AMBIVALENCE AND PREGNANCY: THE EFFECT OF ADOLESCENTS' ATTITUDES ON CONTRACEPTION AND PREGNANCY*

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ABSTRACT

It has been argued that adolescents who get pregnant often do not sufficiently appreciate its unfavorable consequences, and that prevention programs should target participants' attitudes towards pregnancy. This study tests whether the nature and certainty of sexually active adolescent girls' attitudes towards pregnancy influence their contraceptive consistency and risk of pregnancy. It also tests whether attitudes towards contraception influence contraceptive consistency. Data are drawn from the National Longitudinal Study of Adolescent Health, a nationwide prospective study of adolescents in grades 7-12. Attitudes towards pregnancy, attitudes towards contraception, knowledge about fertility and other individual characteristics are included in a multivariate model of contraceptive consistency. Those variables, as well as contraceptive consistency itself, are then included in a multivariate model of pregnancy. Net of other factors, girls' attitudes towards getting pregnant did not affect whether they actually became pregnant. However, ambivalence about pregnancy made girls less likely to use contraception. Girls who were most opposed to pregnancy did not differ in contraceptive consistency from those least opposed. Implications for pregnancy prevention efforts are discussed.

INTRODUCTION

It is the norm for teenagers not to want to become pregnant; consequently, the vast majority (93%) of pregnancies to unmarried 15-19-year-old girls are unintended (AGI 1994). While most adolescents do not want to become pregnant, some adolescents are not opposed to getting pregnant and some have ambivalent attitudes. One can find a number of different explanations in the literature for why adolescent girls' attitudes towards pregnancy vary. Less often considered is whether or not these attitudes actually make any difference with respect to pregnancy risk and contraceptive use. That is the question that this article addresses. The simple answer is that attitudes towards pregnancy do not influence pregnancy risk. On the other hand, attitudes towards contraception are shown to influence consistency of contraceptive use, which in turn affects pregnancy risk. Implications for policy and intervention programs are discussed.

Questions about the relevance of attitudes are reasonable because the evidence for attitude effects on social behavior is often exceedingly thin.[1] Despite this, social policy is often oriented shaping attitudes. Many researchers and advocates have argued that teenage pregnancy prevention programs should target attitudes towards pregnancy (Witte 1997; Stevens-Simon et al. 1996; National Campaign to Prevent Teen Pregnancy (hereafter NCPTV) 1997). One of the reasons for attention to pregnancy attitudes has been the limited success at reducing teen pregnancy experienced by interventions that increase the availability of contraception (Kirby 1997). It seems reasonable to conclude that if adolescents have access to the means to avoid pregnancy but do not use them, they must in part be motivated by attitudes towards pregnancy (Stevens-Simon et al. 1996). Many experts have thus concluded that teens do not sufficiently appreciate the consequences of pregnancy, and that "unless motivation is strong to avoid pregnancy, it can happen all too easily" (NCPTV 1997).

[1] There is some evidence that attitudes do influence some behaviors for some people. For example, Jaccard and colleagues (1990) found that women in the top 20th percentile on a score of consistency between desire to avoid pregnancy and positive attitude toward their contraceptive method successfully avoided pregnancy.

Actors in the social policy domain may also focus on teens' attitudes because they seem easier to change than the social and economic conditions in which those attitudes are thought to develop. For example, poverty is associated with teen initiation of sex, non-use of condoms at first intercourse and accidental pregnancy (AGI 1994), but school- and clinic-based pregnancy intervention programs are not well suited to end poverty. They may, though, seem to be well suited to shape attitudes.

This article addresses the question of whether sexually active teenage girls' attitudes towards pregnancy influence their risk of becoming pregnant. We first consider the relationship between adolescents' characteristics and their attitudes towards pregnancy. Specifically, we explore whether adolescent girls with strongly negative and positive attitudes towards pregnancy differ from both each other and the majority of girls with respect to a range of demographic, social and psychological characteristics. We then test the effect of attitudes towards pregnancy on the occurrence of pregnancy. We consider the relationship between knowledge about pregnancy prevention and attitudes, paying special attention to the ways in which unfounded beliefs (certainty about the wrong facts) are correlated with attitudes and influence pregnancy outcomes. Recognizing that contraceptive behavior significantly impacts the probability of pregnancy, we measure the effect of attitudes towards pregnancy and contraceptives on the consistency of contraceptive use. We then account for consistency of contraceptive use in a model of pregnancy risk.

ANTECEDENTS OF ADOLESCENT CONTRACEPTION AND PREGNANCY

There is an extensive literature on the determinants of adolescent contraceptive behavior. Socio-demographic and family-related determinants include age, race, income (AGI 1994), parental education (Hogan, Sun and Cornwell 2000; Zelnik, Kantner and Ford 1981), and closeness to parents (Jaccard and Dittus 2000; Jaccard, Dittus and Gordon 1996; Luster and Small 1994). Individual characteristics that have been shown to determine contraceptive use include cognitive ability (Cliquet and Balcaen 1983), educational achievement and expectations (Hayes 1987; Luster and Small 1994) and self-esteem (Chewning and VanKoningsveld 1998). The following aspects of sexual activity have also been identified

as determinants: duration of sexual career (Zelnik, Kantner and Ford 1981), history of pregnancy (Zelnik, Kantner and Ford 1981) and attitudes towards contraception (Herceg-Baron et al. 1990; Philliber and Namerow 1990). The effect of knowledge about sex, fertility and contraception has been found to be both important (Eisen, Zellman and McAlister 1985) and unimportant (Levinson 1995). There are also mixed findings about religiosity (Hogan, Sun and Cornwell 2000; Studer and Thornton 1987).

Multiple antecedents of teenage non-marital pregnancy have also been identified in the literature. Socio-demographic predictors include age, race, income (Yamaguchi and Kandell 1987; Hogan, Sun and Cornwell 2000) and parental education (Hogan, Sun and Cornwell 2000; Plotnick 1992). Family-related predictors include family structure (Zelnik, Kantner and Ford 1981) and relationship with parents (Bearman and Brückner 1999). Individual characteristics that predict pregnancy include lower cognitive ability (Cliquet and Balcaen 1983), low educational expectations and achievement (Robbins, Kaplan and Martin 1985; Yamaguchi and Kandel 1987), negative attitudes towards school (Plotnick 1992; Robbins, Kaplan and Martin 1985), lack of involvement in school clubs (Moore et al. 1998) and problem behaviors (Mensch and Kandel 1992; Yamaguchi and Kandel 1987). There are inconsistent findings about the role of religiosity (Hogan, Sun and Cornwell 2000; Plotnick 1992; Zelnik, Kantner and Ford 1981), and self-esteem has been found to be unimportant (Bearman and Brückner 1999; Plotnick 1992). Bearman and Brückner (1999) found that a girl's popularity at school does not predict her risk of pregnancy, although the characteristics of her friends do. Finally, sexual career duration (Zelnik, Kantner and Ford 1981), number of partners (Bearman and Brückner 1999), age at onset of sexual activity (Bearman and Brückner 1999 [BUT ISN'T THIS CAREER DURATION? - AM]) and contraceptive behavior (Mensch and Kandel 1992) are strong predictors of pregnancy risk.

While it has been argued that ambivalence towards pregnancy is a risk factor for pregnancy because it leads to inconsistent contraceptive use (Sable 1999; Zabin 1999; Trussell, Vaughan and Stanford 1999), few studies have directly tested this idea. Two studies of a single adolescent cohort have focused on ambivalent attitudes towards childbearing. Zabin, Hirsch and Boscia (1990) showed for a

small sample of girls presenting for pregnancy tests at two clinics that those with ambivalent or positive attitudes towards conception had a higher probability of subsequent childbearing (rather than a negative test or abortion) than girls who felt negatively towards conception. Following up the girls who tested negative, Zabin, Sedivy and Emerson (1994) found that those who expressed ambivalent or positive attitudes towards childbearing were more likely to have a child within the next two years than those who had a negative attitude. On the other hand, they were not more likely than those with a negative attitude to get pregnant.

Ambivalence may be treated either as dissonance (contradictory responses to similar questions) or as the absence of opinion. In this article, we define ambivalence as the absence of a clear opinion. We focus on the ways in which attitude strength and direction intersect with previously identified determinants to shape contraceptive use and pregnancy risk. We show that attitudes are not particularly important. This suggests the need for revision of public health policies designed to influence adolescent sexual behavior and contraceptive use.

DATA, DESIGN AND MEASUREMENT

Data

The data reported on in this article are drawn from the National Longitudinal Study of Adolescent Health (Add Health). Add Health has significant advantages over competing data sets for this analysis. The first advantage is that Add Health is a prospective study. One of the limitations of competing data set for fertility studies is that they capture pregnancy attitudes retrospectively. Researchers have recently argued for the need to analyze prospective measures of pregnancy attitudes (Bachrach and Newcomer 1999). Exploiting the prospective features of Add Health allows us to time order attitudes and behaviors. The second advantage is that Add Health is extremely rich and allows us to include detailed measures of well-established antecedents of teenage contraceptive use and pregnancy in our models. The third advantage is that Add Health is nationally representative. Adolescents in the study are not selected on the

basis of failed contraceptive use, sexual experience or intention to have sex in the near future, as is the case in most clinic-based studies.

Add Health utilizes a multi-stage clustered sample design. This study considers data drawn from the in-home components of Add Health.[2] From May through December 1995, wave 1 in-home interviews were administered to 20,745 adolescents. The interview lasted 90 minutes on average, and collected detailed information about risk behaviors, romantic partnerships, family dynamics, aspirations, attitudes and activities. Roughly 80% of all adolescents in the initial sample completed a wave-1 interview. Audio-CASI technology was used for questions covering sexual and other sensitive health behaviors. Approximately 85% of the students' parents agreed to complete an interviewer-assisted parent questionnaire. Between April and September 1996, re-interviews with wave-1 respondents, excluding high-school seniors, were conducted. Over 88% of eligible respondents participated in wave 2, yielding a sample of 14,738 adolescents with both interviews.

Female adolescents between the ages of 15 and 19 who participated in both in-home interviews were eligible for inclusion in the present analysis (n=5,059). Forty-four girls were excluded because they were either married at wave 1 or got married between waves. One hundred and thirty-eight girls were excluded because of missing information on pregnancy attitudes or sexual history. The final study population consisted of 4,877 girls.

Design

We first classify girls according to their attitudes towards becoming pregnant at wave 1 and describe their socio-demographic, family, individual and sexual characteristics. Because sexual experience is closely related to the outcomes of interest, girls who were not sexually experienced at wave 1 and those who were are considered separately. Discriminant analysis is used to detect the characteristics that best distinguish the girls in each attitude group. This analytic strategy is useful because the limited

[2] Data are supplemented from the in-school questionnaire (n=90,000) and the parental questionnaires where necessary. Additional details about Add Health are available from Bearman, Jones and Udry (1997).

range of responses to most questions makes it especially difficult to distinguish groups from one another. We next select just those girls who had sex between waves and did not become pregnant, and examine the association between their attitudes towards pregnancy and their contraceptive behavior. Contraceptive consistency reflects all sexual relationships that were initiated after the first wave.[3] Bivariate analysis is supplemented with a multivariate analysis using a multinomial logistic regression model of inconsistent and consistent contraceptive use versus no contraceptive use.[4]

Finally, the association between attitudes towards pregnancy and pregnancy between waves is explored. For girls who had sex between waves, we look at the relationship between pregnancy and pregnancy attitudes, as well as to a host of previously established predictors of pregnancy. We then look at the relationship of pregnancy attitudes to the occurrence of pregnancy using logistic regression in a model adjusting for other pregnancy predictors, including contraceptive consistency.

Measurement

Attitudes Towards Becoming Pregnant

In the wave 1 interview, adolescents were asked to consider how they would feel if they became pregnant. To measure pregnancy attitudes, we focus on five questions that assess the consequences adolescents expect to arise should a pregnancy occur.[5] As expected, the vast majority of girls were predisposed against becoming pregnant, in accordance with normative expectations for their age.

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[3] Girls who became pregnant between waves were excluded because of the probability that they would not use contraception regularly during pregnancy. Their contraceptive consistency was characterized by their behavior during the month they got pregnant. The small number of girls who became pregnant (232 in the weighted sample) prohibited a separate analysis of whether their attitudes towards pregnancy predicted contraceptive use. Many girls who became pregnant reported that they had used contraceptives.

[4] In all bivariate analyses, tests of difference for continuous variables use t-tests or ANOVA, while tests of difference for categorical variables use chi-square tests.

[5] Specifically, the five questions were:

1. If you got pregnant, it would be embarrassing for your family
2. If you got pregnant, it would be embarrassing for you
3. If you got pregnant, you would have to decide whether or not to have the baby, and that would be stressful and difficult.
4. If you got pregnant, you would be forced to grow up too fast
5. Getting pregnant at this time is one of the worst things that could happen to you

Consequently, answers to the questions about pregnancy tended to be skewed.[6] Variation on this measure is thus severely limited. While most girls opposed pregnancy, however, some girls did so more vehemently than others, and still others appeared not to oppose it all. Yet another group of girls often chose "Neither Agree nor Disagree" and were unable to form an opinion.

To capture (and enhance) these differences in feeling, girls' attitudes towards becoming pregnant were characterized relative to those of their peers. Among all girls, those who strongly agreed with all five questions, or strongly agreed with four questions and agreed with one question, were classified as having the most unfavorable attitudes towards becoming pregnant (here termed "*anti-pregnancy*"). Girls who disagreed or strongly disagreed with at least three of the questions were classified as having the most favorable attitudes towards becoming pregnant (here termed "*pro-pregnancy*"). Those who neither agreed nor disagreed with at least two questions were classified as having the least defined attitudes towards becoming pregnant (here termed "*ambivalent*").[7] The remaining girls are mainstream in their type of attitude and strength of conviction (here termed "*mainstream*").[8]

Socio-demographic, family and individual characteristics

Appendix I lists the characteristics used as controls in this analysis, the details of their measurement and their expected effects on contraceptive behavior and pregnancy risk based on previous research. They include: age, parental education, race/ethnicity, poverty status, family structure, closeness to mother, religiosity, cognitive ability, self-esteem and social isolation. Following Bearman and Brückner (1999), we define adolescent risk status from the cross-classification of two indices. The first index summarizes orientation to school, and includes GPA, school attachment, number of extra-curricular

[6] When the five responses were averaged into a single index of pregnancy attitude (raw Cronbach alpha=0.72), this measure had relatively little dispersion (standard deviation=0.09) around its mean (2.1). Thus, girls on average agreed that getting pregnant would be a bad idea.

[7] Fifteen girls who qualified as both ambivalent and pro-pregnancy were considered pro-pregnancy.

[8] The analytic strategy was to define groups outside the mainstream that would be small enough to be considered "extreme" in attitude, but large enough to allow sufficient within-group variation. The group definitions are robust. Multiple adjustments to the groups (i.e., restrictions on and relaxations of the non-mainstream criteria) did not alter their relationship to contraceptive behaviors or the occurrence of pregnancy in a multivariate context (see Appendix II).

activities and desire for and perceived likelihood of attending college. The second index summarizes non-normative social behavior, and includes drinking, truancy, delinquency and having trouble with teachers or other students. Girls who scored in the bottom quartile on the school orientation index and in the top quartile on the non-normative social behavior index are typed high-risk. Girls who scored in the top quartile on the school orientation index and in the bottom quartile on the non-normative social behavior index are typed low-risk. The remaining girls (the majority) are typed middle-risk.

Sexual behavior, contraceptive use and contraceptive knowledge

A girl was classified as sexually experienced if she indicated in the wave 1 interview that she had ever had sexual intercourse. Knowledge about pregnancy avoidance is judged by a score on a quiz administered at wave 1 about fertility and pregnancy avoidance. Nine true/false questions covering proper condom usage, ovulation and pregnancy risk were asked. We speculated that while ignorance about pregnancy avoidance might be a risk factor for poor contraceptive usage or for pregnancy, a more potent risk factor might be the combination of ignorance and a failure to recognize it. Therefore, we created a measure of unfounded certainty about pregnancy avoidance, defined as the number of answers that a girl got wrong but was confident she had gotten right.

A measure of positive attitudes towards contraceptives at wave 1 was constructed by summarizing agreement with seven belief statements about contraceptives (raw Cronbach's alpha=0.81). The mean of the responses is used to represent the degree to which the girl's attitude towards contraceptives is positive. Contraceptive behavior was measured retrospectively at wave 2, when girls were asked to report up to six sexual relationships and, for each relationship, whether they used contraceptives, the type(s) of contraceptive used and the consistency with which it was used (always, sometimes, never). To ensure proper time ordering between attitude formations (as measured at wave 1) and contraceptive behavior (as measured at wave 2), only sexual relationships initiated between waves were included in the analysis.

Contraceptive behavior was characterized differently for girls who did not get pregnant between waves and those who did, to allow for the chance that a pregnant girl's contraceptive behavior was influenced by her pregnancy. For girls who became pregnant, contraceptive behavior was characterized by the month in which the pregnancy occurred. To create a similar "worst case" measure for girls who did *not* get pregnant, contraceptive behavior was summarized across all inter-wave sexual relationships. A girl was considered never to have used contraceptives if she never used it in any of her relationships. She was considered to have used contraceptives inconsistently if she did so inconsistently in any or all of her relationships. A girl was considered to have used contraceptives consistently if she used it every time in all relationships.

Length of sexual career is the difference between a girl's age of sexual debut and her age at wave 2. Number of partners is the number of sexual intercourse partners the girl had between waves 1 and 2, excluding any partners that were current at wave 1. If a girl reported in the wave 1 in-home interview that she had ever been pregnant, she was considered to have had a prior pregnancy at wave 1. Pregnancy is defined as any pregnancy that occurred between waves.

RESULTS

Attitudes Towards Pregnancy

Of the 4,877 girls studied, 996 (20.4%) were anti-pregnancy, 408 (8.4%) were pro-pregnancy, 691 (14.2%) were ambivalent and 2,782 (57.0%) were mainstream. While 41% of the girls in the mainstream group were sexually experienced, disproportionately few in the anti-pregnancy group (32%) and disproportionately many in the ambivalent (53%) and pro-pregnancy (72%) groups were sexually experienced.

Table 1 presents a comparison of the four attitude groups, subdivided by sexual experience status, according to socio-demographic, family, individual and sexual characteristics as of wave 1. It shows pronounced differences among the attitude groups on virtually every characteristic. In general, anti-pregnancy girls enjoyed greater social advantages and personal assets than girls in the mainstream, while

ambivalent and pro-pregnancy girls had fewer. For example, the range of poverty prevalence by attitude is striking. Among the sexually inexperienced, pro-pregnancy girls were twice as likely as the anti-pregnancy girls to be poor; among the experienced, they were four times as likely. The anti-pregnancy group contained the greatest proportion of low-risk girls, followed by the mainstream, pro-pregnancy and ambivalent groups. Likewise, the pro-pregnancy group had the most high-risk girls, followed by the ambivalent, mainstream and anti-pregnancy groups.

Table 1 about here

Among sexually experienced girls, those who were pro-pregnancy were far more likely than others to have ever experienced a pregnancy. Fully 43.0% of them had been pregnant as of wave 1, compared to 21.2% of the ambivalent girls, 15.8% of the mainstream girls and 6.5% of the anti-pregnancy girls. Discriminant analysis was used to highlight the most salient differences among attitude groups, regardless of sexual experience, as of wave 1. It yielded three statistically significant functions. The first distinguished pro-pregnancy girls from anti-pregnancy girls, and the second distinguished them from ambivalent girls. The third distinguished mainstream from ambivalent girls. The main differences between groups are reported here.

Compared to the anti-pregnancy girls, a greater proportion of the pro-pregnancy girls were poor, black and high-risk. They also tended to have less cognitive ability. Their parents had less education. They were much more likely to have had sex or to have ever been pregnant. Compared to the ambivalent girls, the pro-pregnancy girls had higher self-esteem and closer relationships with their mothers. They were more likely to be low-risk. They also had higher scores of unfounded certainty about pregnancy avoidance, and had more positive attitudes towards contraception. Compared to the ambivalent girls, girls in the mainstream were more religious and less likely to be of "other" race/ethnicity. Mainstream girls were less likely to live with neither parent but more likely to live with at least one stepparent.

Attitudes Towards Pregnancy and Consistency of Contraceptive Use

At wave 2, there were 2,758 girls who reported (and dated) prior sexual intercourse. Only those who had at least one sexual relationship that began after wave 1 (n=1,415) were included in the present analysis.[9] Both girls whose sexual debut occurred between waves and those already sexually experienced at wave 1 are included. Of these 1,415 girls, 228 (16%) became pregnant between waves, leaving 1,187 girls for the analysis of the influence of pregnancy attitudes on consistency of contraceptive use.

The majority (57%) of all 1,187 girls used contraception consistently, and an additional 16% used it inconsistently (Table 2). Approximately one-quarter (27%) of the girls did not use contraception. While the differences among mainstream, anti- and pro-pregnancy girls are rather small (p=0.93 (not shown)), ambivalent girls were more likely than others to be non-users.

Table 2 about here

Table 3 reports the distribution of non-users, inconsistent users and consistent users by demographic, family, individual and sexual characteristics. To identify distinctions between contraceptive users and non-users, tests of difference compared both inconsistent users and consistent users with those who never used contraception.

Table 3 about here

In a bivariate context, the only difference between contraceptive users and non-users in their attitudes towards pregnancy surrounds ambivalence. That is, anti-pregnancy girls were no more likely to use contraception than pro-pregnancy girls. However, girls who never used contraception were more likely than those who used it inconsistently to have ambivalent attitudes towards pregnancy (16.95% vs.

[9] There were actually slightly more than 1,500 girls in this group. Nineteen girls who did not answer the pregnancy attitude questions, six girls who did not provide contraceptive information and those without weights were dropped. After weighting was applied, there were 1,415 girls who reported contraceptive behavior at wave 2 for at least one sexual relationship that began after wave 1.

9.60%, $p<.05$). Girls varied significantly in their attitudes towards contraception. Those who used contraception consistently had the most positive attitude (4.17), followed by those who used it inconsistently (4.06) and those who never used it at all (3.79). The differences between the non-users and both the inconsistent and consistent users were significant at the $p<.01$ level.

With respect to contraceptive consistency, compared to non-users, inconsistent users were less likely to be Hispanic, were more likely to be low-risk and had fewer sexual partners. Compared to non-users, consistent users were less likely to live with neither parent, had greater cognitive ability, were more likely to be low-risk (and less likely to be high-risk) and had higher self-esteem. They also had a shorter sexual career, fewer sexual partners and were less likely to have ever been pregnant.

Multinomial logistic regression was used to assess the influence of attitudes towards pregnancy on the consistency of contraception in a multivariate context. Table 4 presents the results of this analysis. The dependent variable is consistency of contraceptive use (none, inconsistent and consistent). We first consider inconsistent contraceptive use as compared to no contraceptive use. We then consider consistent contraceptive use as compared to no contraceptive use.[10]

Table 4 about here

Table 4 shows that compared to those with mainstream attitudes, girls with ambivalent attitudes towards pregnancy are less likely to use contraceptives inconsistently (OR=0.37, 95% CI=0.18,0.75). Ambivalence towards pregnancy also halved the odds of consistent contraceptive use compared to no use at all (OR=0.50, 95% CI=0.28,0.88). The pro-pregnancy and anti-pregnancy groups did not differ from the mainstream group in terms of contraceptive consistency. In addition, Table 4 shows that positive attitudes towards contraceptives, AHPVT score, low-risk status and number of sexual predict both consistent and inconsistent contraceptive use in a multivariate context

[10] Some cases missing information on the independent variables were dropped, resulting in 1,144 girls in the analysis sample.

The more positive a girl's attitudes were towards contraception, the more likely she was to be an inconsistent user (OR=1.57, 95% CI=1.06,2.30) rather than a non-user. Similarly, each increment in the score of positive attitudes towards contraception doubled the odds (OR=2.07, 95% CI=1.54,2.79) of consistent use. Cognitive ability, low-risk status and number of sexual partners also continued to be important. As has been found with sexual debut (Udry and Halpern 1999), there was a curvilinear relationship between cognitive ability and likelihood of consistent and inconsistent contraceptive use. Up to a point, cognitive ability increases the odds of using contraception, but for the smartest girls, the likelihood decreases again. Thus, each increment in AHPVT score increased the odds of inconsistent use (OR=1.31, 95% CI=1.02,1.68), while each increment in the squared AHPVT score decreased inconsistent use (OR=0.9985, 95% CI=0.9971,0.9999). A similar relationship obtains for the odds of being a consistent user versus a non-user.

Being low-risk as opposed to middle-risk about doubled the odds of inconsistent use (OR=2.04, 95% CI=1.04,4.05) and consistent use (OR=1.77, CI=1.05,2.98). Each additional sexual partner reduced the likelihood of inconsistent (OR=0.40, 95% CI=0.27,0.61) and consistent use (OR=0.34, 95% CI=0.24,0.49).

The multinomial logistic regression results reported in Table 4 model the probability of contraceptive use in comparison to no use. It is possible that the effect of pregnancy attitudes on contraceptive use is evident only among girls who use contraceptives. That is, it is possible that attitudes towards pregnancy affect girls who use contraception by influencing the consistency with which they use it. To consider this possibility, we explored the effects of pregnancy attitudes, along with all the other predictor variables, on contraceptive consistency in a multinomial logistic regression model in which inconsistent users, rather than non-users, were the reference group (not shown). No pregnancy attitudes, including ambivalence, significantly influenced the probability of using contraceptives consistently, as opposed to inconsistently, among girls who used it at all. Indeed, only one predictor in the model was found to influence consistency. Being high-risk nearly halved the odds of consistent use compared to

inconsistent use (OR=0.59, 95% CI=0.35,0.99). Recall that being low-risk doubled the odds of inconsistent use as opposed to no use at all. Being high-risk did not make girls less likely to use contraceptives, but among those girls who used contraceptives, it made them less likely to be consistent users.

Attitudes Towards Pregnancy and the Occurrence of Pregnancy

As shown in Table 5, which compares girls who became pregnant with other girls, the occurrence of pregnancy between waves did not vary with attitude towards pregnancy.[11] There were no significant differences between the girls who got pregnant and those who did not in their attitudes towards becoming pregnant. The distribution of extreme attitudes towards pregnancy -- positive, negative and ambivalent -- was similar in the two groups. Nevertheless, girls with different pregnancy outcomes did differ in other respects. Compared to those girls who did not become pregnant, those who did were more likely to be black or Hispanic, live with neither parent and be high-risk. Their parents were less educated, they were not as close to their mothers, and they scored lower on the AHPVT. Likewise, girls who got pregnant were nearly three times as likely as those who did not to have reported a prior pregnancy at wave 1. They were also far more likely not to have used contraception between waves (72.71% vs. 27.27%, $p<.01$).

While 56.13% of the girls who did not get pregnant used contraception consistently, only 14.99% of the girls who got pregnant reported that they did so ($p<.01$).[12] Not surprisingly, contraceptive users were less likely to get pregnant than non-users. Nevertheless, nearly one-third of the girls who did not get pregnant reported that they never used contraceptives, and one-sixth of the girls who did get pregnant reported that they always did. Girls who got pregnant and those who did not were equally knowledgeable

[11] Here, a number of small changes are introduced. Specifically, contraceptive consistency, as determined in the previous model, is added to the comparison with respect to sexual characteristics. The measure of attitudes towards contraception is excluded because of its redundancy with the consistency of use measure. To ensure the correct temporal order, the number of partners between waves is excluded because of the possibility that for girls who got pregnant it included relationships following the pregnancy.

[12] There is no reason to doubt the veracity of the reports of contraceptive use by pregnant girls, since the incidence of pregnancy is consistent with known adolescent contraceptive failure rates (Fu et al. 1999).

about pregnancy avoidance, but the girls who got pregnant were more likely to indicate they were confident they were right about an answer that was wrong (0.86 vs. 0.62, $p<.05$).

Logistic regression was used to test the effect of attitudes towards pregnancy on the occurrence of pregnancy in a multivariate context. As reported in Table 6, the central finding is that attitudes towards pregnancy did not influence the risk of pregnancy. Neither race, parental education, closeness to one's mother, being high-risk, sexual career length nor unfounded certainty about pregnancy avoidance was significant in a multivariate context. The variables that significantly predicted pregnancy were being Hispanic, coming from a single-parent home, cognitive ability, prior pregnancy and contraceptive use. Living with a single parent doubled the odds (OR'2.05, 95% CI'1.19,3.51), and being Hispanic more than doubled the odds (OR=2.42, 95% CI=1.30,4.50) of becoming pregnant between waves. Each increment in the AHPVT score increased the odds (OR=1.34, 95% CI=1.07,1.68), and in the squared score decreased the odds (OR=0.9983, 95% CI=0.9970,0.9996), of pregnancy. A prior pregnancy doubled the odds of pregnancy (OR=1.98, 95% CI=1.06,3.71).

Table 6 about here

Contraceptive use was by far the most powerful predictor of pregnancy in the multivariate context. These results are consistent with those for white adolescents found by Mensch and Kandell (1992) in the National Longitudinal Survey of Youth. In comparison to consistent use of contraceptives, inconsistent use increased the odds of pregnancy 2.76 times (95% CI=1.46,5.22), and no use at all increased the odds 11.39 times (95% CI=7.25,17.90).

Having a non-mainstream attitude towards pregnancy did not significantly predict which sexually active girls became pregnant. However, we considered the possibility that girls on polar ends of the opinion spectrum, i.e., those most opposed to and most in favor of pregnancy, differed from each other in their risk of pregnancy. We conducted a Wald test for the equality of their respective coefficients in the pregnancy model (not shown). This test was not significant ($p=.60$), suggesting that attitudes towards

becoming pregnant do not affect the likelihood of its occurrence. Finally, we also considered the possibility that attitudes towards pregnancy were mediated by contraceptive use, but found that they were not.[13] That is, pregnancy attitudes do not influence adolescent pregnancy outcomes via contraceptive behavior.

DISCUSSION

This study suggests that sexually active girls' attitudes towards pregnancy do not influence their subsequent risk of pregnancy. It is unlikely that this finding is an artifact of our measurement of pregnancy attitudes.[14] Pregnancy attitudes do appear to shape, in subtle ways, contraceptive use, insofar as girls with ambivalent attitudes towards pregnancy are less likely than mainstream girls to contracept. On the other hand, girls with pro-pregnancy attitudes are not less likely than mainstream girls to contracept. Ambivalence here is intended to capture the failure to form an opinion rather than the presence of conflicting opinions. If ambivalent girls were conflicted, and merely "less" in favor of pregnancy than the pro-pregnancy girls, the latter should be even less likely to contracept. That they are not suggests that ambivalent girls are a meaningfully distinct group. Their ambivalence does not represent the midpoint of a continuum of attitudes towards pregnancy, but rather the absence from the continuum due to their inability to form an attitude at all.

Nevertheless, we cannot conclude that because we find no effect of attitudes towards pregnancy on the risk of its occurrence that these attitudes are totally inconsequential. It is possible that attitudes towards pregnancy express themselves by encouraging or discouraging girls to have sexual intercourse. It

[13] The test for mediation consisted of running the model without the contraceptive consistency measures and finding that the pregnancy attitudes' coefficients did not change.

[14] Construct validity is suggested by the consistency of our results in the face of repeated adjustments to the attitude definitions (results are reported in Appendix II). More stringent criteria for defining the pro- and anti-pregnancy groups did not affect the association with contraceptive consistency and pregnancy in multivariate analyses. Attempts to represent pregnancy attitudes through alternative uses of the five survey questions about pregnancy also failed to change our results. For example, when we repeated the analysis with the most direct of the five questions – the characterization of pregnancy as "one of the worst things that could happen" – as a measure of pregnancy attitudes, we found no effect on pregnancy risk. When the analysis was repeated using a summary index that averaged responses to all five questions, no relationship to pregnancy was found. Treating measures of pregnancy attitudes as categorical variables also did not alter the conclusions. In addition, bivariate associations with multiple socio-demographic, individual, family and sexual characteristics (see Table 1) suggest construct validity.

is also likely that girls' attitudes towards pregnancy have already been shaped by a culture that generally condemns teenage pregnancy, and that our findings would not emerge in the absence of such a culture. However, among girls who have sex, and given the current normative environment, variations in attitudes towards pregnancy do not predict the occurrence of pregnancy.[15]

As may be expected, the best predictor of pregnancy is contraceptive behavior, with no use posing a significantly greater risk than both inconsistent and consistent use. In turn, the predictors of contraceptive use (regardless of consistency) are cognitive ability, fewer sexual partners, positive attitudes towards contraception, not being ambivalent towards pregnancy and being typed as low-risk. The only predictor of consistent contraceptive use, as opposed to inconsistent use, is low-risk status. These findings have implications for future attempts to reduce adolescent pregnancy.

First, they suggest that targeting sexually active female adolescents' attitudes towards pregnancy is not likely to be an effective means of discouraging pregnancy. We found that the girls with the strongest anti-pregnancy attitudes were no more likely to use contraception at all or consistently, and no less likely to become pregnant than other girls. Because contraceptive use is the best predictor of whether a pregnancy will occur, it should assume prominence in pregnancy reduction programs. We found that the more positive a girl's attitudes towards contraceptives were, the more likely she was to use them, either inconsistently or consistently, rather than not at all. Therefore, pregnancy interventions that focus on attitudes should prioritize attitudes towards contraception over those towards pregnancy.

Consistent use of contraceptives for sexually active girls is optimal for pregnancy prevention, and inconsistent users should be encouraged to become consistent users if pregnancy prevention is a central goal. We found that what differentiates consistent from inconsistent contraceptors is a measure of risk-status which summarizes adolescents' orientation to school, future expectations and non-normative social

[15] The failure of attitudes towards pregnancy to predict pregnancy cannot be explained away by Ajzen and Fishbein (1973; 1977), who argue that the absence of a relationship between attitudes and behavior in social science research is due to an inexact correspondence between the measured attitudes and behavior in either or both the action of interest and the target of that action. In this study, the measured attitudes referred precisely to the action of interest. The target is in this case not relevant.

behavior. Behind this cluster of inter-related factors likely lie strikingly different conceptions of the world and the adolescents' place within it. These conceptions are in turn shaped by life experiences, with narrow experiences giving rise to truncated visions of opportunity and achievement. Recently, adolescent pregnancy reduction interventions have focused on widening adolescents' experience and understanding of life opportunities. Many of these programs have shown success (Card 1999; Kirby 1997), and additional efforts in this vein should be favored over campaigns to change attitudes per se, since even if the latter succeed in changing attitudes, they are likely to fail in changing behavior.

Table 1. Sociodemographic, Family, Individual and Sexual Characteristics of 15-19-Year-Old Girls by Attitude Towards Becoming Pregnant and Sexual Experience†

	Attitude Towards Becoming Pregnant								Significant Differences by Attitude	
	Anti		Mainstream		Pro		Ambivalent			
	Sexually Experienced		Sexually Experienced		Sexually Experienced		Sexually Experienced		Sexually Experienced	
	No (n=682)	Yes (n=314)	No (n=1,629)	Yes (n=1,153)	No (n=116)	Yes (n=292)	No (n=323)	Yes (n=368)	No (n=2,750)	Yes (n=2,127)
Sociodemographic Characteristics										
Age (mean)	16.4	16.8	16.5	16.9	16.6	17.2	16.4	16.8		**
White (%)	52.1	63.7	52.1	51.5	32.8	39.4	44.6	44.8	**	**
Black (%)	16.0	14.7	18.1	27.0	29.3	41.1	17.3	32.1	**	**
Hispanic (%)	15.4	13.7	21.1	15.0	31.0	14.0	26.0	16.3	**	
Other (%)	16.6	8.0	8.8	6.4	§	5.5	§	6.8	**	
Parental education (mean)	6.0	6.1	5.7	5.4	4.3	4.8	5.3	5.1	**	**
Poor (%)	9.2	6.4	10.7	15.0	19.0	27.4	14.6	20.1	**	**
Family Characteristics										
Two biological parents (%)	63.8	54.5	58.6	38.4	44.0	31.9	55.1	32.1	**	**
At least 1 step-parent (%)	14.8	20.4	14.6	21.9	17.2	16.4	15.2	27.2		**
Single parent (%)	17.9	21.0	22.8	29.0	31.9	34.6	25.4	29.9	**	**
Other family type (%)	3.5	4.1	4.0	10.8	§	17.1	§	10.9		**
Closeness with mother (mean)	3.3	3.1	3.1	3.0	3.2	2.9	3.1	2.9	**	**
Individual Characteristics										
Religiosity (mean)	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	**	
AHPVT (mean)	102.3	101.6	100.0	98.0	90.0	92.8	97.6	96.8	**	**
Low-Risk status (%)	54.8	30.6	45.1	19.3	37.9	14.7	35.0	14.1	**	**
Middle-Risk status (%)	29.0	33.1	35.5	31.6	23.3	27.1	35.9	29.9	**	**
High-Risk status (%)	16.1	36.3	19.3	49.1	38.8	58.2	29.1	56.0	**	**
Self-Esteem (mean)	3.1	3.0	2.9	2.8	2.9	2.8	2.9	2.8	**	**
Socially isolated (%)	20.8	11.5	23.2	18.2	23.3	25.3	26.6	23.4		**
Sexual Characteristics										
Knowledge about pregnancy avoidance (mean)	5.4	6.3	5.4	6.2	4.9	6.0	5.4	6.3	*	
Unfounded certainty about pregnancy avoidance (mean)	0.7	0.7	0.7	0.8	1.3	1.2	0.6	0.6	**	**
Positive attitudes towards contraception (mean)	4.0	4.1	3.9	4.0	3.9	3.9	3.8	3.9	**	**
Prior pregnancy at Wave 1 (%)	na	6.5	na	15.8	na	43.0	na	21.2	na	**

* p<.05
** p<.01
† n=4,877
§ Small n can not be reported because of Add Health confidentiality policy
na = Not applicable

Table 2. Attitude Towards Becoming Pregnant by Consistency of Contraceptive Use†

	No Contraceptive Use		Inconsistent Contraceptive Use		Consistent Contraceptive Use		Total	
	n	%	n	%	n	%	n	%
Mainstream attitude towards pregnancy	163	25.45	107	17.34	379	57.21	649	100.0
Anti-pregnancy attitude	50	24.20	36	15.66	143	60.14	229	100.0
Pro-pregnancy attitude	37	28.31	21	18.02	70	53.67	128	100.0
Ambivalent about pregnancy	53	35.37	29	12.30	99	52.33	181	100.0
Total	303	26.84	193	16.48	691	56.69	1,187	100.0

Note: chi-square test not significant at $p<.05$

† Weighted sample of 15-19-year-old girls with sexual relationships initiated after Wave 1 who did not become pregnant (n=1,187)

Table 3. Comparison of Girls Who Used Contraception Inconsistently and Consistently With Girls Who Did Not Use Contraception†

	No Contraceptive Use (n=303)	Inconsistent Contraceptive Use (n=193)§	Consistent Contraceptive Use (n=691)§
Sociodemographic Characteristics			
Age (mean)	16.71	16.85	16.67
White (%)	70.76	72.54	70.94
Black (%)	14.87	19.87	18.10
Hispanic (%)	9.84	3.76**	6.88
Other (%)	4.53	3.83	4.08
Parental education (mean)	4.69	5.06	4.95
Poor (%)	14.63	8.94	14.87
Family Characteristics			
Two biological parents (%)	47.22	45.55	48.77
At least 1 step-parent (%)	21.75	26.04	19.13
Single parent (%)	22.70	20.27	28.02
Other family type (%)	8.34	8.14	4.08*
Closeness with mother (mean)	3.03	2.97	3.05
Individual Characteristics			
Religiosity (mean)	0.38	0.37	0.39
AHPVT (mean)	85.63	88.08	88.15*
Low-Risk status (%)	12.65	20.50*	25.22**
Middle-Risk status (%)	35.71	25.10	34.54
High-Risk status (%)	51.64	54.40	40.24**
Self-Esteem (mean)	2.77	2.79	2.89*
Socially isolated (%)	14.81	14.61	16.04
Sexual Characteristics			
Sexual career length (mean)	1.27	1.28	0.88*
Number of sexual partners between waves (mean)	1.72	1.27**	1.21**
Prior pregnancy at Wave 1 (%)	11.65	9.55	6.31*
Positive attitudes towards birth control (mean)	3.78	4.06**	4.17**
Knowledge about pregnancy avoidance (mean)	6.14	6.37	6.12
Unfounded certainty about pregnancy avoidance (mean)	0.74	0.56	0.59
Mainstream attitude towards pregnancy (%)	55.39	61.45	58.94
Anti-pregnancy attitude (%)	15.64	16.48	18.40
Pro-pregnancy attitude (%)	12.02	12.47	10.79
Ambivalent about pregnancy (%)	16.95	9.60*	11.87

* $p<.05$

** $p<.01$

† Weighted sample of sexually experienced 15-19-year-old girls with sexual relationships initiated after Wave 1 who did not become pregnant (n=1,187)

§ Compared to No Contraceptive Use group in tests of difference

Table 4. Odds Ratios (and 95% Confidence Intervals) of Inconsistent and Consistent Contraceptive Use (Referent Group: No Contraceptive Use) by Sociodemographic, Family, Individual and Sexual Characteristics†

	Inconsistent Contraceptive Use			Consistent Contraceptive Use		
	O.R.	95% C.I.		O.R.	95% C.I.	
Sociodemographic Characteristics						
Age (ref: 15 y.o.)						
16 y.o.	1.26	0.65	2.43	1.23	0.75	2.02
17 y.o.	1.49	0.69	3.23	1.06	0.60	1.86
18 y.o.	0.96	0.42	2.22	0.53	0.26	1.05
Race/Ethnicity (ref: White)						
Black	1.95	0.90	4.23	1.37	0.63	2.95
Hispanic	0.75	0.27	2.07	1.60	0.80	3.21
Other	1.39	0.48	3.98	1.62	0.72	3.65
Parental education§	1.02	0.91	1.15	0.99	0.88	1.11
Poor	0.66	0.25	1.69	1.31	0.67	2.55
Family Characteristics						
Family structure (ref: 2 biological parents)						
At least 1 step-parent	1.74	0.82	3.73	1.27	0.70	2.29
Single parent	1.08	0.57	2.06	1.31	0.76	2.25
Other family type	1.16	0.21	6.36	0.50	0.14	1.84
Closeness with mother‡	0.86	0.58	1.25	0.87	0.64	1.18
Individual Characteristics						
Religiosity	0.78	0.26	2.34	0.78	0.35	1.77
AHPVT	1.31*	1.02	1.68	1.24**	1.06	1.45
$(AHPVT)^2 / 100$	0.9985*	0.9971	1.0000	0.9988*	0.9979	0.9997
Risk status (ref: Middle-risk)						
Low-Risk	2.04*	1.03	4.05	1.77*	1.05	2.98
High-Risk	1.29	0.69	2.44	0.77	0.47	1.26
Self-Esteem	1.00	0.62	1.64	1.21	0.80	1.84
Socially isolated††	1.38	0.60	3.16	1.87	0.98	3.55
Sexual Characteristics						
Sexual career length	1.04	0.87	1.26	0.96	0.86	1.07
Duration of interwave period	0.94	0.83	1.06	0.98	0.87	1.11
Number of sexual partners between waves	0.40**	0.27	0.61	0.34**	0.24	0.49
Prior pregnancy at Wave 1	1.05	0.44	2.48	0.96	0.42	2.19
Positive attitudes towards contraception	1.57*	1.06	2.30	2.07**	1.54	2.79
Knowledge about pregnancy avoidance	1.04	0.88	1.23	0.99	0.89	1.10
Unfounded certainty about pregnancy avoidance	0.84	0.64	1.10	0.87	0.72	1.05
Attitudes towards becoming pregnant (ref: Mainstream)						
Anti	0.86	0.39	1.92	0.85	0.51	1.41
Pro	0.89	0.38	2.10	0.80	0.42	1.54
Ambivalent	0.37**	0.18	0.75	0.50*	0.28	0.88

* $p<.05$
** $p<.01$
† Weighted sample of 15-19-year-old girls with sexual relationships initiated after Wave 1 (n=1,144)
§ Mean parental education by race and school context was substituted for cases with missing values (n=44). The coefficient for a dummy variable indicating missing original value was not significant.
‡ Mean closeness with mother by age and race was substituted for cases with an "other" family type (n=17). The coefficient for a dummy variable indicating missing original value was not significant.
†† The coefficient for a dummy variable indicating missing value was not significant

Table 5. Attitude Towards Becoming Pregnant by Occurrence of Pregnancy†

	Not Pregnant Between Waves		Pregnant Between Waves		Total	
	n	%	n	%	n	%
Mainstream attitude towards pregnancy	649	84.65	124	15.35	773	100.0
Anti-pregnancy attitude	229	89.30	25	10.70	254	100.0
Pro-pregnancy attitude	128	76.74	39	23.26	167	100.0
Ambivalent about pregnancy	181	81.15	40	18.85	221	100.0
Total	1,187	83.96	228	16.04	1,415	100.0

Note: chi-square test not significant at $p<.05$

† Weighted sample of 15-19-year-old girls with sexual relationships initiated after Wave 1 (n=1,415)

Table 6. Comparison of Girls Who Got Pregnant Between Waves With Those Who Did Not†

	Not Pregnant Between Waves (n=1,187)	Pregnant Between Waves (n=228)
Sociodemographic Characteristics		
Age (mean)	16.71	16.87
White (%)	71.16	57.23**
Black (%)	17.52	25.24*
Hispanic (%)	7.16	13.77**
Other (%)	4.16	3.76
Parental education (mean)	4.88	4.43*
Poor (%)	13.83	19.63
Family Characteristics		
Two biological parents (%)	47.82	30.03**
At least 1 step-parent (%)	20.97	21.36
Single parent (%)	25.31	32.90
Other family type (%)	5.89	15.71**
Closeness with mother (mean)	3.03	2.90*
Individual Characteristics		
Religiosity (mean)	0.38	0.39
AHPVT (mean)	87.46	84.51**
Low-Risk status (%)	21.07	16.32
Middle-Risk status (%)	33.30	28.86
High-Risk status (%)	45.63	54.82*
Self-Esteem (mean)	2.84	2.80
Socially isolated (%)	15.47	18.00
Sexual Characteristics		
Sexual career length (mean)	1.05	1.68**
Prior pregnancy at Wave 1 (%)	8.29	23.34**
No contraceptive use (%)	26.84	72.90**
Inconsistent contraceptive use (%)	16.48	12.05
Consistent contraceptive use (%)	56.69	15.05**
Knowledge about pregnancy avoidance (mean)	6.17	6.25
Unfounded certainty about pregnancy avoidance (mean)	0.62	0.86*
Mainstream attitude towards pregnancy (%)	58.40	55.41
Anti-pregnancy attitude (%)	17.34	10.88
Pro-pregnancy attitude (%)	11.40	18.08
Ambivalent about pregnancy (%)	12.86	15.63

* $p<.05$
** $p<.01$
† Weighted sample of 15-19-year-old girls with sexual relationships initiated after Wave 1 (n=1,415)

Table 7. Odds Ratios (and 95% Confidence Intervals) of Pregnancy Between Waves by Sociodemographic, Family, Individual and Sexual Characteristics†

	O.R.	95% C.I.	
Sociodemographic Characteristics			
Age (ref: 15 y.o.)			
16 y.o.	0.91	0.45	1.82
17 y.o.	0.88	0.49	1.57
18 y.o.	0.97	0.40	2.39
Race/Ethnicity (ref: White)			
Black	1.38	0.86	2.23
Hispanic	2.42**	1.30	4.50
Other	1.26	0.54	2.96
Parental education§	0.96	0.86	1.08
Poor	1.21	0.67	2.19
Family Characteristics			
Family structure (ref: 2 biological parents)			
At least 1 step-parent	1.57	0.91	2.73
Single parent	2.05*	1.19	3.51
Other family type	1.86	0.66	5.26
Closeness with mother‡	0.84	0.67	1.05
Individual Characteristics			
Religiosity	1.03	0.45	2.36
AHPVT	1.34*	1.07	1.68
$(AHPVT)^2 / 100$	0.9983*	0.9970	0.9996
Risk status (ref: Middle-Risk)			
Low-Risk	1.43	0.66	3.10
High-Risk	1.13	0.72	1.78
Self-Esteem	1.40	0.82	2.39
Socially isolated	1.00	0.54	1.86
Sexual Characteristics			
Sexual career length	1.08	0.96	1.21
Duration of interwave period	1.08	0.95	1.23
Prior pregnancy at Wave 1	1.98*	1.06	3.71
Contraceptive use (ref: Consistent Use)			
Inconsistent Use	2.76**	1.46	5.22
No Use	11.39**	7.25	17.90
Knowledge about pregnancy avoidance	1.08	0.93	1.25
Unfounded certainty about pregnancy avoidance	1.15	0.95	1.40
Attitudes towards becoming pregnant (ref: Mainstream)			
Anti	0.77	0.38	1.56
Pro	0.96	0.49	1.88
Ambivalent	0.80	0.45	1.45

* $p<.05$
** $p<.01$
† Weighted sample of 15-19-year-old girls with sexual relationships initiated after Wave 1 (n=1,364)
§ Mean parental education by race and school context was substituted for cases with missing values (n=57). The coefficient for a dummy variable indicating missing original value was not significant.
‡ Mean closeness with mother by age and race was substituted for cases with an "other" family type (n=27). The coefficient for a dummy variable indicating missing original value was not significant.

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Appendix I. Antecedents of Contraceptive Use, Pregnancy and Childbearing Included as Controls

	Relationship to Contraceptive Use / Method Effectiveness / Accuracy[a]	Relationship to Pregnancy[b]	Main Source(s)	Measurement
Sociodemographic Characteristics				
Age	+	+	AGI 1994[a]; Yamaguchi and Kandell 1987[b]; Zelnik, Kantner and Ford 1981[a]	Age in years as of W1 IHI calculated based on interview date and date of birth. Values: 15-18.
Black	-	+	Hogan, Sun and Cornwell 2000[a,b]; Yamaguchi and Kandell 1987[b]	Self-reported race/ethnicity at W1 IHI. Missing data substituted with ISQ. Values: Non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic other.
Hispanic	-	+	Hogan, Sun and Cornwell 2000[a,b]	Self-reported race/ethnicity at W1 IHI. Missing data substituted with ISQ. Values: Non-Hispanic white; non-Hispanic black; Hispanic; non-Hispanic other.
Parental education	+	-	Hogan, Sun and Cornwell 2000[a,b]; Plotnick 1992[b]; Zelnik, Kantner and Ford 1981[a]	Respondent's report of mother's education at W1 IHI. Missing data substituted with father's education. Values: 0=never went to school; 1=8th grade or lower; 2=did not graduate from high school; 3=trade, business or vocational school instead of high school; 4=GED; 5=graduated from high school; 6=high school plus trade, business or vocational school; 7=college, did not graduate; 8=graduated from college; 9=college plus professional training.
Poverty / Low income	-	+	AGI 1994[a,b]	Respondent's report at W1 IHI of whether a parent or a parent's partner had received public assistance in the last year. Missing data substituted with PQ. Values: 0=no; 1=yes.
Family Characteristics				
Living with 2 biological parents		-	Zelnik, Kantner and Ford 1981[b]	Family type (living situation) self-reported at W1 IHI. Values: 2 biological parents; 1 biological parent and 1 step-parent or 2 step-parents; single parent; other family type (neither parent, e.g., foster care, grandparent).
Closeness with parents	+	-	Bearman and Bruckner 1999[b]; Jaccard and Dittus 2000[a]; Jaccard, Dittus and Gordon 1996[a]; Luster, Small 1994[a]	W1 IHI response to "How much do you think she [biological/adoptive/step/foster mother] cares about you?" Values: 0=not at all; 1=very little; 2=somewhat; 3=quite a bit; 4=very much.
Individual Characteristics				
Religiosity	+/-	+/-/*	Hogan, Sun and Cornwell 2000[a,b]; Plotnick 1992[b]; Studer and Thornton 1987[a]; Zelnik, Kantner and Ford 1981[b]	Composite of 4 responses at W1 IHI. Measures on a 4-point scale (frequency of religious services, frequency of religious youth activities, importance of religion to self) and a measure on a 5-point scale (frequency of praying) were converted to percentage of the maximum value, which indicated greatest religiosity, then averaged. Respondents who indicated they had no religion were coded 0. Values: 0-1.
Intelligence	+	-	Cliquet and Balcaen 1983[a,b]	At W1 IHI respondents were given the Add Health Picture Verbal Test, a computerized, abridged version of the Peabody Picture Vocabulary Test-Revised. Scores were standardized by age. Values: 13-146.
Academic achievement	+	-	Luster and Small 1994[a]; Robbins, Kaplan and Martin 1985[b]; Yamaguchi and Kandell 1987[b]	GPA calculated based on school grades reported at W1 IHI. Included in school orientation index, part of adolescent risk status typology.

Positive attitudes towards school		-	Plotnick 1992[b]; Robbins, Kaplan and Martin 1985[b]	Endorsements of 3 belief statements at W1 IHI ("you feel close to people at your school," "you feel like you are part of your school," "you are happy to be at your school") on a 5-point scale (1=strongly agree; 5=strongly disagree) were reverse-coded. Included in school orientation index, part of adolescent risk status typology.
Educational expectations/aspirations	+	-	Hayes 1987[a]; Mensch and Kandel 1992[b]; Plotnick 1992[b]	Responses at W1 IHI to "How much do you want to go to college?" and "How likely is it that you will go to college" given on a 5-point scale (1=low; 5=high). Included in school orientation index, part of adolescent risk status typology. Responses indicating likelihood of living to 35, being killed by 21 and getting HIV/AIDS on a 5-point scale (0=almost no chance; 5=almost certain) were reverse-coded. Included in non-normative social behavior index, part of adolescent risk typology.
Problem behaviors		+	Mensch and Kandel 1992[b]; Yamaguchi and Kandell 1987[b]	Non-normative social behavior index includes W1 IHI responses indicating frequency of having problems at school, cutting school, drinking and performing acts of delinquency (e.g., fights, vandalism). Part of adolescent risk typology.
Self-Esteem	+	*	Bearman and Brückner 1999[b]; Chewning and VanKoningsveld 1998[a]; Plotnick 1992[b]	Composite of endorsements of 9 belief statements at W1 IHI (you have a lot of energy, are well-coordinated, have a lot of good qualities, are physically fit, have a lot to be proud of, like yourself just the way you are, feel like you are doing everything just about right, feel socially accepted, feel loved and wanted) on a 5-point scale (1=strongly agree; 5=strongly disagree) were reverse-coded, then averaged.
Popularity at school		*	Bearman and Brückner 1999[b]	Respondent considered socially isolated if fewer than 3 other respondents in school named her as friend in ISQ. Values: 0=no; 1=yes.
Sexual Characteristics				
Sexual career length	-	+	Zelnik, Kantner and Ford 1981[a,b]	Calculated in years for sexually experienced based on W2 IHI interview date and date of first sex.
Ever pregnant	+		Zelnik, Kantner and Ford 1981[a]	Report at W1 IHI of whether ever been pregnant, regardless of whether live birth resulted. Values: 0=no; 1=yes.
Number of partners		+	Bearman and Brückner 1999[b]	The number of sexual intercourse partners between waves as reported at W2 IHI. Partners who were current as of W1 IHI were excluded.
Birth control use		-	Mensch and Kandell 1992[b]	For each sexual intercourse partner reported at W2 IHI, respondents indicated whether contraception was used by either partner (0=no; 1=yes) and the consistency of use across all acts of intercourse (0=not always; 1=always).
Knowledge about birth control or pregnancy avoidance	+/-		Eisen, Zellman and McAlister 1985[a]; Levinson 1995[a]	Calculated as the score at W1 IHI on 9 true/false knowledge questions about fertility and pregnancy avoidance. The number of questions answered correctly was summed. A measure of unfounded certainty about pregnancy avoidance captures the combination of lack of knowledge and the failure to recognize it. Values: 0-9. For each question, respondents indicated how sure they were that their response was correct on a 4-point scale (1=not at all; 4=very). The number of incorrect answers for which the respondent chose "4" was counted. Values: 0-9.

Positive attitudes towards birth control	+		Herceg-Baron et al. 1990[a]; Philliber and Namerow 1990[a]	Agreements at W1 IHI with 7 characterizations of birth control ("too much of a hassle to use," "too expensive to buy," "takes too much planning," "too hard to get a boy to use with you," "interferes with sexual enjoyment," "using it is morally wrong," "if you used it your friends might think that you were looking for sex" on a 5-point scale (1=strongly agree; 5=strongly disagree) were reverse-coded, where characterization was negative, and averaged to indicate positive attitude towards contraception. Values: 1-5.

a = Citation supports relationship to contraceptive use
b = Citation supports relationship to pregnancy
+ = Positive relationship
- = Negative relationship
* = No relationship
W1 = Wave 1
W2 = Wave 2
IHI = In-Home Interview
ISQ = In-School Questionnaire
PQ = Parents' Questionnaire

Results

ORs and 95% CIs in the models of contraceptive consistency and pregnancy, where Mainstream group is the referent:

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
Anti	0.89 (0.35, 2.30)	0.54 (0.26, 1.10)	0.77 (0.32, 1.87)
Pro	0.72 (0.22, 2.38)	0.89 (0.36, 2.19)	0.48 (0.15, 1.50)
Ambivalent	0.42 (0.20, 0.89)	0.53 (0.31, 0.88)	0.76 (0.43, 1.33)

3. Alternative Classification 3

Group Criteria

Anti: strongly agreed with all 5 Qs.
Pro: strongly disagreed or disagreed with 3-5 Qs.
Ambivalent: neither agreed nor disagreed with 2-5 Qs.
Mainstream: all others.

15 people qualified as both Ambivalent and Pro; they were coded as Pro.

Results

ORs and 95% CIs in the models of contraceptive consistency and pregnancy, where Mainstream group is the referent:

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
Anti	0.89 (0.34, 2.29)	0.52 (0.25, 1.08)	0.82 (0.34, 1.95)
Pro	0.88 (0.37, 2.07)	0.76 (0.40, 1.47)	0.98 (0.49, 1.94)
Ambivalent	0.38 (0.18, 0.77)	0.48 (0.28, 0.84)	0.83 (0.46, 1.48)

4. Alternative Classification 4

Group Criteria

Anti: strongly agreed with all 5 Qs.
Pro: strongly disagreed or disagreed with 4-5 Qs or neither agreed nor disagreed with 3-5 Qs.
Mainstream: all others.

Results

ORs and 95% CIs in the models of contraceptive consistency and pregnancy, where Mainstream group is the referent:

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
Anti	0.96 (0.37, 2.47)	0.57 (0.28, 1.17)	0.80 (0.33, 1.93)
Pro	0.44 (0.17, 1.12)	0.66 (0.32, 1.37)	0.59 (0.24, 1.47)

Deleting contraceptive consistency measures from the pregnancy model did not significantly alter the ORs, indicating that attitudes are not mediated by contraception.

Summary Index

An index summarizing all 5 Qs with their mean value was used to characterize pregnancy attitudes on a continuum. Values range from 1 (most opposed to pregnancy) to 5 (least opposed).

5. Summary Index, Treated as a Continuous Variable

   ORs and 95% CIs in the models of contraceptive consistency and pregnancy:

INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
0.84 (0.60, 1.18)	0.90 (0.71, 1.13)	1.11 (0.84, 1.46)

   Deleting contraceptive consistency measures from the pregnancy model did not significantly alter the OR, indicating that attitudes are not mediated by contraception.

6. Summary Index, Treated as a Categorical Variable

   ORs and 95% CIs in the models of contraceptive consistency and pregnancy, where a score of 1 was the referent:

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
2	0.74 (0.38, 1.43)	1.23 (0.77, 1.99)	0.95 (0.48, 1.89)
3	0.44 (0.20, 1.00)	0.48 (0.27, 0.87)	1.21 (0.62, 2.37)
4	1.49 (0.47, 4.70)	1.86 (0.69, 4.98)	1.63 (0.58, 4.56)
5	1.52 (0.18, 13.01)	1.68 (0.27, 10.44)	0.20 (0.03, 1.59)

Single Questions

See main text for listing of questions by number. Responses ranged from 1 (indicating greatest opposition to pregnancy) to 5 (indicating least).

7. Question 5, Treated as a Continuous Variable

   ORs and 95% CIs in the models of contraceptive consistency and pregnancy:

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
Q5	1.23 (0.92, 1.66)	1.11 (0.86, 1.42)	1.12 (0.93, 1.35)

   Deleting contraceptive consistency measures from the pregnancy model did not significantly alter the OR, indicating that attitudes are not mediated by contraception.

8. Question 5, Treated as a Categorical Variable

   ORs and 95% CIs in the models of contraceptive consistency and pregnancy, where a score of 1 was the referent:

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
2	0.78 (0.33, 1.81)	0.83 (0.51, 1.37)	1.22 (0.65, 2.28)
3	1.29 (0.55, 3.05)	1.18 (0.54, 2.60)	1.19 (0.64, 2.21)
4	2.25 (0.85, 5.96)	1.61 (0.64, 4.04)	1.71 (0.84, 3.48)
5	4.79 (0.43, 52.70)	2.27 (0.31, 16.64)	1.04 (0.32, 3.36)

   Deleting contraceptive consistency measures from the pregnancy model did not significantly alter the ORs, indicating that attitudes are not mediated by contraception.

   ORs and 95% CIs in the models of contraceptive consistency and pregnancy, where codes of 5 – because they were few in number – were recoded to 4, and 1 is the referent:

Appendix II. Methodological Details

Alternative Measures of Attitudes Towards Pregnancy

To test whether the finding that attitudes towards pregnancy did not influence pregnancy occurrence was an artifact of the measure of pregnancy attitudes, the multivariate analyses of contraceptive consistency and pregnancy were repeated with nine alternative attitude measures. The odds ratios (ORs) yielded by these analyses, presented here, all indicate that attitudes towards pregnancy did not affect its occurrence. Some measures were also tested to see if their effect on pregnancy was mediated by contraceptive consistency.

All measures of pregnancy attitudes were derived from the same five[1] *Add Health* survey questions. Responses to these questions (hereafter, Qs) were given on a 5-point scale that included "strongly agree," "agree," "neither agree nor disagree," "disagree" and "strongly disagree."

Classification Schemes

1. Alternative Classification 1

   Group Criteria

   Anti: strongly agreed with all 5 Qs.
   Pro: strongly disagreed or disagreed with 4-5 Qs.
   Ambivalent: neither agreed nor disagreed with 3-5 Qs.
   Mainstream: all others.

   Results

   ORs and 95% CIs in the models of contraceptive consistency and pregnancy, where Mainstream group is the referent:

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
Anti	0.96 (0.37, 2.49)	0.57 (0.28, 1.18)	0.80 (0.33, 1.93)
Pro	0.80 (0.24, 2.67)	0.96 (0.40, 2.35)	0.50 (0.16, 1.55)
Ambivalent	0.20 (0.06, 0.70)	0.44 (0.14, 1.39)	0.74 (0.21, 2.57)

2. Alternative Classification 2

   Group Criteria

   Anti: strongly agreed with all 5 Qs.
   Pro: strongly disagreed or disagreed with 4-5 Qs.
   Ambivalent: neither agreed nor disagreed with 2-5 Qs.
   Mainstream: all others.

[1] It should be noted that the survey contained 3 additional questions that captured attitudes towards pregnancy: (1) If you got pregnant, you might marry the wrong person, just to get married; (2) If you got pregnant, you would have to quit school; and (3) It wouldn't be all that bad if you got pregnant at this time in your life. Preliminary analysis revealed that the vast majority of respondents did not believe that getting pregnant would result in either marrying the wrong person or having to quit school, and that these questions were weakly correlated with the others. The question characterizing pregnancy as not "all that bad" was also weakly correlated with the others, perhaps because it was worded in the negative. These 3 questions had no relationship with pregnancy risk and contraceptive use and were omitted from further analysis.

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
2	0.78 (0.33, 1.81)	0.83 (0.51, 1.37)	1.22 (0.65, 2.27)
3	1.28 (0.54, 3.03)	1.17 (0.53, 2.58)	1.19 (0.64, 2.21)
4	2.62 (0.93, 7.40)	1.72 (0.67, 4.46)	1.53 (0.81, 2.91)

ORs and 95% CIs in the pregnancy model without contraceptive consistency variables to test for mediation, where codes of 5 were recoded to 4:

	PREGNANCY
2	1.18 (0.72, 1.94)
3	1.29 (0.74, 2.25)
4	1.28 (0.62, 2.62)

9. Question 4, Treated as a Continuous Variable

ORs and 95% CIs in the models of contraceptive consistency and pregnancy:

	INCONSISTENT vs. NO USE	CONSISTENT vs. NO USE	PREGNANCY
Q4	0.86 (0.68, 1.09)	0.94 (0.78, 1.12)	0.98 (0.81, 1.18)

Potential Independent Variables Excluded From Analysis

The following independent variables were considered for inclusion in the analysis but were ultimately rejected:

1. Contraceptive Method Failure Rate

In addition to the consistency with which a contraceptive method is used, the average failure rate for that method is an important determinant of pregnancy risk. Nevertheless, method failure rate was not included in the analysis for two reasons. First, many of the girls did not respond to questions about method used. Among girls who did respond, method effectiveness was not associated with pregnancy attitudes. Second, it would have been beyond the scope of this paper to estimate the "failure rate" (i.e., expected pregnancy risk) for girls who did not use a method.

2. Asian Ethnicity

The number of respondents who indicated that they were of Asian ethnicity was so small that there were cell sizes of $n<5$ in cross-tabulations of pregnancy attitudes and contraceptive consistency and pregnancy. Consequently, these respondents were eventually combined with those of "other" race/ethnicity.

3. Contraceptive Self-Efficacy

Four questions pertaining to respondents' ability to promote contraceptive use under pressure in sexual situations (self-efficacy) were asked at Wave 1. However, they were excluded as predictors from the final analysis because they would have introduced bias related to sexual experience. Because non-virgins were able to answer the self-efficacy questions based on actual experience, it is likely that they would have had less measurement error. Since contraceptive self-efficacy is related to contraceptive consistency and pregnancy, the models of those outcomes would have been biased.

4. Maternal Attitudes Towards Sex

One Wave 1 question asked respondents to describe how upset their mothers would be if they had sex now. There was no analogous question about the father. The question could not be used to predict contraceptive consistency and pregnancy because it was missing for respondents who did not live with their mothers.