Unintended pregnancy · Birth control · Discontinuation · Reproduction · Side effects

Introduction

Rates of unintended pregnancy remain high in the United States, with recent data showing that one-half of all pregnancies are unintended (Finer and Henshaw 2006).

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Although black, Latina, and less-educated women are more likely to have an unintended pregnancy than white and more-educated women (Finer and Henshaw 2006), little is known about the role that discontinuation of contraception because of dissatisfaction plays in contributing to this disparity. Although discontinuation of hormonal birth control has been largely overlooked in the literature, this study posits that race and education differences in discontinuation may help explain the striking differences in unintended pregnancy across race and education subgroups. To explore this issue, this study uses data from the 2002 (Cycle 6) National Survey of Family Growth (NSFG) to examine the effects of race and education on the likelihood that women have ever used particular types of hormonal contraception and on the likelihood that they have ever discontinued use because of dissatisfaction.

Differences in the rate of unintended pregnancy across groups of women by race, education, and income remained largely unchanged between 1994 and 2001 (Finer and Henshaw 2006) despite the availability of highly effective forms of birth control. In 2001, 40 % of all pregnancies to white women were unintended, compared with 69 % and 54 % of all pregnancies to black and Latina women, respectively (Finer and Henshaw 2006). The differences are also striking across education groups, with almost one-half of all pregnancies for women with some college or less being unintended (47–52 %), compared with only 24 % for women with college degrees (Finer and Henshaw 2006).¹

Surprisingly, almost one-half (48 %) of unintended pregnancies in 2001 occurred in a month when birth control was used (Finer and Henshaw 2006); and in 2002, 82 % of women who had ever had sex had ever used oral contraceptives (“the pill”) (Mosher et al. 2004, as cited in Kost et al. 2008). This suggests that a large proportion of unintended pregnancies is not solely the result of couples never having used birth control. Instead, inconsistent use and contraceptive failure play an important role, and the type of contraceptive used and discontinuation is likely related to both. That is, discontinuation of one method may lead to inconsistent use of that method (or others), and inconsistent use may lead to failure, which may in turn lead to unintended pregnancy. Like unintended pregnancy, consistency and failure also vary by race and education, with minority and less-educated women contracepting less than white and more-educated women (Frost et al. 2007; Mosher et al. 2004), and black and poorer women experiencing much higher rates of contraceptive failure than white and more affluent women (Kost et al. 2008).

The high proportion of pregnancies that are unintended, even among women who used contraception during the month of conception, suggests the importance of understanding whether dissatisfaction with hormonal methods may lead to discontinuation despite ongoing sexual activity. Although hormonal methods are highly effective at preventing pregnancy, they are not inconsequential to use, and they pose risks of dissatisfaction because of side effects, lack of access, or cost, for example. Discontinuation because of dissatisfaction can lead to inconsistent use if women do

¹ The unintended pregnancy rate for black women also has important implications for race differences in having more children than intended; Morgan and Rackin (2010) found that race differences between black and white women in the likelihood of overachieving fertility intentions (versus achieving intentions) were largely eliminated after accounting for experiencing births from pregnancies that the women themselves retrospectively called unwanted or mistimed.

not immediately switch to another form of birth control, but the immediate adoption of a new method may not be possible among the most disadvantaged women. Because particular forms of birth control may be tied to higher rates of discontinuation (Moreau et al. 2007; Vaughan et al. 2008), this study also analyzes the correlates of the types of hormonal birth control that women have ever used.

Prior Research

In a nationally representative sample of women obtaining abortions in the United States, Jones et al. (2002) found that non-use and inconsistent use of contraception were major causes of unintended pregnancy. Data on subgroup differences in use are complex but suggest that nonwhite and less-educated women are more likely than white and more-educated women to be inconsistent birth control users (Frost et al. 2007) and black women are less likely to use birth control than are similar whites (Mosher et al. 2004). Past research shows that sexually active black, Latina, and less-educated women are less likely to contracept, but we know little regarding why this is the case. This study seeks to examine race and education differences in the types of birth control used as well as discontinuation because of dissatisfaction as potential explanations for racial and educational disparities in unintended pregnancy.

The literature identifies striking race and education differences in the types of birth control used (Mosher and Jones 2010). Various studies have shown that black, foreign-born Latina, and less-educated women were more likely than white and more-educated women to be current users of a long-acting method (e.g., an injectable, a patch, or an IUD) (Frost and Darroch 2008; Forrest and Frost 1996; Malat 2000), and less likely to be current users of the pill (Frost and Darroch 2008; Piccinino and Mosher 1998). The extant literature provides few explanations for differences in use, but it is possible that the high rate of contraceptive failure (or dissatisfaction) with the available shorter-term methods experienced by black, Latina, and poorer women may lead them to use more long-term methods instead.² For example, the high rate of contraceptive sterilization as a current form of birth control (although not a hormonal method) among black, Latina, and less-educated women (Borrero et al. 2007; Mosher et al. 2004) may reflect the desire for a long-term method with a lower risk of failure (Borrero et al. 2010; for data on contraception and failure, see Trussell 2011). However, it may also reflect widespread subgroup differences in dissatisfaction with the other available nonpermanent alternatives.

Given widespread differences in use, it is interesting that the literature has been largely silent on the relationship between contraceptive discontinuation because of dissatisfaction and subgroup differences in unintended pregnancy. Instead, contraceptive use is usually examined with cross-sectional data about use at a specific point in time but with little information on the context of use and the reasons for non-use (for an exception to the former, see Manlove et al. 2007). Many of the studies that do focus on contraceptive use and discontinuation employ nonrepresentative hospital- or clinic-based samples, and focus only on use and discontinuation of one particular

² Other research suggests that physicians may play a role. See Lopez (1997), Roberts (1997), and Dehlendorf et al. (2010) for further discussion.

method (Davidson et al. 1997; Glantz et al. 2000) or limit their samples solely to one racial/ethnic or income group (e.g., solely black women or solely low-income black women) (Clarke et al. 1998; Davidson et al. 1997). Although important, these studies do not speak to broader processes of discontinuation nor to differences across groups.

Recently, however, researchers have begun to uncover important data on discontinuation. For example, Vaughan et al. (2008) found that within the first year of use, more than 30 % of women discontinued use of the pill, and more than 40 % discontinued use of injectable contraception (“the shot”), for method-related reasons.³ Further, the authors found that some forms of birth control were more likely to be discontinued than others, with higher levels of discontinuation for injectable contraception (44 %) than for oral contraception (32 %). Although many women in their study resumed use of contraception (hormonal or other) within one month of discontinuation, more than 20 % of those who discontinued did not resume use of a method within the year. The study by Vaughan et al. (2008) could not explicitly address the causes of discontinuation, but because many women did not resume use of contraception within the year, it suggested the importance of examining discontinuation as a factor motivating unintended pregnancy.

Although there are many reasons why women may be dissatisfied with hormonal forms of birth control, some research suggests that black and Latina women may have unique concerns. In a nationally representative survey of unmarried people ages 20–29, the data show that higher percentages of black and Latina women reported believing that the pill and other hormonal methods could lead to serious health problems (22 % of whites, versus 36 % of blacks and 32 % of Latinas) (Kaye et al. 2010; also see Sangi-Haghpeykar et al. (2006)). Much higher percentages of blacks and Latinas also believed that “the government is trying to limit blacks and other minority populations by encouraging the use of birth control” (24 % of whites, compared with 44 % of blacks and 46 % of Latinas) (Kaye et al. 2010:53).⁴ In this study, I posit that race and ethnicity may be associated with discontinuation because the increased levels of concern for black and Latina women may make them more sensitive to use. For example, fears about the safety of birth control may make black and Latina women more susceptible to discontinuation if they experience side effects or other inconveniences, and side effects are a major cause of dissatisfaction or concern with hormonal methods (Huber Brunner et al. 2006; Kaye et al. 2010; Reed et al. 2011).

The existing literature does not examine the influence of education on discontinuation. I suggest that discontinuation may be related to education for two reasons. First, less-educated people are less likely to have health insurance and a regular source of health care than are better-educated people (DeVoe et al. 2003), and

³ They defined non-method-related reasons as the desire to become pregnant or lack of exposure to pregnancy; they defined all other incidences of discontinuation as method-related. The authors used a contraceptive calendar in conjunction with a sexual activity calendar to determine why women stopped use. (The survey did not ask about reasons for discontinuation.) Using these calendars, the authors infer when women stopped use for method-related and non-method-related reasons. See Vaughan et al. (2008:2) for more detail.

⁴ In a similar vein, Thorburn and Bogart (2005) found that in a random sample of 324 black women, only half agreed that “the government tells the truth about the safety and side effects of new birth control methods” (p. 478). See also Crocker et al. (1999) for a discussion of similar results for black and white college students.

numerous studies show that lack of insurance or access to care results in more negative health outcomes across a variety of conditions (Hadley 2007; Institute of Medicine 2009). Further, using nationally representative data, Kasper et al. (2000) found that relative to adults who were continuously insured (either privately or through Medicaid), adults who lost health insurance were more likely to have difficulty getting care and to have no physician visits in the previous year. Access to care is important for discontinuation because although women often receive birth control counseling when they receive a prescription for contraception, research shows that many women still discontinued use because of side effects even after such counseling (Clarke et al. 1998; Davidson et al. 1997). However, it is plausible that access to a regular physician would help prevent discontinuation because women could better ask questions and learn strategies to alleviate general dissatisfaction (such as developing a routine to make taking the pill every day less tedious) or gain reassurance regarding timelines for when side effects should cease (e.g., after 3 months). However, without access to a regular physician with whom a woman feels comfortable asking questions, she may decide to cease use instead. In fact, Frost et al. (2007) found that women who felt that they could not call their providers to ask questions about their birth control were more likely to have gaps in use. Discontinuation of birth control because of dissatisfaction could lead to such gaps.

Second, I also suggest that education is related to discontinuation because education and health literacy are highly correlated (Kutner et al. 2006; Rudd et al. 2004), and health literacy is vitally important to success in the healthcare setting.⁵ Using data from the 2003 National Assessment of Adult Literacy, Kutner et al. (2006) found that average health literacy increased with educational attainment. Their results showed that almost 50 % of adults without a high school diploma fell in the “Below Basic” health literacy category, compared with only 3 % of their college-educated counterparts (Kutner et al. 2006:v).⁶ People with low levels of health literacy are disadvantaged because they “have less knowledge of disease management and of health promoting behaviors, report poorer health status, and are less likely to use preventive services” (Institute of Medicine 2004:8). Patients need health literacy skills not only to read and understand health information but also to have conversations with doctors, to understand tables, and to take the appropriate amounts of medication at the appropriate times (Institute of Medicine 2004:31). Because being satisfied with a hormonal birth control method entails understanding information about the variety of methods available (and the different types and combinations of hormones for each method), benefits and drawbacks of each method, and how to use the method correctly, women with lower levels of health literacy may be at higher risk of dissatisfaction. That is, if they are not able to select the best method for them or do not understand how to use the method correctly (including what to do in the event

⁵ The Institute of Medicine (2004) used the definition of health literacy presented by the National Library of Medicine (Selden et al. 2000). The authors define health literacy as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Selden et al. 2000:vi).

⁶ The health literacy scale used included four categories: Below Basic, Basic, Intermediate, and Proficient. Although those in the Below Basic category demonstrate “no more than the most simple and concrete literacy skills,” those at the next level (Basic) demonstrate the “skills necessary to perform simple and everyday literacy activities” (Kutner et al. 2006:5). See Kutner et al. (2006) for more discussion.

that they are late taking or using the method), they may be more likely to be dissatisfied with results.

Hypotheses

The literature previously discussed leads to four hypotheses. First, black and Latina women are more likely to have ever used the shot but less likely to have used the pill than white women. Second, less-educated women are more likely to have ever used the shot but less likely to have used the pill than better-educated women. Third, black and Latina women are more likely to discontinue hormonal contraception because of dissatisfaction than white women. And, lastly, less-educated women are more likely than better-educated women to discontinue hormonal birth control because of dissatisfaction.

Data and Methods

Data

This study uses data from Cycle 6 of the National Survey of Family Growth (NSFG). The NSFG is a nationally representative sample of noninstitutionalized men and women in the United States ages 15–44; the female respondent file includes data on 7,643 women. Data for the survey were collected in 2002. The survey asks women detailed questions about their sexual and contraceptive history, and also contains information on their race, ethnicity, and education. The survey employed a multistage area probability design with an overall female response rate of 80 %. For the analysis of the types of hormonal birth control used, this study excluded 858 women who had never had sex, 455 women who identified as “other” race, 1,154 women who were younger than 23 (see footnotes 11 and 12 for further description), and 55 women who had missing information on any variable used in the analysis; the final analytic sample included 5,121 women. For the analysis of discontinuation because dissatisfaction, this study excluded 1,816 women who had never used hormonal contraception, 353 women who identified as “other” race,⁷ 969 women who were younger than 23, and 59 women who had missing information on any of the variables used in this analysis; the final analytic sample included 4,446 women.⁸

Dependent Variables

Types of Hormonal Birth Control Ever Used

Two dependent variables are constructed based on questions in the survey asking women about the types of hormonal contraception that they had ever used. (The

⁷ Previous analyses (not shown) included women of “other” races as a separate category and reached similar conclusions to those herein.

⁸ Of those women included in the sample, types of hormonal contraception include the pill, the patch, Depo-Provera (the shot), Lunelle, and Norplant. Emergency contraception is not included as a form of hormonal contraception.

survey includes approximately 20 such non-mutually exclusive questions.) Two dependent variables are constructed based on two questions on ever-use of the pill and the shot. There is one dependent variable each for ever-use of the pill (yes=1) and ever-use of the Depo-Provera shot (yes=1).⁹

Ever Discontinued Any Form of Hormonal Birth Control Because of Dissatisfaction

This is a dichotomous measure of whether a woman had ever stopped using hormonal birth control because of dissatisfaction (yes=1). The variable is constructed based on several variables in the survey. For the first question, interviewers first state that “[s]ome people try a method and then don’t use it again, or stop using it, because they are not satisfied with the method,” and then ask, “[d]id you ever stop using a method because you were not satisfied with it in some way? *Do not count stopping a method for reasons other than dissatisfaction, for example, stopped to get pregnant or because not having intercourse.*” The second question asks women who said that they had stopped because of dissatisfaction, “What method or methods did you stop because you were not satisfied?”

To construct the dependent variable, those who said that they stopped a hormonal form of birth control because of dissatisfaction were coded 1, and others were coded 0.¹⁰ Those coded as 0 are women who had used hormonal contraception at some point but did not report that they had ever discontinued because of dissatisfaction.

Ideally, the data would include information on the date of discontinuation. A lack of these data does not affect the analysis of the effects of race/ethnicity because race is exogenous to decisions to discontinue at any point of the life cycle. However, the lack of the date of discontinuation does affect the analysis of the education effects, making causation unclear. That is, the analysis cannot determine whether a woman discontinued because she had less education or whether discontinuation resulted in less education (e.g., because discontinuation resulted in pregnancy, and the woman therefore could not continue schooling). However, findings by Frost et al. (2007) provided reason to be confident that the education differences do not arise entirely from endogeneity of education to discontinuation. Their study of a nationally representative sample of women found that women with less than a college degree were more likely than college-educated women (1) to be nonusers (relative to any use) for the entire 12-month period prior to the interview and (2) to have gaps in use (relative to no gaps in use) when they were at risk of pregnancy. To the extent that education affects non-use or gaps in use—and to the extent that discontinuation because of dissatisfaction could result in either non-use or gaps in use—the study’s findings provide reason to believe that education does affect discontinuation. However, to make it more likely that the education coefficients reflect the causal effects of education, this study controls for mother’s education and excludes women younger

⁹ Analyses were also performed with “other methods” as a third dependent variable. These methods included the patch, Norplant, and Lunelle; the injectable Lunelle was included with “other methods” because of the very small number of women who used this method. Because of space constraints and the heterogeneity of this variable, these findings are not discussed. However, the results are available upon request.

¹⁰ Because the analysis sample includes only women who had ever used hormonal methods, the dependent variable indicates which of these women had ever stopped hormonal birth control because of dissatisfaction.

than 23 at the time of the survey¹¹ because they may not have been old enough to have already completed their education.¹²

Independent Variables

This study uses the independent variables described herein to examine hormonal contraceptive use and discontinuation because of dissatisfaction.

Race/Ethnicity

Because this study's hypotheses focus on race and ethnicity, categories constructed from a cross-classification of racial groups by ethnicity form the dichotomous measures. This study uses the following dummy indicators of race: (1) white (the reference category), (2) black, and (3) Latina.¹³

Education

Following previous research in this area, this study uses a series of indicator variables to measure the respondent's level of education (at the time of the survey). The variables representing the different categories are (1) less than high school diploma, (2) high school diploma, (3) some college education, and (4) bachelor's degree or more (the reference category).¹⁴

Control Variables

Socioeconomic Status

Because the respondents' reported level of family income in 2001 (collected at the time of the survey) is not necessarily equivalent to the income that they earned at the time that they discontinued (because the data do not contain information on the date of discontinuation), this study instead includes their mother's education as an indicator of the respondents' socioeconomic background.¹⁵

¹¹ In published reports on education data from the NSFG, The National Center for Health Statistics (NCHS) restricts its analytical sample to women ages 22–44. Because some women may be poised to earn a bachelor's degree at age 22 but still be in college, the current study restricts the sample to women ages 23–44 in an effort to further minimize the number of women who may report not having a bachelor's degree solely because they were not yet old enough to complete their education at the time of the interview.

¹² This may be especially true for women who were younger than 18, for example, who would be included in the "less than high school" category simply because they were not old enough to be high school graduates rather than because they dropped out of high school.

¹³ Black and white respondents are those who selected black or white, respectively, as their race and indicated that they were not of Hispanic origin.

¹⁴ To determine whether women with a bachelor's degree differed from those with more than a bachelor's degree, analyses were performed with separate dummy variables for each respective group (results not shown). The analyses revealed no significant differences between women with a bachelor's degree and those with more than a bachelor's degree on any of the outcomes.

¹⁵ Analyses were performed with family income at the survey date, expressed in a series of dummy variables, included in the models, but including these controls had little effect on the coefficients for race or education.

Age and Age Squared

This study controls for age (in years) and includes a quadratic term to test for nonlinear effects. Curvilinear effects can result from both younger women and older women stopping because of dissatisfaction at higher rates (or lower rates) than women in the middle-age range. This could be possible, for example, if younger women stop more because of heightened sensitivity to dissatisfaction and if older women stop more because they have reached their desired fertility and have the option of more-permanent methods to prevent pregnancy (such as sterilization) without the accompanied dissatisfaction. Thus, the models include a squared term to control for a possible curvilinear effect.

Methods

Logistic regression models are used throughout the analysis because of the dichotomous nature of each dependent variable in this study. Specifically, the logistic regression model is as follows:

$$\ln\Omega(\mathbf{x}) = \mathbf{x}\beta,$$

where $\ln\Omega(\mathbf{x})$ is the log of the odds that a woman has ever used a type of hormonal birth control (the pill or the shot, respectively) versus not having ever done so, or has ever stopped using hormonal contraception because of dissatisfaction versus not having ever done so; \mathbf{x} is a vector of covariates, and β is a vector of the parameter estimates.

Calculations from the data presented for both the descriptive and multivariate analyses used Stata version 10 to account for the complex survey design employed by the NSFG. Lack of adjustment for weighting, clustering, and stratification in the sample design of the NSFG could otherwise lead to inaccurate point estimates and inadequately conservative standard errors (Lee and Forthofer 2006).

Results

Descriptive Analyses¹⁶

Ever-Use of Hormonal Contraceptives

Table 1 displays data on ever-use of the pill and the shot by women ages 23–44 who had ever had sex, and it displays descriptive statistics for the variables used in the analyses. More than 85 % of women who had ever had sex had ever used the pill, and more than 15 % of women had ever used the shot (Table 1). Table 2 displays similar data on hormonal contraceptive use disaggregated according to race/ethnicity and education. Because abandonment of hormonal contraception and use of sterilization instead could represent dissatisfaction with the available hormonal methods, Table 2

¹⁶ χ^2 tests were used as a measure of association for all bivariate results presented.

Table 1 Means of variables used in analyses of discontinuation because of dissatisfaction and types of hormonal contraception ever used, among women ages 23–44

Variables	Analytic Sample	
	Discontinuation (%)	Ever Used Hormonal Contraception (%)
Dependent Variables		
Types of contraception ever used		
The pill		85.8
The shot		15.8
Stopped because of dissatisfaction	37.0	
Independent Variables		
Race/ethnicity		
Black	14.6	14.9
Latina	11.9	13.4
White (ref.)	73.5	71.7
Education		
Less than high school	10.7	11.7
High school	30.8	38.7
Some college	30.4	20.3
College degree or more (ref.)	28.1	27.6
Control Variables		
Age (years)	34.1	34.2
Mother's education		
Less than high school	24.3	11.7
High school	38.7	30.9
Some college	21.3	29.8
College degree or more (ref.)	15.7	15.0
<i>N</i>	4,446	5,121

Note: Data adjusted to account for complex sampling design.

Source: 2002 National Survey of Family Growth (NSFG).

also presents information on current use of male and female sterilization.¹⁷ A majority of women across all racial/ethnic groups and education levels reported having ever used the pill, but these numbers still varied by race and education.

Hypothesis 1 stated that black and Latina women are less likely than white women to have ever used the pill but more likely to have ever used the shot. Consistent with this hypothesis, Latina women had the lowest percentage of ever-use of the pill (71.2%), and white women had the highest (89.0 %; see Table 2). Hypothesis 2 stated that compared with better-educated women, less-educated women are more likely to have used the shot but less likely to have used the pill. Consistent with this hypothesis,

¹⁷ The bivariate analysis presents data on current use of sterilization rather than “ever-use” (with the sample restricted to nonpostpartum women at risk of unintended pregnancy) because it may better reflect current satisfaction with available methods (or desire for a method with a lower risk of failure). The results for “ever use” of sterilization are qualitatively similar.

Table 2 Types of hormonal contraception ever-used and current use of sterilization among women ages 23–44, by race/ethnicity and education

	Types of Hormonal Contraception Ever-Used (%)		Current Use of Sterilization (%)	
	The Pill	The Shot	Female Sterilization	Male Sterilization
Race/Ethnicity				
Black	83.5	22.1	42.4	2.5
Latina	71.2	23.4	34.6	4.3
White	89.0	13.1	27.0	13.3
Education				
Less than high school	74.5	23.8	51.3	2.6
High school	86.6	19.4	37.9	10.1
Some college	88.0	15.2	28.6	12.1
College degree or more	87.5	9.1	12.9	12.9
% of Respondents	85.8	15.8	30.2	10.5

Notes: $N = 5,121$ women who had ever had sex (types of hormonal contraception ever-used) and 3,903 women at risk of unintended pregnancy (current use of sterilization). Data adjusted to account for complex sampling design. $p < .01$ for all bivariate associations presented.

Source: 2002 National Survey of Family Growth (NSFG).

ever-use of the pill increased as the level of education increased. Women with less than a high school diploma were the least represented in this category (74.5 %), and women with a college degree or more were most represented (87.5 %; see Table 2).

Findings for ever-use of the shot operate in the opposite direction. Consistent with Hypothesis 1, Latinas had the highest percentage of ever-use of the shot (23.4 %), followed by blacks (22.1 %; see Table 2). White women had the lowest percentage of use (13.1 %; see Table 2). Again, consistent with Hypothesis 2, women with less than a high school diploma had the highest percentage of ever-use of the shot (23.8 % versus 9.1 % for college-educated women; see Table 2).

The last two columns of Table 2 reveal striking race and education differences in current use of male and female sterilization. Blacks and Latinas had much higher percentages of current use of female sterilization (42.4 % and 34.6 %, respectively) compared with white women (only 27 %; see Table 2). The results for education, on the other hand, show that use of female sterilization decreases dramatically as education increases (51.3 % for women with less than a high school diploma vs. only 12.9 % for women with a college degree or more; see Table 2). The results for male sterilization reflect the opposite pattern, with lower percentages of blacks and Latinas using male sterilization as a current form of birth control (2.5 % and 4.3 %, respectively) and a higher percentage of whites doing so (13.3 %; see Table 2). Less-educated women were less likely than college-educated women to use male sterilization as a current form of birth control (2.6 % vs. 12.9 %, respectively; see Table 2).

In summary, the descriptive results suggest that more advantaged educational and racial/ethnic groups use the pill more than the shot and female sterilization, with use of the shot and female sterilization concentrated in disadvantaged groups.

Discontinuation Because of Dissatisfaction

Of all women who had ever used hormonal contraception, approximately 37 % had discontinued at some point in time because of dissatisfaction (see Table 1). Table 3 displays data about the reasons that women reported stopping use of their birth control because of dissatisfaction. The table displays information only for women who stopped the pill, the shot, and/or implant (e.g., Norplant) because of dissatisfaction, since the NSFG did not ask women who stopped other hormonal methods the reason for dissatisfaction (because of the small number of women who had ever used and discontinued other hormonal methods). Of all hormonal contraceptive users ages 23–44 who had ever discontinued the pill, the shot, and Norplant (the most widely used hormonal methods) because of dissatisfaction, 59.3 % listed side effects as the reason why they were dissatisfied (see Table 3).¹⁸

Table 4 displays data on the percentage of women, by race/ethnicity and education, who discontinued because of dissatisfaction. Discontinuation because of dissatisfaction is presented in one column, and discontinuation because of dissatisfaction with side effects—a specific reason for dissatisfaction—is presented in the other.¹⁹ The data show that blacks and Latinas are more likely than whites to discontinue because of dissatisfaction and to discontinue because of dissatisfaction with side effects. The results are similar for less-educated women, with 40.4 % discontinuing because of dissatisfaction (vs. 30 % for college-educated women) and 26.3 % discontinuing because of dissatisfaction with side effects (vs. 17 % for college-educated women; see Table 4).

Multivariate Analyses

Ever-Use of Hormonal Contraceptives

Results from the multivariate models show that race and education predict ever-use of particular hormonal contraceptive methods. Tables 5 and 6 display the results of estimating individual logistic regression models predicting ever-use of (1) the pill and (2) the shot. Model 1 includes control variables for age and age squared and dummy variables for race/ethnicity. Model 2 adds control variables for the respondent's mother's education, and Model 3 adds the respondent's own education.

¹⁸ Multinomial logistic regression models were also used for a categorical dependent variable constructed with these data. A three-category dependent variable was constructed with the following categories: (1) did not stop because of dissatisfaction, (2) stopped because of dissatisfaction with side effects, and (3) stopped for other reasons. The results are not discussed because of the small percentages in the categories for all reasons other than side effects and the resultant heterogeneity introduced by creating a residual "Other reasons" category, but the results are available upon request.

¹⁹ The "side effects" category in Table 4 combines the categories "Did not like changes to menstrual cycle" and "Had side effects" from Table 3 because "changes to menstrual cycle" can be thought of as a side effect to using hormonal birth control. "Worried might have side effects" is not included because a woman worrying that she might have side effects at some point may not be equivalent to experiencing side effects (or believing that she is).

Table 3 Reasons women discontinued hormonal contraception because of dissatisfaction among women ages 23–44 who had ever used hormonal birth control

	(%)
Too Expensive	2.1
Too Difficult to Use	2.0
Too Messy	<1.0
Partner Did Not Like it	1.4
Experienced Side Effects	59.3
Worried Might Have Side Effects	8.3
Worried Method Would Not Work	<1.0
The Method Failed, Became Pregnant	6.2
Method Did Not Protect Against Disease	<1.0
Other Health Problems	5.3
Method Decreased Sexual Pleasure	1.0
Too Difficult to Obtain Method	<1.0
Did Not Like Changes to Menstrual Cycle	5.9
Other	5.8

Notes: $N = 1,520$ women ages 23–44 who had used hormonal contraception and discontinued the pill, the shot, or Norplant because of dissatisfaction. The NSFG did not ask women who discontinued the patch or Lunelle the reason for dissatisfaction because of the small number of women who had ever used and discontinued either method. Data adjusted to account for complex sampling design.

Source: 2002 National Survey of Family Growth (NSFG).

Ever-Use of the Pill

Consistent with Hypothesis 1, the multivariate results show that blacks and Latinas are significantly less likely than whites to have used the pill, net of controls. Model 3 (the best fitting model) shows that Latinas have 62 % ($1 - .377$) lower odds of ever using the pill, compared with whites (see Table 5). Black women, on the other hand, have 34 % lower odds of having ever used the pill when compared with their white counterparts (see Table 5). There were no significant differences in ever-use of the pill between college and non-college-educated women, net of race/ethnicity and controls.

Ever-Use of the Shot

Race and education have the strongest effects when examining ever-use of the shot. Consistent with Hypothesis 1, the models show that blacks and Latinas are more likely to have used the shot compared with white women. Model 3 (the best fitting model) shows that black women have 61 % higher odds of having ever used the shot compared with white women (see Table 6).

The odds are similar for Latinas. Model 3 shows that Latinas have 37 % higher odds of having ever used the shot compared with white women (see Table 6). These findings provide strong support for Hypothesis 1 and also show striking differences in ever-use of the shot between white and nonwhite women.

Table 4 Percentage of women discontinuing hormonal contraception because of dissatisfaction and because of dissatisfaction with side effects among women ages 23–44 who had ever used hormonal contraception, by race/ethnicity and education

	Reason for Discontinuation	
	Dissatisfaction	Dissatisfaction With Side Effects
Race/Ethnicity		
Black	41.7	23.7
Latina	41.9	26.8
White	35.2	20.5
Education		
Less than high school	40.4	26.3
High school	39.5	24.4
Some college	39.6	21.8
College degree or more	30.0	17.0
Percentage of Respondents	37.0	21.7

Notes: $N = 4,446$ women ages 23–44 who had ever used hormonal contraception. Data adjusted to account for complex sampling design. Discontinuation because of dissatisfaction with side effects is a subcategory of reasons for dissatisfaction. The percentages for both columns are derived from the analytic sample that included all women who had ever used hormonal birth control. See Table 3 for information on other reasons of dissatisfaction. For data presented in this table, “did not like changes to menstrual cycle” was included in the “side effects” category. $p < .05$ for all bivariate associations presented.

Source: 2002 National Survey of Family Growth (NSFG).

Examining the effects of education shows that women with less education are indeed more likely than college-educated women to have ever used the shot. This is consistent with Hypothesis 2. Model 3 shows that women with less than a high school diploma are twice as likely as women with a college degree (or more) to have used the shot. Women with some college experience are also more likely than college-educated women to have ever done so, with 78 % higher odds (see Table 6).

Discontinuation Because of Dissatisfaction

Table 7 reports estimates of logistic regression models (odds ratios are reported). Model 1 includes control variables for age and age squared as well as dummy variables for race/ethnicity. Model 2 adds control variables for the respondent’s mother’s education, and Model 3 adds the respondent’s own education.

Consistent with Hypothesis 4, the multivariate results in Table 7 show that less-educated women are more likely than college-educated women to have ever stopped using hormonal birth control because of dissatisfaction. However, net of education, the results show no significant effects of race and ethnicity. Although Model 1, which controls only for age, shows that black and Latina women are more likely to discontinue birth control than are white women, the effect disappears for Latina women after controlling for the respondent’s mother’s education (Model 2), and it disappears for black women after controlling for the respondent’s own education (Model 3). This suggests that differences between white and nonwhite women in the

Table 5 Odds ratios predicting ever-use of the pill, among women ages 23–44 who had ever had sex

Independent Variables	Model 1	Model 2	Model 3
Age (years)	1.483***	1.490***	1.490***
Age Squared	0.994***	0.994***	0.994***
Race/Ethnicity			
Black	0.622***	0.654**	0.656**
Latina	0.299***	0.351***	0.377***
White (ref.)			
Mother's Education			
Less than high school		0.629**	0.640**
High school		0.744	0.717*
Some college		1.056	1.020
College degree or more (ref.)			
Education			
Less than high school			0.796
High school			1.213
Some college			1.231
College degree or more (ref.)			
<i>F</i> Statistic	28.420***	22.100***	20.150***
<i>df</i>	4	7	10
Incremental <i>F</i> Statistic		6.340***	3.890*
<i>df</i>		3	3

Notes: $N = 5,121$ women ages 23–44 who had ever had sex. Data adjusted to account for complex sampling design.

Source: 2002 National Survey of Family Growth (NSFG).

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

respondent's own education (for black women) and in the respondent's mother's education (for Latina women) motivated the racial/ethnic differences apparent in Model 1. For the effects of education, the estimates from Model 3 show that after controlling for race, women with less than a high school diploma have 47 % higher odds of discontinuing hormonal birth control because of dissatisfaction compared with college-educated women (see Table 7). The results are similar for women with a high school diploma and those with some college experience (but no bachelor's degree); these women have, respectively, 59 % and 57 % higher odds of discontinuing than do college-educated women (see Table 7).

Because women with less education are more likely to use the shot than college-educated women *and* more likely to discontinue hormonal birth control because of dissatisfaction, one might wonder whether it is the type of birth control used, rather than education, that drives discontinuation. The results by Vaughan et al. (2008), discussed earlier in this article, showed that injectable contraception was more likely than oral contraception to be discontinued for method-related reasons (44 % versus 32 %, respectively). In results not shown, analyses of the current data show that 42 % of women who had ever used the shot had ever discontinued it because of

Table 6 Odds ratios predicting ever-use of the shot, among women ages 23–44 who had ever had sex

Independent Variables	Model 1	Model 2	Model 3
Age (years)	1.079	1.067	1.091
Age Squared	0.997	0.997	0.997
Race/Ethnicity			
Black	1.826***	1.722***	1.608***
Latina	1.769***	1.486**	1.366*
White (ref.)			
Mother's Education			
Less than high school		1.946***	1.347
High school		1.740***	1.332
Some college		1.253	1.086
College degree or more (ref.)			
Education			
Less than high school			2.376***
High school			2.268***
Some college			1.784***
College degree or more (ref.)			
<i>F</i> Statistic	39.460***	25.780***	24.810***
<i>df</i>	4	7	10
Incremental <i>F</i> Statistic		6.900***	7.970***
<i>df</i>		3	3

Notes: $N = 5,121$ women ages 23–44 who had ever had sex. Data adjusted to account for complex sampling design.

Source: 2002 National Survey of Family Growth (NSFG).

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

dissatisfaction. In contrast, 30 % of women who had ever used the pill discontinued it because of dissatisfaction. These results suggest that the shot is indeed more likely to be discontinued than the pill, lending *a priori* plausibility to the alternative hypothesis that it is type of birth control rather than education driving discontinuation.

To determine whether education differences in the methods used could be driving education differences in discontinuation, I estimated separate regression models with one dependent variable each predicting (1) discontinuation of the pill because of dissatisfaction (versus no discontinuation of the pill) and (2) discontinuation of the shot because of dissatisfaction (versus no discontinuation of the shot). Those who had ever used the pill were in the first regressions, and the overlapping group who had ever used the shot was in the second. The results (not shown but available on request) showed that women with less than a college degree were significantly more likely than college-educated women to discontinue the pill because of dissatisfaction; there were no significant education differences in discontinuation of the shot. That results show significant education differences in discontinuation of the pill suggests that less-educated women are *not* more likely than college-educated women to discontinue hormonal birth control owing to dissatisfaction simply because they *are* more likely

Table 7 Odds ratios predicting discontinuation of hormonal contraception because of dissatisfaction among women ages 23–44 who had ever used hormonal birth control

Independent Variables	Model 1	Model 2	Model 3
Age (years)	1.150	1.161	1.176
Age Squared	0.998	0.998*	0.997*
Race/Ethnicity			
Black	1.310*	1.276*	1.229
Latina	1.289**	1.167	1.133
White (ref.)			
Mother's Education			
Less than high school		1.159	0.964
High school		0.892	0.765
Some college		0.982	0.902
College degree or more (ref.)			
Education			
Less than high school			1.470**
High school			1.589***
Some college			1.571***
College degree or more (ref.)			
<i>F</i> Statistic	5.070**	3.740**	5.980***
<i>df</i>	4	7	10
Incremental <i>F</i> Statistic		1.730	8.790***
<i>df</i>		3	3

Notes: $N = 4,446$ women ages 23–44 who had ever used hormonal contraception. Data adjusted to account for complex sampling design.

Source: 2002 National Survey of Family Growth (NSFG).

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests)

to use the shot. Thus, education differences in the hormonal methods ever used cannot entirely explain education differences in discontinuation.

Discussion

In light of striking race and education differences in unintended pregnancy and the high rate of unintended pregnancy in the United States overall, this study posits that we should analyze race and education differences in the types of hormonal contraceptive methods used and discontinuation because of dissatisfaction to shed light on subgroup differences in unintended pregnancy. The analysis reveals that race and education strongly predicted the types of hormonal contraception ever used. Most striking, black, Latina, and less-educated women were all more likely to have ever used the shot (compared with white and college-educated women, respectively), and blacks and Latinas were less likely to have used the pill than white women. These results are similar to previous research showing that black and Latina women and

women with less education were more likely to use a long-acting method as their current form of birth control, compared with white and more-educated women, respectively (Frost and Darroch 2008). This study extends upon this research by showing that racial/ethnic and educational differences in the types of hormonal contraceptives used persist even when examining ever-use of particular methods.

For discontinuation because of dissatisfaction, this study finds support for the hypothesis that women with less education are more likely than better-educated women to stop using hormonal birth control because of dissatisfaction, but finds no support for the hypothesis that blacks and Latinas are more likely than whites to do so, after education is controlled. In results not shown, analyses show that education effects persist even in a separate analysis of discontinuation of the pill, a hormonal method with the lowest rates of discontinuation. These results suggest that education has effects on discontinuation over and above those driven by differences in the types of hormonal birth control used. These findings suggest that future research would benefit from determining what role discontinuation because of dissatisfaction plays in the lower rates of consistent contraceptive use, and consequently, higher rates of unintended pregnancy for less-educated women.

This analysis also has limitations. One limitation is that the dependent variable does not indicate when women discontinued use of hormonal birth control because of dissatisfaction. Without this information, the respondent's exact level of education at the time of discontinuation cannot be determined (this study uses level of education at the time of the survey), and the causal interpretation of education is not certain. Although this is a limitation of the dependent variable, Frost et al. (2007) found a link between level of education and inconsistent birth control use, with timing of the two very close. Because discontinuation owing to dissatisfaction could lead to gaps in birth control use, findings by Frost et al. (2007) provided reason to be confident that the effects of education are not entirely the result of discontinuation curtailing education. Studies that have more precise information on women's contraceptive discontinuation relative to their completion of education would be helpful.

A second limitation is that the data do not measure individual differences in motivation to avoid pregnancy. Although survey respondents were instructed *not to* include stopping birth control because of plans to get pregnant as a reason for stopping owing to dissatisfaction, the analysis nonetheless cannot identify those respondents who had particularly high motivation to avoid pregnancy; these women may be less likely to stop birth control even if they were dissatisfied. Lastly, the variables for the types of contraception ever used provide little information on how long women actually employed these methods. Although it can be assumed that methods such as the shot were used for 3 months, for methods such as the pill, length of use is less clear.

Given the complexity of the topic and the data, this study cannot be completely comprehensive, but it provides direction for future research. This study contributes to the literature by showing that higher rates of contraceptive discontinuation because of dissatisfaction explain some of the observed education differences in consistent birth control use. Future research should examine the role of discontinuation in group differences in unintended pregnancy. Future research would also benefit from further investigation of the reasons for race and education differences in the type of hormonal methods used and the education differences in discontinuation because of dissatisfaction. Lastly, we should also begin to examine data on the number of women who

do not ever begin a hormonal method because of concerns about the safety and side effects of hormonal birth control. What role do providers versus individual preferences play in method selection and in subsequent discontinuation? The results for the types of hormonal birth control used and discontinuation owing to dissatisfaction, along with the answers to the aforementioned questions, have very important implications for unintended pregnancy. The results presented herein suggest that if we continue to overlook discontinuation because of dissatisfaction, we will overlook an important cause of unintended pregnancy and a potential explanation for subgroup differences in unintended fertility.

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