THE RELATIONSHIP BETWEEN FORMAL SEX EDUCATION AND CONTRACEPTIVE USE AT COITAL DEBUT AMONG FEMALE ADOLESCENTS USING THE NATIONAL SURVEY OF FAMILY GROWTH, CYCLE 6 DATABASE

By

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CERTIFICATE OF APPROVAL

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List of Abbreviations

CDC- Center for Disease Control

STI- Sexually transmitted infection

STD- Sexually transmitted disease

HPV- Human Papilloma Virus

AFLA- Adolescent Family Life Act

CBAE- Community Based Abstinence Education

NSFG- Nation Survey of Family Growth

CAPI- Computer assisted personal interviewing

ACASI- Audio computer assisted self- interviewing

AO- Abstinence-only formal sex education

MO- Birth control methods information only formal sex education

AM- Comprehensive formal sex education

MSA- Metropolitan Statistical Area

OR- Odds Ratio

CI- Confidence Interval

DMPA- Depo-Medroxyprogesterone Acetate

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Abstract

Objective

The majority of adolescents will become sexually active between the ages of 15 and 19 (1). Teens are more likely than adults to use inadequate and/or inconsistent contraception, putting them at risk for unintended pregnancies and sexually transmitted infections (STIs) (2,3). It often falls upon school-based sex education programs to provide teens with the information and skills needed to make informed, healthy decisions about sexual behavior (4).

The content of school-based sex education programs varies widely. Based on funding decisions made at the federal level, the sex education programs at many schools are limited to abstinence-only messaging. Alternatively, some schools offer comprehensive, or abstinence-plus sex education, in which abstinence is promoted, but adolescents are also provided information about contraceptive options and STIs. There are few studies examining the relationship between contraceptive use at coital debut and formal sex education, yet this remains an important question in terms of health outcomes and federal spending.

The primary objective of this thesis was to determine whether the use and type of contraceptive method used at coital debut among female adolescents can be explained by differences in formal sex education. We also explored the effect of formal sex education on high risk sex behavior, as represented by history of sexually transmitted infection treatment.

Methods

Variables related to sexual activity and contraceptive use were identified in the 2002 National Survey of Family Growth, a nationally representative weighted database collected using interviews with 7,643 women aged 15-44. All analyses were performed using SPSS version 15.0

for Windows (Chicago, Illinois) with the complex samples module to account for the complex sampling design used by the NSFG, Cycle 6.

Descriptive statistics including frequency measures were generated to compare demographic and socioeconomic variables between those that received formal sex education and those that did not, as well as between formal sex education groups. Contraceptive method use at coital debut, sex behaviors, attitude towards sex, and substance use were compared between those with and without formal sex education and between formal sex education groups using chi square tests for categorical variables.

The primary outcome in this analysis was contraceptive method use at coital debut and use of a reliable contraceptive method (i.e. contraceptive pills/transdermal patch/vaginal ring, injectable contraceptive, intrauterine device) at coital debut. The secondary outcome of interest was history of STI treatment. Multiple logistic regression was employed and measures of association, including odds ratios, were calculated. The effect of confounding and effect modification was explored.

Results

A statistically significant association was demonstrated between type of formal sex education and reliable contraceptive method use at coital debut for female adolescents age 15 to 19 who reported formal sex education prior to coital debut, and this remained true after adjusting for other factors. We found that female adolescents in the formal sex education group who received information about birth control methods only had three times the odds of reliable method use at coital debut than those in the abstinence-only sex education group (OR= 3.14, 95% CI [1.01-11.52]) and four times the odds than the comprehensive sex education group (OR= 4.28, 95% CI [1.44-12.75]). Parental discussion of sex topics also increased the use of a reliable

contraceptive method at coital debut in this sample. We found no association between type of formal sex education and use of any contraceptive method at coital debut. There was no association between formal sex education and history of STI treatment.

Conclusions

The results of our study, based on a large representative survey of female adolescents aged 15 to 19, demonstrated that formal sex education consisting of only information about birth control methods increases the use of a reliable contraceptive method at coital debut and inclusion of abstinence-only messaging in sex education curriculum appears to reduce the likelihood of more reliable contraceptive method use at coitarche. In view of this data, current sex education programming emphasizing abstinence-only needs to be re-examined and alternate ways of educating teens about sexuality need to be developed and studied.

Chapter 1- Introduction

The majority of adolescents will become sexually active between the ages of 15 and 19 (1). According to the Center for Disease Control (CDC), while only 13% of American girls are sexually experienced by 15 years of age, the proportion grows to 43% by 17, and to 70% by age 19 (5). In 2005, 14% of those sexually active adolescents (grades 9 through 12) reported four or more lifetime sex partners (6). Unintended pregnancy and sexually transmitted infections (STIs) among teenagers resulting from inadequate and/or inconsistent contraceptive use remain major public health concerns. In addition, early initiation of sexual intercourse is associated with several sexual risk factors, including increased numbers of sexual partners and sexual intercourse under the influence of alcohol (2).

Teens are less likely than adults to use contraception or to consistently use effective methods, and despite similar sex behavior in terms of initiation and frequency, U.S. teens are less likely to use any method or effective contraceptive methods than teens in other developed countries (3). Factors that influence adolescent sexual behavior have been the focus of many studies. Delaying sexual debut may increase the likelihood of contraceptive use at first sex for female teens (7) and increase the consistency of contraceptive use (8, 9). Other factors shown to be important in predicting contraceptive use include race/ethnicity, income, parental education, closeness with parents, and individual characteristics, such as cognitive ability and educational achievement and expectations, self-esteem, history of pregnancy and attitudes toward contraception (1).

Contraceptive use at coital debut is important because unplanned pregnancies have been found to occur early in an adolescent's sexual experiences (10) and patterns of contraceptive use at younger ages may influence later contraceptive decisions (11). In 1995, one in four American

adolescents did not use any method at first intercourse (12). Among currently sexually active students in grades 9 through 12, 15% used no contraception and 2% were not sure if their partner used contraception at last intercourse (13). If a contraceptive method is used by teens, the method is most likely to be condoms and/or oral contraceptive pills (14).

The contraceptive method chosen by teenagers may influence consistency of use (15). Generally, users of coitus-dependent methods (i.e. condoms) demonstrate less consistent use patterns than users of the oral contraceptive pill (16). Teenagers who use dual methods (9) or hormonal methods in their first sexual relationships (17) are more consistent users than teenagers using other methods (15).

Inconsistent and incorrect use of birth control methods contributes to teen pregnancy; 811,000 pregnancies occurred among girls aged 15-19 in 2001 (18). The majority of teen pregnancies are unintended (approximately 80%), with approximately 40% ending in abortion (18). Almost 415,000 births occurred in teens in 2005 (19). Pregnant teens are less likely to get prenatal care and infants of teens are at risk for poor birth outcomes, such as preterm birth and low birth weight (19). In addition, teen mothers achieve lower educational levels, resulting in a greater likelihood of future economic hardship.

U.S. teens also underestimate their risk of STIs (20), as 37.2% of sexually active high school students and 44.6% of sexually active 12th grade students did not use a condom during their last sexual intercourse (21). Inconsistent and incorrect condom use in teens may contribute to the disproportionately high burden of disease in this age group. Of an estimated 19 million new cases of STIs that occurred in 2000, nearly one-half were among persons aged 15 to 24 years, even though adolescents only represent 25% of the sexually active population (22, 23). At the 2008 National STD (sexually transmitted disease) Prevention Conference, the CDC released

information estimating that one in four (26 percent) of young women between the ages of 14 and 19 in the U.S. (3.2 million teenage girls) is infected with at least one of the most common sexually transmitted diseases (human papillomavirus [HPV], Chlamydia, herpes simplex virus, and Trichomoniasis).

Since the majority of adolescents become sexually active by age 19, efforts to provide sex education to teens must begin well before this time. Adolescents obtain information about sex and sexuality from a variety of sources. While parents think that it is important to educate their children about sex (24) and adolescents want to talk with their parents about sexuality (25), studies have revealed that discussion of sexuality between parents and adolescents is limited and frequently a source of discomfort (25, 26). Therefore, school-based sex education programs must bridge the gap (27) and provide teens with the information and skills needed to make healthy and informed decisions about sexual behavior (4).

A great majority of adolescents attending public school receive sex education at least once in middle or high school, but the content varies widely (28). Research has shown that abstinence-only education has increased in recent years, while education on birth control methods has decreased since 1995 (29). This trend began in 1981 with congressional approval of the Adolescent Family Life Act (AFLA), promoting premarital abstinence as the solution to non-marital teen births. In 1996 the federal government sought to increase its influence over the type of sex education provided in schools through enactment of the welfare reform package, which designated $250 million over five years to promote abstinence-only programs. States receive money to support abstinence-only education programs that "exclusively" teach "the social, psychological, and health gains to be realized by abstaining from sexual activity" and that "a mutually faithful monogamous relationship in [the] context of marriage is the expected standard

of human sexual activity" (30). A third program, the Community Based Abstinence Education (CBAE) in 2001 called for federal funding of community-based abstinence-only education groups, including faith-based groups. As of 2005, the federal government, across all three programs, spent $176 million annually on abstinence education. These programs endorse abstinence as "the only certain way to avoid out-of-wedlock pregnancy, sexually transmitted diseases, and other associated health problems" (30). States that receive federal money and implement federally funded abstinence-only education programs are prohibited from mentioning contraception and other forms of birth control or protection, such as condoms, unless it is to mention their limitations and failure rates (30).

Some abstinence-only education programs include the promotion of the virginity pledge, which involves teens taking a public vow to remain abstinent until marriage. By 1995, an estimated 2.2 million adolescents (12%) in the U.S. had taken such pledges (31). Although this public commitment may encourage "pledgers" to be more covert if they engage in sexual activities of any kind, some research indicates that adolescent pledgers do have a later (18 months on average) sexual debut but most will engage in sex prior to marriage. Those that fail abstinence are less likely to use a condom at first intercourse or any contraception after initiating sexual intercourse (32). Additionally, while pledgers, may abstain longer from vaginal intercourse, some evidence has shown that they are more likely to substitute oral and/or anal sex for vaginal sex (31).

Federal funding directed towards abstinence-only education remains high, despite the lack of objective evidence that this type of programming is effective in delaying first sex or reducing high risk sex behaviors (33-35). Studies evaluating abstinence-only programs are few,

have produced mixed results, and are limited by lack of proper outcomes, such as condom or contraceptive use (33-35).

The alternative to abstinence-only sex education programs are comprehensive (abstinence-plus) sex education programs. Comprehensive sex education programs emphasize abstinence and delay of sexual debut, but also offer teens information on contraception and protection against sexually transmitted infections. Comprehensive programs may or may not include instruction on proper condom use (36). Comprehensive sexuality education that includes information about contraception and STI prevention is broadly supported by teachers and health professionals (37). Several studies have shown that a majority (81%) of parents and U.S. adults support the teaching of both abstinence and pregnancy and STI prevention (28, 36, 38). Several systematic reviews of comprehensive sex education programs have demonstrated that comprehensive sexuality education effectively promotes abstinence as well as other protective behaviors (33, 37, 39). In their review of randomized controlled trails of school-based abstinence-plus programs, Bennett et al found that 7 of 10 programs increased contraceptive use (34).

There are few studies examining the relationship between contraceptive use at coital debut and sex education. Mauldon et al looked at data from the 1988 National Survey of Family Growth and found that formal contraceptive education increased the likelihood that female adolescents would use a contraceptive method at first intercourse by about one-third (40). Two other studies also using nationally representative samples found that teenage women exposed to sex education are somewhat more likely to have used contraception at first intercourse (41, 42), while another found that sex education did not have the same effect on the behavior of teenage males (43). Manning et al (42) found that women who had birth control education prior to first

intercourse were almost twice as likely to use a contraceptive method at first intercourse as those who had not had education on this topic, but that type of contraceptive method used was not related to birth control education.

Since the relationship between sexual health education curriculum and health outcomes remains unclear, it is important to study this more thoroughly. In addition to health outcomes, large amounts of money are at stake. In the United States, a huge investment in abstinence-only sex education has been made, while Title X funding, public funding for family planning and preventive health screening services with a special emphasis on preventing unwanted pregnancies among sexually active adolescents, has flat-lined (44).

The National Survey of Family Growth (NSFG), Cycle 6 is a validated population-based representative database that includes information on a variety of reproductive health outcomes and behaviors. The primary objective of this thesis was to use the NSFG, Cycle 6 database to characterize the relationship between formal abstinence-based (e.g. how to say no to sex) and information-based (e.g. provides information about birth control and contraceptive methods) sex education and contraceptive use and type of contraception used at coital debut in females aged 15-19. We also explored the effect of formal sex education on high risk sex behaviors, as measured by history of treatment for an STI. We hypothesized that adolescents who receive formal sexual education about birth control, with or without formal education about abstinence, are more likely to use a contraceptive method at coital debut and that the method is more likely to have higher reliability than adolescents who received only formal abstinence-based sex education. We hypothesized that having information-based sex education will correlate with decreased history of treatment of STIs.

Chapter 2- Materials and Methods

Study Population

The National Survey of Family Growth (NSFG), Cycle 6 is a validated population-based representative database that includes information on a variety of reproductive health outcomes and behaviors. The NSFG, Cycle 6 was conducted by the Institute of Social Research under contract with the National Center for Health Statistics. The purpose of the NSFG was to collect information on factors affecting pregnancy and reproductive health. Information was collected on demographics and socioeconomic factors as well as a wide variety of reproductive health variables and outcomes, including family planning services, sex education, sexually transmitted infection history, sexual experience, and marriage. The NSFG has become the principal source of U.S. national estimates of factors affecting reproductive health outcomes (45). The NSFG survey has been repeated six times since its inception in 1973. Cycle 6 represents the most recently completed survey. The NSFG, Cycle 6 is a public database and files are available for public use at no charge.

NSFG data was collected between January 2002 and March 2003 using in-person interviews with 12,571 respondents aged 15-44, 7,643 women and 4,928 men. All interviews were voluntary and confidential. Interviews with female respondents lasted approximately 80 minutes and were administered by trained female interviewers in the respondent's home. To protect the respondent's privacy, only one person was interviewed from each selected household. There was a 79% response rate overall, 80% for females.

While most of the questions were administered using computer-assisted personal interviewing (CAPI) in which interviewers asked questions and entered responses with the

assistance of a computer program, some of the more sensitive questions were asked using audio computer assisted self-interviewing (ACASI). The ACASI system allowed respondents to read and listen to questions and enter answers into the computer system privately, without the knowledge of the interviewer.

The NSFG, Cycle 6 employed a stratified, multistage probability sample of households and eligible persons drawn from 120 areas across the country (46). The target population for the survey was household women aged 15-44 who resided in all 50 states and the District of Columbia. The NSFG, Cycle 6 is a weighted database, meaning that all respondents were assigned a weight based on demographic national averages provided by the U.S. Census Bureau. The 7,643 women in the NSFG, Cycle 6 represent the 61.6 million women aged 15-44 in the U.S. household population in 2002.

The sampling weight is the number of women that one respondent represents. Sampling weight was determined using four criteria: 1) The base sampling weight or the probability that an individual would be selected to participate in the survey 2) The non-response adjustment that included eligibility, non-contact, and refusal adjustments 3) Post-stratification adjustments based on age, sex, race, ethnicity, and gender as provided by the U.S. Census Bureau 4) Trimming, which reduced the value of a few extremely large weights.

On average, each respondent represented 8,000 women. However, the sampling weight could vary considerably from individual to individual, depending on demographics. All analysis of the NSFG, Cycle 6 database must be done using a sampling study design that takes into account weighting. Failure to do so will result in an underestimate of sampling variance, which is a measure of the variation of a statistic caused by sampling a proportion of the population rather than the whole population. If all females in the U.S. ages 15-44 had been studied, the

sampling variance would be zero. For the NSFG, Cycle 6 database, the variance is a function of the sampling design and the population parameter being estimated (46).

Definition of the outcome

The primary outcomes of interest in this analysis were contraceptive use (yes/no) and reliable contraceptive method use (yes/no) at coital debut. Respondent's who reported having ever had sexual intercourse were asked whether a birth control method was used the first time she had intercourse (yes or no), and if yes, what was the type of contraceptive method used the first time she had intercourse. Respondents who used more than one method were classified by the most effective method they reported using, since that method has the most effect on their risk of unintended pregnancy (47). For the purpose of this study, contraceptive methods were divided into most reliable, reliable, least reliable, and no method using the strategy described in Table 1.

Table 1. Contraceptive Reliability Categories

Most Reliable	Reliable	Least Reliable	No Method
Male surgical sterilization	Contraceptive Transdermal Patch	Rhythm or safe method	
Female surgical sterilization	Contraceptive Vaginal Ring	Jelly or cream	
IUD, Coil, or Loop	Oral Contraceptive Pill	Withdrawal	
Norplant		Male condoms	
Injectable Contraceptive		Female condoms	
Respondent was sterile		Cervical Cap	
Partner was sterile		Sponge	
		Foam, Suppository	
		Natural Family Planning by temperature or mucous	
		Emergency Contraceptives (The Morning After Pill)	

Reliable method use at coital debut was classified as such if the contraceptive method was considered "most reliable" or "reliable". Non-use of a reliable method at coital debut was

classified as such if the contraceptive method was considered “least reliable” or “no method”. We also briefly examined “hormonal method” versus “no method” and “hormonal method” versus “condom use only”. But again, because of the way contraceptive method was categorized, we are unable to account for dual method use (ie hormonal method plus condom).

The secondary outcome of interest in this analysis was history of a sexually transmitted infection (STI). Respondents were asked, using audio computer assisted self-interviewing (ACASI), whether they had been treated or received medication from a doctor or other medical care provider for a sexually transmitted disease, like gonorrhea, Chlamydia, herpes, or syphilis. A respondent who answered yes to this question was considered to have a history of an STI. Literature suggests that acquisition of a sexually transmitted infection is related to higher risk sex behavior, such as condom non-use and multiple sexual partners (2, 6, 21). We considered using number of sex partners or condom use at last intercourse as alternative outcomes to explore teen high risk sex behavior, but felt that STI treatment history might be more useful in that it is measurable and there is no evidence in the literature to suggest that this is underreported by teens, and therefore was selected as the best marker for high risk sex behavior.

Definition of Determinants

Formal Sex Education

Respondents were asked a series of questions about how they learned about sex and birth control. Formal sex education included any formal instruction at school, church, a community center, or some other place, about “how to say no” to sex and “about methods of birth control”. Initial descriptive statistics were generated to compare adolescents who received any type of

formal sex education to those who received no formal sex education. To do this, a variable was created and categorized as having received any type of formal sex education (those who reported "how to say no" to sex and/or information about birth control methods) and having received no formal sex education (those who reported no type of formal sex education). To look more specifically at the effects of formal sex education and to compare the different types of sex education, another variable was created. The two types of formal sex education variables were combined into a single variable and re-categorized into three formal sex education categories:

1) Received only formal sex education on "how to say no" to sex, defined as abstinence only, (AO)

2) Received only formal sex education about "methods of birth control", defined as methods only, (MO)

3) Received both types of formal sex education ("how to say no" to sex and "methods of birth control"), defined as comprehensive sex education (AM).

We also wanted to examine the effect of taking a virginity pledge and parents talking about sex topics, and these variables were also included as covariates in the analysis.

Socioeconomic and Demographic Variables

Multiple socio-demographic variables were included in the analysis. Age at the time of the interview and age at coital debut were examined as continuous variables. Age at coital debut was asked using the audio computer assisted self-interviewing (ACASI): "How old were you when you had vaginal sex for the first time with a male?". Race and ethnicity were accounted for using two variables. Respondents identified themselves as either Hispanic or non-Hispanic, and were asked in a separate question to select a group (White, African American, or other) that

best describes their racial background. We also felt it was important to include in the analysis marital history (ever married, yes or no) since this could affect sexual history as well as motivation to use a form of contraception. Current religious affiliation was considered in the analysis and categorized as Catholic, Protestant, other, and none.

Socioeconomic status was incorporated into the analysis using insurance status. The NSFG, Cycle 6 database asked respondents to report whether they had private health insurance, Medicaid, public/government/state/military insurance, or were uninsured. Whether the respondent had ever been employed or was currently employed was also included.

To examine current living arrangement and family intactness, we included in the analysis two variables, currently living with biological or adoptive parents and have always lived with biological or adoptive parents.

The NSFG, Cycle 6 categorized place of residence based on population using Metropolitan Statistical Areas (MSA). An MSA, defined by the U.S. Office of Management and Budget, is a county or a group of contiguous counties that contain a Census Bureau defined urbanized area of at least 50,000 with a metropolitan population of at least 100,000. An MSA contains a central city described as a large urbanized area and may contain other counties that are metropolitan in character. In this national survey, place of residence was divided into three categories: 1) MSA central cities described as large, urban cities (Large Urban City) 2) metropolitan areas described as metropolitan cities near a central city (Other Metro Area) 3) other areas in which all other types of residence were categorized (Non-Metro Area) (42).

To examine the effect of education on the outcomes of interest, we included educational level achieved by the respondent, and the respondent's mother and father. The respondent's educational level was categorized as 9^{th} grade or less, 10^{th} grade, 11^{th} grade, 12^{th} grade, and 1

year of college or more. The educational level of the mother and father was divided into three categories: 1) Less than high school education 2) High school degree or equivalent 3) One or more years of college. We also incorporated into our analysis current enrollment in a regular school.

Attitude Towards Sex Variable

To address attitude towards sex, which may affect sex behaviors, respondents were asked whether they agreed with the following statement: "It is all right for unmarried 16 year olds to have sexual intercourse if they have strong affection for each other." This variable was re-categorized as yes (strongly agree or agree) and no (strongly disagree or disagree).

Substance Use Variables

Because substance use may affect sex behaviors, including sexual risk taking behaviors, smoking status (yes or no), and frequency of alcohol use, alcohol binge drinking, and marijuana use were examined. For the latter three variables, frequency was coded as follows: 1) Use several times per year 2) Use several times per month or per week 3) Never.

Statistical Analysis

The sample for our study was limited to females aged 15-19 years of age. Respondents reporting a history of first sex prior to the age of 11 were excluded. This was done because of the concern that first sex before age 11 might be related to abuse or other complicated issues. While descriptives were obtained for the entire remaining sample, adolescents who reported no formal sex education and adolescents who reported formal sex education after coital debut were

excluded from logistical regression analysis, since our primary focus was on the effect of having different types of formal sex education on our designated outcomes.

Descriptive statistics were obtained, including frequency measures, and we examined differences between those with and without formal sex education, as well as differences between formal sex education groups. The significances of association were determined using Chi-Square tests for categorical variables.

Univariate logistical regression analysis was performed to determine which variables were significantly associated with the outcome variables: contraceptive use at coital debut, reliable contraceptive method use at coital debut, and history of STI treatment. Unadjusted odds ratios (ORs) and 95% confidence intervals (CI) were obtained for each variable and each of the outcomes of interest.

Multiple logistic regression was then performed. The formal sex education variable, whether it was statistically significantly associated or not, and the determinant variables found to be significantly associated with the outcome variables (contraceptive use at coital debut, reliable contraceptive method use at coital debut, and history of STI treatment) at the 0.20 level were included in an initial multivariate model. Backwards selection using the Wald statistic p-value was performed, until all variables that remained in the model had a significance level of 0.05. This model became the preliminary final model.

To assess for confounding, each variable was put into a model with the predictor variable of interest (formal sex education). If the variable added to the model caused a percent change in the OR for formal sex education of more than 10%, the variable was considered to be a confounder of the relationship between formal sex education and the outcome and was included in the final model. The possibility of effect modification was also explored. We considered the

interaction between age, age at coital debut, and race/ethnicity with the formal sex education variable and included the appropriate interaction terms. These factors were chosen because they are often important in health-related outcomes. Final models are adjusted for sociodemographic characteristics commonly controlled for in other similar studies: age at coital debut, age at interview, current school enrollment, insurance status, race, and place of residence (4,48).

All analyses were performed using SPSS version 15.0 for Windows (Chicago, Illinois) with the complex samples module to account for the complex sampling design used by the NSFG, Cycle 6.

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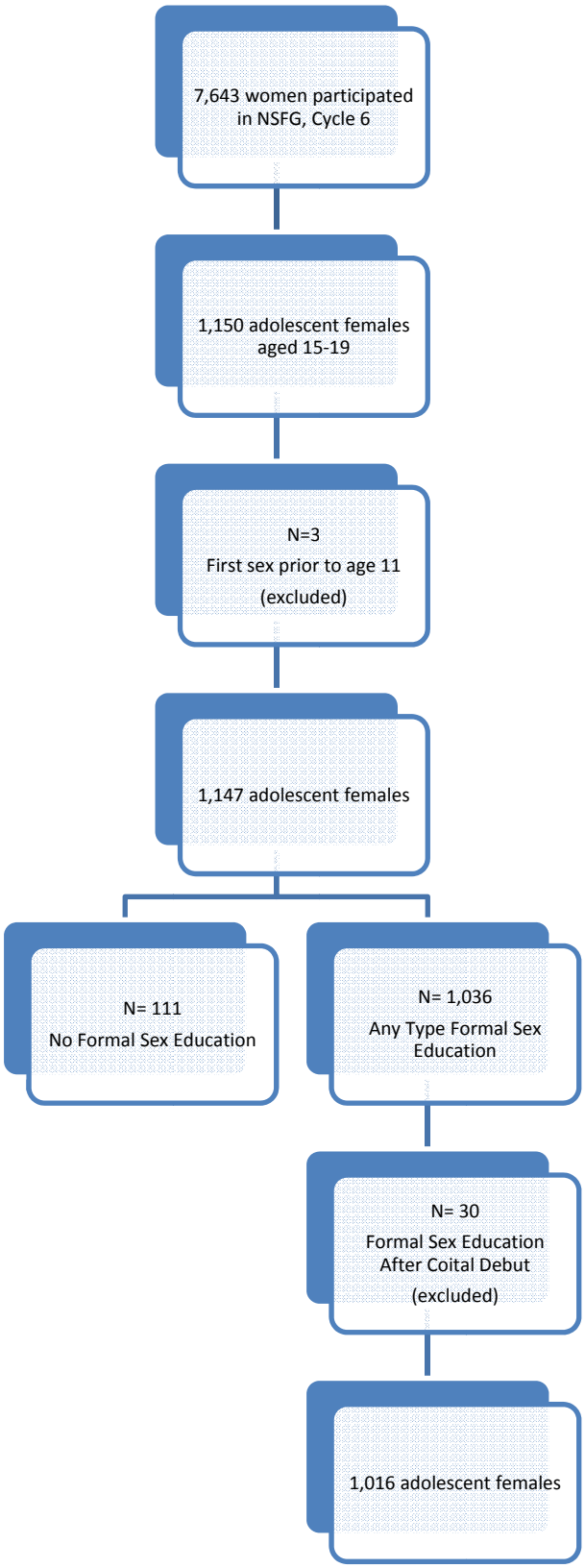
Chapter 3- Results

There were a total of 7,643 women who participated in the NSFG, Cycle 6 survey. When weighting was taken into account, this translated into a weighted count of 61,057,678 female respondents. Of these, 1,150 were aged 15 to 19 years, representing a weighted count of 9,834,109 adolescent females. We excluded respondents who reported an age at coital debut less than 11 years of age (n=3), leaving a total sample of 1,147 adolescent females (weighted count= 9,805,664). Of this adolescent sample, 1,036 reported any type of formal sex education and 111 reported no formal sex education. These two groups were compared using descriptive statistics.

To look more closely at whether the type of formal sex education influenced contraceptive use at coital debut, we focused on just the 1,036 female adolescents who reported any type of formal sex education. To ensure a temporal sequence in our assessment of whether the type of formal sex education affected contraceptive use at coital debut, we excluded those who reported first vaginal intercourse before formal sex education (n=30), leaving a sample of

1,016 adolescent females aged 15 to 19 years, representing a weighted count of 8,731,996. See Figure 1.

Figure 1. Description of the study sample



General

The mean age at the time of interview of the female adolescent sample (N= 1,147, excluding those female adolescents reporting coital debut before age 11) was 17.04 years (SE 0.05). The mean age of first vaginal intercourse (considered "coital debut" in this analysis) was 16.01 years (SE 0.33). A majority of the sample reported having some type of formal sex education (90.4%, N=1,036): 20.4% abstinence only (AO), 4.9% birth control methods only (MO), 65.1% comprehensive (AM), and 9.6% with no formal sex education. Of note, all percentages reported are weighted percentages.

Demographics of the Study Sample

Selected demographic and socioeconomic characteristics of the two study sample populations are presented in Table 2 and Table 3. (Full details of demographic and socioeconomic characteristics can be found in Appendix A, Table 21 and 22.) Those who received no formal sex education were compared to those who had received any formal sex education, presented in Table 2. Compared to those with some formal sex education, there was a statistically significant difference in place of residence (p=0.013), education level of respondent (p=0.004) and level of education achieved of both mother (0.015) and father (p=0.039) of the respondent. Those respondents in the 10^{th} grade or higher and those living in large urban city areas were more likely to report any type of formal sex education. Respondents reporting no formal sex education were more likely to have parents with less formal education.

Table 2: Selected Demographic and Socioeconomic Characteristics of the Study Sample

Characteristic				
	Total	**No Formal Sex Education**	**Any type of Formal Sex Education**	**P-value***
N§ (%)	1147 (100%)	111 (9.4%)	1036 (90.6%)	
Weighted n	9,805,664	925,833	8,879,831	
	N§ (weighted %)	**N (weighted %)**	**N (weighted %)**	
Ethnicity				
Hispanic	231 (15.5)	28 (21.1)	203 (14.9)	0.162
Non-Hispanic	916 (84.5)	83 (78.9)	833 (85.1)	
Race				0.582
Black	258 (16.1)	30 (20.2)	228 (15.6)	
White	778 (74.8)	73 (70.4)	705 (75.3)	
Other	111 (9.1)	8 (9.4)	103 (9.1)	
Health Insurance Status				0.120
Uninsured	148 (12.4)	22 (20.3)	126 (10.5)	
Private Plan	692 (64.2)	57 (55.0)	635 (65.1)	
Medicaid	198 (14.9)	22 (16.1)	176 (14.8)	
Public, government, state, or military	109 (8.5)	10 (8.6)	99 (8.5)	
Place of Residence				**0.013**
Large urban city	537 (48.3)	39 (32.7)	498 (45.2)	
Other metro area	389 (29.2)	40 (35.8)	349 (28.5)	
Non-metro area	221 (22.5)	32 (31.5)	189 (21.6)	
School status				0.054
Currently enrolled in school	911 (79.4)	78 (70.8)	833 (80.3)	
Not currently enrolled in school	236 (20.6)	33 (29.2)	203 (19.7)	
Education				**0.004**
9th grade or less	322 (28.4)	43 (46.2)	279 (24.1)	
10th grade	249 (20.8)	23 (17.5)	226 (21.1)	
11th grade	237 (22.0)	15 (14.1)	222 (20.7)	
12th grade	232 (19.8)	20 (14.3)	212 (20.4)	
1 year college or more	107 (8.9)	10 (7.9)	97 (9.0)	
Mother's Education				**0.015**
No high school degree	205 (16.5)	30 (27.8)	175 (15.4)	
High school degree or equivalent	377 (32.4)	39 (31.4)	338 (32.5)	
Some college or more	565 (51.1)	42 (40.8)	523 (52.2)	
Father's Education				**0.039**
No high school degree	183 (14.8)	21 (24.8)	162 (13.8)	
High school degree or equivalent	342 (31.0)	38 (27.7)	304 (31.3)	
Some college or more	622 (54.2)	52 (47.5)	570 (54.9)	

*Based on Pearson Chi-square test for difference between categories, significant at $p < .05$

§N= unweighted sample number

Table 3 compares the socio-demographics between the formal sex education groups (abstinence only (AO), methods only (MO), and comprehensive (AM)). There were no statistically significant differences between formal sex education groups in terms of race/ethnicity, place of residence, health insurance, educational level of respondent or her mother or father, current religious affiliation, current family living situation, marital history, or pregnancy history. There was a statistically significant difference in current or past employment history ($p<0.001$), family intactness ($p=0.009$), and current school enrollment ($p=0.021$) between formal sex education categories. The AO group was less likely than the other two groups to have current employment or a history of employment. The AO group was also more likely to report an intact family ("have always lived with both parents", 80.3%) than the AM group (67.9%) and the MO group (78.3%). Most (80.2%) of the female adolescent sample reporting any type of formal sex education were enrolled in school. Respondents reporting AO formal sex education tended to be currently enrolled in regular school more often (86.7%) than those reporting MO education (65.0%).

Table 3. Selected Demographic and Socioeconomic Characteristics of the Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value***
N (%)	1016 (100%)	739 (72.0)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Place of Residence					0.167
Large urban city	488 (50.0)	364 (51.9)	20 (34.6)	104 (47.6)	
Other metro area	339 (28.1)	245 (28.0)	21 (29.9)	73 (28.1)	
Non-metro area	189 (21.9)	130 (20.1)	11 (35.4)	48 (24.6)	
School status					**0.021**
Currently enrolled in school	818 (80.2)	587 (79.4)	36 (65.0)	195 (86.7)	
Not currently enrolled in school	198 (19.8)	152 (20.6)	16 (35.0)	30 (13.3)	
Education					0.118
9^{th} grade or less	274 (26.5)	183 (23.7)	11 (29.9)	80 (34.7)	
10^{th} grade	224 (21.4)	157 (20.7)	12 (16.5)	55 (24.9)	
11^{th} grade	216 (22.7)	160 (23.8)	12 (25.0)	44 (18.7)	
12^{th} grade	207 (20.3)	162 (21.9)	12 (18.1)	33 (15.7)	
1 year college or more	95 (9.0)	77 (9.8)	5 (10.4)	13 (5.9)	
Currently or ever worked					**<0.001**
Yes	727 (72.3)	550 (76.4)	40 (76.1)	137 (58.4)	
No	289 (27.7)	189 (23.6)	12 (23.9)	88 (41.6)	
Have always lived with both parents					**0.009**
Yes	531 (71.2)	375 (67.9)	29 (78.3)	127 (80.3)	
No	242 (28.8)	189 (32.1)	14 (21.7)	39 (19.7)	

*Based on Pearson Chi-square test for difference between categories, significant at $p < .05$

Sex Education and Contraceptive method use

When comparing the no formal sex education group to the group who received any type of formal sex education, there were no statistically significant differences in the use of a contraceptive method at coital debut, use of a reliable contraceptive method at coital debut, or of type contraceptive method used (Table 23, Appendix A). The majority of adolescents in the total sample reported using a condom at coital debut (55.1%). Although those who reported any formal sex education, 56.2% used a condom, while 44.4% of those with no formal sex education

used a condom at coital debut, this was not statistically significant. In the total sample, the only regular hormonal methods used at coital debut were oral contraceptives (15.3%) and depo-medroxyprogesterone acetate (0.6%). Other methods used included withdrawal (2.8%), emergency contraception ("the morning after pill", 0.4%), jelly or cream (0.3%), and the rhythm method (0.2%).

Contraceptive method use was then compared between the formal sex education groups (Table 4, 5). While there was no significant difference between the groups in the use of a contraceptive method at coital debut, those who received MO education were more likely to use a reliable contraceptive method at coital debut than both the AO group and the AM group, and this finding was statistically significant (37.0% versus 15.8% and 14.8%, respectively, p=0.029). Those adolescents whose formal sex education did not include an abstinence only component (information about birth control methods only), were twice as likely to use oral contraceptives at coital debut and over three times as likely to use DMPA than those who formal sex education included an abstinence only component. The MO group was less likely to use a only condom at coital debut compared to the other two groups. However, we cannot compare and make accurate conclusions about condom use in general with this data, since the NSFG used a classification system where those who used more than one method were classified by the most effective method they used (51).

Table 4. Use of Contraceptive Method at Coital Debut by Formal Sex Education Groups

Characteristic		Formal Sex Education Category			
	Total	**Comprehensive**	**Birth Control Methods Information Only**	**Abstinence Only**	**P-value**
N (%)	452 (100%)	334 (73.4%)	34 (7.5%)	84 (19.1%)	
Weighted n	3,836,835	2,815,688	288,966	732,180	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Use of a birth control method at coital debut					0.783
Yes	343 (77.9)	253 (77.9)	27 (73.2)	66 (79.9)	
No	109 (22.1)	81 (22.1)	10 (26.8)	18 (20.1)	

Table 5. Type of Contraceptive Method Used at Coital Debut by Formal Sex Education Groups

Characteristic		Formal Sex Education Category			
	Total	**Comprehensive**	**Birth Control Methods Information Only**	**Abstinence Only**	**P-value***
N (%)	471 (100%)	349 (75.5%)	35 (7.6%)	87 (19.0%)	
Weighted n	3,989,789	2,930,866	302,305	756,618	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Use of a reliable* method at coital debut					**0.029**
Yes	75 (16.7)	55 (14.8)	8 (37.0)	12 (15.8)	
No	396 (83.3)	294 (85.2)	27 (63.0)	75 (84.2)	
Contraceptive Method Used					0.237
Most Reliable					
Depo-Medroxy-Progesterone Acetate	4 (0.7)	2 (0.3)	1 (3.7)	1 (0.9)	
Reliable					
Oral contraceptive pill	71 (16.0)	53 (14.5)	7 (33.4)	11 (14.9)	
Least Reliable					
Condom only	261 (56.4)	193 (57.8)	16 (32.9)	52 (60.7)	
Withdrawal	14 (2.8)	10 (3.0)	0	4 (3.3)	
Rhythm Method	1 (0.2)	1 (0.5)	0	0	
Jelly/Cream	1 (0.3)	1 (0.4)	0	0	
Emergency Contraception	1 (0.3)	1 (0.4)	0	0	
No Method Used					
Have never used a method	10 (2.1)	9 (2.4)	1 (4.4)	0	
Did not use a method at coital debut	108 (21.1)	79 (20.9)	10 (25.7)	19 (20.2)	

*Reliable method use= use of a most reliable or reliable method, as defined in Table 1.

In addition, we re-categorized our reliable method use variable to look specifically at differences in hormonal method use (in this case, DMPA use and oral contraceptive use) compared to no method use and condom use only. These results can be seen in Tables 6 through

9. Using these alternative outcome variables, we saw no difference in either outcome (contraceptive method use at coital debut and reliable contraceptive method use at coital debut) when those with no formal sex education were compared to those with any type of formal sex education. When we examined the outcome of hormonal birth control method use versus no method use among those with the three types of formal sex education, there was also no difference. There was a significant difference between formal sex education groups when hormonal birth control method use versus condom only use was examined (p=0.01): Adolescents who received MO education were more likely to use a hormonal method than those who received AO and AM education and less likely to use condoms only at coital debut. We have no way of knowing the frequency of condom use overall for those reporting hormonal method use, since only the most reliable method use was recorded for each respondent.

Table 6. Hormonal Contraceptive Use and No Method Use in the Study Sample

Characteristic				
	Total	**No Formal Sex Education**	**Any Type of Formal Sex Education**	**P-value***
N (%)	229 (100%)	28 (11.7%)	201 (88.3%)	
Weighted n	1,884,271	221,051	1,663,221	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
Used hormonal method	80 (38.4)	5 (26.8)	75 (40.0)	0.321
Used no method	149 (61.6)	23 (73.2)	126 (53.0)	

*DMPA and oral contraceptives

Table 7. Hormonal Contraceptive Use and Condom Use Only in the Study Sample

Characteristic				
	Total	**No Formal Sex Education**	**Any Type of Formal Sex Education**	**P-value***
N (%)	381 (100%)	33 (7.7%)	348 (92.3%)	
Weighted n	3,167,696	251,055	2,916,641	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
*Used hormonal method**	80 (22.3)	5 (23.6)	75 (22.2)	0.898
Used condom only	301 (77.7)	28 (76.4)	273 (77.8)	

*DMPA and oral contraceptives

Table 8. Hormonal Contraceptive Use and No Method Use in Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Information Only**	**Abstinence Only**	**P-value**
N (%)	193 (100%)	143 (70.1%)	19 (12.8%)	31 (17.1%)	
Weighted n	1,589,462	1,114,096	202,822	272,545	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
*Used hormonal method**	75 (41.8)	55 (38.9)	8 (55.2)	12 (44.0)	0.471
Used no method	118 (58.2)	88 (61.1)	11 (44.8)	19 (56.0)	

*DMPA and oral contraceptives

Table 9. Hormonal Contraceptive Use and Condom Use Only in Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Information Only**	**Abstinence Only**	**P-value**
N (%)	336 (100%)	248 (72.9%)	24 (7.2%)	64 (19.9%)	
Weighted n	2,916,641	2,126,103	211,400	579,138	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
*Used hormonal method**	75 (22.8)	55 (20.4)	8 (52.9)	12 (20.7)	**0.011**
Used condom only	261 (77.2)	193 (79.6)	16 (47.1)	52 (79.3)	

*DMPA and oral contraceptives

Sex education and Substance use

Substance use variables between groups (no formal sex education versus any type of formal sex education) were compared next. Those who received no formal sex education did not differ significantly from those who did receive sex education in terms of frequency of alcohol use, binge drinking, use of marijuana, or smoking status. These results are found in Table 26 in the Appendix A.

Between formal sex education groups we found statistically significant differences in patterns of use in terms of alcohol use frequency (p= 0.004), frequency of binge drinking (p= 0.008), and frequency of marijuana use (p= 0.049) (Table 10). Those in the MO group were

more likely to use alcohol and marijuana more frequently and the AM group was found to binge drink more often than those in the other formal sex education groups. However, when we adjusted for important socio-demographic factors, there was no longer a difference in groups in terms of alcohol use and marijuana use frequency. The AM group was still more likely to binge drink more frequently compared to the AO group after adjustment for these socio-demographic factors.

Table 10. Substance Use in Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value***
N (%)	1016 (100%)	739 (72.0%)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286,746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Use of alcohol					**0.004**
Several times per year	456 (43.0)	342 (45.2)	18 (29.2)	96 (39.3)	
Several times per month or per week	235 (24.2)	175 (24.4)	20 (44.1)	40 (18.9)	
Never use alcohol	325 (32.7)	222 (30.3)	14 (26.7)	89 (41.7)	
Binge alcohol drinking					**0.008**
Several times per year	253 (24.4)	196 (26.3)	12 (22.7)	45 (18.7)	
Several times per month or per week	145 (15.9)	111 (16.9)	12 (27.7)	22 (10.0)	
Never	618 (59.7)	432 (56.8)	28 (49.6)	158 (71.3)	
Frequency of marijuana use					**0.049**
Several times per year	190 (19.1)	146 (20.3)	12 (17.6)	32 (15.6)	
Several times per month or per week	104 (10.1)	81 (10.9)	9 (18.6)	14 (5.6)	
Never	722 (70.8)	512 (68.8)	31 (63.7)	179 (78.8)	
Smoker	219 (22.7)	171 (24.1)	14 (25.2)	34 (17.6)	0.298

Other sex variables and attitude towards teen sex

We were also interested in comparing parental discussion of sex topics, taking the virginity pledge, and attitude towards teen sex between those with no formal sex education and those with any type, as well as between formal sex education groups. These results are presented in Tables 11 and 12. Adolescents reporting no formal sex education were less likely to report

that parents talked about sex topics than those adolescents who received some form of formal sex education (58.6% versus 72.2%, respectively, p=0.011). A minority of the sample population had taken a virginity pledge and this did not differ between groups. Attitudes towards teen sex also did not differ between groups.

Table 11. Other Sex Variables and Attitude Towards Teen Sex in the Study Sample

Characteristic				
	Total	**No Formal Sex Education**	**Any Type of Formal Sex Education**	**P-value**
N (%)	1147 (100%)	111 (9.4%)	1036 (90.6%)	
Weighted n	9,805,664	925,833	8,879,831	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
Parents have talked about sex topics				**0.011**
Yes	806 (70.9)	63 (58.6)	743 (72.2)	
No	341 (29.1)	48 (41.4)	293 (27.8)	
Have taken a virginity pledge				0.385
Yes	148 (12.9)	8 (9.3)	140 (13.3)	
No	999 (87.1)	103 (90.7)	896 (86.7)	
"It is okay for unmarried 16 year olds to have sex if strong affection."				0.442
Agree	342 (30.5)	31 (26.8)	311 (30.9)	
Disagree	805 (69.5)	80 (73.2)	725 (69.1)	

Of those adolescents receiving formal sex education (Table 12), respondents reporting AM formal sex education were more likely to have parents talk about sex topics at home than those in the other sex education groups (75.6% versus 64.3% and 64.5%, p=0.012). Adolescents who received AO education were more likely to have taken a virginity pledge than those who received AM or MO formal sex education (21.2% versus 10.9% and 13.4%, p=0.003).

Table 12. Other Sex Variables and Attitude Towards Teen Sex in Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value**
N (%)	1016 (100%)	739 (72.0%)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286,746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Parents have talked about sex topics					**0.012**
Yes	732 (72.5)	555 (75.6)	32 (64.3)	145 (64.5)	
No	284 (27.5)	184 (24.4)	20 (35.7)	80 (35.5)	
Have taken a virginity pledge					**0.003**
Yes	139 (13.4)	85 (10.9)	6 (13.4)	48 (21.2)	
No	877 (86.6)	654 (89.1)	46 (86.6)	177 (78.8)	
"It is okay for unmarried 16 year olds to have sex if strong affection."					0.123
Agree	301 (30.5)	228 (31.2)	20 (42.8)	53 (25.3)	
Disagree	715 (69.5)	511 (68.8)	32 (57.2)	172 (74.7)	

Sex education and sex behavior

Of the female adolescent sample, 61.4% reported ever having vaginal, anal, or oral sex with a male and approximately one-half (50.7%) reported ever having vaginal intercourse with a male. There were no significant differences between those who had any type of formal sex education and those who had no formal sex education in terms of sexual behavior variables (Table 30, Appendix A).

Between the formal sex education groups (Table 13, 14), adolescent females who received MO were more likely to report any type of sex (oral, anal, vaginal) (p=0.020), vaginal intercourse (p=0.003), and be tested for an STI (p=0.012) than the other two formal sex

education groups. There was no difference between the sex education groups in terms of treatment for an STI.

Because these findings indicated that the MO group might just be a higher risk group in general and this could influence conclusions drawn, additional analyses were performed on the sex behavior variables. Although a greater proportion of the MO group reported engaging in vaginal sex, any type of sex, and being tested for STIs, in additional analyses adjusting for age, race, health insurance status, school enrollment, and place of residence, the differences in proportions between the three groups were no longer significant (P= 0.46, vaginal sex; P= 0.17, any sex; P= 0.08, STI testing).

Table 13. Sexual Behavior in Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value**
N (%)	1016 (100%)	739 (72.0%)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286,746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Had any type of sex with a male (anal, oral, vaginal)					**0.003**
Yes	623 (60.8)	469 (63.1)	39 (74.7)	115 (50.5)	
No	393 (39.2)	270 (36.9)	13 (25.3)	110 (49.5)	
Ever been treated for a sexually transmitted infection					0.293
Yes	50 (4.7)	33 (4.4)	6 (9.2)	11 (4.2)	
No	966 (95.3)	706 (95.6)	46 (90.8)	214 (95.8)	
Ever been tested for a sexually transmitted infection					**0.009**
Yes	239 (23.3)	181 (25.0)	20 (35.2)	38 (15.3)	
No	777 (76.7)	558 (75.0)	32 (64.8)	187 (84.7)	

Table 14. Male Vaginal Sex in Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value**
N (%)	1014 (100%)	738 (72.0%)	52 (5.4%)	224 (22.6%)	
Weighted n	8,716,830	6,276,541	471,178	1,969,112	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Had any vaginal sex with a male					**0.020**
Yes	516 (50.1)	382 (51.6)	36 (64.7)	98 (41.6)	
No	498 (49.9)	356 (48.4)	16 (35.3)	126 (58.4)	

Model building: Contraceptive method use at coital debut as outcome

Based on differences in socioeconomic, demographic, sexual behavior and attitudes towards sex, substance use, and contraceptive use, and known variables of interest we chose to examine the relationship between selected variables, and our three primary outcomes, contraceptive method use at coital debut, reliable method use at coital debut, and history of STI treatment. The main variable of interest in this analysis was formal sex education. For the remainder of this analysis, we will only be examining those female adolescents who reported any type of formal sex education prior to coital debut (n= 1,016). Other selected characteristics include age at interview, age at coital debut, race/ethnicity, health insurance status, current living situation, family intactness, place of residence, current religion, employment, marital status, history of taking virginity pledge, parental discussion of sex topics, attitude towards 16 year olds having sex, pregnancy history, educational level of respondent and parent's of respondent, smoking status, alcohol use, and marijuana use. The unadjusted odds ratios and CIs for the association between selected characteristics and contraceptive method use at coital debut are

presented in Table 15. Full detailed results from all model building for the three outcomes of interest are located in Appendix A, Tables 33 through 38.

Table 15. Association Between Selected Characteristics and Contraceptive Use at Coital Debut;** Unadjusted Odds Ratios and 95% Confidence Intervals as Obtained From Univariate Analysis (Reference= No, negative history of contraceptive use at coital debut)

Variable of interest	Wald statistic	P-value for Wald Statistic	Unadjusted OR	[95% CI]
Age at coital debut*	10.692	0.001	**1.30**	[1.11-1.51]
Health insurance status	2.072	0.103		
No insurance			Reference	Reference
Private			1.88	[0.99-3.60]
Medicaid			1.56	[0.74-3.28]
Public, government, state, or military			0.84	[0.33-2.14]
Hispanic origin	3.012	0.083		
Yes			0.60	[0.34-1.07]
No			Reference	Reference
Currently enrolled in regular school	6.292	0.012		
Yes			**1.85**	[1.14-2.99]
No			Reference	Reference
Education	2.135	0.075		
9th grade or less			Reference	Reference
10th grade			1.75	[0.80-3.87]
11th grade			**2.09**	[1.04-4.22]
12th grade			1.39	[0.71-2.72]
1 year college or more			**3.11**	[1.33-7.31]
Currently living with parents or guardians	3.767	0.053		
Yes			1.78	[0.99-3.18]
No			Reference	Reference
Formal Sex Education	0.238	0.788		
Comprehensive			Reference	Reference
Methods only			0.77	[0.30-1.97]
Abstinence only			1.13	[0.58-2.20]
Frequency of Binge Alcohol Drinking	5.463	0.004		
Several times per year			1.71	[0.993-2.932]
Several times per month or per week			**2.73**	[1.452-5.119]
Never			Reference	Reference

*Age was examined as a continuous variable

**Among females adolescents ages 15-19 reporting formal sex education prior to coital debut

Formal sex education category, our variable of interest, and other predictor variables that were significant to the 0.20 level using the p-value for the Wald statistic in univariate analysis were included in the initial multivariate model. This included formal sex education, age at coital

debut, health insurance status, currently living with both parents/guardians, respondent education level, current school enrollment, Hispanic origin, and frequency of binge drinking. Since both frequency of alcohol use and frequency of binge drinking were significantly related to contraceptive method use, and these variables share similar information, we decided to choose just one. To determine which of these two variables to use, we put each in a model with our variable of interest, formal sex education, and chose the most significant variable based on its p-value in this bivariate model; this resulted in the binge drinking variable being retained in the initial multivariate model. Using backwards selection based on the least significant p-value of the Wald statistic, variables were removed from the model, until all remaining variables had a p-value of 0.05 or less. Again, we retained the formal sex education variable in the model despite its insignificant p-value because this was our variable of interest. The preliminary final model included formal sex education, frequency of alcohol binge drinking, and age at coital debut (first vaginal intercourse with a male).

Although the relationship between formal sex education and contraceptive method use at coital debut was not significant, we assessed for confounding. Each variable was added to a model containing formal sex education and we looked for a change in the OR for formal sex education of >10%. The addition of health insurance status and current enrollment in regular school resulted in a >10% change in the formal sex education OR, and therefore these were added to the preliminary final model as possible confounders of the relationship between formal sex education and contraceptive method use at coital debut.

Interaction terms for sex education and age at interview, sex education and age at coital debut, and sex education and race/ethnicity were evaluated and none of these terms were statistically significant.

The final multivariate model for the outcome of contraceptive use at coital debut in adolescent females who report formal sex education prior to coital debut contains formal sex education, frequency of alcohol binge drinking, age at coital debut, and is adjusted for the following sociodemographic characteristics: health insurance status, race, place of residence, age at interview, and current enrollment in school. The results of the adjusted OR and 95% CI can be found in Table 16. When adjusted for other variables, increasing age at coital debut increases the odds of use of a contraceptive method at coital debut. Compared to those who never binge drink, those that binge drink several times per year and several times per month or per week are more likely to have used a contraceptive method at coital debut, when adjusted for all other variables.

Table 16. Characteristics Associated With Contraceptive Use at Coital Debut;** Adjusted Odds Ratios and 95% Confidence Intervals (Reference= No, negative history of contraceptive use at coital debut)

Characteristic	**Adjusted OR**	**[95% CI]**	**p-value**
Formal sex education			0.931
Comprehensive	Reference	Reference	
Methods only	0.93	[0.38-2.26][b]	
Abstinence only	1.13	[0.53-2.40] [b]	
Frequency of Alcohol Binge drinking			0.001
Several times per year	**2.46**	[1.30-4.65] [b]	
Several times per month or per week	**3.70**	[1.75-7.82] [b]	
Never	Reference	Reference	
Age at coital debut	**1.35**	[1.10-1.65] [b]	0.004

b Adjusted for age at interview, place of residence, current school enrollment, health insurance status, and race
** Among female adolescents age 15-19 reporting formal sex education prior to coital debut

Model building: Use of reliable contraceptive method at coital debut

The unadjusted odds ratios and CIs for the association between selected characteristics and use of a reliable contraceptive method at coital debut are presented in Table 17. A reliable contraceptive method was considered a most reliable or reliable method, as categorized in Table 1.

Table 17. Association Between Important Selected Characteristics and Use of a Reliable Contraceptive Method at Coital Debut;** Unadjusted Odds Ratios and 95% Confidence Intervals as Obtained From Univariate Analysis (Reference= No reliable method used or no method used)

Variable of interest	Wald statistic	P-value for Wald Statistic	Unadjusted OR	[95% CI]
Age at interview*	1.667	0.197	1.19	[0.92-1.54]
Age at coital debut*	3.022	0.083	1.20	[0.98-1.46]
Education	2.392	0.050		
9th grade or less			0.52	[0.20-1.35]
10th grade			**0.37**	[0.15-0.93]
11th grade			**0.29**	[0.13-0.67]
12th grade			**0.42**	[0.19-0.93]
1 year college or more			Reference	Reference
Formal Sex Education	2.976	0.052		
Comprehensive			Reference	Reference
Methods only			**3.39**	[1.27-9.08]
Abstinence only			1.09	[0.50-2.37]
Parents talked about sex topics	3.554	0.060		
Yes			1.89	[0.97-3.65]
No			Reference	Reference
Do you agree with the statement: "It is okay for unmarried 16 year olds to have sex if strong affection."?	4.892	0.027		
Agree			**1.89**	[1.07-3.32]
Disagree			Reference	Reference
Frequency of Binge Alcohol Drinking	3.404	0.034		
Several times per year			1.04	[0.53-2.06]
Several times per month or per week			**2.33**	[1.18-4.59]
Never			Reference	Reference
Frequency of marijuana use	2.166	0.116		
Several times per year			0.81	[0.39-1.66]
Several times per month or per week			1.87	[0.93-3.86]
Never			Reference	Reference

** Among female adolescents age 15-19 reporting formal sex education prior to coital debut

Formal sex education category and other predictor variables that were significant to the 0.20 level based on the p-value of the Wald statistic in univariate analysis were included in the initial multivariate model. This included age at interview, age at coital debut, agreeing with the statement "It's okay for unmarried 16 year olds have sex if they have strong affections", parents have talked about sex topics, formal sex education, educational level of the respondent, frequency of alcohol binge drinking, and frequency of marijuana use. While both the frequency of alcohol use and frequency of binge drinking were significantly associated in univariate

analysis, only binge drinking was included in the initial multivariate model because it was more significantly associated with reliable method use at coital debut (p=0.034 versus 0.126). After backwards selection using the least significant p-value of the Wald statistic, the preliminary final model includes formal sex education, age at coital debut, and frequency of marijuana use.

Although the relationship between formal sex education and reliable method use at coital debut was not statistically significant, we assessed for confounding. Each variable was added to a model containing formal sex education and the variable was considered a confounder of the relationship between formal sex education and reliable method use at coital debut if the OR for formal sex education changed by more than 10%. Only the addition of parents talk about sex topic changed the OR >10% and therefore was considered a confounder and added to the preliminary final model. Interaction terms for formal sex education and age, formal sex education and race/ethnicity, and formal sex education and age at coital debut were assessed and none of these terms were significant.

The final model for the outcome of reliable contraceptive method use at coital debut for female adolescents who reported formal sex education before coitarche includes formal sex education, age at coital debut, frequency of marijuana use, and parents talking about sex topics, and is adjusted for sociodemographic characteristics. The adjusted ORs and CIs are presented in Table 18. The odds of reliable contraceptive method use in the MO formal sex education group was about four times the odds of reliable contraceptive method at coital debut in the AM group (OR= 4.28, [1.44-12.75]), and about three times the odds of reliable method use in the the AO sex education group (OR= 3.141, [1.012-11.518] (using AO as the reference category)). Parents' discussion of sex topics doubled the odds that a reliable contraceptive method was be used at coital debut in our sample of female adolescents who had formal sex education prior to coitarche

(OR= 2.28, [1.03-5.03]). Compared to those who never use marijuana, frequent marijuana use, several times per month or per week, doubled the odds of reliable method use at coital debut, when adjusting for all other factors (OR= 2.28, [1.09-4.76]). As age at coital debut increases, the odds of a reliable contraceptive method use at coital debut increases, but this was no longer significant after adjustment for important sociodemographic factors.

Table 18. Characteristics Associated With Use of a Reliable Contraceptive Method at Coital Debut;** Adjusted Odds Ratios and 95% Confidence Intervals (Reference= No reliable method used or no method used)

Characteristic	**Adjusted OR**	**[95% CI]**	**p-value**
Formal Sex Education Category			0.033
Comprehensive	Reference	Reference	
Methods Only	**4.28**	[1.44-12.75] b	
Abstinence Only	1.16	[0.48-2.80] b	
Parents talked about sex topics			0.042
Yes	**2.28**	[1.03-5.03] b	
No	Reference	Reference	
Frequency of marijuana Use			0.054
Several times per year	0.90	[0.42-1.91] b	
Several times per month or per week	**2.28**	[1.09-4.76] b	
Never	Reference	Reference	
Age at Coital Debut*	1.30	[0.95-1.77] b	0.129

b Adjusted for age at interview, place of residence, current school enrollment, health insurance status, and race
*Age is evaluated as a continuous variable
** Among female adolescents age 15-19 reporting formal sex education prior to coital debut

Model building: History of STI treatment as outcome

The secondary outcome of interest in this analysis was the effect of formal sex education on high risk sex behavior, as measured by history of STI treatment. The same 24 variables were included in the initial univariate analysis. The unadjusted odds ratios and CIs for the association between selected characteristics and history of STI treatment are presented in Table 19.

Table 19. Association Between Important Selected Characteristics and Past Treatment for a Sexually Transmitted Infection;** Unadjusted Odds Ratios and 95% Confidence Intervals as Obtained from Univariate Analysis **(Reference= No history of treatment)**

Variable of interest	**Wald statistic**	**P-value for Wald Statistic**	**Unadjusted OR**	**[95% CI]**
Age at interview	8.359	0.004	**1.30**	[1.09-1.55]
Age at coital debut	7.548	0.006	**0.77**	[0.63-0.93]
Race	3.732	0.024		
Black			Reference	Reference
White			**0.40**	[0.20-0.78]
Other			0.73	[0.26-2.07]
Place of Residence	3.243	0.039		
Large urban city			**0.44**	[0.20-0.97]
Other metro area			1.00	[0.45-2.19]
Non-metro area			Reference	Reference
Currently enrolled in regular school	7.901	0.005		
Yes			**0.39**	[0.20-0.75]
No			Reference	Reference
Currently living with parents or guardians	11.225	0.001		
Yes			**0.22**	[0.09-0.53]
No			Reference	Reference
Have always lived with parents or guardian	13.182	<0.001		
Yes			**0.24**	[0.11-0.52]
No			Reference	Reference
Ever pregnant	35.579	<0.001		
Yes			**7.03**	[3.70-13.34]
No			Reference	Reference
Formal Sex Education	1.182	0.307		
Comprehensive			Reference	Reference
Methods only			2.18	[0.77-6.14]
Abstinence only			0.95	[0.44-2.06]
Parents talked about sex topics	4.049	0.044		
Yes			**2.16**	[1.02-4.60]
No			Reference	Reference
Do you agree with the statement: "It is okay for unmarried 16 year olds to have sex if strong affection."?	4.788	0.029		
Agree			**2.01**	[1.08-3.77]
Disagree			Reference	Reference
Smoking status	11.772	0.001		
Smoker			**2.01**	[1.61-5.69]
Non-smoker			Reference	Reference
Frequency of Alcohol Use	2.214	0.110		
Several times per year			2.13	[0.95-4.78]
Several times per month or per week			**2.43**	[1.00-5.88]
Never			Reference	Reference
Frequency of marijuana use	10.450	<0.001		
Several times per year			1.78	[0.80-3.97]
Several times per month or per week			**5.66**	[2.69-11.89]
Never			Reference	Reference

** Among female adolescents age 15-19 reporting formal sex education prior to coital debut

Sex education category and other predictor variables that were significantly associated with history of treatment for an STI to the 0.20 level in univariate analysis, based on the p-value of the Wald statistic were included in the initial multivariate model. This included age, age at coital debut, health insurance status, race, place of residence, current school enrollment, educational level achieved by respondent's mother, family intactness, history of pregnancy, parents talk about sex topics, smoking status, frequency of alcohol and marijuana use, and attitude towards teenage sex. The variable always lived with both parents (family intactness) was selected over currently living with both parents because it had a more significant p-value when put into a bivariate model with formal sex education. Backwards selection based on the p-value of the Wald statistic was employed to reach a preliminary final model, which included marijuana use frequency, age at coital debut, and formal sex education. Formal sex education, the variable of interest, was not significant, but was retained in the model. Interaction terms for formal sex education and race/ethnicity, sex education and age, and sex education and age at coital debut were included in the analysis and none of these terms were statistically significant.

The final model, adjusted for sociodemographic characteristics, describing the association between selected characteristics and history of STI treatment includes the variables listed in Table 20. The adjusted ORs and 95% CIs are also presented in Table 20. Receiving birth control methods only information, as compared to receiving both types, seemed to decrease the likelihood of treatment for an STI, but this was not significant, with the CI crossing 1.0 (OR= 0.80, [0.35-1.82]). As age at coital debut increased, the likelihood of a history of STI treatment was decreased. Frequent THC use, several times per month or per week, was associated with increased odds of STI treatment, compared to those who never smoke THC.

Table 20. Characteristics Associated With Past Treatment of Sexually Transmitted Infection Treatment;** Adjusted Odds Ratios and 95% Confidence Intervals **(Reference= No history of STI treatment)**

Characteristic	**Adjusted OR**	**[95% CI]**	**p-value**
Formal Sex Education Category			0.807
Comprehensive	Reference	Reference	
Methods Only	0.80	[0.35-1.82] b	
Abstinence Only	1.04	[0.29-3.68] b	
Age at Coital Debut	**0.81**	[0.66-0.98] b	0.033
Frequency of marijuana Use			0.006
Several times per year	1.14	[0.49-2.68] b	
Several times per month or per week	**3.81**	[1.62-8.99] b	
Never	Reference	Reference	

b Adjusted for age at interview, place of residence, current school enrollment, health insurance status, and race
** Among female adolescents age 15-19 reporting formal sex education prior to coital debut

Chapter 4 – Discussion

In this study using the NSFG, Cycle 6 we were interested in examining the effect of formal sex education on contraceptive use at coital debut, and more importantly, reliable contraceptive method use at coital debut in female adolescents. When all methods of formal sex education were considered together, adolescents exposed to a formal sex education intervention were no more likely to use a contraceptive method at coital debut than those that reported no formal education. Obviously, the content and objectives of different educational strategies differs. However, interestingly and significantly, we found that those who received only information about birth control methods were more likely to use a reliable contraceptive method at coital debut, compared to those who received comprehensive sex education, and those who received abstinence-only sex education. This association remained after adjustment for other factors.

Prior to beginning this analysis, we had predicted that female teens receiving any information about birth control methods would be more likely to use a contraceptive method at

coital debut and that the method chosen would likely be more reliable. Instead, we found that while type of formal sex education does not seem to be related significantly to contraceptive use at coital debut, method only sex education increased the odds that the method chosen was reliable. Our discovery suggests that in this sample, abstinence-only messaging cancels out, or dilutes, the potential beneficial effects that information about birth control methods might convey: Even those who received comprehensive formal sex education were less likely to use a reliable method at coital debut. Only adolescents who reported receiving only birth control method information were more likely to choose a reliable contraceptive method at coital debut.

The finding that abstinence-only messaging might be injurious to adolescents deserves pause. Formal sex education is meant to provide teens with information and skills necessary to make educated, informed decisions with regards to their sexuality (4). Therefore, programs that do not result in teens electing to use reliable contraceptive methods when they have decided to engage in sexual activity should be considered harmful. We know that non-use or inconsistent birth control method use can lead to such consequences as unintended pregnancy and sexually transmitted infections (2).

The present analysis also revealed that parental discussion of sex topics increases the likelihood that a reliable contraceptive method will be used. While findings of other studies suggest that parents are not widely used by their adolescent children as sources of information or advice about sexual health secondary to embarrassment and discomfort (25, 26, 49), the present study results suggest that the sex conversation between parents and teens may serve to promote healthier sexual behaviors, such as use of a reliable birth control method at first sexual intercourse.

From our study and others (14), we know that adolescents most often select a coitus-dependent method, such as condoms, at first sex. Correct and consistent condom use is an excellent way to protect against STIs and should be encouraged. However, condoms are less reliable at preventing unintended pregnancy, with a typical use failure rate (defined as the percentage of women who become pregnant during their first year of use) of 15% (50) and a failure rate as high as 24% in black adolescents (51). More effective methods exist that require little in terms of user compliance (e.g. intrauterine devices, contraceptive implants, contraceptive vaginal ring, contraceptive transdermal patch) and are safe and appropriate for teens (51), but require a medical provider visit to secure. The popularity of condoms can be attributed to their easy over-the-counter availability (51). Greater access to contraceptive and reproductive health services may be another important issue.

A study by Manlove et al (9) found an association between hormonal method use and increased consistency of contraceptive use among adolescent females. These methods may be the most effective methods to promote for sexually active teenagers, but as revealed here, only a small proportion of teenagers in our sample report having used these methods at coital debut. If the current formal sex education (dominated by the abstinence-only message) results in the dilution of the birth control messaging, then promotion of these more reliable methods is limited and sexually active teens may be more vulnerable to unintended pregnancy.

These findings call into question the current formal sex education models used in the United States. With the majority of funding directed towards abstinence-only programming and the alternative programming being comprehensive sex education, the content of the formal sex education our teens are receiving and the goals of adolescent sex education should be re-examined by parents, providers, policy makers, and teens. Faced with the possibility that those

programs, including comprehensive programs that contain abstinence-only messaging may decrease the likelihood that our teens choose a reliable method of contraception at coital debut to prevent pregnancy, advocacy for policy changes may be necessary that will provide teens with information they can use to protect themselves now and in the future.

Consistent with other studies (7-9), our findings indicate that age at coital debut is important in regards to several high risk sex behaviors: Younger age at coital debut decreased contraceptive use and increased history of STI treatment. We also found in this sample of adolescent females, substance use affected contraceptive use at coital debut. Counter intuitively, increased frequency of binge drinking increased the odds of use of a contraceptive method at coital debut and increased frequency of marijuana use increased the odds of reliable method use. An explanation for this might be that those adolescents who use substances in effect, are choosing substance use as their high risk behavior, and therefore choose to be less risky when it comes to contraceptive use with intercourse. Another possibility is that adolescents who use substances have to plan ahead, and therefore may also be more likely to plan ahead with regards to securing a reliable method of contraception. Last, some adolescents who use alcohol may be getting a message from parents that if they choose to drink, to be safe and responsible, and possibly a similar message about sexual activity and birth control. However, increasing frequency of marijuana use also increased the odds of past STI treatment, suggesting higher risk sex behavior. There could be other unknown confounding factors at work here that are not accounted for.

A recent study, similar to the present study, used data from the National Survey of Family Growth (NSFG), Cycle 6 database to look at the association between sex education and use of birth control at first sex (4). However, Mueller et al failed to look at the separate effects

of abstinence-only messaging and information on birth control methods formal sex education on contraceptive use at first sex. Instead, types of formal sex education were combined together, and they found no association among adolescent females between receipt of formal sex education and birth control use at first sex (4). The present study is the first to examine the components of formal sex education separately (abstinence-only and information about birth control methods) and determine if having either one, or the other or both influence contraceptive use at the first episode of sexual intercourse.

A study by Kohler et al also using the NSFG, Cycle 6 examined the role that sex education plays in the initiation of teen sexual activity, teen pregnancy and the risk of sexually transmitted infections (STIs) (48). They found that among male and female adolescents aged 15-19 years, neither abstinence-only nor comprehensive sex education significantly reduced the likelihood of reported STI diagnoses (48). However, the investigators excluded those teens who reported formal sex education that consisted only of information about birth control methods, which the present study did not.

The inclusion of the methods only group did not alter the overall findings. Like Kohler et al, we also found no association between formal sex education or the type of formal sex education and history of STI, our chosen proxy for high risk sex behavior. The lack of association may be due to several explanations. STI treatment history may not be the appropriate measure of high risk sex behavior in teens. Since formal sex education programs do not always contain information about STI prevention, it may be inappropriate to look at this exposure and this outcome for all respondents, but we have no way of knowing program content. STI treatment history is also self-reported, and may not be objective. While it was asked during the ACASI portion of the survey, there could be recall bias or outcome misclassification, if

respondents were hesitant to report STI treatment in the past. In addition, lack of STI diagnoses may reflect lack of access to care or overall under-diagnoses secondary to minimal to no symptoms of many STIs in females (52).

There are several potential limitations related to the information type collected in the NFSG, Cycle 6. While we attempted to account for temporality, by excluding those who reported formal sex education after first sex, the cross-sectional design of this study prevents the conclusion that any associations found between variables are due to causal relationships. Information and/or recall bias may have occurred since information about the outcomes and the exposure variable of interest were self- reported. Selection bias may have occurred if parents who were already discussing sex at home selected more information based sex education, such as methods only, for their teens, skewing the group make-up of the MO group to more confident, knowledgeable teens. In fact, however, our analysis found that those in the comprehensive group had significantly more parental discussion of sex topics and they were not more likely to use a reliable method at coital debut.

Another potential limitation of the analysis is the small sample size of the methods only group, which only represented 7.6% of respondents reporting formal sex education. This could result in inadequate numbers to detect a difference in reliable method use between the groups, biasing the results towards the null, so that no difference in reliable method use would be found. However, a difference in proportions between groups was found, indicating that inadequate sample size was not a factor.

The NSFG, Cycle 6 was not designed to evaluate the effectiveness of formal sex education programs. The question in the survey asked respondents only about whether they had participated in a formal sex education program. Such a question provides no information about

the content, quality, or duration of the formal sex education programs that respondents reported, or the context in which the programming was presented. All of the former may affect the impact that any particular formal educational programming may have. We have no way to account for these differences in programming and therefore conclusions cannot be made for specific sex education programs.

Another potential limitation of this study is the lack of a formal education programming model that provides just information about birth control methods. Most sex education programs are classified as either abstinence-only or comprehensive, containing both information about birth control methods and abstinence. A recent study looking at sex education and the initiation of sexual activity and teen pregnancy using the NSFG, Cycle 6 eliminated those respondents who reported information about birth control methods only because such programs did not fit into the common sex education definitions of comprehensive and abstinence-only education (48).

It is difficult to know the type of formal sex education programming these respondents reporting information about birth control methods only actually had, and while it is a weakness of the present analysis, it is also a strength. This group of female adolescents, whatever the specific type of sex education programming they had, took away the birth control method information messaging. It is possible that some teens came away from a comprehensive sex education program with the birth control messaging only, ignoring the abstinence-only messaging. The MO group may be a more savvy group of adolescents, able to distill the sex education program they received down to a message they could relate to, but we have no way of measuring this with the data provided. The important fact is that this group of adolescents who perceived that they received sex education that contained only information about birth control methods was more likely to use a reliable method of contraception at coital debut. And this take

away message may prove to be the most important aspect of formal sex education and one that deserves more attention.

Chapter 5 - Conclusion

This thesis was a hypothesis driven analysis of the association between formal sex education and contraceptive use in female adolescents using a robust database, the NSFG, Cycle 6. As federal funding for abstinence-only sexuality education continues to increase, while funding for other reproductive health sources has decreased or flat-lined, it is important to examine whether this type of programming is effective at providing teens the information and skills they need to negotiate their burgeoning sexuality. In the present analysis female adolescents who reported receiving only information on birth control methods have higher rates of reliable contraceptive method use at coital debut (oral contraceptives and DMPA) than adolescents who received abstinence-only sex education, and those who received comprehensive formal education. This seems to suggest that abstinence-only messaging, when included in formal sex education, dilutes birth control information. Our findings are substantial because the large sample size and high quality of the NSFG permitted incorporation of several potential confounders into our model.

As stated previously, most teens have become sexually active by age 19 (1), making school-based sex education important. Without information and skill building regarding contraceptive use, teens are put at risk for contraceptive non-use or inconsistent use, and unintended pregnancy and/or sexually transmitted infections. The findings here suggest that current sex education programming needs to be re-examined. There is still much work to be done to discover better ways of providing sexuality education and this type of data analysis

cannot substitute for prospective trials which would specifically evaluate formal sex education programs. However, this thesis contributes to our understanding of factors that affect adolescent contraceptive use in this country. It is only through a thorough understanding of these factors that we will be able to properly address this important public health problem and improve the health of adolescents.

List of Supplemental Tables in Appendix A

APPENDIX A: Supplemental Tables

Table 21: Demographic and Socioeconomic Characteristics of the study sample

Characteristic				
	Total	**No Formal Sex Education**	**Any type of Formal Sex Education**	**P-value***
Un-weighted N (%)	1147 (100%)	111 (9.4%)	1036 (90.6%)	
Weighted n	9,805,664	925,833	8,879,831	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
Ethnicity				0.162
Hispanic	231 (15.5)	28 (21.1)	203 (14.9)	
Non-Hispanic	916 (84.5)	83 (78.9)	833 (85.1)	
Race				0.582
Black	258 (16.1)	30 (20.2)	228 (15.6)	
White	778 (74.8)	73 (70.4)	705 (75.3)	
Other	111 (9.1)	8 (9.4)	103 (9.1)	
Health Insurance Status				0.120
Uninsured	148 (12.4)	22 (20.3)	126 (10.5)	
Private Plan	692 (64.2)	57 (55.0)	635 (65.1)	
Medicaid	198 (14.9)	22 (16.1)	176 (14.8)	
Public, government, state, or military	109 (8.5)	10 (8.6)	99 (8.5)	
Place of Residence				**0.013**
Large urban city	537 (48.3)	39 (32.7)	498 (45.2)	
Other metro area	389 (29.2)	40 (35.8)	349 (28.5)	
Non-metro area	221 (22.5)	32 (31.5)	189 (21.6)	
School status				0.054
Currently enrolled in school	911 (79.4)	78 (70.8)	833 (80.3)	
Not currently enrolled in school	236 (20.6)	33 (29.2)	203 (19.7)	
Education				**0.004**
9th grade or less	322 (28.4)	43 (46.2)	279 (24.1)	
10th grade	249 (20.8)	23 (17.5)	226 (21.1)	
11th grade	237 (22.0)	15 (14.1)	222 (20.7)	
12th grade	232 (19.8)	20 (14.3)	212 (20.4)	
1 year college or more	107 (8.9)	10 (7.9)	97 (9.0)	
Mother's Education				**0.015**
No high school degree	205 (16.5)	30 (27.8)	175 (15.4)	
High school degree or equivalent	377 (32.4)	39 (31.4)	338 (32.5)	
Some college or more	565 (51.1)	42 (40.8)	523 (52.2)	
Father's Education				**0.039**
No high school degree	183 (14.8)	21 (24.8)	162 (13.8)	
High school degree or equivalent	342 (31.0)	38 (27.7)	304 (31.3)	
Some college or more	622 (54.2)	52 (47.5)	570 (54.9)	
Currently or ever worked				0.526
Yes	828 (72.8)	84 (76.0)	744 (72.5)	
No	319 (27.2)	27 (24.0)	292 (27.5)	
Current Living Arrangement				
Currently living with both parents				0.084
Yes	472 (45.5)	35 (36.0)	437 (46.5)	
No	675 (54.5)	76 (64.0)	599 (53.5)	

Characteristic				
	Total	**No Formal Sex Education**	**Any type of Formal Sex Education**	**P-value***
Un-weighted N (%)	1147 (100%)	111 (9.4%)	1036 (90.6%)	
Weighted n	9,805,664	925,833	8,879,831	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
Always lived with both parents				0.226
Yes	590 (70.4)	49 (63.7)	541 (71.1)	
No	283 (29.6)	34 (36.3)	249 (28.9)	
Current Religion				0.148
No religious affiliation	161 (14.3)	16 (14.1)	145 (14.3)	
Catholic	322 (27.1)	27 (23.0)	295 (92.1)	
Protestant	221 (18.5)	31 (28.2)	190 (17.5)	
Other religion	442 (40.1)	36 (34.8)	406 (40.7)	
Marital History				0.142
Never married	1120 (97.6)	109 (99.1)	1011 (97.4)	
Currently or married in past	27 (2.4)	2 (0.9)	25 (2.6)	
Pregnancy History				0.192
History of pregnancy	178 (14.2)	26 (18.9)	152 (13.8)	
No history of pregnancy	969 (85.8)	85 (81.1)	884 (86.2)	

*Based on Pearson Chi-square test for difference between categories, significant at $p < .05$

Table 22. Demographic and Socioeconomic Characteristics of the Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value***
Un-weighted N (%)	1016 (100%)	739 (72.0)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Ethnicity					0.517
Hispanic	199 (14.9)	132 (14.1)	14 (17.7)	53 (16.9)	
Non-Hispanic	817 (85.1)	607 (85.9)	38 (82.3)	172 (85.1)	
Race					0.392
Black	215 (14.8)	153 (14.2)	10 (10.9)	52 (17.6)	
White	700 (76.0)	513 (77.5)	37 (77.0)	150 (71.2)	
Other	101 (9.1)	73 (8.3)	5 (12.1)	23 (11.2)	
Health Insurance Status					0.862
Uninsured	120 (11.4)	89 (11.2)	6 (14.7)	25 (11.6)	
Private Plan	627 (65.2)	460 (66.1)	31 (55.3)	138 (64.5)	
Medicaid	171 (14.8)	124 (14.8)	8 (16.0)	39 (14.5)	
Public, government, state, or military	98 (8.6)	66 (7.9)	7 (14.0)	25 (9.4)	
Place of Residence					0.167
Large urban city	488 (50.0)	364 (51.9)	20 (34.6)	104 (47.6)	
Other metro area	339 (28.1)	245 (28.0)	21 (29.9)	73 (28.1)	
Non-metro area	189 (21.9)	130 (20.1)	11 (35.4)	48 (24.6)	
School status					**0.021**
Currently enrolled in school	818 (80.2)	587 (79.4)	36 (65.0)	195 (86.7)	
Not currently enrolled in school	198 (19.8)	152 (20.6)	16 (35.0)	30 (13.3)	
Education					0.118
9^{th} grade or less	274 (26.5)	183 (23.7)	11 (29.9)	80 (34.7)	
10^{th} grade	224 (21.4)	157 (20.7)	12 (16.5)	55 (24.9)	
11^{th} grade	216 (22.7)	160 (23.8)	12 (25.0)	44 (18.7)	
12^{th} grade	207 (20.3)	162 (21.9)	12 (18.1)	33 (15.7)	
1 year college or more	95 (9.0)	77 (9.8)	5 (10.4)	13 (5.9)	
Mother's Education					0.943
No high school degree	170 (15.2)	127 (15.8)	4 (11.7)	39 (13.8)	
High school degree or equivalent	330 (32.5)	237 (32.3)	19 (34.5)	74 (32.7)	
Some college or more	516 (52.3)	375 (51.8)	29 (53.8)	112 (53.5)	
Father's Education					0.691
No high school degree	155 (13.5)	116 (14.2)	6 (8.4)	33 (12.6)	
High school degree or equivalent	297 (31.3)	218 (31.6)	11 (26.2)	68 (31.8)	
Some college or more	564 (55.1)	405 (54.2)	35 (65.4)	124 (55.6)	
Currently or ever worked					**<0.001**
Yes	727 (72.3)	550 (76.4)	40 (76.1)	137 (58.4)	
No	289 (27.7)	189 (23.6)	12 (23.9)	88 (41.6)	

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value***
Un-weighted N (%)	1016 (100%)	739 (72.0)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Current Living Arrangement					0.105
Currently living with both parents					
Yes	430 (46.4)	302 (43.9)	25 (52.3)	103 (53.1)	
No	586 (53.6)	437 (56.1)	27 (47.7)	122 (46.9)	
Have always lived with both parents					**0.009**
Yes	531 (71.2)	375 (67.9)	29 (78.3)	127 (80.3)	
No	242 (28.8)	189 (32.1)	14 (21.7)	39 (19.7)	
Current Religion					0.451
No religious affiliation	141 (14.1)	108 (15.0)	11 (22.7)	22 (9.5)	
Catholic	290 (27.7)	203 (27.0)	16 (29.0)	71 (29.5)	
Protestant	185 (17.2)	135 (16.8)	9 (15.0)	41 (18.9)	
Other religion	400 (41.0)	293 (41.3)	16 (33.3)	91 (42.1)	
Marital History					0.850
Never married	994 (97.6)	724 (97.4)	51 (97.4)	219 (98.1)	
Currently or married in past	22 (2.4)	15 (2.6)	1 (2.6)	6 (1.9)	

*Based on Pearson Chi-square test for difference between categories, significant at $p < .05$

Table 23. Contraceptive Method Used at Coital debut in the Study Sample

Characteristic				
	Total	**No Formal Sex Education**	**Any Type of Formal Sex Education**	**P-value**
Un-weighted N (%)	1147 (100%)	111 (9.4%)	1036 (90.6%)	
Weighted n	9,805,664	925,833	8,879,831	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
Use of a birth control method at coital debut				0.051
Yes	390 (75.7)	35 (63.1)	355 (76.9)	
No	137 (24.3)	20 (36.9)	117 (23.1)	
Use of a reliable* method at coital debut				0.747
Yes	80 (15.8)	5 (13.7)	75 (16.1)	
No	470 (84.2)	54 (86.3)	416 (83.9)	
Contraceptive Method Used				0.580
Most Reliable				
Depot Medroxy-Progesterone Acetate (DMPA)	4 (0.6)	0	4 (0.6)	
Reliable				
Oral contraceptive pill	76 (15.3)	5 (13.7)	71 (15.4)	
Least Reliable				
Condom only	301 (55.1)	28 (44.4)	273 (56.2)	
Withdrawal	16 (2.8)	2 (3.0)	14 (2.7)	
Rhythm Method	1 (0.2)	0	1 (0.2)	
Jelly/Cream	1 (0.3)	0	1 (0.3)	
Emergency Contraception	2 (0.4)	1 (1.5)	1 (0.3)	
No Method Used				
Have never used a method	14 (2.3)	4 (5.1)	10 (2.0)	
Did not use a method at coital debut	135 (23.1)	19 (32.4)	116 (22.1)	

*Reliable method use= use of a most reliable or reliable method, as defined in Table 1.

Table 24. Contraceptive Method Use at Coital Debut in Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Methods Information Only**	**Abstinence Only**	**P-value***
Un-weighted N (%)	452 (100%)	334 (73.4%)	34 (7.5%)	84 (19.1%)	
Weighted n	3,836,835	2,815,688	288,966	732,180	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Use of a birth control method at coital debut					0.783
Yes	343 (77.9)	253 (77.9)	27 (73.2)	66 (79.9)	
No	109 (22.1)	81 (22.1)	10 (26.8)	18 (20.1)	

Table 25. Type of Contraceptive Used at Coital Debut in Formal Sex Education Groups

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Methods Information Only**	**Abstinence Only**	**P-value***
Un-weighted N (%)	471 (100%)	349 (75.5%)	35 (7.6%)	87 (19.0%)	
Weighted n	3,989,789	2,930,866	302,305	756,618	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Use of a reliable* method at coital debut					**0.029**
Yes	75 (16.7)	55 (14.8)	8 (37.0)	12 (15.8)	
No	396 (83.3)	294 (85.2)	27 (63.0)	75 (84.2)	
Contraceptive Method Used					0.237
Most Reliable					
Depo- Medroxy-Progesterone Acetate	4 (0.7)	2 (0.3)	1 (3.7)	1 (0.9)	
Reliable					
Oral contraceptive pill	71 (16.0)	53 (14.5)	7 (33.4)	11 (14.9)	
Least Reliable					
Condom only	261 (56.4)	193 (57.8)	16 (32.9)	52 (60.7)	
Withdrawal	14 (2.8)	10 (3.0)	0	4 (3.3)	
Rhythm Method	1 (0.2)	1 (0.5)	0	0	
Jelly/Cream	1 (0.3)	1 (0.4)	0	0	
Emergency Contraception	1 (0.3)	1 (0.4)	0	0	
No Method Used					
Have never used a method	10 (2.1)	9 (2.4)	1 (4.4)	0	
Did not use a method at coital debut	108 (21.1)	79 (20.9)	10 (25.7)	19 (20.2)	

*Reliable method use= use of a most reliable or reliable method, as defined in Table 1.

Table 26. Substance Use in the Study Sample

Characteristic				
	Total	**No Formal Sex Education**	**Any Type of Formal Sex Education**	**P-value**
Un-weighted N (%)	1147 (100%)	111 (9.4%)	1036 (90.6%)	
Weighted n	9,805,664	925,833	8,879,831	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
Use of alcohol				0.771
Several times per year	507 (42.9)	42 (40.8)	465 (43.2)	
Several times per month or per week	263 (23.9)	25 (22.4)	238 (24.0)	
Never use alcohol	377 (33.2)	44 (36.8)	333 (32.8)	
Binge alcohol drinking				0.234
Several times per year	286 (24.7)	26 (25.0)	260 (24.7)	
Several times per month or per week	155 (15.0)	10 (8.5)	145 (15.7)	
Never	706 (60.3)	75 (66.4)	631 (59.7)	
Frequency of marijuana use				0.178
Several times per year	208 (18.7)	11 (10.0)	197 (19.6)	
Several times per month or per week	118 (10.3)	11 (11.4)	107 (10.2)	
Never	821 (71.0)	89 (78.6)	732 (70.3)	
Smoking status				0.438
Yes	241 (22.3)	19 (18.7)	222 (22.7)	
No	906 (77.7)	92 (81.3)	814 (77.3)	

Table 27. Substance Use Formal Sex Education Group

Characteristic		Formal Sex Education Category			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value**
Un-weighted N (%)	1016 (100%)	739 (72.0%)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286,746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Use of alcohol					**0.004**
Several times per year	456 (43.0)	342 (45.2)	18 (29.2)	96 (39.3)	
Several times per month or per week	235 (24.2)	175 (24.4)	20 (44.1)	40 (18.9)	
Never use alcohol	325 (32.7)	222 (30.3)	14 (26.7)	89 (41.7)	
Binge alcohol drinking					**0.008**
Several times per year	253 (24.4)	196 (26.3)	12 (22.7)	45 (18.7)	
Several times per month or per week	145 (15.9)	111 (16.9)	12 (27.7)	22 (10.0)	
Never	618 (59.7)	432 (56.8)	28 (49.6)	158 (71.3)	
Frequency of marijuana use					**0.049**
Several times per year	190 (19.1)	146 (20.3)	12 (17.6)	32 (15.6)	
Several times per month or per week	104 (10.1)	81 (10.9)	9 (18.6)	14 (5.6)	
Never	722 (70.8)	512 (68.8)	31 (63.7)	179 (78.8)	
Smoking status					0.298
Yes	219 (22.7)	171 (24.1)	14 (25.2)	34 (17.6)	
No	797 (77.3)	568 (75.9)	38 (74.8)	191 (82.4)	

Table 28. Other Sex Variables and Attitude towards Teen Sex in Study Sample

Characteristic				
	Total	**No Formal Sex Education**	**Any Type of Formal Sex Education**	**P-value**
Un-weighted N (%)	1147 (100%)	111 (9.4%)	1036 (90.6%)	
Weighted n	9,805,664	925,833	8,879,831	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
Parents have talked about sex topics				**0.011**
Yes	806 (70.9)	63 (58.6)	743 (72.2)	
No	341 (29.1)	48 (41.4)	293 (27.8)	
Have taken a virginity pledge				0.385
Yes	148 (12.9)	8 (9.3)	140 (13.3)	
No	999 (87.1)	103 (90.7)	896 (86.7)	
"It is okay for unmarried 16 year olds to have sex if strong affection."				0.442
Agree	342 (30.5)	31 (26.8)	311 (30.9)	
Disagree	805 (69.5)	80 (73.2)	725 (69.1)	

Table 29. Other Sex Variables and Attitude Towards Teen Sex in Formal Sex Education Group

Characteristic		**Formal Sex Education Category**			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value**
Un-weighetd N (%)	1016 (100%)	739 (72.0%)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286,746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Parents have talked about sex topics					**0.012**
Yes	732 (72.5)	555 (75.6)	32 (64.3)	145 (64.5)	
No	284 (27.5)	184 (24.4)	20 (35.7)	80 (35.5)	
Have taken a virginity pledge					**0.003**
Yes	139 (13.4)	85 (10.9)	6 (13.4)	48 (21.2)	
No	877 (86.6)	654 (89.1)	46 (86.6)	177 (78.8)	
"It is okay for unmarried 16 year olds to have sex if strong affection."					0.123
Agree	301 (30.5)	228 (31.2)	20 (42.8)	53 (25.3)	
Disagree	715 (69.5)	511 (68.8)	32 (57.2)	172 (74.7)	

Table 30. Sexual Behavior in Study Sample

Characteristic	**Total**	**No Formal Sex Education**	**Any Type of Formal Sex Education**	**P-value**
Un-weighted N (%)	1147 (100%)	111 (9.4%)	1036 (90.6%)	
Weighted n	9,805,664	925,833	8,879,831	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	
Had any vaginal sex with a male				0.973
Yes	595 (50.7)	61 (50.5)	534 (50.7)	
No	552 (49.3)	50 (49.5)	502 (49.3)	
Had any type of sex with a male (anal, oral, vaginal)				0.926
Yes	713 (61.4)	71 (60.9)	642 (61.4)	
No	434 (38.6)	40 (39.1)	394 (38.6)	
Ever been treated for a sexually transmitted infection				0.475
Yes	59 (4.8)	6 (3.6)	53 (5.0)	
No	1086 (95.2)	103 (96.4)	983 (95.0)	
Ever been tested for a sexually transmitted infection				0.475
Yes	277 (23.5)	29 (20.6)	248 (23.8)	
No	870 (76.5)	82 (79.4)	788 (76.2)	

Table 31. Sexual Behavior in Formal Sex Education Groups

Characteristic		Formal Sex Education Category			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value**
Un-weighted N (%)	1016 (100%)	739 (72.0%)	52 (5.4%)	225 (22.6%)	
Weighted n	8,731,996	6,286,746	471,178	1,974,073	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Had any type of sex with a male (anal, oral, vaginal)					**0.003**
Yes	623 (60.8)	469 (63.1)	39 (74.7)	115 (50.5)	
No	393 (39.2)	270 (36.9)	13 (25.3)	110 (49.5)	
Ever been treated for a sexually transmitted infection					0.293
Yes	50 (4.7)	33 (4.4)	6 (9.2)	11 (4.2)	
No	966 (95.3)	706 (95.6)	46 (90.8)	214 (95.8)	
Ever been tested for a sexually transmitted infection					**0.009**
Yes	239 (23.3)	181 (25.0)	20 (35.2)	38 (15.3)	
No	777 (76.7)	558 (75.0)	32 (64.8)	187 (84.7)	

Table 32. Male Vaginal Sex in Formal Sex Education Groups

Characteristic		Formal Sex Education Category			
	Total	**Comprehensive**	**Birth Control Method Information Only**	**Abstinence Only**	**P-value**
Un-weighted N (%)	1014 (100%)	738 (72.0%)	52 (5.4%)	224 (22.6%)	
Weighted n	8,716,830	6,276,541	471,178	1,969,112	
	N (weighted %)	**N (weighted %)**	**N (weighted %)**	**N (weighted %)**	
Had any vaginal sex with a male					**0.020**
Yes	516 (50.1)	382 (51.6)	36 (64.7)	98 (41.6)	
No	498 (49.9)	356 (48.4)	16 (35.3)	126 (58.4)	

Table 33. Wald statistic, unadjusted OR, 95% CI, and p-value as obtained from univariate analysis of the association between selected characteristics and contraceptive use at coital debut (reference= no, negative history of contraceptive use at coital debut)

Variable of interest	Wald statistic	P-value for Wald Statistic	Unadjusted OR	[95% CI]
Age at interview	0.002	0.968	1.00	[.82-1.22]
Age at coital debut	10.692	0.001	**1.30**	[1.11-1.51]
Health insurance status	2.072	0.103		
No insurance			Reference	Reference
Private			1.88	[0.99-3.60]
Medicaid			1.56	[0.74-3.28]
Public, government, state, or military			0.84	[0.33-2.14]
Hispanic origin	3.012	0.083		
Yes			0.60	[0.34-1.07]
No			Reference	Reference
Race	0.646	0.525		
Black			Reference	Reference
White			1.08	[0.62-1.88]
Other			0.67	[0.267-1.674]
Current Religion	0.277	0.842		
None			Reference	Reference
Catholic			1.25	[0.64-2.43]
Protestant			1.28	[0.61-2.68]
Other religion			1.33	[0.70-2.52]
Place of Residence	0.650	0.522		
Large urban city			1.35	[0.73-2.47]
Other metro area			1.05	[0.56-1.94]
Non-metro area			Reference	Reference
Currently enrolled in regular school	6.292	0.012		
Yes			**1.85**	[1.14-2.99]
No			Reference	Reference
Education	2.135	0.075		
9^{th} grade or less			Reference	Reference
10^{th} grade			1.75	[0.80-3.87]
11^{th} grade			**2.09**	[1.04-4.22]
12^{th} grade			1.39	[0.71-2.72]
1 year college or more			**3.11**	[1.33-7.31]
Mother's Education	0.272	0.762		
Less than high school			Reference	Reference
High school degree or equivalent			0.93	[0.47-1.84]
Some college or more			1.13	[0.58-2.20]
Father's Education	0.436	0.647		
Less than high school			Reference	Reference
High school degree or equivalent			1.19	[0.60-2.35]
Some college or more			0.93	[0.49-1.78]
Current or past employment	0.002	0.961		
Yes			0.98	[0.50-1.93]
No			Reference	Reference
Currently living with parents or guardians	3.767	0.053		
Yes			1.78	[0.99-3.18]
No			Reference	Reference

Variable of interest	Wald statistic	P-value for Wald Statistic	Unadjusted OR	[95% CI]
Have always lived with parents or guardian	0.110	0.740		
Yes			1.09	[0.65-1.82]
No			Reference	Reference
Ever married	1.064	0.303		
Never			Reference	Reference
Yes			0.59	[0.30-1.79]
Formal Sex Education	0.238	0.788		
Comprehensive			Reference	Reference
Birth control methods only			0.77	[0.30-1.97]
Abstinence only			1.13	[0.58-2.20]
Parents talked about sex topics	0.096	0.757		
Yes			0.92	[0.56-1.53]
No			Reference	Reference
Taken a virginity pledge	1.095	0.296		
Yes			1.92	[0.57-6.52]
No			Reference	Reference
Do you agree with the statement: "It is okay for unmarried 16 year olds to have sex if strong affection."?	0.422	0.516		
Agree			1.17	[0.730-1.869]
Disagree			Reference	Reference
Smoking status	0.147	0.702		
Smoker			1.10	[0.680-1.772]
Non-smoker			Reference	Reference
Frequency of Alcohol Use	2.621	0.074		
Several times per year			1.38	[0.751-2.531]
Several times per month or per week			**2.11**	[1.091-4.061]
Never			Reference	Reference
Frequency of Binge Alcohol Drinking	5.463	0.004		
Several times per year			1.71	[0.993-2.932]
Several times per month or per week			**2.73**	[1.452-5.119]
Never			Reference	Reference
Frequency of marijuana use	0.259	0.772		
Several times per year			1.19	[0.686-2.059]
Several times per month or per week			1.19	[0.611-2.317]
Never			Reference	Reference

Table 34. Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (CIs) of the association between selected characteristics and contraceptive use at coital debut for adolescent females reporting coital debut and formal sex education before coital debut (reference= No, negative history of contraceptive method use at coital debut)

Characteristic	Adjusted OR	[95% CI]	p-value
Formal sex education			0.931
Comprehensive	Reference	Reference	
Birth control methods only	0.93	[0.38-2.26]b	
Abstinence-Only	1.13	[0.53-2.40] b	
Frequency of Alcohol Binge drinking			0.001
Several times per year	**2.46**	[1.30-4.65] b	
Several times per month or per week	**3.70**	[1.75-7.82] b	
Never	Reference	Reference	
Age at coital debut	**1.35**	[1.10-1.65] b	0.004

b Adjusted for age at interview, place of residence, current school enrollment, health insurance status, and race

Table 35. Wald statistic, unadjusted OR, 95% CI, and p-value as obtained from univariate analysis of the association between selected characteristics and use of a reliable contraceptive method at coital debut (reference= no reliable method used or no method used)

Variable of interest	Wald statistic	P-value for Wald Statistic	Unadjusted OR	[95% CI]
Age at interview*	1.667	0.197	1.19	[0.92-1.54]
Age at coital debut*	3.022	0.083	1.20	[0.98-1.46]
Health insurance status	0.294	0.830		
No insurance			Reference	Reference
Private			1.26	[0.45-3.50]
Medicaid			1.62	[0.52-5.07]
Public, government, state, or military			1.46	[0.39-5.43]
Hispanic origin	1.319	0.251		
Yes			0.55	[0.20-1.53]
No			Reference	Reference
Race	0.170	0.843		
Black			Reference	Reference
White			1.22	[0.59-2.54]
Other			1.31	[0.42-4.10]
Current Religion	1.311	0.270		
None			Reference	Reference
Catholic			1.04	[0.42-2.58]
Protestant			0.74	[0.30-1.86]
Other religion			1.54	[0.69-3.46]
Place of Residence	0.098	0.907		
Large urban city			1.18	[0.56-2.49]
Other metro area			1.16	[0.52-2.58]
Non-metro area			Reference	Reference
Currently enrolled in regular school	0.033	0.855		
Yes			0.94	[0.51-1.75]
No			Reference	Reference
Education	2.392	0.050		
9th grade or less			0.52	[0.20-1.35]
10th grade			**0.37**	[0.15-0.93]
11th grade			**0.29**	[0.13-0.67]
12th grade			**0.42**	[0.19-0.93]
1 year college or more			Reference	Reference

Variable of interest	Wald statistic	P-value for Wald Statistic	Unadjusted OR	[95% CI]
Mother's Education	0.484	0.617		
Less than high school			Reference	Reference
High school degree or equivalent			0.82	[0.33-2.06]
Some college or more			1.13	[0.49-2.63]
Father's Education	0.238	0.788		
Less than high school			Reference	Reference
High school degree or equivalent			1.37	[0.55-3.46]
Some college or more			1.21	[0.50-2.89]
Current or past employment	0.874	0.350		
Yes			1.61	[0.59-4.34]
No			Reference	Reference
Currently living with parents or guardians	0.290	0.591		
Yes			1.18	[0.66-2.10]
No			Reference	Reference
Have always lived with parents or guardian	0.002	0.962		
Yes			1.02	[0.55-1.87]
No			Reference	Reference
Ever married	0.033	0.857		
Never			Reference	Reference
Yes			0.88	[0.22-3.53]
Formal Sex Education	2.976	0.052		
Comprehensive			Reference	Reference
Birth control methods only			**3.39**	[1.27-9.08]
Abstinence- only			1.09	[0.50-2.37]
Parents talked about sex topics	3.554	0.060		
Yes			1.89	[0.97-3.65]
No			Reference	Reference
Taken a virginity pledge	0.001	0.970		
Yes			1.02	[0.32-3.31]
No			Reference	Reference
Do you agree with the statement: "It is okay for unmarried 16 year olds to have sex if strong affection."?	4.892	0.027		
Agree			**1.89**	[1.07-3.32]
Disagree			Reference	Reference
Smoking status	0.175	0.676		
Smoker			1.13	[0.63-2.05]
Non-smoker			Reference	Reference
Frequency of Alcohol Use	2.077	0.126		
Several times per year			0.62	[0.29-1.32]
Several times per month or per week			1.19	[0.56-2.54]
Never			Reference	Reference
Frequency of Binge Alcohol Drinking	3.404	0.034		
Several times per year			1.04	[0.53-2.06]
Several times per month or per week			**2.33**	[1.18-4.59]
Never			Reference	Reference
Frequency of marijuana use	2.166	0.116		
Several times per year			0.81	[0.39-1.66]
Several times per month or per week			1.87	[0.93-3.86]
Never			Reference	Reference

Table 36. Adjusted Odds Ratios (OR) and 95% Confidence Intervals (CI) of the Association Between Selected Characteristics and Reliable Contraceptive Method Use at Coital Debut (reference= no reliable method use or no method used)

Characteristic	Adjusted OR	[95% CI]	p-value
Formal Sex Education Category			0.033
Comprehensive	Reference	Reference	
Birth Control Methods Only	**4.28**	[1.44-12.75] b	
Abstinence Only	1.16	[0.48-2.80] b	
Parents talked about sex topics			0.042
Yes	**2.28**	[1.03-5.03] b	
No	Reference	Reference	
Frequency of marijuana Use			0.054
Several times per year	0.90	[0.42-1.91] b	
Several times per month or per week	**2.28**	[1.09-4.76] b	
Never	Reference	Reference	
Age at Coital Debut	1.30	[0.95-1.77] b	0.129

b Adjusted for age at interview, place of residence, current school enrollment, health insurance status, and race

Table 37. Wald statistic, unadjusted OR, 95% CI, and p-value as obtained from univariate analysis of the association between selected characteristics and Past Treatment for a Sexually Transmitted Infection (reference= no history of treatment)

Variable of interest	Wald statistic	P-value for Wald Statistic	Unadjusted OR	[95% CI]
Age at interview	8.359	0.004	**1.30**	[1.09-1.55]
Age at coital debut	7.548	0.006	**0.77**	[0.63-0.93]
Health insurance status	3.103	0.026		
No insurance			Reference	Reference
Private			0.87	[0.34-2.22]
Medicaid			2.43	[0.90-6.60]
Public, government, state, or military			2.25	[0.74-6.85]
Hispanic origin	0.316	0.574		
Yes			0.78	[0.34-1.83]
No			Reference	Reference
Race	3.732	0.024		
Black			Reference	Reference
White			0.40	[0.20-0.78]
Other			0.73	[0.26-2.07]
Current Religion	0.857	0.463		
None			Reference	Reference
Catholic			0.68	[0.23-2.04]
Protestant			1.38	[0.49-3.90]
Other religion			1.26	[0.49-3.26]
Place of Residence	3.243	0.039		
Large urban city			**0.44**	[0.20-0.97]
Other metro area			1.00	[0.45-2.19]
Non-metro area			Reference	Reference
Currently enrolled in regular school	7.901	0.005		
Yes			**0.39**	[0.20-0.75]
No			Reference	Reference
Education	0.597	0.665		
9^{th} grade or less			Reference	Reference
10^{th} grade			0.98	[0.36-2.71]
11^{th} grade			1.69	[0.71-4.00]
12^{th} grade			1.62	[0.65-4.02]
1 year college or more			1.50	[0.47-4.82]
Mother's Education	1.688	0.185		
Less than high school			Reference	Reference
High school degree or equivalent			1.38	[0.58-3.30]
Some college or more			0.73	[0.31-1.74]
Father's Education	0.106	0.899		
Less than high school			Reference	Reference
High school degree or equivalent			1.20	[0.43-3.39]
Some college or more			1.25	[0.48-3.24]
Current or past employment	1.402	0.237		
Yes			1.54	[0.75-3.16]
No			Reference	Reference
Currently living with parents or guardians	11.225	0.001		
Yes			**0.22**	[0.09-0.53]
No			Reference	Reference
Have always lived with parents or guardian	13.182	<0.001		

Variable of interest	Wald statistic	P-value for Wald Statistic	Unadjusted OR	[95% CI]
Yes			**0.24**	[0.11-0.52]
No			Reference	Reference
Ever married	0.300	0.584		
Never			Reference	Reference
Yes			1.63	[0.28-9.37]
Ever pregnant	35.579	<0.001		
Yes			**7.03**	[3.70-13.34]
No			Reference	Reference
Formal Sex Education	1.182	0.307		
Comprehensive			Reference	Reference
Birth control methods only			2.18	[0.77-6.14]
Abstinence only			0.95	[0.44-2.06]
Parents talked about sex topics	4.049	0.044		
Yes			**2.16**	[1.02-4.60]
No			Reference	Reference
Taken a virginity pledge	0.465	0.496		
Yes			0.68	[0.22-2.07]
No			Reference	Reference
Do you agree with the statement: "It is okay for unmarried 16 year olds to have sex if strong affection."?	4.788	0.029		
Agree			**2.01**	[1.08-3.77]
Disagree			Reference	Reference
Smoking status	11.772	0.001		
Smoker			**2.01**	[1.61-5.69]
Non-smoker			Reference	Reference
Frequency of Alcohol Use	2.214	0.110		
Several times per year			2.13	[0.95-4.78]
Several times per month or per week			**2.43**	[1.00-5.88]
Never			Reference	Reference
Frequency of Binge Alcohol Drinking	1.471	0.230		
Several times per year			1.14	[0.55-2.37]
Several times per month or per week			2.02	[0.90-4.55]
Never			Reference	Reference
Frequency of marijuana use	10.450	<0.001		
Several times per year			1.78	[0.80-3.97]
Several times per month or per week			**5.66**	[2.69-11.89]
Never			Reference	Reference

Table 38. Adjusted Odds Ratios (OR) and 95% Confidence Intervals (CI) of the Association Between Selected Characteristics and History of Sexually Transmitted Infection Treatment (reference= no history of STI treatment)

Characteristic	Adjusted OR	[95% CI]	p-value
Formal Sex Education Category			0.807
Comprehensive	Reference	Reference	
Birth Control Methods Only	0.80	[0.35-1.82] b	
Abstinence Only	1.04	[0.29-3.68] b	
Age at Coital Debut	**0.81**	[0.66-0.98] b	0.033
Frequency of marijuana Use			0.006
Several times per year	1.14	[0.49-2.68] b	
Several times per month or per week	**3.81**	[1.62-8.99] b	
Never	Reference	Reference	

b Adjusted for age at interview, place of residence, current school enrollment, health insurance status, and race

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