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Impact of AIDS Education on Adolescent Risky Sexual Behaviors

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IMPACT OF AIDS EDUCATION ON

ADOLESCENT RISKY SEXUAL BEHAVIORS

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Abstract

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Modern sex education recognizes that adolescents need formal guidance and information regarding sexuality and sexual behaviors. From an economic policy perspective, sex education is seen as an important tool in preventing costly social outcomes such as teen pregnancy and sexually transmitted diseases (STDs). Previous literature has shown that sex education was associated with earlier initiation into sexual activity but not necessarily with increased pregnancy rates (Marsiglio and Mott 1984). The evidence has also shown that the relationship may not be causal (Sabia 2006). In order to better understand these conclusions, this thesis uses data from the Center for Disease Control's Youth Risk Behavior Surveillance Study (YRBSS) to investigate how effective AIDS education policies are in influencing the more risky sexual behaviors in high school students. The results show that for some risky sexual behaviors, AIDS education significantly decreased the probability of their occurrence. AIDS education appears to have had more of an impact than the general or typical sex education programs evaluated in previous literature. However, future research is needed to determine if AIDS education is being provided in a way that is cost effective by making sure that the students who receive it are the ones who will benefit the most.

Table of Contents

CHAPTER 1: INTRODUCTION..... 1

CHAPTER 2: LITERATURE REVIEW..... 4
Economic Consequences of Risky Sexual Behavior..... 4
Impact of Sex Education on Risky Sexual Behavior..... 6
Content of Sex Education..... 12
State and School Policy..... 13
Impact of Influencing Factors..... 15

CHAPTER 3: EXPECTATIONS AND THEORY..... 20

CHAPTER 4: DATA AND MODEL..... 22
Data..... 22
Independent Variables..... 25
Dependent Variables..... 29

CHAPTER 5: EMPIRICAL STATEGY AND ANALYSIS..... 33
Survey Design..... 33
Logit Model..... 34
Descriptive Statistics..... 37

CHAPTER 6: RESULTS 57

CHAPTER 7: DISCUSSION..... 60
Having Sex Young..... 60
Having Many Sexual Partners..... 63
Having an STD..... 65
Being Tested For HIV..... 67
Birth Control: No Method..... 70
Condoms..... 71
Birth Control: Withdrawal..... 74
Pregnancy..... 75
Talking to Parents..... 77
Including Age..... 78
Limitations..... 80

CHAPTER 8: CONCLUSION..... 85

APPENDIX A..... 87

APPENDIX B..... 98

REFERENCES..... 99

List of Tables

Table 1: States and Years Used in Analysis..... 26

Table 2: Variable Definitions.....31

Table 3: Design Effects.....34

Table 4: Distribution of Data by Race, Gender, and Grade.....37

Table 5: Frequencies and Percentages for AIDS education and Risky Behaviors..... 38

Tables 6-14: Frequencies and Percentages for each Risky Behavior by Race, Gender, and Grade..... 40

Figures 1-8: Trends in AIDS Education and Risky Sexual Behaviors..... 52

Tables A1-A9: Marginal Effects.....88

Table B1: Correlation Matrix.....98

CHAPTER 1: INTRODUCTION

Modern sex education recognizes that adolescents need formal guidance and information regarding sexuality and sexual behaviors. Providing sex education in the school system is based on both moral and economic objectives. From an economic policy perspective, sex education is seen as an important tool in preventing costly social outcomes such as teen pregnancy and sexually transmitted diseases (STDs). Moral objectives include postponing sex until marriage and preventing teen pregnancy.

Previous literature has shown that sex education was associated with earlier initiation into sexual activity but not necessarily with increased pregnancy rates (Marsiglio and Mott 1984). Oettinger(1999) and Sabia (2006) also found a positive association between sex education and earlier initiation into sexual activity. Sabia goes on to suggest, however, that this relationship was not causal. He found that typical sex education was actually having little or no impact on the behavior of those students who received it.

This thesis expands on the above research in four ways. First, the dataset, adapted from the Center for Disease Control's Youth Risk Behavior Surveillance Study (YRBSS) for the years 1991 through 2007, was more recent than the data used in previous studies. Factors affecting adolescent decisions may change over time. Using more recent data will be more explanatory of the current trends in sexual decision-making.

Secondly, having data over a period of nine years in multiple states with many observations in each state makes the sample more comprehensive than some of the data used in previous research. The third advantage of this analysis is the interstate comparisons it makes possible. The creation and implementation of sex education polices

vary widely across states. Being able to control for the policy variations between states is important in determining the true impact of sex education. Not controlling for these state effects could lead to biased results.

Finally, much of the current focus of sex education is on the more specific topic of AIDS education. AIDS education may be taught in more schools and the content may also vary less than typical sex education, making the effects found in this thesis easier to generalize to the greater population. Also, further assessment of AIDS education is important in lieu of the rising pandemic of AIDS as a global killer.

The empirical findings of this study suggest that for some behaviors, having sex young, having many sexual partners, using no method of birth control, and having had or caused a pregnancy, AIDS education significantly decreased the probability of their occurrence. No significant effects were seen for females, while the effect of AIDS education on males was significant in about half of the risky sexual behaviors measured. Similarly, AIDS education was not a significant determinant for risky sexual behaviors in Hispanics or Latinos. For African Americans and Whites, AIDS education was significant for some risky sexual behaviors and insignificant for others. It also proved to be a more significant determinant for risky sexual behaviors in younger students (freshmen and sophomores) rather than older students (juniors or seniors).

Putting this information together, AIDS education appears to have had more of an impact than the general or typical sex education programs evaluated in previous literature. However, AIDS education did not seem to have a significant impact for the groups that were at the most risk. Also, if it is true that these most at risk groups would

benefit the most from AIDS education, these results may suggest that funding for AIDS education is not being distributed efficiently.

CHAPTER 2: LITERATURE REVIEW

Economic Consequences of Risky Sexual Behavior

Two of the most common consequences of risky sexual behavior are pregnancy and infection by an STD. Although teen pregnancy rates have fallen since 1992, they remain high compared to other developed countries. Belgium, Germany, and the Netherlands report rates of less than 20 pregnancies per 1000 women. Australia, Canada, and England and Wales report more moderate rates at around 45 pregnancies per 1000 women. (Singh and Darroch, 2000) In 1996, 97 pregnancies occurred per 1000 women aged 15-19 in the U.S. (Henshaw and Feivelson 2000)

Teen pregnancy is often seen as costly because it is associated with lower educational attainment, lower probability of marriage, increased probability of using public aid, increased probability of living below the poverty line, and lower labor force participation. Recent studies have shown, however, that the negative effects of teen motherhood are substantially lower than previously thought for both mothers and children (Bronars and Grogger 1994, Chevalier and Viitanen 2003, Hotz et al. 2005).

Using a variety of methods to control for other influencing factors, these studies found that the association between teenage motherhood and undesirable economic outcomes was not so much causal but, rather, could have been attributed to other factors. Many teen mothers were already disadvantaged before teen motherhood and the action of having a child did not significantly increase their disadvantage (Hotz et al. 2005).

However, different groups of women were impacted differentially by teen motherhood. Black mothers were 10.8 percentage points less likely to complete high school than white mothers. An unplanned child reduced family earnings by one-third in

black households, while it had no substantial effect for white households. The effects on poverty and welfare were also larger for black mothers (Bronars and Grogger 1994).

Over time these effects diminished, however, and no evidence was found that these negative effects were transmitted to children in either the form of reduced time spent on their education or financial input into their education (Bronars and Grogger 1994). Teen motherhood is still a problem but these recent studies have suggested that the solution to these undesirable outcomes goes deeper than just preventing teen pregnancy.

Along with teen pregnancy, economic costs associated with STDs are seen as a significant consequence of engaging in risky sexual behavior. In 2000, an estimated nine million cases of STDs occurred in persons aged 15-24 (Chesson et al. 2004). The estimated economic burden of STDs for all age groups was estimated to be between $9.3-$15.5 billion. The most costly were human immunodeficiency virus (HIV) and human papilloma virus (HPV). An estimated 40,000 new HIV infections occur in the U.S. each year. 70 percent of these new diagnoses were among minority races and ethnicities. (Hutchinson et al. 2006)

Besides direct medical costs, there were also productivity losses associated with HIV infection. In 2002, $36.7 billion was estimated as the cost of new HIV infections, including $6.7 billion in direct medical costs and $29.7 billion in productivity losses with 81 percent of those losses being mortality-related (Hutchinson et. al 2006). Because treatment costs were so great, even a small reduction in incidence would lead to a considerable reduction in treatment costs (Chesson et al. 2004).

From looking at these consequences, the economic costs associated with HIV/AIDS were much higher than those associated with teen pregnancy. Focusing on

the reduction of sexually transmitted diseases could be more cost-effective than focusing on pregnancy prevention. This thesis uses data that focuses on AIDS education rather than pregnancy prevention education in order to reflect this potential cost-effectiveness.

However, because for many there are still moral costs associated with teen pregnancy, society must ultimately make choices regarding whether it wants to focus resources on AIDS education or teen pregnancy prevention.

Impact of Sex Education on Risky Sexual Behavior

Many previous papers have evaluated the impact of sex education on an individual's decision to engage in certain sexual behaviors. Marsiglio and Mott (1986) studied the impact of sex education on sexual activity, contraceptive use, and premarital pregnancy. They found that 60 percent of females and 52 percent of males had taken a sex education course by age 19. They also found that a large proportion of teenagers had sex before taking a sex education course. This highlights the importance of taking the timing of sex education into account when trying to measure its impact on sexual behavior.

Using the National Longitudinal Survey of Work Experience and Youth for 1984 and multivariate logit models, Marsiglio and Mott tried to determine whether teenagers who take a sex education course are more or less likely to subsequently become sexually active, use contraceptives, or experience a premarital pregnancy. Their results showed that prior exposure to sex education was positively and significantly associated with initiation of sexual activity at ages 15 and 16. Sex education, however, had a smaller effect than almost every other significant variable included in the model. The largest

predictors in the model for the initiation of sexual activity were lower church attendance, less parental education, and being black.

To test for omitted variable bias, Marsiglio and Mott used three dummy variables to control for the timing of the course, education before initiating sex, education in the same year, and education after initiating sex. The first two variables were positively and significantly related with the onset of sex and the third variable was negatively and significantly related with onset. They concluded that if there were an unmeasured variable influencing the association, it would have showed an effect in the same direction, regardless of the timing of sex education. In this case, there was not an unmeasured influence.

Looking at the role of contraceptive use, Marsiglio and Mott found that teenagers who took a sex education course were significantly more likely to have used effective contraceptive methods. Furthermore, sex education was the only variable in this model that was a significant predictor of effective contraceptive use. Finally, their analysis showed that attending a sex education course did not increase a women's probability of becoming pregnant. These results suggest that, sex education, as it existed in 1984, was an important deterrent in preventing teen pregnancy and any associated economic outcomes. However, it was not an important deterrent in reducing the initiation of sexual activity, which may be associated with undesirable moral outcomes for many people.

Following Marsiglio and Mott, Oettinger (1999) used the National Longitudinal Survey of Youth to look at the relationship between prior enrollment in sex education and the initiation rate into sexual activity and pregnancy for U.S. teenagers in the 1970's. Similar to Marsiglio and Mott, Oettinger found that prior enrollment in sex education was

associated with a higher initiation rate into sexual activity for females and may have also been associated with a higher pregnancy rate for certain groups of females. Oettinger attributed other differences between the studies to his better control methods of previously unmeasured variables such as within family analysis of sibling pairs.

He began his analysis by developing a theoretical model to predict the impact of different types of sex education. These predictions showed how the magnitude of the impact of sex education could vary with certain individual characteristics.

In the model, teens make a discrete choice between sexual activity and abstinence at each age. Sex education can impact this choice only by providing new information to the teen. This information would change their perceived costs and benefits of sex. Oettinger identified three types of sex education: *risk altering, utility altering, and risk revealing*. The impact of each type of sex education depends on each individual's utility.

To test these predictions with the data, a hazard rate model is used to estimate the effect of sex education on the transition time into sexual activity and pregnancy, controlling for age, sex, and presence of an older sibling. Oettinger noted that the determinants of teen sexual behavior, however, might be affected by a correlation between enrollment in sex education and unobserved community and family influences. This correlation may affect which students are enrolled and the age that the enrollment in sex education occurs. Through within-family analysis of sibling pairs, a fixed-effect conditional logit model was estimated. This hazard or initiation rate could now depend on an unobserved heterogeneity term for sibling pairs that would control for family influences. His results showed that sex education had a positive and significant effect on the hazard rate into sexual activity for all groups of teen females. This positive effect was

much smaller for older teens and teens with older siblings. Alternatively, sex education had a positive effect on the pregnancy rate but it was of a much smaller magnitude and less statistically significant than the results for initiating of sexual activity.

Based on his theoretical model described above, the results suggested that the prominent type of sex education in the 1970's was *risk altering*. From this, Oettinger surmises that sex education did have some causal relationship with teen sexual behaviors through the provision of this risk altering information. This means that the information provided in sex education courses lead sexually active teens to alter the risks associated with getting pregnant most likely through the promotion of increased contraceptive use. *Utility altering* education would have changed the perceived utilities of teens regarding getting pregnant and *risk revealing* education would have provided additional information to teens who initially under or over estimated the risks associated with pregnancy. Looking back at Marsiglio and Mott's results, which showed that sex education was associated with higher initiation rates into sexual activity but increased contraception use; it is likely that sex education in the 1980's also fell under the *risk altering* category.

Oettinger pointed out some limitations with the study. The emergence of AIDS greatly altered the costs and benefits of sexual activity, which could have potentially altered the impact of sex education if it included information on this topic. Also, he only looked at transition ages into sexual activity and pregnancy rates. Including data about a wider set of sexual behaviors would have provided a more thorough understanding of the impact of sex education. This thesis will investigate some of these points.

Sabia (2006) analyzed whether offering sex education to teenagers affected certain measures of sexual behavior. He followed Oettinger's suggestion by including more comprehensive outcomes such as virginity status, contraceptive use, frequency of intercourse, likelihood of pregnancy, and probability of contracting an STD. Sabia (2006) differed from the studies done by Marsiglio and Mott (1984) and Oettinger(1999) in two main aspects. First, the data used, from the 1994-1995 National Longitudinal Study of Adolescent Health for 7^{th}-9^{th} graders, was more recent. It consisted of 4621 observations. Using more recent data from the early 1990's, may have made the results more comparable to current trends. Second, the type of sex education focused on was more general rather than specific in structure and content. Typical sex education programs are short-term and encourage abstinence but also permit the discussion of birth control methods. Atypical programs are more long-term, intensive, and promote a more rigid message such as abstinence only (Sabia 2006).

Like Oettinger, Sabia finds that sex education was associated with adverse outcomes such as higher initiation rates into sexual activity and pregnancy rates. Unlike in Oettinger, however, there was little evidence that this relationship was causal. Sabia suggested that these differences arose because he made additional assumptions about selection into the treatment of sex education. One assumption was that a cross-section estimator would only yield an unbiased estimate of the effect of the treatment on the treated if, conditional on observables, the mean outcome of untreated adolescents were equivalent to the mean outcome that treated teenagers would have had if they had not been treated. This assumption would be violated if there were non-random participation in sex education through either selection on observables or selection on unobservables. In

this case, the treated students would be those who received sex education and the untreated would be those students who did not receive sex education. Observables would include such personal characteristics as age, grade, race and gender. Unobservables would be school or individual characteristics that were not controlled for in the analysis.

Sabia compared results from cross-section estimators to propensity score matched, difference-in-difference, and instrumental variable estimators in order to understand the extent and direction of selection bias. There were two possible sources of bias; substitution bias and dropout bias. Substitution bias would arise if untreated students received information from an alternate source. Dropout bias would arise if certain parents were keeping their children out of sex education.

To control for selection on the observables, propensity score matching creates matched samples of treated and untreated teenagers based on the observable characteristics. In this way, mean differences between treated and untreated teenagers could be estimated. Additionally, Sabia used individual fixed-effects and instrumental variables with the difference in difference propensity score matching to control for the unobservables. His chosen instrument involved the size of school budgets.

Starting with the OLS results, Sabia showed that sex education was strongly associated with adverse health outcomes. After propensity score matching to control for selection on the observables, the results still showed a positive and significant association but it was much weaker than the association shown in the OLS results. Finally, using difference-in-difference propensity score matching to control for selection on observables and unobservables, the results showed little evidence that sex education was associated with changes in adolescent sexual behavior. The instrumental variable estimates also

found no association between sex education and adolescent sexual behavior. Again, Sabia maintained that his results differed from Marsiglio and Mott and Oettinger because he controlled for selection on both observables and unobservables. Sabia also noted that this lack of causal impact between sex education and youth risky sexual behavior does not mean that it was likely that no sex education programs impacted risky sexual behaviors. Rather, Sabia concluded that the typical program offered did not appear to have had any impact. Some sex education programs might have had an impact depending on their content and structure. It is difficult to conclude if the content of sex education programs in the 1990s was *risk altering* and similar to the content of the 1970s and 1980s without being able to identify a causal impact in the results.

Content of Sex Education

Recently, increased attention has been given to the specific curriculum used in sex education courses. Kirby (1984) did an extensive evaluation of sex education programs in schools. His analysis came to two primary conclusions. First, the majority of sex education programs did not affect teenage behavior in any substantial way, either to deter or promote sexual activity. Secondly, the few programs that did work, gave teenagers a very narrow and concise message. These findings suggested that teens responded to specific direction in sex education. Kirby (2002) analyzed characteristics of effective approaches to reduce unprotected sex and teen pregnancy. Again, he found that the most comprehensive sex and HIV programs had the most success. Effective curricula in these programs included (1) giving and reinforcing a clear message about sexual activity and condom/contraceptive use, (2) providing basic and accurate information about the risks of

sex, (3) involving activities on how to deal with the social pressure surrounding sexual behavior, (4) employing methods that involved all participants and allowed them to personalize the information they were receiving and (5) using methods and teaching materials that were appropriate for the age group and culture.

State and School Policy

The receipt of sex education policy in a certain state might be influenced by or related to other policies that are specific to that state. Previous studies have found that the way in which sex education policy was implemented can be influenced by other community factors and ideals (Sabia 2006). It is possible that there were also influential state-level factors. Even if programs were implemented at local or community levels, funding often came from the state level. Because all residents of a state were subject to the same policies, these policies or the forces behind these policies might also have been influencing sex education policy. This thesis will advance the analysis of influential factors by controlling for state level variables.

Kirby (2002) did a review of studies that look at how school and school programs (not specifically sex education programs) impacted adolescent sexual behavior. The studies reviewed showed that students' time in school was usually structured in a way that limited the amount of time that they could be alone. There was often increased interaction with adults, like teachers and coaches, who discouraged risk-taking behavior. Schools may have affected the selection of friends, which significantly influenced teens' behavior. An increase in the hope for the future through planning for higher education

may have helped teens to stay motivated to prevent pregnancy. School learned skills such as communication, self-esteem, competence and refusal skills also helped avoid sex.

Kirby evaluated various types of studies on school programs. These programs included school based health centers and school condom availability programs. Most studies of schools with school based health centers that provided contraception did not hasten or increase sexual activity. Also, the students' access to school health centers may have increased the likelihood of the use of contraception. School condom availability programs also did not increase the rate of sexual activity. Their impact on increased condom use was minimal, however. The reason behind this result may be because students didn't usually cite lack of access to condoms as their basis for not using them.

When looking at the prevalence of sex and HIV/STD education programs in school, Kirby (2002) reported that in 1999, 93 percent of schools offered sexuality or HIV education. However, most of these programs were less effective than they could have been. Most programs were short and not comprehensive.

Kirby and Scales's (1981) earlier analysis of state guidelines for sex education in public schools was done according to the support the guidelines gave for sex education both in general and based on specific features. The analysis on school support for specific features included how much autonomy local school districts had, whether or not guidelines were provided, required or suggested, how much parental involvement occurred, the flexibility in the interpretation of the guidelines, and whether there were any forbidden topics.

While most states had guidelines for schools to follow, they were only weakly encouraged. It was legal to teach most topics but not often required. Controversial topics

were often ignored. Many schools didn't allow questions about sexual beliefs, attitudes, and behaviors. Few states provided funding or concrete guidelines for special teacher training. Discussion was more commonly about physiology and venereal disease rather than decision- making skills regarding sex. This was contrary to the most effective type of content suggested by Kirby in his 1984 study.

Impact of Influencing Factors

Many factors have been found to be associated with risky sexual behavior in adolescents. Gender and ethnic differences have often been associated with differences in adolescent risky sexual behaviors. Upchurch et al. (1998) studied these differences and looked at the role they may have had in influencing risky behaviors. Using data from a population based, ethnically diverse sample of Los Angeles County youth, Upchurch et al. suggested that differences in male and female sexual activity could be due to biological maturation differences, differences in the opportunity costs of becoming pregnant, and variations in expectations about the appropriate age and circumstances to become sexually active. Different subgroups or ethnicities may also have different sexual norms, attitudes and values.

Upchurch et al. found that age at first intercourse does not vary much by ethnicity for females. Whites and Blacks reported younger median ages of first intercourse than Hispanics. After controlling for family and socioeconomic characteristics, Blacks still initiated sexual activity at a rate that was 3 to 5 times higher than other groups. Across genders and within each ethnic group, Hispanic males initiated sexual activity at twice the rate of Hispanic females.

Another study done by Luster and Small (1994) divided a sample of 2567 Midwestern teens, aged 13 to 19, into three groups: high-risk sexually active, low-risk sexually active, and abstinent. High-risk sexually active teens were those who had multiple partners and did not use contraception. They found that high- risk females, compared to the other two groups, had low grade point averages, contemplated suicide more often, consumed more alcohol, were less likely to talk to their parents, and were more likely to have been abused. For the males, the results were similar except that high-risk males were just as likely as low-risk males and abstinent males to talk with their parents. Sexual risk takers were exposed to multiple risks and generally had fewer incentives for avoiding risk. According to Luster and Small, more education and parental involvement was needed to alter the risk for this group. Not only could parental involvement have directly impacted risky sexual behaviors, but it could also have indirectly affected the behaviors by directly affecting school performance and alcohol use.

Rashad and Kaestner (2003) looked more closely at how drug and alcohol abuse were associated with certain risky sexual behaviors. Using the National Longitudinal Survey of Adolescent Health and the National Longitudinal Survey of Youth, Rashad and Kaestner found that substance abuse was positively associated with the initiation of sexual intercourse, having multiple sexual partners, and engaging in intercourse without contraception. However, he pointed out that causality between substance abuse and risky sexual behaviors was hard to establish as they both could depend on a common set of factors.

Shrier et al. (2001) studied the associations of depression, self-esteem, and substance use with sexual risk, using the National Longitudinal Survey of Adolescent Health for 7^{th}-12^{th} graders. For males, depressive symptoms were associated with an increase in risk of condom non-use at last sexual intercourse. The association between depressive symptoms and having been told they had an STD was impacted by alcohol and marijuana use. Depressive symptoms and substance use often occurred simultaneously. For girls, depressive symptoms were associated with having an STD but not with condom non-use. It is important to note that the degree of substance use and the degree of depressive symptoms were important in determining the impact on risky sexual behaviors.

Athletic participation has also been associated with changes in adolescent risky sexual behavior. Miller et al. (1998) examined the relationship between gender, athletic participation and risky sexual behavior. She specifically looked at how athletic participation affected girls and boys differently and how the effect of athletic participation on sexual behavior differed from those of extra-curricular activities.

Theory suggested that athletic participation could affect risky sexual behavior in a variety of ways. Sports could fill idle time between when students get done with school and when parents return home from work. Participants may have also formed attachments to other players and coaches, which could increase consequences of risky sexual behavior by damaging these opportunities and relationships. If this idea held true there should have been no difference in the effect of athletic participation on males and females and also no difference between the effects of athletic participation and participation in other extra-curricular activities.

Additional theory provided by Miller et al. showed that sports might have also affected the psychological identity of participants and their status among their peers. For boys, athletic participation engendered masculinity, making them more aggressive. For girls, the opposite was true. Having more masculine traits than their non-athletic counterparts, empowered girls, leading to less subservient behavior and less dependency on boys for attention and self-worth. The status athletic participation provided may have helped males to request or demand sexual favors while it gave girls the power to resist sexual advances. If this part of the theory held true, athletic participation would have increased risky sexual behavior for boys and decreased risky sexual behavior for females. Other non-athletic extra-curricular activities may have given status to participants but they would not have engendered the masculine traits. With this theory, the effects of sports and other extra-curricular activities would have likely not have been the same.

Miller et al.'s analysis used a sample of youth aged 13-16 from western New York and showed that athletic participation was associated with a decrease in risky sexual behaviors for girls and an increase for boys. Miller et al. also concluded that athletic participation had effects unique from other activities. The results from this study are in line with the second part of the theory postulated by Miller.

Another, perhaps, even more important factor associated with adolescent risky sexual behavior was the relationship between parents and adolescents. Meschke et al. (2000) studied how parenting was related to adolescent sexuality. Most previous work had been done on how communication between parents and adolescents affected sexual behavior. However, Meschke et al. suggested that there were also other parental processes that may have had the potential to have a more significant effect. These

included parental values, monitoring and parental control versus adolescent autonomy, and the level of warmth and support in the parent/adolescent relationship. Meschke et al.'s results show that females were more likely to receive information from their parents. Non-Hispanics were more likely to discuss AIDS and African Americans were more likely to discuss more sexual risk topics than Caucasians. These sexual risk topics included contraception and birth control use, how to protect yourself from getting STDs and HIV, condom use, resisting sexual pressure from partners and postponing or not having sex (Hutchinson and Cooney 1998).

Parental values might have been more influential if parents provided warmth and support to their adolescent. The effect of monitoring and control had a curvilinear effect. Too many rules and too little supervision could both result in increased adolescent risky sexual behaviors. Ultimately, Meschke et al. found that parents, as quality educators in conjunction with positive family relationships involving warmth and support were essential for healthy adolescent sexual development.

CHAPTER 3: EXPECTATIONS AND THEORY

I expect to identify the impacts of sex education policy on youth risky sexual behavior using the most recent data on U.S. adolescents. Learning the impact of sex education policy would be useful in determining how money and resources should be appropriated to these programs to have the greatest impact on the students' behavior.

Many of my expectations involve demographic characteristics and how they affect risky sexual behavior. As the literature showed, age at first sex and use of birth control differs across ethnic groups. Certain ethnic groups may choose to become sexually active earlier than others. Each group's beliefs and social systems may also affect their likelihood to use birth control. Gender will also impact use of birth control as becoming pregnant and getting a person pregnant have different perceived costs. Females are more likely to incur greater costs associated with a pregnancy than males. Age might impact birth control, number of partners and number of pregnancies. Older adolescents may have different or more information about birth control that causes them to use it more or less consistently.

I have chosen to control for those personal characteristics that are included in the dataset and, based on the literature, may impact risky sexual behavior. If an individual is a good student they might perceive higher costs of pregnancy. Pregnancy might pose greater opportunity costs if students see themselves as moving on to higher education. Students with poorer grades might not have as much to lose from a pregnancy. Women who are at the highest risk of dropping out are also the ones who have the lowest perceived cost of unwed teen motherhood (Levine and Painter 2003).

Better grades could also be a better measure of communication skills. Research has shown that better ability to communicate with one's partner may be associated with an increase in use of birth control and the age at first sexual intercourse. (Ryan et al. 2007) The same may be true for an individual's relationship with their parents.

School characteristics may also be important in predicting risky sexual behavior. Kirby's 2002 study of the impact of schools and school programs on sexual behavior reported that students who attend a school where violence and vandalism occurred may be more likely to become pregnant than students at non-violent schools. To control for this, questions about violence, vandalism, and selling of drugs on school property have been selected.

I expect that students being taught about AIDS and HIV in school will be more likely to use birth control and condoms and also will report fewer partners and possibly fewer pregnancies.

CHAPTER 4: DATA AND MODEL

Data

To estimate risky behaviors I used data from the Center for Disease Control's Youth Risk Behavior Surveillance Study (YRBSS) for 1991 through 2007. YRBSS was created to monitor priority health risk behaviors that contribute substantially to the leading causes of death, disability and social problems in adolescents. It is a biennial survey given to mostly public school students in grades 9-12. The questionnaire is reviewed every two years and updated to better address current national health priorities.

Eligible samples from participating states were weighted to adjust for non-response and the distribution of students by age, race, and gender. A two-stage cluster sample design was used. In the first stage, schools were selected with probability proportional to school enrollment size. In the second stage, classes of a required subject or period were selected with equal probability. All students in the sampled classes were assigned a base-weight, which was equal to the number of students represented by each sampled student. Two adjustments were then made to the weights.

The first adjustment controlled for schools that were sampled but didn't participate in the survey. These schools were grouped into three categories: large, medium, and small. Within each category, the weights of the non-participating schools were distributed to participating schools. The second adjustment accounted for students who were enrolled in the sampled classes but failed to complete the questionnaire. The weights of those students were given to responding students in the same class or in classes of a similar grade in the same school. The final step in the weighting process adjusted weighted sample totals for variables that could have affected the response to a

survey question, including age, race, and gender (State and Local . . . Procedures 2007). These criteria were put in place to ensure that the data collected was representative of students in grades 9-12 in each survey jurisdiction. (YRBSS Methodology 2008)

To account for the survey design, the data included variables for strata and primary sampling units. The sampling strata consisted of single certainty schools or pairs of non-certainty schools. The schools were sorted prior to sampling based on enrollment in target grades. Very large schools were sampled with certainty. Non-certainty schools were sampled using systematic sampling with probability proportional to enrollment. Within certainty schools, each class was a primary sampling unit. When there was only one primary sampling unit sampled within a school, the certainty school was combined into strata with schools of similar size or locale. Non-certainty schools were grouped into pairs according to the order they were sampled. Each pair was a stratum for non-certainty schools. Each school within this pair was a primary sampling unit.

State and local education agencies or state health departments were in charge of administering the survey. In collecting the data, local procedures were followed regarding parental permission. Responses that conflicted in logic with other responses were set to missing in the data.

The YRBSS data were organized by state and year. Each question was numerically coded for the corresponding answer. Within each state, each year of data had a codebook for that year's questions. While the study was conducted every two years from 1991 to 2007, not every state had data available for every year.

Along with a question about whether or not the individual had ever been taught about HIV and AIDS in school, six youth sexual behavior questions from the survey were

used in this data set: (1) the age at first intercourse, (2) the number of sexual partners in their lifetime, (3) whether drugs or alcohol were used before last sex, (4) whether a condom was used, (5) what type of birth control was used, (6) and number of pregnancies. Twenty-six states that included these questions on their questionnaire made the data available to be studied.

Furthermore, the questionnaire used in those 26 states varyingly included questions about drug use, violence and drugs on school property, discussion of sex with parents, how the student considered their performance in school, participation in sports, depression and whether they had been tested for HIV or told they have an STD.

In addition states may have unobservable characteristics specific to that state which influence adolescent sexual behavior. States have specific policies and other non-economic factors that could be associated with how risky adolescents in that state are. I controlled for individual state effects using dummy variables.

Age at first intercourse, number of sexual partners in their lifetime, condom and birth control use, having a pregnancy, being told you have an STD, and getting tested for HIV were all considered variables that measure risky sexual behavior. Having been told you have an STD and getting tested for HIV were more indirect measures as they indicated the consequences a student has suffered from having engaged in risky sexual behavior. All other questions used represented the variables that explain these risky behaviors with AIDS education being the main variable of interest.

The methodology used here is a demand side analysis of the factors that contribute to the risky or non-risky sexual behaviors for high school students. In this analysis, the choices for risky sexual behaviors were a function of AIDS education

policy, demographic factors, school characteristics, personal characteristics and state characteristics.

The basic model described above is specified as

$$Risky\ Sexual\ Behavior = \alpha_1 R + \alpha_2 D + \alpha_5 F + \alpha_3 S + \alpha_4 P$$

Where R represents the AIDS education policy, D is a vector of demographics, F a vector of individual state level fixed effects, S a vector of school characteristics, and P a vector of personal characteristics.

Independent Variables

The main policy variable of interest was AIDS education policy. Did AIDS education programs influence the sexual choices made by adolescents? If AIDS education programs were successful it would be expected that the incidence of risky sexual behaviors would have decreased for the students who participated. The dummy variable, *AIDS_edu,* was equal to 1 if a student had been taught about AIDS in school and equal to 0 if the student had not been taught about AIDS in school.

Demographic factors included gender, race or ethnicity, grade in school, state the student lived in, and the year the survey was taken. The variables for race/ethnicity include White, African American, Hispanic/Latino, American Indian/Alaska Native, Asian/Native Hawaiian/Pacific Islander, and Other. The states were numbered 1-26. Table 1 shows which states and years were included.

Table 1.

States and Years Used in the Analysis

#	State	Years	#	State	Year
1	AK	1995, 2003, 2007	15	ME	1995, 1997, 2001, 2003, 2005, 2007
2	AL	2003, 2005	16	MS	1993, 1995, 1997, 1999, 2001, 2003, 2007
3	AR	1995, 1997, 1999, 2001, 2005, 2007	17	MT	1993, 1995, 1997, 1999, 2001, 2003,2005, 2007
4	AZ	2005, 2007	18	NC	2003
5	CO	2005	19	ND	2001, 2003, 2005
6	CT	1997, 2005, 2007	20	NE	1991, 1993, 2003, 2005
7	DE	1999, 2001, 2003, 2005, 2007	21	NJ	2001, 2005
8	IA	1997, 2005, 2007	22	NY	1997, 1999, 2003, 2005, 2007
9	ID	2001, 2003, 2005,2007	23	SC	1991, 1993, 1995, 1997, 1999, 2005, 2007
10	IL	1993, 1995, 2007	24	TN	1993, 2003, 2005, 2007
11	IN	2003, 2005, 2007	25	WI	1993, 1997, 1999, 2001, 2003, 2005
12	KS	2005, 2007	26	WV	1993, 1995, 1997, 1999, 2003, 2005, 2007
13	KY	1997, 2003, 2004, 2007			
14	MA	1993, 1995, 1997, 1999, 2001,2003,2005, 2007			

Grade in school was divided into freshmen/sophomores and junior/seniors. I initially chose to use the grade variable because students generally are enrolled in sex education based on their grade in school rather than their age. Also, I grouped the two younger grades together and the two older grades together because I wanted to see simply see how younger students differed from older students.

After doing the analysis, however, I became aware of the fact that grouping the two grades together may have not been the best choice, because the differences between the grades may be great and when they are grouped these differences cannot be controlled. Also, using age instead of grade may have been more appropriate. A fifteen-year-old sophomore is probably at least physically different than a seventeen-year-old sophomore. Their emotional maturity may also differ. Including the age variable would have introduced more control mechanisms into the model, making the results stronger.

To check the variability between using the age variable and using the grade variable, I ran some separate regressions including age. These results are included after the main results.

School characteristics that may have been associated with an individual's sexual choice included such things as violence and drug use on school property. *Thrt_sch* identified those students who had ever been threatened or injured on school property at least once. *Drug_sch* identified those students who had ever been offered drugs on school property. Students who had experienced any combination of these situations could have been those who were going to a riskier school. Also, a school identifier that could be used to group students together by school was included in the questionnaire. It wasn't possible to know anything about the school but it was possible to know which groups of students went to which school. Knowing this and then

looking at which groups identified themselves into a riskier school through the above variables could be used as an important control mechanism.

Influencing personal characteristics included current drug and alcohol use, using drugs before sex, the type of student the individual was, whether they were involved in sports, and if they ever felt depressed. Also, a separate analysis was run with the variable for parental relationship. This is discussed after the initial results. Dummy variables have been created for the analysis involving these characteristics.

For drug use, four dummy variables were included *risk_cig*, *risk_mar*, *risk_coc* and *risk_alc*. *Risk_cig* identified those students who had smoked cigarettes daily for the last 30 days. This measure was chosen because it identified current, daily cigarette users. Smoking cigarettes daily was more risky than intermittent cigarette use. *Risk_mar* identified those students who had used marijuana at least once in the last 30 days. Again, this identified current users but also included more than daily users of the drug. I am making the assumption that marijuana's status as an illegal drug made it potentially more risky than cigarette use. *Risk_coc* also included those students who had used cocaine at least once in the past 30 days. The reasoning for this measure was the same as for marijuana. All use of cocaine was potentially risky. The impact of current drug use might also be easier to measure than any drug use throughout the student's lifetime. For alcohol use, I chose the measure that I thought best measured binge drinking. *Risk_alc* identified those students who have had 5 or more drinks of alcohol in a row at least once in the past 30 days. Again, this identified the more risky behavior and current use.

Certain variables involving sex could also be predictors of risky sexual behaviors. Having used drugs and alcohol before sex could lead to risky choices. *Use_drugbf* identified those

students who used drugs or alcohol before the last time they had sex. It was classified under personal characteristics because it was a choice each sexually active student had made.

For type of student, there was the dummy variable *good_grade* which identified those students who received mostly A's in school. *Avg_grade* identified those students who received mostly A's, B's, or C's. The type of grades a student received could have been a factor that put them more or less at risk of engaging in risky sexual behavior

Sad_stop was the dummy that identified whether or not the student had ever felt so sad or hopeless that they stopped doing normal activities. This was used as a measure of depression. Feeling depressed could have led to certain sexual choices. *No_sports* identified those students who had not been involved in sports in or outside of school. Being involved in some type of extra-curricular activity could have been indicative of what sexual choices a student made.

Parent_talk was the dummy used to identify if a student had ever talked with a parent or guardian about sex. Having ever talked with a parent could have been a potential measure of the student's relationship with their parents. Parental relationships could have an impact on the sexual choices many students made. It could also be considered an alternate measure of sex education as opposed to school education. Also, talking with a parent was a different kind of personal characteristic, as it wasn't necessarily a choice that a student had control over. Parents may have been the ones making the choice not to talk.

Dependent Variables

The various types of risky sexual behaviors were the dependent variables. These included the age at first intercourse, number of sexual partners in their lifetime, whether they've been told they have an STD, whether they've ever been tested for HIV, what type of birth control was used

whether a condom was used, and whether they've had or caused a pregnancy. As previously mentioned, being told they have an STD and ever having been tested for HIV were special measures of risky sexual behavior because they were more indicative of the consequences of risky choices rather than the choices themselves.

Sex_young identified those students that were younger than 15 years of age the first time they had sexual intercourse. *Many_lifpar* was the dummy for the student having had more than 3 sexual partners in their lifetime. Using no method of birth control and using the withdrawal method were what I chose as the two riskiest forms of birth control. *Told_STD* was the dummy for the student having been told they have an STD by a healthcare professional and *HIV_test* was the dummy for ever having gotten an HIV test. *No_bc* identified those students who chose not to use any method of birth control the last time they had sexual intercourse. *Withdrawal* identified those students who used the withdrawal method of birth control the last time they had sexual intercourse. *Use_con* identified those students who used condoms the last time they had sexual intercourse. Using condoms suggests they know of or are at least thinking about the risks involved in sex. *Had_preg* identified those students who have been pregnant or gotten someone pregnant.

For each of these dependent variables, a different regression was run. Most of the independent variables were included in each regression unless the nature of the data prevented certain variables from being included. Table 2, below, shows a list of these variable definitions.

Table 2. Variable Definitions	
Independent Variables	**Definition**
AIDS_edu	Student having ever been taught about HIV/AIDS in school 0=Never taught in school, 1=Taught in school
fem	Student gender 0=Male 1= Female
ag1-ag7	Student age 0=Not (12 or younger, 13, 14, 15, 16, 17, 18 and over) 1= Age (12 or younger, 13, 14, 15, 16, 17, 18 and over)
jun_sen	Student in grade 11 or 12 0=Not in grade 11 or 12, 1=In grade 11 or 12
fre_sop	Student in grade 9 or 10 0=Not in grade 9 or 10, 1=In grade 9 or 10
his_lat	Student of Hispanic or Latino Ethnicity 0=Not Hispanic or Latino, 1=Hispanic or Latino
af_am	Student of African American Race 0=Not African American, 1=African American
white	Student of White Race 0=Not White, 1=White
thrt_sch	Student having ever been threatened or injured on school property 0=Not threatened or injured, 1=threatened or injured
drug_sch	Student having ever been offered drugs on school property 0=Not been offered drugs, 1=Been offered drugs
risk_alc	Student had five or more drinks of alcohol at least once in the past 30 days 0=Did not exhibit risky alcohol behavior 1=Exhibited risky alcohol behavior
risk_mar	Student used marijuana at least once in the past 30 days 0=Did not exhibit risky marijuana use 1=Did exhibit risky marijuana use
risk_cig	Student smoked cigarettes daily for the past 30 days 0=Did not exhibit risky cigarette use, 1=Exhibited risky cigarette use
risk_coc	Student used cocaine at least once in the past 30 days 0=Did not exhibit risky cocaine behavior 1=Did exhibit risky cocaine behavior
use_drugbf	Student used drugs or alcohol before last sexual intercourse 0=Did not use before last intercourse 1=Used before last intercourse
good_grade	Student received mostly A's in school 0=Did not receive good grades, 1= Received good grades
avg_grade	Student received mostly A's, B's, or C's in school 0=Did not receive average grades, 1=Received average grades
no_sports	Student having ever participated in sports in or outside of school 0=Did participate in sports, 1=Did not participate
sad_stop	Student having felt so sad or hopeless that they stopped doing normal activities 0=Did not stop normal activities, 1=Did stop normal activities
parent_talk	Student having ever talked with parent or guardian about sex 0=Did not talk, 1=Did talk
Dependent Variables	**Definition**
sex_young	Students younger than 15 years of age at first sexual intercourse 0=Did not have sex young, 1=Did have sex young
many_lifpar	Students had 3 or more sexual partners in their lifetime

	0=Did not have many partners, 1=Did have many partners
told_STD	Student having been told they have an STD by a healthcare professional 0=Have not been told, 1=Have been told
HIV_test	Student having received an HIV test 0=Did not receive test, 1=Did receive test
no_bc	Student did not use any method of birth control at last sexual intercourse 0=Did use a method, 1=Did not use a method
withdrawal	Student used withdrawal method at last sexual intercourse 0=Did not use withdrawal, 1=Used withdrawal
use_con	Student used condoms at last sexual intercourse 0=Did not use condoms, 1=Used condoms
had_preg	Student has been pregnant or gotten someone pregnant 0=Not been pregnant, 1=Been pregnant

CHAPTER 5: EMPIRICAL STRATEGY AND ANALYSIS

Survey Design

Using Stata, this model was adjusted for survey design. Accounting for survey design was important in calculating unbiased variance estimators. As the following discussion of design effects shows, ignoring the sampling design would have likely resulted in standard errors that were underestimated, showing significance where none existed (Introduction to Survey Analysis 2009).

Computing design effects showed how controlling for sampling design affected the results. The design effect (DEFF) is defined as the ratio of the sampling variance of the statistic under the actual sampling design divided by the variance that would be expected for a simple random sample of the same size. When the DEFF is greater than one, the t- statistic accounting for survey design will be smaller than the t-statistic under a simple random sample. When the DEFF is less than one, the opposite is true. If the survey design has no effect the DEFF will be equal to one. If the DEFF is greater than one and the survey data are treated as a simple random sample, inflated significance levels of regression coefficients will be shown (Dowd and Duggan, 2001).

Table 3, below, shows the design effects for the AIDS education variable in each of the specifications of the model. Only the DEFF for *HIV_test* was close to one. The other design effects were all greater than one indicating that if the data were treated as a simple random sample, there would have been inflated levels of significance in all the specifications but likely less so in the *HIV_test* specification.

Table 3. Design Effects for AIDS_edu	
Model	*DEFF*
sex_young	2.07125
many_lifpar	3.05054
told_STD	1.74597
HIV_test	1.05954
no_bc	2.15021
use_con	1.93499
withdrawal	2.09325
had_preg	2.04848

Logit Model

The logistic curve is useful for modeling binary dependent variables coded 0 and 1 because its shape comes close to the 0 and 1 points on the y-axis. When the dependent variable is represented by a dummy variable, its predicted value can be interpreted as the probability that the requirement is present for that individual given the values of the explanatory variable for that individual (Kennedy 2003).

Estimation is done through maximum likelihood. The logit function provides the probability that the event will occur and one minus this function provides the probability that it will not occur. The likelihood is the product of logit functions for all observations for which the event occurred multiplied by the product of one-minus-the-logit-functions for all observations for which the event did not occur (Kennedy 2003). The likelihood function is shown below.

$$L = \prod_i \frac{e^{X_i B}}{1 + e^{X_i B}} \prod_j \frac{1}{1 + e^{X_j B}}$$

Because the functions are non-linear, the marginal effect of an explanatory variable on the dependent variable of interest is not given by the explanatory variable's coefficient, but rather it is a function of the coefficient. Marginal effects are different for each observation.

Marginal effects can be computed by three different methods: (1) by calculating the marginal effect of the average values of the explanatory variables (2) by calculating the individual marginal effects for all the observations in the sample and then finding the average of these effects (3) by reporting marginal effects for typical observations to give some sense how the marginal effect varies across observations. (Kennedy 2003)

For dummy variables, marginal effects are discrete changes in the quantities of interest as the dummy variable changes from 0 to 1. Margeff, the Stata command used for calculating the mean of all the marginal effects, does not work after the survey command. The marginal effects were estimated at the means. Because of the large sample size the differences between mean of the marginal effects and average marginal effects may not have been that great.

Logistic regression does not assume linearity, does not require normally distributed variables and does not assume homoskedactisity. It does, however, require that observations be independent and that the independent variables be linearly related to the logit of the dependent variable. Satisfying these assumptions involves checking for specification errors, goodness of fit and multicollinearity. Without satisfying these assumptions there may be problems with biased coefficients or biased standard errors.

While -*linktest*- is not a valid command when survey data has been declared, it can be recreated by first running the logit model without declaring survey data, predicting *yhat*, and then generating *yhat2*. If *yhat2* is significant then it would be the same as if the –*linktest*- command showed significance, meaning that there is a specification error, likely from an omitted variable.

In seven of the eight estimations, *yhat2* showed significance. Only the model with the dependent variable *told_STD* had an insignificant *yhat2* variable. I was unable to discover an interaction term that, when added to the model, would result in an insignificant *yhat2* variable.

For the seven estimations that showed *yhat2* significance, this may suggest that there are important variables missing from the model that I was not able to control for with the data.

With cluster sampling there is often a positive covariance between elements of the same cluster. Intraclass correlation, which measures homogeneity within clusters, is positive for cluster sample designs like the data used for this analysis. Traditional maximum likelihood methods cannot be used. Pseudomaximum likelihood may be used. A goodness of fit test called the F-adjusted mean residual test has been created to deal with this type of situation.

After the logistic regression model is fitted, the residuals are obtained. The goodness-of-fit test is based on the residuals since large departures between observed and predicted values, taking variability into account, would seemingly indicate lack of fit. Observations are sorted into deciles based on their estimated probabilities, and each decile of risk includes approximately equivalent total sampling weights. This goodness of fit test is implemented in Stata by the command svylogitgof. (Archer, Lemeshow 2006). However, with the data I am using this test is not compatible and I was unable to find other tests that work when specifying survey data.

While the standard errors do not suggest there was a problem with multicollinearity, I ran a correlation matrix for the independent variables to confirm. The matrix shows a high correlation between *fre_sop* and *jun_sen.* This is to be expected, as these dummy variables are two different levels of the same predictor. In the regression, only one of these variables is included to avoid this multicollinearity problem. None of the other correlation coefficients had a high value (> 0.75) between independent variables. The correlation matrix is shown in Appendix B.

Descriptive Statistics

Tables 4 shows the frequencies and percentages of the distribution of the data by gender, race, and grade. Also, frequency and percentage tables are given for having received AIDS education, and for each of the risky behaviors.

Table 4.
Distribution of Data by Selected Variables

Variable	Frequency	Percent
Race or Ethnicity		
Hispanic/Latino	19,024	7.17
African American	41,637	15.69
White	175,742	66.23
Other	28,957	10.91
Total	265,360	100.00
Gender		
Male	130,503	48.86
Female	136,577	51.14
Total	267,080	100.00
Grade		
Freshmen/ Sophomore	148,928	55.86
Junior/Senior	116,843	43.82
Other	849	0.32
Total	266,620	100.00

The dataset is over 60 percent white. The Other category contains those who identify as American Indian, Alaska Native, Asian, Native Hawaiian, Pacific Islander and any other combination of race or ethnicity. While the results tables will only report estimates for the Hispanic/Latino, African American, and White groups, dummies for the other groups have been included in the analysis.

The dataset contains slightly more females, 51.14 percent, than males, 48.86 percent. The total frequency number differs between the categories because of missing values in each of the variables.

There are more freshmen and sophomores in the dataset, 55.86 percent, than juniors or seniors, 43.82 percent. The Other category identifies those students who are ungraded or in another grade. The estimation results will show only the freshmen/sophomore and junior/senior groups but a dummy for ungraded was included.

Table 5.
Frequencies and Percentages for AIDS Education and Risky Behavior Dependent Variables

Variable	Frequency	Percent
AIDS_edu	236,484	88.17
sex_young	63,093	25.43
many_lifpar	39,290	16.27
told_STD	2,492	4.26
HIV_test	2,944	11.88
no_bc	16,441	6.87
use_con	75,283	30.98
withdrawal	11,860	4.96
had_preg	10,140	5.82

Table 5 above gives frequencies and percentages for having ever received AIDS education and having exhibited each of the risky sexual behaviors. 88.17 percent of the students in the sample had been taught about AIDS and HIV in school. 25.43 percent of students had sexual intercourse for the first time before the age of 15. 16.27 percent of students had three or more sexual partners in their lifetime. Less than five percent of the students, who were asked, reported having ever been told they have an STD by a healthcare professional. 11.88 percent of the students who were asked reported having been tested for HIV. 6.87 percent of students

reported using no method of birth control at last sexual intercourse. Almost 31 percent of students used condoms at their last sexual intercourse. Approximately five percent of students used the withdrawal method at last sexual intercourse. Finally, close to six percent of the students who were asked had ever had or caused a pregnancy. Having sex young appears to be the risky behavior in which students were most commonly engaged while having had or caused a pregnancy is the least common.

Table 6.
Percentages and Frequencies of Individuals Who Have been taught about AIDS in school by each grade, Separated by Gender and Race
AIDS_edu=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/ Sophomore	4030	81.15	9352	84.52	42139	88.58
Junior/Senior	3363	84.77	6967	84.75	34171	89.71
Total Males	7496	82.66	16476	84.53	76641	89.05
Females						
Freshmen/ Sophomore	4510	83.06	10834	87.97	44339	89.88
Junior/Senior	3833	87.49	8376	87.73	36121	91.15
Total Females	8404	84.97	19327	87.83	80744	90.43
Total Males and Females	15943	83.80	35909	86.24	157705	89.74

Table 7.
Percentages and Frequencies of Individuals Who Had Sex Before the Age of 15 by Each Grade, Separated by Gender and Race or Ethnicity
sex_young=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/Sophomore	1854	42.45	6186	64.59	10689	24.45
Junior/Senior	1255	35.04	4145	56.56	6509	18.34
Total Males	3160	39.20	10419	61.05	17318	21.77
Females						
Freshmen/Sophomore	1266	25.22	4426	39.05	9446	20.23
Junior /Senior	709	17.25	2564	28.66	5844	15.41
Total Females	1997	21.72	7030	34.46	15354	18.08
Total Males and Females	5178	29.92	17504	46.58	32767	19.88

Table 8.
Percentages and Frequencies of Individuals Who Have Had Three or More Sexual Partners in Their Lifetime by Each Grade, Separated by Gender and Race or Ethnicity
many_lifpar=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/Sophomore	911	21.54	3782	40.02	4454	10.49
Junior/Senior	1004	28.93	3869	53.62	5953	17.35
Total Males	1965	25.15	7721	45.89	10488	13.60
Females						
Freshmen/Sophomore	349	7.14	1715	15.21	3256	7.17
Junior /Senior	529	13.26	2357	26.51	5968	16.24
Total Females	898	10.04	4106	20.24	9257	11.23
Total Males and Females	2877	17.11	11862	31.87	19806	12.39

Table 9.
Percentages and Frequencies of Individuals Who Have Ever Been Told They Have an STD by a Healthcare Professional by Each Grade, Separated by Gender and Race or Ethnicity
told_STD=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/Sophomore	44	5.16	137	5.79	356	3.29
Junior/Senior	37	6.25	166	8.56	321	3.41
Total Males	82	5.59	307	7.06	687	3.38
Females						
Freshmen/Sophomore	39	4.14	147	5.79	304	2.73
Junior /Senior	34	5.33	194	9.18	331	3.50
Total Females	76	4.76	348	7.43	640	3.10
Total Males and Females	160	5.21	661	7.28	1330	3.24

Table 10.
Percentages and Frequencies of Individuals Who Have Ever been Tested for HIV by Each Grade, Separated by Gender and Race or Ethnicity
HIV_test=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/Sophomore	67	12.38	141	16.13	313	7.27
Junior/Senior	61	19.24	131	20.25	324	9.04
Total Males	130	14.96	274	17.87	642	8.11
Females						
Freshmen/Sophomore	86	14.43	168	17.85	307	6.83
Junior /Senior	92	26.67	219	30.46	496	12.92
Total Females	183	19.26	391	23.29	805	9.64
Total Males and Females	316	17.32	667	20.73	1453	8.92

Table 11.
Percentages and Frequencies of Individuals Who Used No Method of Birth Control at Last Sexual Intercourse by Each Grade, Separated by Gender and Race or Ethnicity
no_bc=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/Sophomore	336	8.09	983	10.57	2062	4.89
Junior/Senior	354	10.39	802	11.35	1959	5.78
Total Males	706	9.20	1806	10.93	4050	5.30
Females						
Freshmen/Sophomore	411	8.46	1084	9.71	2189	4.85
Junior /Senior	498	12.57	1118	12.75	2431	6.67
Total Females	917	10.32	2220	11.07	4638	5.66
Total Males and Females	1628	9.80	4038	11.01	8720	5.50

Table 12.
Percentages and Frequencies of Individuals Who Used Condoms at Last Sexual Intercourse by Each Grade, Separated by Gender and Race or Ethnicity
use_con=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/Sophomore	1703	40.60	5203	55.32	10820	25.24
Junior/Senior	1564	45.56	4124	57.69	12434	35.94
Total Males	3317	42.87	9405	56.27	23347	30.00
Females						
Freshmen/Sophomore	1141	23.39	4148	36.60	9203	20.03
Junior /Senior	1210	30.43	3822	43.06	11402	30.68
Total Females	2369	26.56	8010	39.40	20670	24.78
Total Males and Females	5707	34.16	17464	47.01	44123	27.31

Table 13
Percentages and Frequencies of Individuals Who Used the Withdrawal Method at Last Sexual Intercourse by Each Grade, Separated by Gender and Race or Ethnicity
withdrawal=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/Sophomore	122	2.94	426	4.58	1327	3.15
Junior/Senior	194	5.69	552	7.81	2132	6.29
Total Males	318	4.14	984	5.96	3476	4.55
Females						
Freshmen/Sophomore	132	2.72	520	4.66	1758	3.90
Junior /Senior	232	5.86	676	7.71	2510	6.89
Total Females	368	4.14	1200	5.98	4284	5.23
Total Males and Females	687	4.14	2190	5.97	7779	4.90

Table 14.
Percentages and Frequencies of Individuals Who Have Ever Been Pregnant or Gotten Someone Pregnant by Each Grade, Separated by Gender and Race or Ethnicity
had_preg=1

Grade	Frequency Hispanic	Percent of Total Hispanic Males/Females	Frequency African American	Percent of Total African American Males/Females	Frequency White	Percent of Total White Males/Females
Males						
Freshman/Sophomore	137	5.03	576	7.27	909	2.91
Junior/Senior	212	9.38	825	14.20	1037	4.06
Total Males	366	7.23	1417	10.22	1966	3.45
Females						
Freshmen/Sophomore	161	5.29	805	8.69	982	2.99
Junior /Senior	282	11.84	1218	17.79	1632	6.19
Total Females	449	8.22	2041	12.83	2625	4.43
Total Males and Females	820	7.76	3467	11.61	4606	3.95

Table 6 shows the frequencies and percentages by each race, gender, and grade for those students who received AIDS education. For the males, the group with the highest percentage of receiving AIDS education was White juniors and seniors at 89.71 percent. The lowest percentage was the Hispanic/Latino freshman and sophomores at 81.15 percent.

For the females, the highest percentage was again White juniors and seniors at 91.15 percent and the lowest percentage was Hispanic/Latino freshman and sophomores at 83.06 percent. Whites (89.74 percent), followed by African Americans (86.24 percent) and Hispanic/Latinos (83.80 percent), received AIDS education in the highest percentages. The differences between race/ethnicity, gender and grade appeared to be relatively small.

These estimates were much higher than those reported in previous literature. Marsiglio and Mott (1986) reported that 60 percent of females and 52 percent of males reported receiving a sex education course by the age of 19. These differences could be due to increased enrollment and participation in sex education or AIDS education courses could be more widespread than general sex education courses.

Looking at Table 7 for the variable for having sex young, African American males reported the highest percentage at 61.05 percent, with the highest overall being freshmen and sophomores within this group at 64.59 percent. Hispanic and White males reported much lower percentages at 39.20 percent and 21.77 percent, respectively.

African American females reported the highest female percentage at 34.46 percent, with freshmen and sophomores in this group as the highest overall at 39.05 percent, making the combined highest percentage 46.58 percent for both males and females. 21.72 percent of Hispanic females and 18.08 percent of White females reported having sex before the age of 15. There were large differences between both race and gender, and smaller differences between grades.

In Table 8, for males, African Americans reported the highest percentage of having three or more sexual partners at 45.89 percent, with juniors and seniors having the highest overall percentage of 53.62 percent. 25.15 percent of Hispanic males and 13.60 percent of White males reported three or more sexual partners.

For females, African Americans had the highest percentage of having three or more sexual partners at 20.24 percent with the highest being within the junior and senior group at 26.51 percent. 10.04 percent of Hispanic females and 11.23 percent of White females reported having had three or more sexual partners in their lifetime. The highest percentage for both genders was 31.87 percent for African Americans. These percentages were lower than those shown for the individuals having sex young. The differences between race, gender and grade were similar to those for having sex young. Whites and Hispanics reported similar percentages for both risky behaviors with a large gap between their reported percentages and those of African Americans. The main difference was that junior and seniors showed higher percentages of

having many sexual partners while the freshmen and sophomores showed the highest percentage of having had sex young.

Table 9 shows, at 7.06 percent, African American males had the highest percentage of ever having been told they have an STD by a healthcare professional. Within this group, juniors and seniors had the highest percentage at 8.56 percent. White males had the lowest percentage at 3.38 percent and Hispanics were in the middle at 5.59 percent.

African American females showed the highest percentage of having been told they have an STD at 7.43 percent, with juniors and seniors as the highest within the group at 9.18 percent. Hispanics were again in the middle at 4.76 percent and Whites were the lowest percentage at 3.10 percent. Over both genders, African Americans were the highest at 7.28 percent, followed by Hispanics at 5.21 percent, and Whites at 3.24 percent.

Like the percentages for many sexual partners, juniors and seniors showed the highest percentages. Variation between gender, race, and grade was very small. Only 4.26 percent of the total sample had ever been told they have an STD.

Table 10 shows that African American males reported the highest percentage of ever having been tested for HIV at 17.87 percent, followed by Hispanics at 14.96 percent and Whites at 8.11 percent. Of the African American males, juniors and seniors were getting tested in the highest percentage at 20.25 percent.

African American females were also getting tested in the highest percentage. 23.29 percent of African American females reported getting an HIV test, followed by Hispanics at 19.26 percent and Whites at 9.64 percent. Older females were also getting tested in the highest percentages. The highest overall was for junior and senior African Americans at 30.46 percent. For both genders, the highest percentage was for African Americans at 20.73 percent. The same

group that was being told they have an STD in the highest percentage was also getting tested for HIV in the highest percentage. The percentages for getting tested for HIV were higher than the percentages for being told they have an STD, as everyone who was tested wouldn't necessarily get a positive result.

In Table 11, the highest percentage for using no method of birth control at last sexual intercourse for the male groups was African Americans at 10.93 percent with juniors and seniors at 11.35 percent. 9.20 percent of Hispanic males and 5.30 percent of White males reported using no method of birth control at last sexual intercourse.

For females, 11.07 percent of African Americans reported using no method of birth control with juniors and seniors as the highest at 12.75 percent. 10.32 percent of Hispanic females and 5.66 percent of White females reported using no method. For both genders, African Americans had the highest percentage of using no method of birth control at 11.01 percent. There was little difference between genders. The largest differences occurred across races followed by the differences across grades.

In Table 12, 56.27 percent of African American males used condoms at last sexual intercourse compared to 42.87 percent for Hispanics and 30.00 percent for Whites. Within the African American group, juniors and seniors had the highest percentage of use at 57.69 percent.

For the females, 39.40 percent of African Americans reported using condoms with 43.06 percent of juniors and seniors reporting use within that group. 26.56 percent of Hispanic females and 24.78 percent of White females reported use. Overall, across genders, the highest percentage of use was from the African Americans at 47.01 percent. Large differences between all three categories were present.

Looking at Table 13, 5.96 of African American males used the withdrawal method of birth control at last sexual intercourse. Juniors and seniors were the grade level within this group that reported the highest percentage of use at 7.81 percent. 4.14 percent of Hispanic males and 4.55 percent of White males also used the withdrawal method at last sexual intercourse.

Females had very similar percentages. 5.98 percent of African American females used the withdrawal method with juniors and seniors at 7.71 percent. 4.14 of Hispanics and 5.23 percent of Whites also used the withdrawal method. Overall, percentages were 5.97 for African Americans, 4.14 percent for Hispanics and 4.90 for Whites. The largest differences were between grades, followed by the difference between races. Little difference occurred between genders. For this method, Whites actually had a higher percentage of use than Hispanics which was opposite from the other two methods. Also, withdrawal was the method that is used the least, followed by no method, with condoms as the most used method analyzed.

In Table 14, 10.22 percent of African American males reported having caused at least one pregnancy, with juniors and seniors at the highest with 14.20 percent. This was compared to 7.23 percent of Hispanic males and 3.45 percent of White males.

The statistics were similar for females. 12.83 percent of African American females reported having had at least one pregnancy with junior and seniors again the highest at 17.79 percent. Hispanics were at 8.22 percent and Whites at 4.43 percent. For both genders, 11.61 percent of African Americans reported having had or caused a pregnancy. The largest differences were between grades. There was also a substantial difference between races and a smaller difference between genders. Comparing the pregnancy statistics with the birth control method statistics, the having had or caused a pregnancy statistics seem the most similar to the statistics

for the use of no method of birth control and the withdrawal method. This would occur, as these are the two methods that most frequently result in pregnancy.

Figures 1-8 show the trends across time for each risky behavior. Figure 1 shows that the percent of students who have ever been taught about AIDS in school appears to be decreasing across the years, after an initial increase from 1991 to 1997. The sharp increase from 1991 to 1993 could be due to a large increase (almost 20,000) in the number of students participating in the survey. It would be hard to determine if this also meant an increase in the number of students who received AIDS education. All three races or ethnicities seem to follow the same trend except at two points. From 1999 to 2001, the percent of African American students who received AIDS education appears to increase while for the other groups it continues to decrease. Also, from 1999 to 2003 the percent of Hispanic/Latinos who received AIDS education decreases much more sharply than the other groups. It should be noted that almost 2000 more Hispanic/Latino students answered the question in 2003 than answered the question in 1999, however. The number of African Americans who answered the question in 1999 was also twice as much as the number who answered the question in 2001. Ultimately, the number of students taught about AIDS in school seems to be decreasing through the years.

Looking at Figure 2, the change in the percent of students who had sex before the age of 15 also appears to decrease through the years. I would attribute the initial decrease to the large increase in sample size of students who participated in the survey. As mentioned previously, from 1991 to 1993, almost 20,000 more students answered this question. The observed increase for Hispanic/Latinos from 1995 to 1997 could be attributed to a change in sample size. In 1995, 1795 Hispanic/Latinos answered the question. In 1997, there were only 734. Overall, the trend

appears to be a steady decrease in all groups across years for the percent of students who had sex before the age of 15.

Figure 3 shows the change in the percent of students who have had three or more sexual partners. There is a steady decrease in the number of students who have had three or more sexual partners with the decrease leveling off in later years. Again, the sharp decrease from 1991 to 1993 and the sharp increase for Hispanic/Latinos from 1995 to 1997 are probably due to a large change in sample size.

Figures 4 and 5 may be more difficult to interpret because their corresponding question was asked in fewer years and to fewer students overall than the other questions. In Figure 4, the percent of students who have been told they have an STD appears to initially, sharply decrease and then increase again in 2001, before sharply decreasing again in 2003. Also, the question was not asked in 1995 or 1997. Because this question was asked to fewer students, the frequency of students who responded yes was very small, just a couple hundred. This small sample size may not very accurately represent the trend. In Figure 5, the percent of students who have been tested for HIV appears to steadily increase across all groups. The initial decrease is most likely due to a large change in sample size from 1999 to 2001. From 2001 to 2007, the sample size remains fairly steady lending strength to the trend that the percent of students being tested for HIV is increasing.

In Figure 6, the percent of students who used no method of birth control at last sexual intercourse steadily decreases for all groups except Hispanic/Latinos for which it shows increases and decreases. The main increase is likely due to a large change in sample size.

Figure 7, the percent of students who used a condom at last sexual intercourse stays mostly the same across the years with little increase or decrease. Figure 8, the percent of students

who used the withdrawal method at last sexual intercourse shows a steady decline across years. In Figure 9, the percent of students who have ever had or caused a pregnancy also shows a steady decrease. The sharp changes seen are due to changes in sample size. Besides the large increase in sample size from 1991 to 1993, there was also a large decrease in sample size from 2003 to 2005 and continuing in 2007. This is the most likely the most explanation for the sharp peaks seen on the graph.

In summary, the percent of students taught about AIDS, the percent of students who have had sex before the age of 15, the percent of students who have had three or more sexual partners, the percent of studies who used no method of birth control, the percent of students who used the withdrawal method, and the percent of students who have had or caused a pregnancy all appear to be decreasing over the years. The percent of students who have been tested for HIV seems to be increasing while the percent of students who have used a condom at last sexual intercourse has remained relatively the same. The results for the percent of students having been told they have an STD may be too ambiguous to make much of a conclusion but from the graph it appears there is a decline.

Figure 1: Percent of Students Who Received AIDS Education

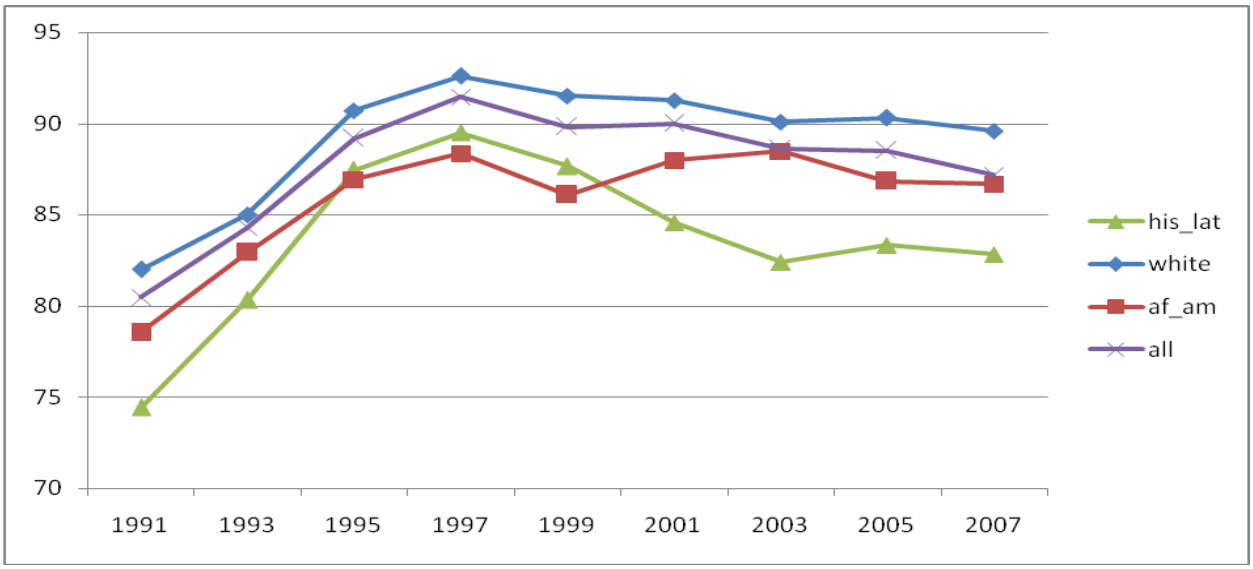


Figure 2: Percent of Students Who Had Sex Before the Age of 15

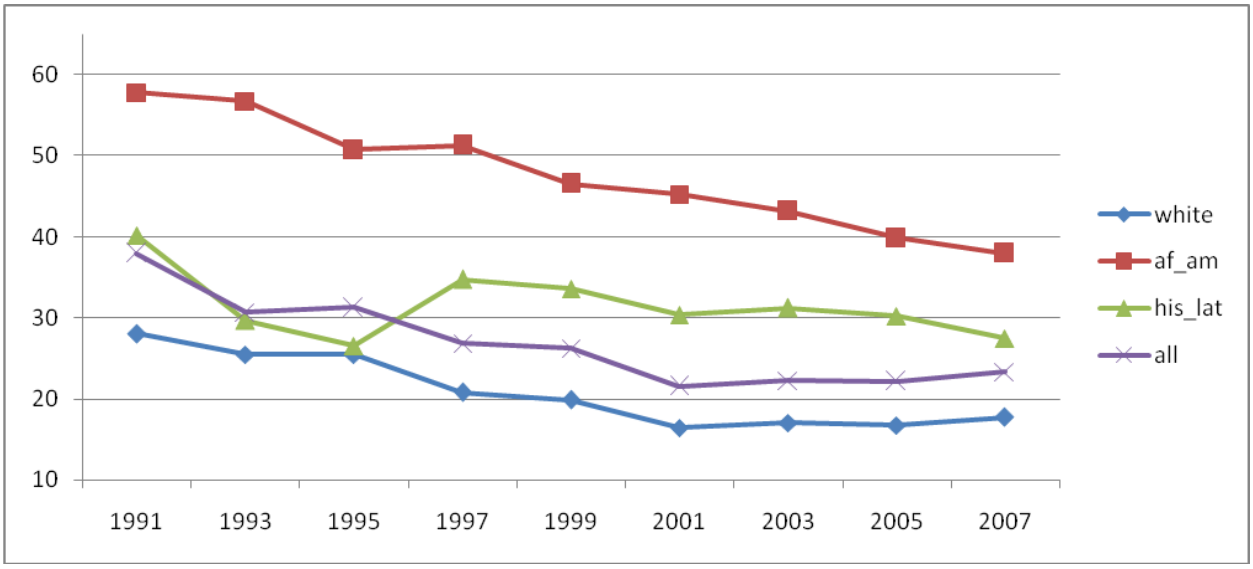


Figure 3: Percent of Students Who Have Had Three or More Sexual Partners

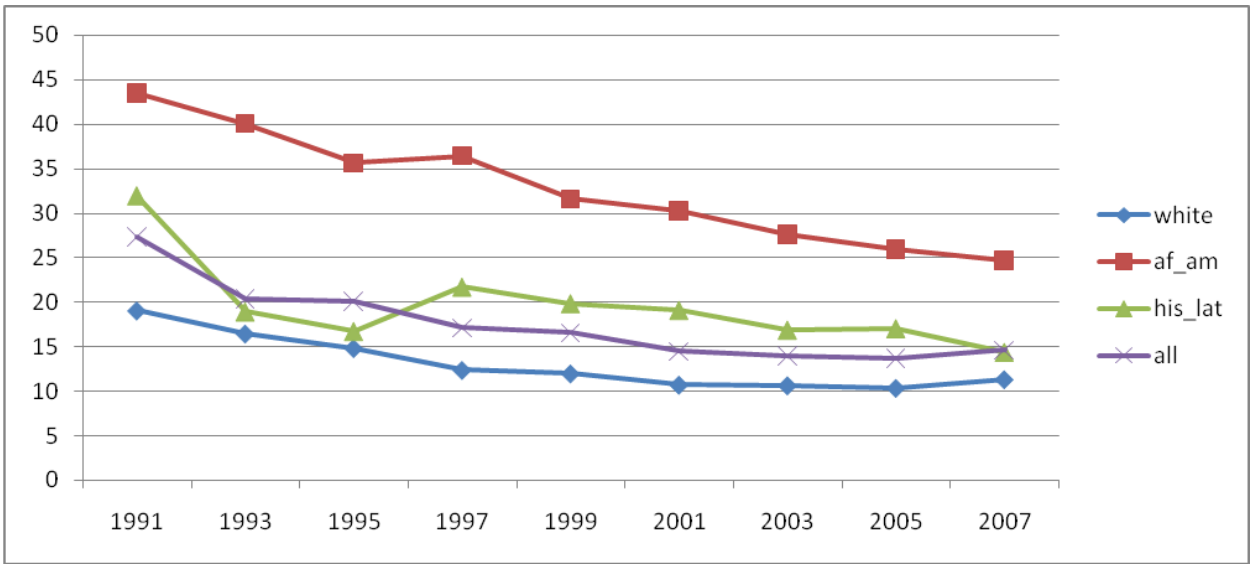


Figure 4: Percent of Students Who Have Been Told They Have an STD

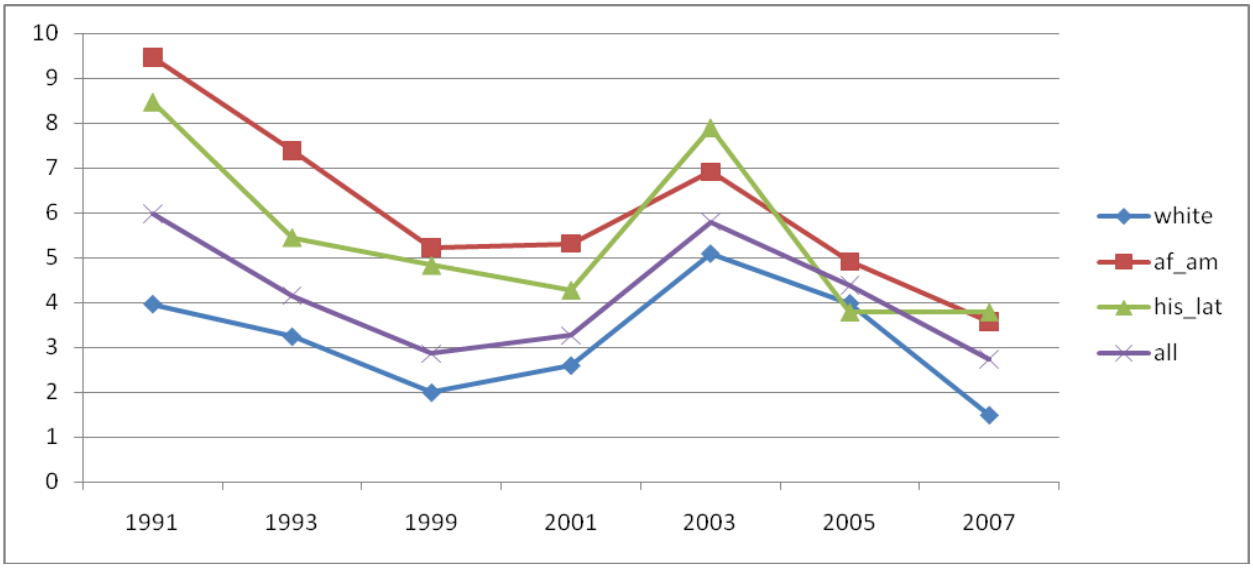


Figure 5: Percent of Students Who Have Had an HIV Test

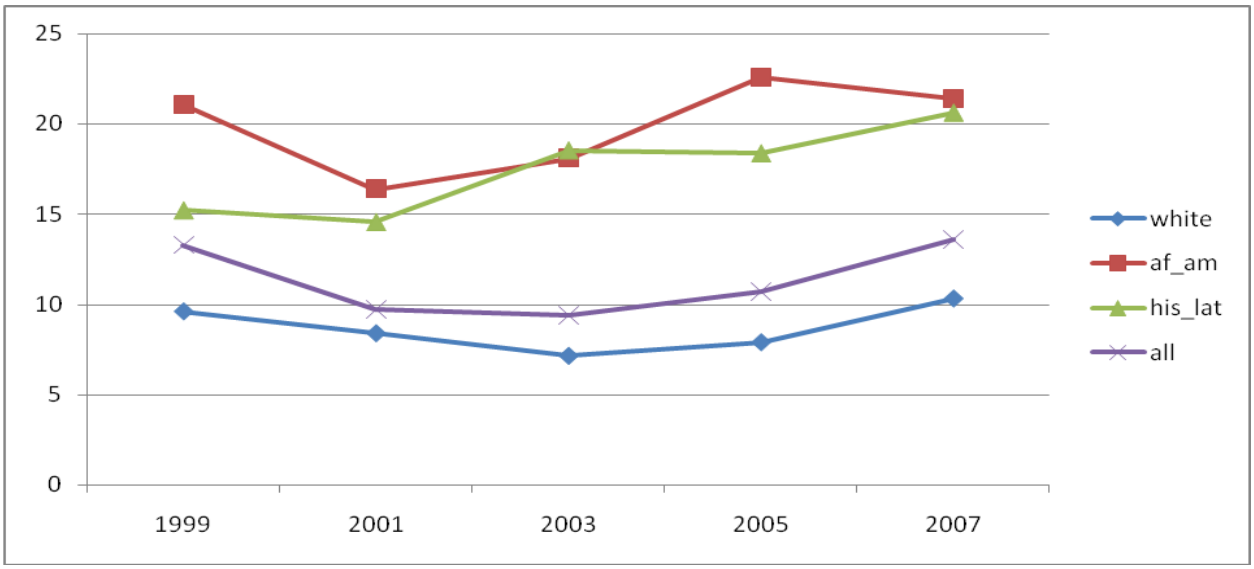


Figure 6: Percent of Students Who Used No Method of Birth Control At Last Sexual Intercourse

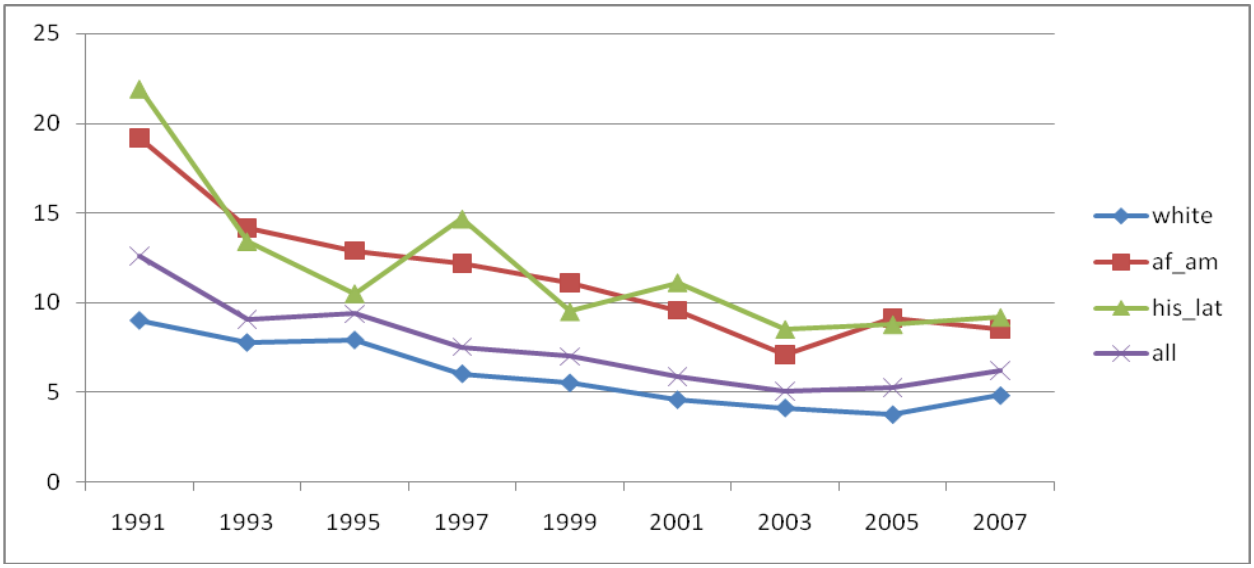


Figure 7: Percent of Students Who Used a Condom At Last Sexual Intercourse

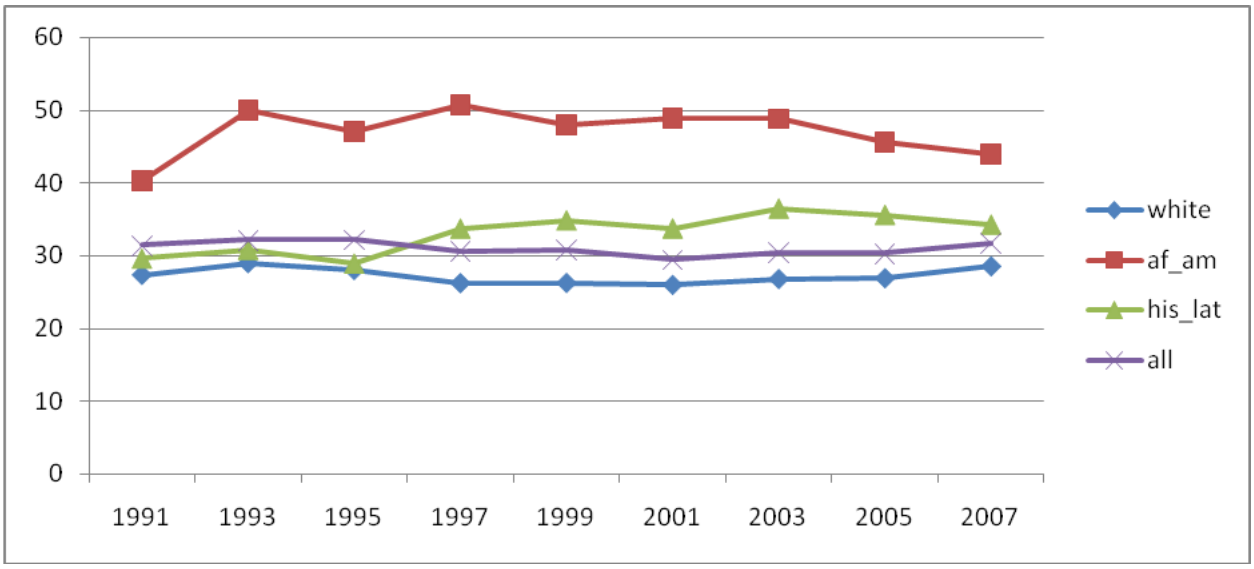


Figure 8: Percent of Students Who Used the Withdrawal Method At Last Sexual Intercourse

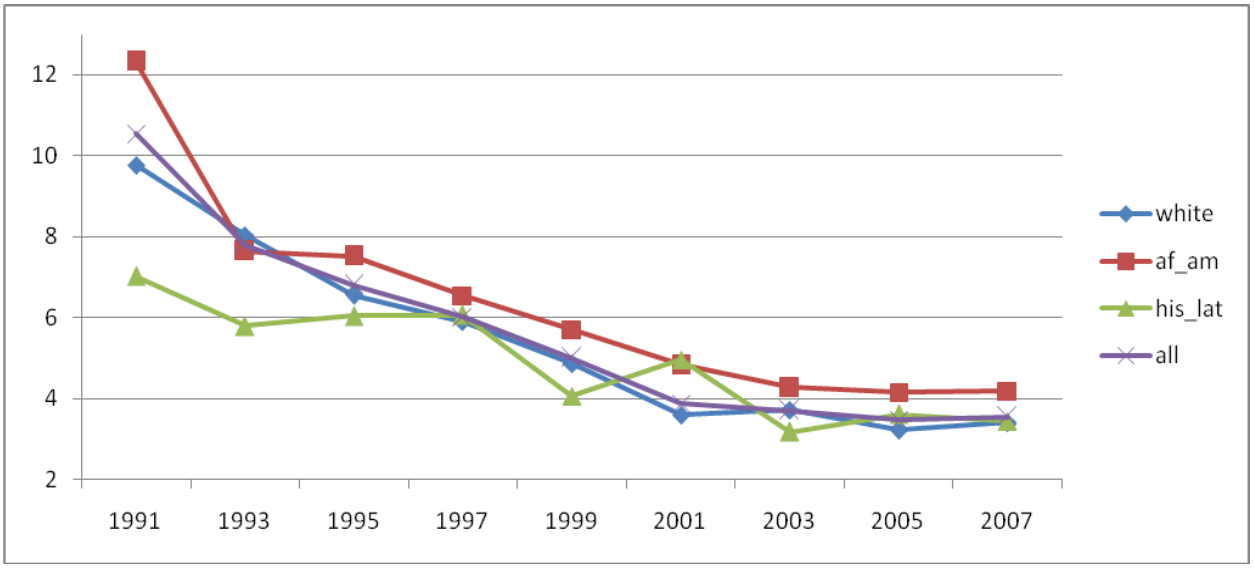
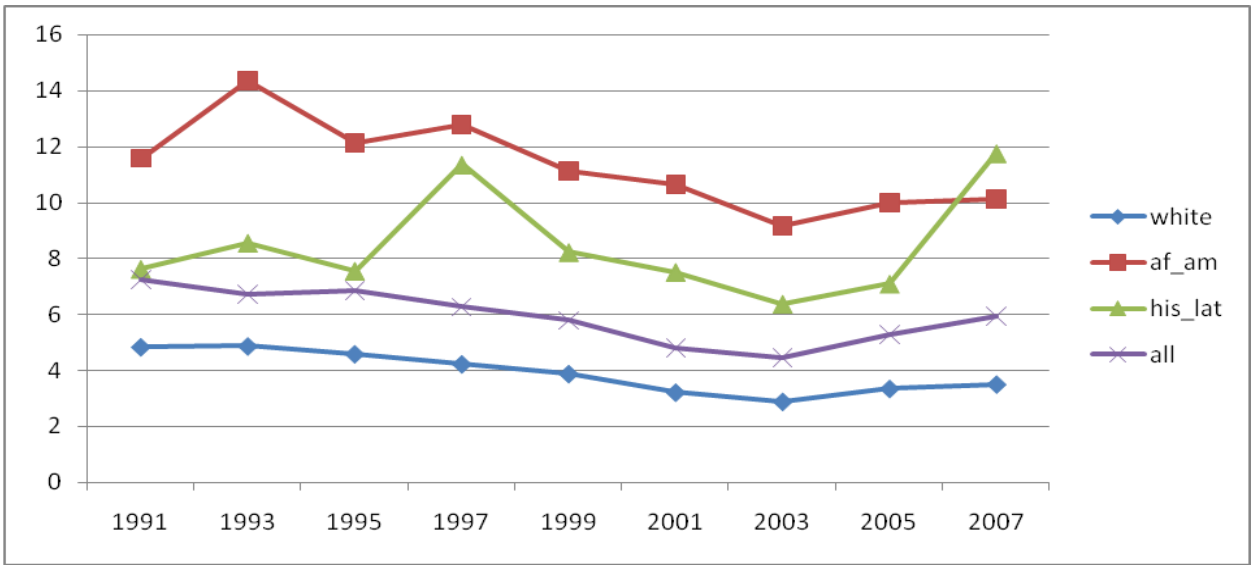


Figure 9: Percent of Students Who Have Had or Caused a Pregnancy



CHAPTER 6: RESULTS

Of the eight measures of risky sexual behavior used, four reported significant results for the AIDS education variable using the full sample. These four are *sex_young*, *many_lifpar*, *no_bc*, and *had_preg.* Comparing these results to the other determinants in the model, gender and grade were significant in all eight measures of the model. For the race variables, both *his_lat* and *af_am*, relative to being white, were significant in all measures except for *withdrawal.* The variables used to differentiate between risky and non-risky schools, *thrt_sch* and *drug_sch*, were significant in five and three measures of the model, respectively. The variables for risky alcohol and risky marijuana use were significant in seven measures, while using drugs before last sexual intercourse was significant in all eight measures of the model. Getting average grades was significant in five out of seven measures and getting good grades was significant in six out of seven measures. Not participating in sports was significant in four out of seven measures. Being so sad that it affected normal activities was significant in five out of six measures. Risky cigarette behavior was significant in seven out of seven measures while risky cocaine use was significant in six out of seven measures of the model.

The data includes information used to group students together by school. No information was given about each school but it was possible to determine which students went to the same school. I attempted to create a model that included a dummy variable for each school. There were 2743 separate schools in the 26 states. Too much memory was required to perform this task and Stata was not able to create dummy variables for each school.

Because some questions were not included in all states or years, I started out with a regression that would keep as many of the observations as possible. Then I added additional variables in steps and looked at the results. In considering both how many states were retained in

the analysis and how many other significant predictors were in the models, I chose to estimate the measures of the model specified below.

The same independent variables were included in all the estimations of the model except for *told_STD* and *HIV_test.* The variable *sad_stop* was removed from the *told_STD* analysis because including it drops the number of qualified states (i.e. the states that included the *told_STD* question and all the independent variable questions) to one. Having a one state analysis would not extrapolate very well to national or even regional result interpretations. I was more interested in including many observations from a variety of states. Leaving out this variable pushes the number of states in the analysis up to ten.

The *HIV_test* estimation does not include the independent variables *risk_cig, risk_coc, good_grade, avg_grade, no_sports,* or *sad_stop* because the question asking about having an *HIV_test* was included in so few states and years that including these variables makes it impossible to run the regression.

(a)
(sex_young, many_lifpar, no_bc, withdrawal, use_con, had_preg)

Risky Sexual Behavior = AIDS_edu + sta1-sta26 + yr91-yr07 + fem + jun_sen + fre_sop + ai_an +as_nh_pi + af_am + his_lat + thrt_sch + drug_sch + risk_alc + risk_mar + use_drugbf + risk_cig + risk_coc + good_grade + avg_grade + no_sports + sad_stop

(b)
told_STD = AIDS_edu + sta1-sta26 + yr91-yr07 + fem + jun_sen + fre_sop + ai_an as_nh_pi + af_am + white + his_lat + thrt_sch + drug_sch + risk_alc + risk_mar + use_drugbf + risk_cig+ risk_coc+ avg_grade+ good_grade+ no_sports

(c)
HIV_test = AIDS_edu + sta1-sta26 + yr91-yr07 + fem + jun_sen + fre_sop + ai_an as_nh_pi + af_am + white + his_lat + thrt_sch + drug_sch + risk_alc + risk_mar + use_drugbf

Certain variables were dropped because of perfect collinearity. Variables included in the regression did not always occur in every state or every year. Where that measure did not exist the corresponding dummy variable would be dropped from the results. Along with the full sample estimation equation, I also ran separate regressions by gender, race, and grade in school. In some cases, the AIDS education variable was significant in these separate measures when it was not in the full measure and vice versa. The measure for females did not report a significant result for the AIDS education variable for any of the risky behaviors. The measure for males was significant for three dependent variables. AIDS education was not significant for any of the Hispanic/Latino measures. It was significant for two of the African American measures and significant in three of the measures for Whites. By grade, it was significant in three of the freshmen/sophomore measures and none of the junior/senior measures. Tables A1-A8 in the Appendix show the marginal effects at the means for these estimated equations.

CHAPTER 7: INTERPRETATION AND POLICY IMPLICATIONS

As the literature shows, sex education in the school system is widely varied in both its content and structure (Kirby and Scales 1981, Kirby 2002). The only constant that this data provides is that the measure of sex education used involves a specific topic, AIDS. By being able to use AIDS as a measure, I assume that the content received is more consistent than if the question asked if sex education was received in school. AIDS education may not have information on the range of topics that more general sex education typically includes but it still has the potential to impact risky sexual behaviors that aren't directly related to AIDS or STD's, such as getting pregnant, using birth control or having sex young. By being taught to be aware of the dangers of AIDS, students may be putting more thought into which risky sexual behaviors they engage.

Having Sex Young

Table A1 shows the marginal effects for the risky sexual behavior measured by *sex_young*. Of the twenty-six original states, fifteen were included in the analysis. They were Alaska, Alabama, Arkansas, Arizona, Delaware, Kentucky, Mississippi, Montana, Nebraska, New Jersey, New York, South Carolina, Tennessee, Wisconsin and West Virginia. With Montana as the base case, being from West Virginia increased the probability of having had sex young by the greatest amount (+8.97 percentage points (ppt)). Being from Wisconsin decreased the probability of having had sex young by the greatest amount (-6.76 ppt).

Running the estimation equation of the full sample for all races, grades and genders showed that having received AIDS education relative to not receiving AIDS education was significant and decreased the probability of having had sex young by 1.78 ppt, all else constant at the means. All other predictors in the model were significant except for never having played

sports. The marginal effect of AIDS education was the smallest effect of all variables and quite a bit smaller than the other predictors.

Some of the largest predictors of having had sex young were being African American relative to being white (+27.1 ppt) and having used drugs before the last sexual intercourse (+18.3 ppt). Being female decreased the probability of having had sex young by 4.35 ppt and being a junior or senior relative to being a freshmen or sophomore decreased the probability of having had sex young by 8.43 ppt. Also, getting A's in school decreased the probability of having had sex young by 5.8 ppt while getting A's, B's, or C's decreased the probability of having had sex young by 4.8 ppt.

For the risky drug behaviors, the largest positive effect came from risky cigarette behavior, at 16.1 ppt followed by risky cocaine use, risky marijuana use, and risky alcohol use, respectively. Both being threatened on school property and being offered drugs on school property were positively significant at 4.85 and 3.15 ppt, respectively. Being so sad that normal activities stopped, increased the probability of having had sex young by 3.2 ppt.

Breaking the down the estimation by gender, race, and grade, AIDS education was insignificant in all groups except the specification for freshmen and sophomores. For the freshmen and sophomores, having received AIDS education decreased the probability of having had sex young by 3.31 ppt. This was still one of the smallest magnitudes for the predictors; however, it was no longer the smallest.

The other strong significant predictors remained relatively the same but at slightly higher magnitudes. For the freshmen and sophomores, having used drugs before the last sexual intercourse showed an increase up to 35.1 ppt from 18.3 ppt. Also, in this group, the *no_sports* variable was negatively significant, which was opposite from what would be expected. Having

never participated in sports relative to participating in sports decreased the probability of having had sex young by 2.69 ppt, all else constant at the means. Based on the study done by Miller et al. (1998) this could mean that there were more boys among these freshmen and sophomores. Her results showed that athletic participation could actually increase the probability of sexual activity for boys as it gives them more status and makes them more aggressive.

Based on the results gained from this data, I believe that I am able to make some inferences about current and past AIDS education policies and where the focus of school AIDS/sex education should lie in the future.

AIDS education decreased the probability that a student had had sex before age 15, specifically for freshmen and sophomores, in which the magnitude of the effect was larger and significant at a higher level. Most freshmen and sophomores are ages 14 or 15. Because they are not older, and for those that reported receiving AIDS education, for this analysis we know that they received that education before or at the age of 15. We also know by this age whether or not they have chosen to have sex young as defined for this thesis. While we still cannot ascertain that the education influenced them in their decision, we do know that they received it and also chose not to have sex young. Knowing this, we may be able to add more strength to the results received for the freshmen and sophomores.

Along with the variable for AIDS education, every other variable included in the equation was significant for the freshmen and sophomores. If one of the goals of sex education is to decrease the probability that students have sex young, then the content of the education should take into account these other variables. First of all, sex education needs to occur at an early age if it is to influence the students who might choose to have sex young. The other variables in the estimation can be considered additional risk factors. Males, African Americans, and

Hispanics/Latinos were all demographic groups that had an increased probability of having sex young. The results showed that the current system of AIDS education was not having an effect on these groups who are at increased risk.

Going to a school where violence or drug dealing occurred, also increased the probability of having sex young. Looking at an additional regression that only included those students who had ever been threatened or injured on school property, AIDS education did not have a significant effect on their probability of having sex young. If students who were already at increased risk of having sex young were indeed the ones receiving the AIDS education, then based on these results, AIDS education was not having an effect in changing their risky behaviors.

All four of the risky drug behaviors, along with being sad and not receiving good or average grades put students at increased risk of ever having had sex young. The content and structure of sex education should be formatted in a way that would be more understandable to these groups of at risk students. Sex education isn't always just about providing information on what is risky. It may also involve guidelines on what to do when confronted with risky situations. If school AIDS/sex education is to have an impact on risky sexual behavior, it also needs to impact other risky behaviors as well. Students need to be able to communicate, negotiate, and express their thoughts and beliefs. If they learn these sets of skills, they may be less likely to turn to any risky behavior as relief.

Having Many Sexual Partners

Table A2 shows the results for the next risky behavior, many sexual partners. Having had AIDS education relative to having had no AIDS education decreased the probability of having had three or more sexual partners in a lifetime by 1.46 ppt, all else constant at the means. The

same fifteen states were in this specification of the model, Alaska, Alabama, Arkansas, Arizona, Delaware, Kentucky, Mississippi, Montana, Nebraska, New Jersey, New York, South Carolina, Tennessee, Wisconsin and West Virginia. Again with Montana as the base case, being from Mississippi increased the probability of having had three or more sexual partners by greatest amount (+3.66 ppt). Being from Wisconsin decreased the probability of having had three or more sexual partners by the greatest amount (-3.54 ppt). South Carolina was dropped from the estimation for Hispanic/Latinos because it predicted failure perfectly.

The highest positive predictors were again being African American (20.3 ppt) and having used drugs before sex (11.8 ppt). The highest effect of the drug behaviors was again risky cigarette use (9.97 ppt). In this model, getting average grades had a slightly larger negative effect than getting good grades. The two insignificant predictors were being offered drugs on school property and not participating in sports. Being threatened on school property was still significant at 3.84 ppt, as was being so sad to stop normal activities at 2.19 ppt.

Once the results were broken down, having had AIDS education was still significant for males (2.92 ppt) and for Whites (2.09 ppt) at slightly higher magnitudes than for the full sample. The other strong predictors remained the same and both being offered drugs on school property and not participating in sports were still insignificant.

The results for the equation involving many sexual partners, should, potentially, show more of an impact from AIDS education than the model for having sex young, as this risky behavior is more directly related to contracting AIDS and the topics discussed might address this behavior. However, the magnitude of the effect was slightly less than in the results for the equation involving having had sex young. However, in this case AIDS education had a significant effect for the male and White portions of the sample. Being African American or

being Hispanic/Latino were still two of the most significant variables in the model but AIDS education had more of an impact on the White, less at risk group. From these results, my assumption would be that typical AIDS education was designed more for White males than any other group. On one hand, this is good because males are more at risk of having many sexual partners but on the other, the education is still not targeting the racial or ethnic groups that are most at risk.

Having an STD

Table A3 shows the results for *told_STD*. Only the African American and White groups yielded significant results. Ten states were used in the analysis. They were Delaware, Illinois, Massachusetts, Mississippi, Montana, Nebraska, South Carolina, Tennessee, Wisconsin, and West Virginia. With MT as the base case, being from Mississippi or South Carolina decreased the probability of having been told you have an STD by the greatest amount (-1.59 ppt). In the full sample, the strongest predictors were being African American (+3.36 ppt) and risky cocaine behavior (+2.64 ppt). Also, having average grades relative to not having average grades increased the probability of ever having been told you have an STD by a healthcare professional by .742 ppt, all else constant at the means. Having good grades had no significant effect. In the separate African American group, having received AIDS education relative to not having received AIDS education increased the probability of having been told you have an STD by 1.85 ppt, all else constant at the means. However, in the White group, having received AIDS education relative to not having received AIDS education decreased the probability of ever having been told you have an STD by .781 ppt, all else constant at the means.

The positive effect in the African American group could mean varying things. First of all, the *told_STD* variable could be seen as a positive behavior or a negative behavior. Being told

you have an STD could mean that you are seeing a health care professional and trying to improve your health. AIDS education could be having a positive effect if it is encouraging individuals to seek out healthcare professionals. However, it could also be a negative behavior because being told you have an STD means that you are engaging in risky sex. I assume that AIDS education would have a larger negative effect on being told you have an STD because of the way education could prevent the infection and spread of STD's. With this data and not knowing the timing of AIDS education, it is difficult to say for certain what kind of effect was actually taking place.

In a more basic analysis where *risk_cig, risk_coc, good_grade, avg_grade, no_sports, and sad_stop* were left out, AIDS education decreased the probability of being told you have an STD in all groups except for Hispanic/Latinos and African Americans. In these two groups it had an insignificant effect. Comparing these results to the more detailed specification, the observations increased from 4619 in the detailed equation to 5822 in the basic equation. With this basic specification and the larger sample the effect of AIDS education was insignificant in the group where it had previously yielded a positive result.

Of the variables that were excluded, none had a significant effect in the more detailed African American model making it more likely, that for this group, the effect of AIDS education was insignificant rather than positive. It could be that if more states included the required questions there might be a significant negative effect or the two effects might cancel each other and result in no effect for this variable.

Being Tested for HIV

Table A4 shows the results for the dependent variable *HIV_test*. Only three states were used in this analysis, Connecticut, Massachusetts, and South Carolina. Montana was not the base case in this model as it was not included in the analysis. South Carolina was used as the base case instead. Being from Massachusetts decreased the probability of having had an HIV test by the greatest amount (-5.19 ppt). As mentioned above, there were also fewer variables included in this model. Nevertheless, none of the groups reported significant effects for the AIDS education variable. It could be that AIDS education had no effect on the probability of getting an HIV test. However, it is difficult to say if this is the most plausible explanation. I think a bigger sample size and more control variables are needed to determine the nature of the effect. In the full sample equation, the strongest predictor was being African American (+8.02 ppt). There were no other insignificant predictors. Risky alcohol behavior became insignificant in the group for males, Hispanics/Latinos, African Americans and junior/seniors. Being threatened and being offered drugs were insignificant in the model for Hispanic/Latinos and African Americans.

Like the *told_STD* variable, getting an HIV test could also be a positive or negative behavior. Individuals could be getting an HIV test in an attempt to improve their health, in which case it would be expected that AIDS education would have a positive effect. They could also be getting an HIV test because they have been engaging in risky sex, in which case it would be expected that AIDS education would have a negative effect as it would be encouraging students not to have risky sex. Again, information about the timing of the education (before or after the test) might be beneficial in determining a substantial effect.

Having been told you have an STD and getting an HIV test, would intuitively seem to be the two risky behaviors that could be impacted the most by AIDS education. With this data,

however, AIDS education had an effect in only two groups for the *told_STD* results, and no effect for the *HIV_test* results. The lack of effect in these two models might be due to the timing of the AIDS education. It may also be due to a reduced sample size in the reported model. Some students may have received AIDS education before engaging in risky sex and some may have received AIDS education after. For those who received AIDS education before engaging in risky sex, a negative effect for ever *told_STD* would be expected because those students would have a decreased probability of ever having engaged in risky sex. For those students who received AIDS education after engaging in risky sex, a positive effect for *told_STD* might be expected. This would happen if they received AIDS education and it lead them to seek out a healthcare professional and get tested. In the results shown, these two effects could be canceling each other out.

After looking at a more basic analysis that leaves some of the variables out, I think it may be likely that the negative effect may be the more prominent effect. Without these variables, and with a larger sample size, the effect of AIDS education was negative and significant for all groups except the Hispanic/Latino and the African American groups. Again, this is troublesome as these were the two variables that increased the probability of having been told you have an STD by the most percentage points. Even if the lack of significance was due to reduced sample size, in this estimation where you would expect AIDS education to have a larger magnitude of effect, it was in fact smaller than other models. This could again be due to the conflicting effects involved with the variable and the timing of the education.

The risky drug behaviors and risky school characteristics also showed an increased probability of being told you have an STD, which would be consistent with the idea that exposure to risky behaviors and situations lead to risky consequences, in this case having an

STD. It should also be noted, that because exposure to drugs, alcohol, and violence put students at increased risk, any AIDS education program needs to be designed to incorporate these situations and provide guidelines on how to deal with them.

AIDS education had no effect on the probability that a student got an HIV test. All other variables in the full sample analysis were significant and positive. This could mean that the students exposed to risky situations were the ones having sex, so they were also the ones who were more likely to get an HIV test. I would expect AIDS education to have a significant effect on students getting an HIV test if they received it after they engaged in risky sex. If they received the education before making the decision to engage in risky sex then the education might not have seemed relevant to them and, thus, the education would have no impact. This would explain a positive effect. A negative effect would be much the same as with the analysis for having been told you have an STD. Those taught not to engage in risky sex have no need of an HIV test.

The structure of AIDS education should be designed in a way so that the lessons learned are lasting and the anticipated effects are more certain. This could mean that the program be more intensive or longer lasting. It would be easier to determine the direction the effect of AIDS education if the timing and the structure of the program were more concrete. Also, the sample size was smallest in the analysis for *HIV_test* and only minimal variables were included. With a larger sample size that included the required question, a more definite effect could be estimated.

The rest of the measures of risky sex used in this analysis can be thought of as pertaining less to AIDS education and more to typical sex education. Nevertheless, as mentioned above, AIDS education still has the potential to impact these behaviors by leading the students to think twice before engaging in risky sex.

Birth Control: No Method

Table A5 shows the marginal effects for the association between having received AIDS education and not having used any form of birth control at last sexual intercourse. Fifteen states were used in the analysis, Alaska, Alabama, Arkansas, Arizona, Delaware, Kentucky, Mississippi, Montana, Nebraska, New Jersey, New York, South Carolina, Tennessee, Wisconsin and West Virginia. These were the same fifteen states used in both the *sex_young* and *many_lifpar* analyses. Back to Montana as the base case, being from Wisconsin decreased the probability of using no birth control by the largest amount (-1.51 ppt). Also, Alabama and West Virginia were dropped from the Hispanic/Latino analysis because they predicted failure perfectly.

Having received AIDS education relative to not receiving AIDS education decreased the probability that no birth control was used at last sexual intercourse by 1.35 ppt, all else constant at the means. The strongest predictor this time was being Hispanic/Latino relative to being white (5.24 ppt) but was a much smaller magnitude than previous strong predictors. Risky cigarette behavior and using drugs before were also significant at smaller magnitudes. Both, being threatened or injured on school property and being offered drugs on school property, along with risky marijuana use were insignificant. Not playing sports relative to playing sports increased the probability of not using any form of birth control by 1.02 ppt, which is opposite of the significant result reported in the freshmen/sophomore model for the dependent variable *sex_young.* Students who played sports more may have been having sex earlier but they could also be exposed to more information about birth control methods. Student athletes could have been seeking medical

assistance more often, giving them more opportunities to learn about more effective birth control methods.

For the males, having received AIDS education relative to not having received AIDS education decreased the probability of not using any form of birth control at last sexual intercourse by 1.60 ppt, all else constant at the means. In addition to *thrt_sch, drug_sch, risk_mar, risk_alc* and *avg_grade* were also insignificant. The other previously significant variables also had smaller magnitudes. For African Americans, having received AIDS education relative to not having received AIDS education decreased the probability of having used no birth control by 3.12 ppt, all else constant at the means. The only other significant predictors were *good_grade, no_sports,* and *sad_stop.* All other previous significant predictors from the full sample were insignificant. For freshmen and sophomores, having received AIDS education relative to not having received AIDS education decreased the probability of not having used any form of birth control by 1.26 ppt. Insignificant predictors were *thrt_sch, drug_sch, risk_mar,* and *risk_coc*. Being African American (3.93 ppt) and risky cigarette behavior (3.03 ppt) were still two of the strongest predictors. Also, out of the eight separate estimation equations for this variable, four show significant marginal effects for the AIDS education variable, which was the most for any dependent variable.

Condoms

Table A6 shows the results for *use_con.* Running the specification for whether or not condoms were used at last sexual intercourse also yielded no significant results for the AIDS education variable. Again, the same fifteen states were used in the analysis. Being from West Virginia increased the probability of having used condoms by the greatest amount (+11.41 ppt). Being from Arizona decreased the probability of having used condoms by the greatest amount (-

4.74 ppt). The strong predictors in this model were being African American (+24.3 ppt), risky alcohol behavior (+11.2 ppt), and having used drugs before last sexual intercourse (+22.7 ppt). Interestingly though, risky alcohol behavior had a positive effect on having used condoms rather than the expected negative. The same was true for risky marijuana use and risky cigarette use. Risky cocaine use, however, had a negative effect on having used condoms. Having good grades relative to not having good grades also decreased the probability that condoms were used at last sexual intercourse by 9.22 ppt, all else constant at the means. Not participating in sports relative to participating in sports decreased the probability that condoms were used at last sexual intercourse by 4.28 ppt, all else constant at the means.

Some variables had the expected effect while others did not. These results can mostly be explained by the nature of the dummy variable. Students who used condoms at last sexual intercourse have a value of one for this variable. Students who did not use condoms at last sexual intercourse have a value of zero for this variable but students who have not had sexual intercourse at all, also have a value of zero. Because abstinent students are included, these results are harder to interpret. Condom usage is correlated with other variables that affect risky sexual behavior. This could explain why the risky drug behaviors were associated with increased condom usage. It may be that students who are using drugs are more likely to have sex and because they are having sex, they are more likely to use condoms. The opposite could be said for getting good grades and participating in sports. Students who participate and get good grades may be less likely to have sex and therefore less likely to use condoms.

To help in understanding these results I ran a more basic analysis. Without *risk_cig, risk_coc, good_grade, avg_grade, no_sports, and sad_stop* the results for the AIDS education variable were significant in every category except for Hispanic/Latinos. In the full sample

analysis, the number of observations used in the analysis increased from 44, 516 to 211,498. As expected, having received AIDS education relative to not having received AIDS education increased the probability that condoms were used at last sexual intercourse by 2.85 ppt, all else constant at the means. Risky alcohol behavior, risky marijuana use, along with being threatened or injured on school property and being offered drugs on school property were all, again, associated with an increased probability of condom use. With the larger sample size, the other risky behaviors still show an increased probability of condom use. AIDS education now also shows an increased probability of condom use. While the nature of the variable complicates the results, it might still be possible that AIDS education focuses on condom use and targets those students who were at increased risk. Because it is increasing the probability instead of decreasing I think that that means that it is focusing on the students at risk. If it decreased the probability then it would be easier to assume that the students who are not having sex are the ones receiving the AIDS education. A better variable and an increased sample size are needed for stronger results and a clearer interpretation.

In the results for having used no birth control, AIDS education decreased the probability for freshmen and sophomore, African American males. This would follow the previous assumption that AIDS education was targeted toward males. In the results for multiple sexual partners, the results showed that AIDS education was having more of an impact on Whites than African Americans. Some factor was causing AIDS education to affect different risky behaviors differently. Perhaps, the content of the education is responsible. As mentioned above, the focus may have been on increased condom use rather than reduction in sexual partners. The discrepancies between the analyses are probably due to some combination of a reduced sample

size, variable measurement errors, or the change in impact that occurred from adding more control variables.

Birth Control: Withdrawal

Table A7 shows the results for *withdrawal.* The same fifteen states were used. Being from Alabama increased the probability of having used the withdrawal method by greatest amount (4.53 ppt). Stata dropped Alabama, South Carolina, Tennessee, Wisconsin, and West Virginia from the analysis for Hispanic/Latinos. Kentucky and Montana were dropped from the analysis for African Americans and an alternate base case for state effects was used. Neither the full sample analysis nor the separate analyses reported significant results for the AIDS education variable. The most significant predictor in the full sample analysis was having used drugs before last sexual intercourse (2.36 ppt). Overall, even the significant effects were of a much smaller magnitude than for the previous dependent variables. Even running a more basic analysis with fewer independent variables, which would increase the number of states used in the analysis and thus the number of observations, did not give significant results.

The withdrawal method of birth control is considered a risky measure of sex but it is one that might not be impacted that much by AIDS education. AIDS education is going to focus on safe sex and probably not so much on what method of birth control is most effective. What impacted the probability of having used this method the most was having used drugs before sex. Having used drugs before most likely led to a lack of planning about what method of birth control was going to be used. After sex had begun the withdrawal method may have be the only choice even if it had the least effectiveness.

Pregnancy

Table A8 shows the results for *had_preg.* Only fourteen states were used in this analysis. Unlike previous analyses, South Carolina was not included. Being from New York decreased the probability of having had a pregnancy by the largest amount (-0.94 ppt). Alaska was dropped from the analysis for Hispanic/Latinos. Looking at the marginal effects for whether or not a student has had or ever caused a pregnancy, having received AIDS education relative to not having received AIDS education decreased the probability of ever having had or caused a pregnancy by 1.16 ppt. This magnitude was similar to other variables included in this estimation. It was neither the smallest or largest effect. The largest determinants of having had or caused a pregnancy were being African American relative to being White, being Hispanic/Latino relative to being White and smoking cigarettes on a daily basis. The only insignificant effect was that of being offered drugs on school property.

Interestingly, when the results were broken down, AIDS education did not have a significant effect in the analysis for females. It did have a significant and negative effect for males. For males, having received AIDS education relative to not having received AIDS education decreased the probability of ever having caused a pregnancy by 1.22 ppt, all else constant at the means. The strongest significant predictor was being African American relative to being White (+4.59 ppt). Being Hispanic/Latino, average and good grades, not playing sports, and risky cocaine behavior along with having been offered drugs on school property were insignificant in the male model.

Also, with a significant and negative effect were the results for the White and freshman/sophomore analyses. For the Whites, having received AIDS education relative to not having received AIDS education decreased the probability of ever having had or caused a

pregnancy by 1.38 ppt, all else constant at the means. The strongest predictor was risky cigarette behavior (+2.29 ppt). In this group, both risky alcohol and risky marijuana use were insignificant along with being offered drugs on school property. Grades did have a significant and negative effect on having had or caused a pregnancy for Whites.

For freshmen and sophomores, having received AIDS education relative to not having received AIDS education decreased the probability of ever having had or caused a pregnancy by 1.10 ppt, all else constant at the mans. Being threatened on school property, being offered drugs on school property, and getting good grades were insignificant. The most significant predictor was being African American relative to being White (+3.35 ppt).

AIDS education affects the probability of ever having had a pregnancy indirectly by affecting use of birth control and other safe sex practices. The *had_preg* analysis showed four significant effects for AIDS education, which was very similar to the *no_bc* analysis. Both analyses showed significant effects for the full, male, and freshmen/sophomore models. *Had_preg* showed a significant effect for Whites while *no_bc* showed a significant effect for African Americans. This effect on African Americans was one of the largest magnitudes from AIDS education seen in any of the analyses run. Decreasing the probability of using no birth control and decreasing the probability of ever having had a pregnancy should be caused by a common component. The sample size was very similar in both the *no_bc* and *had_preg* analyses. There may have been a missing variable that was impacting having had or caused a pregnancy for African Americans or a missing variable that was affecting having used birth control for Whites. The effects in the full, White and freshmen/sophomore analyses were similar across the two dependent variables.

Talking to Parents

Another variable included in the data was *parent_talk*, measuring whether a student had ever talked to their parents about sex. *Parent_talk* was an important variable to include because it could be seen as alternate form of sex education and as previous literature (Meschke et al. 2000) showed it could be important in influencing risky sexual behavior. Failing to measure it could have biased the results. This variable, however, was not included in the main regression results because it brings down the size of the sample and the number of states used in that analysis by a substantial amount.

By running *parent_talk* in a separate analysis, with only basic variables included to maximize the number of observations used, for each of the risky behaviors, the results showed that it was a significant variable in six of the analyses: *sex_young, many_lifpar told_STD, HIV_test, use_con* and *had_preg.* In each of these analyses it had a positive effect on the corresponding risky behavior measure. One way to explain this positive effect was that the parents might have been talking to their children after they had already begun to engage in risky sexual behavior.

The effect was largest for *use_con.* Having talked with parents about sex relative to not having talked with parents about sex increased the probability of having used condoms at last sexual intercourse by 4.52 ppt. In this case, talking with parents about sex actually encouraged a positive behavior.

Because *parent_talk* had a positive and significant effect on having used condoms, on having been told you have an STD, and on having gotten an HIV test, it could mean that parents were encouraging their children to be safer and less risky in their sexual behavior by using a condom and visiting a healthcare professional. However, without knowing when a child spoke

with their parents relative to engaging in risky sexual behavior it is difficult to know if this was the actual impact taking place.

Comparing the results to a basic analysis without the *parent_talk* variable, *AIDS_edu* lost significance in two of the six estimations where it showed previous significance, which may have occurred due to the loss in sample size from including the *parent_talk* variable. Including the additional *parent_talk* variable increased the magnitude of the effect of AIDS education in the estimation for *told_STD* by a small amount. In the other analyses, the magnitude of AIDS education decreased. I think that the lack of significance of the AIDS education variable in the other analyses that showed previous significance was due more to the substantially decreased sample size rather than an extra impact created by the inclusion of this variable. For the reported results in Tables A1-A8 the full analyses are run using ten to seventeen states. In the models including *parent_talk*, the number of states in the analyses ranges from 2 to 9 states. More states including this question on future surveys would help determine a more accurate impact of this variable.

Including Age

As mentioned above in the Data section, I chose to use the variables *jun_sen* and *fre_sop* to control for characteristics specific to each grade. However, it was pointed out to me that failing to control for characteristics specific to age could be problematic. Students of a variety of ages are in the same grade but they may not all be at the same emotional or physical level, which could affect the results.

I ran an alternate analysis where the variable for age was included. I reported the difference in results that occurred for my main variable of interest, *AIDS_edu*. In the *sex_young* results, the full sample group continued to show significance at approximately the same

magnitude. The specification for fifteen year olds showed the only other significant results. Previously, the freshmen/sophomore model was negatively significant. The magnitude for fifteen year olds was slightly higher than the results for freshmen/sophomores.

In the *many_lifpar* results, the full sample specification lost significance. The specification for seventeen year olds was significant when previously neither the freshmen/sophomore nor the junior/senior models showed significance. For seventeen year olds, having received AIDS education in school decreased the probability that they had three or more sexual partners by 4.96 ppt.

The *told_STD* and *HIV_test* results showed no change in significance when the age variable was included. All groups of results were still insignificant for the AIDS education variable.

The *no_bc* results continued to show significance in the full model at approximately the same magnitude. The specification for eighteen years old and older also showed significance where previously, the specification for freshmen/sophomores showed significance.

Previously, in the *use_con* results none of the groups showed significance. When including the age variable, the specification for sixteen year olds showed significance. For sixteen year olds, having been taught about AIDS in school increased the probability that they used a condom at last sexual intercourse by 3.94 ppt.

In the withdrawal results, the specification for eighteen years and older showed significance. Previously, none of the specifications showed significance. For eighteen year olds, having been taught about AIDS in school increased the probability that the withdrawal method was used at last sexual intercourse by 2.26 ppt.

The results for *had_preg* continued to show significance in the full model specification. The specification for sixteen year olds also showed significance where previously the significant specification was freshmen/sophomores. The magnitude of the effect was also higher for sixteen year olds than it was for the freshmen/sophomore group.

Overall, including the age variable would make the results more specific. For the majority of the risky behaviors, including the age variable made a specific age group's results significant rather than the whole grade. For a few behaviors, the sixteen-year-old group for *use_con* and the eighteen years and over group for *withdrawal*, the results showed significance where previously none existed. Only one group of estimation results showed insignificance where previously significance occurred. In the full specification for *many_lifpar,* AIDS education was a significant predictor. When including the age variable, it was no longer significant in the full group.

While including a variable to measure age in the results doesn't affect the results for the impact of AIDS education substantially, knowing what age groups of students were impacted the most or the least by AIDS education would be instrumental in developing effective programs. Simply, knowing the grades or group of grades may not be enough. Focusing on age groups rather than grades could save time and resources.

Limitations

While the analysis above was done carefully and thoroughly, there were still limitations that arose from the data and the specific methods used in the analysis. Most importantly, there was no information on timing. There was no way of knowing when students received AIDS education relative to having had sex young, having talked to their parents about sex, having been told they had an STD, and to having gotten tested for HIV. Looking at the results, predictions

can be made about when the timing took place but there is no way to know if the results actually support this speculation.

Also, the data used were cross-sectional rather than panel data. This data set had many observations over multiple years but they were not the same observations over many years. Being able to study the same observations would be especially useful in knowing if receiving sex education actually did change behavior as that information would explicitly be included in the data set. The assumption here was that a cross-section estimator will only yield an unbiased estimate of the effect of the treatment (AIDS education) on the treated if, conditional on observables, the mean outcome of untreated adolescents were equivalent to the mean outcome that treated teenagers would have had if they had not been treated. This assumption would be violated if there were non-random participation in sex education through either selection on observables or selection on unobservables. There were also two potential sources of bias that could arise, substitution bias and dropout bias. Substitution bias could arise if untreated students received information from an alternate source. Dropout bias could arise if certain types of students were kept out of sex education. (Sabia 2006)

Other studies attempted to control for this using fixed effects, which was not a method that was possible with this kind of data. Also, the determinants of teen sexual behavior may be correlated with enrollment in sex education because of both unobserved community and family influences that may affect which students and at what age these students were enrolled in sex education (Oettinger 1999). I attempted to control for these community influences by including state level dummies and dummies for violence and drugs on school property which could be indicative of more high risk areas. I also attempted to include school level dummies but as discussed it was not possible. A good measure of family level characteristics was not available.

Studying this data and attempting to ascertain the impact and association of sex education policies on risky sexual behaviors was an interesting endeavor. However, incorporating economic variables, such as spending on sex education within states, would be instrumental in understanding whether sex education resources spent were actually allocated efficiently to achieve the goal of reducing sexual risk behaviors.

Philipson and Posner (1994) studied government- employed methods used to increase awareness and knowledge and also to reduce the incidence of AIDS in states. Public expenditures on AIDS education exceeded almost $700 million in 1992. The specific use of those funds was left up to state and local agencies.

According to Philipson and Posner, public subsidization of AIDS information would only affect certain groups of people. People at the highest risk of contracting AIDS would seek out information even if it weren't provided publicly. People at the lowest risk of AIDS would get very little value from receiving AIDS information since it would most likely not affect their lives directly. Expenditures should be targeted toward the uninformed members of the intermediate risk group. Teenagers were more likely to be both uninformed and in the intermediate risk group. He added that if it was too difficult to find and target this group specifically, the region that was to receive the education should contain the largest possible fraction of uninformed so as to maximize the marginal product of every dollar spent on education. Expenditures should also be allocated throughout these regions in order to equalize the marginal reduction in HIV infections that would occur relative to how costly it was to educate the groups within those regions.

The results from Philipson and Posner's empirical analysis showed that public expenditures on AIDS education were not being allocated efficiently across states. There was evidence to suggest that public programs increased knowledge about AIDS but there was little

evidence to suggest that this knowledge was actually associated with a decrease in the spread of the disease. Reallocation of resources to a more targeted group would have increased the effectiveness and efficiency of the resources spent on AIDS education.

Having similar information in this data set about public AIDS expenditures within the states and schools could have helped determine whether dollars spent on AIDS education were being used efficiently. If this information was available more research could also be done about the content and structure of the programs used in the states and schools where the education seemed to be most effective.

Along with missing economic variables, from looking at the results of the *linktest,* it was likely that there were other omitted variables that were having an effect on the analysis. With more variables, more accurate and unbiased effects could be estimated.

Another point to note was the difference between statistical significance and oomph. According to McCloskey (1986), a variable has oomph when its coefficient is large; its variance is high and its character exogenous. Statistical significance only implies that you have acquired some control over sampling error as a source of doubt. McCloskey pointed out that sampling error was generally not the main source of doubt. The main source was whether a variable mattered, whether a coefficient was large enough to have had meaning in the context of the problem at hand. The researcher must decide how large was large enough. In the case of AIDS education, the goal was to reduce risky sexual behavior. Some of the analyses produced significant results but the coefficients were usually 1 or 2 percent. Deciding if this was a large enough change is difficult. Within the results the size of these coefficients was small compared to the other variables in the analysis, which might suggest that the size of the coefficients was not large enough. Previous studies rarely found significant results for sex education. The most

comparable results were in Sabia's (2006) OLS cross-section estimates. In his study, the offer of sex education was associated with a 2.9 ppt higher probability of exiting virginity. The mean age of his sample was 14.3 years, meaning most of the respondents of the study, if they were sexually active, could be considered to be having sex young. For this thesis, having received AIDS education decreased the probability of having sex young by 1.78 ppt. The results were in different directions but the size of the coefficient was similar. However, because of the different designs of the two studies, the results may not be that comparable. Before it can be decided if the results have oomph, I think more concrete goals need to be set for what the expected impact should be of AIDS education.

CHAPTER 8: CONCLUSION

Sex education policy is seen as a useful device in the prevention of costly social outcomes. Understanding its effectiveness will not only help reduce these costs but may also improve the distribution of government funds appropriated to its implementation. In this thesis, the analysis produced was done through looking at a more recent, comprehensive and state-specific dataset. More concentration was put on analyzing the more risky sexual behaviors rather than all adolescent sexual behavior in general. More risk may be associated with a higher cost.

The results showed that for some behaviors, having sex young, having many sexual partners, using no method of birth control, and having had or cause a pregnancy, AIDS education significantly decreased the probability of their occurrence. The analyses for females did not report significant results for AIDS education for any of the dependent variables. For males the results showed significance for three dependent variables, *many_lifpar, no_bc* and *had_preg.* AIDS education was not significant for any of the Hispanic/Latino analyses. It was significant for three of the African American analyses (*told_STD, no_bc,* and *had_preg)* and significant in three of the analyses for Whites (many*_lifpar, told_STD,* and *had_preg).*

By grade, AIDS education was significant in three of the freshmen/sophomore analyses (*sex_young, no_bc,* and *had_preg*) and none of the junior/senior analyses. In general, AIDS education was not significant for the groups who were most at risk of engaging in risky sexual behaviors, specifically, African Americans. However, Philipson and Posner (1994) suggested that funding for AIDS education would be most efficiently spent for the groups who were at intermediate risk. Teenagers as a whole may be the group on which to focus. Deciding which subgroups of teenagers to focus on requires further analysis. There may be a specific ethnicity, state, or age that should be the targeted subgroup. Future research should be designed to

determine which groups would benefit the most from AIDS education so that funding can be allocated appropriately.

APPENDIX A

Table A1. Marginal Effects at the Means for the Estimation on Whether the Individual Had Sex Before the Age of 15

	All	Female	Male	Hispanic/ Latino	African American	White	Freshmen/ Sophomore	Junior/ Senior
AIDS_edu	-0.0178*	-0.0130	-0.0242	-0.0070	-0.0427	-0.0158	-0.0331**	0.0009
	(-2.06)	(-1.25)	(-1.62)	(-0.25)	(-1.37)	(-1.70)	(-2.74)	(0.07)
fem	-0.0435***			-0.1230***	-0.2060***	-0.0002	-0.0637***	-0.0283***
	(-6.87)			(-5.63)	(-9.62)	(-0.03)	(-7.06)	(-3.54)
jun_sen	-0.0843***	-0.0679***	-0.1080***	-0.1060***	-0.1300***	-0.0730***		
	(-13.91)	(-9.64)	(-11.94)	(-4.65)	(-5.93)	(-12.08)		
af_am	0.2710***	0.1740***	0.3760***				0.2920***	0.2530***
	(19.65)	(10.81)	(16.83)				(16.10)	(13.31)
his_lat	0.1490***	0.0746***	0.2230***				0.1600***	0.1410***
	(10.60)	(4.15)	(10.70)				(8.16)	(6.20)
thrt_sch	0.0485***	0.0193	0.0754***	0.0370	0.0037	0.0561***	0.0530**	0.0386
	(3.85)	(1.26)	(3.91)	(1.05)	(0.08)	(4.44)	(3.23)	(1.93)
drug_sch	0.0315***	0.0212*	0.0406***	0.0591**	0.0445	0.0229**	0.0474***	0.0132
	(4.22)	(2.40)	(3.56)	(2.78)	(1.55)	(3.10)	(4.55)	(1.36)
risk_alc	0.0544***	0.0389***	0.0791***	0.0689*	0.0160	0.0532***	0.0633***	0.0426***
	(7.06)	(3.96)	(6.52)	(2.46)	(0.46)	(7.98)	(5.64)	(4.10)
risk_mar	0.0732***	0.0750***	0.0644***	0.0940*	0.2180***	0.0357***	0.1000***	0.0476***
	(8.23)	(6.33)	(4.46)	(2.56)	(7.42)	(4.28)	(7.20)	(4.33)
risk_cig	0.1610***	0.1810***	0.1230***	0.2910***	0.0540	0.1410***	0.1880***	0.1420***
	(14.48)	(13.22)	(7.67)	(6.69)	(1.03)	(14.40)	(11.31)	(9.31)
risk_coc	0.0807***	0.0946***	0.0715*	0.0822	-0.0033	0.0747***	0.0798*	0.0882**
	(3.69)	(3.42)	(2.19)	(1.26)	(-0.02)	(3.94)	(2.41)	(3.16)
use_drugbf	0.1830***	0.1330***	0.2360***	0.2710***	0.1800***	0.1540***	0.3510***	0.0886***
	(12.43)	(7.49)	(10.99)	(5.12)	(3.91)	(10.55)	(14.77)	(5.59)
good_grade	-0.0580***	-0.0486***	-0.0717***	-0.0758**	-0.1090***	-0.0425***	-0.0750***	-0.0394***
	(-9.77)	(-6.96)	(-6.96)	(-2.65)	(-3.61)	(-6.85)	(-8.49)	(-4.39)
avg_grade	-0.0477***	-0.0319**	-0.0676***	-0.0276	-0.0722*	-0.0429***	-0.0540***	-0.0348*
	(-5.09)	(-2.71)	(-4.59)	(-0.95)	(-2.10)	(-4.63)	(-4.47)	(-2.49)
no_sports	-0.00598	0.0169*	-0.0267**	-0.0688**	-0.0070	0.0035	-0.0259**	0.0132
	(-1.04)	(2.47)	(-2.97)	(-3.10)	(-0.33)	(0.66)	(-3.21)	(1.67)
sad_stop	0.0320***	0.0398***	0.0157	0.0310	0.0448*	0.0269***	0.0456***	0.0155
	(5.12)	(5.58)	(1.34)	(1.30)	(2.06)	(3.97)	(4.67)	(1.79)
N	44748	23644	21104	3782	7013	28322	25062	19576

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A2. Marginal Effects at the Means for the Estimation on Whether an Individual Has Had Three or More Sexual Partners in Their Lifetime

	All	Female	Male	Hispanic/ Latino	African American	White	Freshmen/ Sophomores	Junior/ Senior
AIDS_edu	-0.0146*	-0.00111	-0.0292*	0.0110	-0.0151	-0.0209*	-0.0094	-0.0182
	(-2.00)	(-0.14)	(-2.55)	(0.72)	(-0.54)	(-2.34)	(-1.64)	(-1.17)
fem	-0.0323***			-0.0880***	-0.2190***	0.0049	-0.0397***	-0.0177*
	(-6.60)			(-5.93)	(-10.93)	(1.37)	(-8.86)	(-1.99)
jun_sen	0.0545***	0.0618***	0.0434***	0.0571***	0.1090***	0.0439***		
	(12.60)	(12.51)	(6.13)	(3.92)	(5.78)	(10.22)		
af_am	0.2030***	0.0817***	0.342***				0.1500***	0.2570***
	(15.47)	(8.09)	(14.60)				(11.67)	(12.34)
his_lat	0.0758***	0.0130	0.1510***				0.0590***	0.0903***
	(6.05)	(1.19)	(6.82)				(5.03)	(4.35)
thrt_sch	0.0384***	0.0169	0.0567***	0.0135	0.0283	0.0380***	0.0219**	0.0552*
	(3.75)	(1.44)	(3.72)	(0.55)	(0.61)	(4.33)	(2.91)	(2.47)
drug_sch	0.00856	0.0098*	0.00715	0.0306*	0.0285	0.0011	0.0129**	0.0011
	(1.92)	(1.99)	(1.00)	(1.97)	(1.22)	(0.27)	(3.06)	(0.12)
risk_alc	0.0498***	0.0305***	0.0789***	0.0774***	0.0838*	0.0407***	0.0241***	0.0821***
	(8.03)	(4.50)	(7.47)	(4.36)	(2.50)	(7.48)	(4.48)	(7.11)
risk_mar	0.0604***	0.0604***	0.0533***	0.0628*	0.1820***	0.0353***	0.0514***	0.0696***
	(10.33)	(7.64)	(5.53)	(2.49)	(6.46)	(6.36)	(7.27)	(6.72)
use_drugbf	0.1180***	0.0818***	0.1540***	0.1540***	0.1650***	0.0929***	0.0950***	0.1470***
	(11.65)	(6.83)	(9.46)	(3.34)	(3.70)	(9.54)	(6.78)	(8.26)
good_grade	-0.0222***	-0.0192***	-0.0268**	-0.0215	-0.0451	-0.0175***	-0.0224***	-0.0251*
	(-4.28)	(-3.62)	(-3.25)	(-1.08)	(-1.64)	(-3.69)	(-5.68)	(-2.36)
avg_grade	-0.0339***	-0.0213*	-0.0481***	-0.0283	-0.0943**	-0.0234**	-0.0215***	-0.0401*
	(-4.97)	(-2.34)	(-4.36)	(-1.86)	(-2.99)	(-3.27)	(-3.87)	(-2.54)
no_sports	-0.00111	0.0173***	-0.0185**	-0.0181	0.0203	0.0008	0.0009	-0.0043
	(-0.29)	(4.35)	(-2.85)	(-1.39)	(1.15)	(0.21)	(0.25)	(-0.55)
sad_stop	0.0219***	0.0242***	0.0148*	0.0065	0.0503**	0.0181***	0.0199***	0.0256**
	(4.93)	(4.54)	(2.04)	(0.43)	(2.79)	(4.07)	(4.46)	(2.95)
risk_cig	0.0997***	0.0940***	0.0880***	0.1420*	0.0684	0.0844***	0.0707***	0.1320***
	(13.35)	(9.94)	(7.95)	(2.55)	(1.34)	(12.38)	(8.27)	(9.91)
risk_coc	0.0619***	0.0521**	0.0732**	0.0967	-0.0049	0.0492***	0.0485**	0.0774**
	(4.22)	(3.06)	(3.17)	(1.60)	(-0.07)	(3.78)	(3.22)	(3.09)
N	44738	23651	21087	3768	6995	28325	25067	19561

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A3. Marginal Effects at the Means for the Estimation on Whether an Individual Has Ever Been Told They Have An STD by a Healthcare Professional

	All	Female	Male	Hispanic/ Latino	African American	White	Freshmen/ Sophomore	Junior/ Senior
AIDS_edu	-0.0035	-0.0061	-0.0010	-0.0021	0.0185*	-0.0078*	-0.0021	-0.0053
	(-1.12)	(-1.22)	(-0.27)	(-0.18)	(2.07)	(-2.21)	(-0.57)	(-1.27)
fem	0.0092***			0.0222	0.0175	0.0074**	0.0044	0.0137***
	(3.35)			(1.75)	(1.58)	(2.75)	(1.34)	(3.58)
jun_sen	0.0061**	0.0098**	0.0029	-0.0057	0.0339***	0.0026		
	(2.84)	(2.89)	(1.06)	(-0.71)	(3.72)	(1.20)		
af_am	0.0336***	0.0375***	0.0459***				0.0248***	0.0411***
	(10.57)	(8.62)	(4.32)				(6.66)	(8.53)
his_lat	0.0150*	0.0208*	0.0079				0.0186***	0.0103
	(2.43)	(2.16)	(0.94)				(3.90)	(1.11)
thrt_sch	0.0153***	0.0183***	0.0119***	0.0323*	0.0303*	0.0132**	0.0103**	0.0197***
	(5.38)	(3.83)	(3.63)	(2.29)	(2.01)	(2.82)	(2.92)	(4.43)
drug_sch	0.0058	0.0059	0.0055	0.0136	0.0090	0.0060*	0.0074*	0.0033
	(1.84)	(1.34)	(1.67)	(0.66)	(0.70)	(2.07)	(2.27)	(0.69)
risk_alc	-0.0007	0.0061	-0.0074	0.0073	-0.0189	-0.0003	0.0024	-0.0027
	(-0.21)	(1.38)	(-1.29)	(0.65)	(-1.46)	(-0.13)	(0.53)	(-0.58)
risk_mar	0.0121***	0.0116**	0.0126***	0.0056	0.0441***	0.0070*	0.0022	0.0208***
	(4.29)	(2.66)	(3.34)	(0.48)	(3.74)	(2.15)	(0.52)	(4.89)
use_drugbf	0.0150***	0.0144***	0.0150***	0.0362**	0.0405**	0.0094***	0.0056	0.0213***
	(5.08)	(3.60)	(3.83)	(3.05)	(2.71)	(3.72)	(1.43)	(5.00)
risk_cig	0.0073*	0.0113**	0.0019	0.0010	0.0101	0.0089***	0.0126**	0.0021
	(2.59)	(2.61)	(0.53)	(0.11)	(0.61)	(3.53)	(3.00)	(0.52)
risk_coc	0.0264***	0.0227*	0.0272***	0.0027	0.0021	0.0245***	0.0301***	0.0253**
	(4.97)	(2.17)	(5.69)	(0.11)	(0.06)	(5.16)	(5.15)	(3.28)
good_grade	0.0000	-0.0062	0.0051	0.0004	-0.0060	0.0008	-0.0006	-0.0002
	(0.01)	(-1.55)	(1.74)	(0.04)	(-0.64)	(0.26)	(-0.20)	(-0.04)
avg_grade	0.0074*	0.0095	0.0044	0.0267	-0.0004	0.0068	0.0109*	0.0020
	(2.03)	(1.56)	(1.10)	(1.46)	(-0.03)	(1.79)	(2.22)	(0.40)
no_sports	0.0060**	0.0097**	0.0021	0.0244*	0.0081	0.0030	0.0025	0.0090*
	(3.07)	(2.91)	(0.72)	(2.45)	(1.09)	(1.26)	(0.97)	(2.45)
N	29073	15158	13911	1245	4619	21343	15487	13543

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A4. Marginal Effects at the Means for the Estimation on Whether an Individual Has Ever Been Tested for HIV

	All	Female	Male	Hispanic/ Latino	African American	White	Freshmen/ Sophomore	Junior/ Senior
AIDS_edu	0.0016	0.0122	-0.0103	0.0522	-0.0321	-0.0047	0.0065	-0.0100
	(0.22)	(1.16)	(-1.04)	(1.83)	(-0.97)	(-0.54)	(0.80)	(-0.71)
fem	0.0371***			0.0711***	0.0780***	0.0296***	0.0160**	0.0636***
	(7.44)			(3.57)	(4.39)	(5.35)	(3.18)	(7.41)
jun_sen	0.0419***	0.0643***	0.0213***	0.0804**	0.1060***	0.0319***		
	(8.99)	(8.83)	(3.78)	(3.32)	(6.54)	(6.42)		
af_am	0.0802***	0.1030***	0.0764***				0.0499***	0.1210***
	(11.48)	(10.71)	(5.21)				(7.19)	(10.41)
his_lat	0.0768***	0.0958***	0.0785***				0.0581***	0.1000***
	(9.74)	(8.74)	(5.04)				(7.33)	(7.26)
thrt_sch	0.0389***	0.0578***	0.0267**	0.0133	-0.0178	0.0680***	0.0286***	0.0497***
	(5.33)	(4.42)	(2.83)	(0.32)	(-0.59)	(4.98)	(3.59)	(3.47)
drug_sch	0.0188***	0.0217**	0.0172*	-0.0023	0.0020	0.0206***	0.0178**	0.0191*
	(3.75)	(2.89)	(2.47)	(-0.09)	(0.10)	(4.12)	(3.11)	(2.21)
risk_mar	0.0434***	0.0667***	0.0186*	0.0775**	0.0789***	0.0340***	0.0388***	0.0479***
	(8.53)	(8.89)	(2.51)	(3.20)	(3.51)	(6.10)	(5.55)	(5.25)
risk_alc	0.0158**	0.0202**	0.0129	0.0267	-0.0076	0.0167**	0.0159*	0.0176
	(2.90)	(2.70)	(1.69)	(1.13)	(-0.27)	(2.93)	(2.40)	(1.92)
use_drugbf	0.0445***	0.0471***	0.0450***	0.0903*	0.0753*	0.0364***	0.0481***	0.0433***
	(6.76)	(5.15)	(5.01)	(2.57)	(2.37)	(5.82)	(6.75)	(4.21)
N	22196	11679	10513	1658	2890	14965	12362	9772

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A5. Marginal Effects at the Means for the Estimation on Whether an Individual Used No Method of Birth Control at Last Sexual Intercourse

	All	Female	Male	Hispanic/ Latino	African American	White	Freshmen/ Sophomore	Junior/ Senior
AIDS_edu	-0.0135**	-0.0103	-0.0160**	-0.0304	-0.0312*	-0.0098	-0.0126**	-0.0137
	(-3.15)	(-1.54)	(-3.04)	(-1.49)	(-2.02)	(-1.92)	(-2.64)	(-1.91)
fem	0.0152***			0.0206	0.0094	0.0141***	0.0063*	0.0259***
	(5.69)			(1.91)	(1.01)	(4.86)	(2.40)	(5.32)
jun_sen	0.0067*	0.0146***	-0.0006	0.0446***	-0.0074	0.0062*		
	(2.58)	(3.57)	(-0.18)	(3.58)	(-0.77)	(2.38)		
af_am	0.0329***	0.0382***	0.0287***				0.0393***	0.0237**
	(6.25)	(5.07)	(3.48)				(5.24)	(3.12)
his_lat	0.0524***	0.0605***	0.0455***				0.0312***	0.0874***
	(5.62)	(4.76)	(4.29)				(4.31)	(4.69)
thrt_sch	0.0058	0.0079	0.0046	-0.0056	-0.0137	0.0119*	0.0016	0.0103
	(1.37)	(1.09)	(0.91)	(-0.30)	(-1.20)	(2.30)	(0.37)	(1.20)
drug_sch	0.0046	0.0071	0.0025	-0.0066	0.0015	0.0069*	0.0033	0.0060
	(1.46)	(1.40)	(0.71)	(-0.52)	(0.15)	(2.00)	(1.04)	(1.11)
risk_alc	0.0079*	0.0084	0.0081	0.0655***	0.0266	0.0002	0.0121*	0.0033
	(2.42)	(1.62)	(1.87)	(4.11)	(1.79)	(0.07)	(2.50)	(0.73)
risk_mar	0.0033	0.0022	0.0042	0.0130	0.0110	0.0004	0.0059	-0.0000
	(0.92)	(0.42)	(0.80)	(0.75)	(0.71)	(0.12)	(1.27)	(-0.01)
use_drugbf	0.0319***	0.0414***	0.0236**	0.0354	0.0254	0.0281***	0.0338***	0.0305***
	(5.68)	(4.37)	(3.18)	(1.48)	(1.39)	(4.43)	(4.14)	(3.54)
risk_cig	0.0250***	0.0332***	0.0155*	0.0147	0.0149	0.0233***	0.0303***	0.0192**
	(5.01)	(4.59)	(2.35)	(0.68)	(0.83)	(4.94)	(4.38)	(2.76)
risk_coc	0.0291***	0.0368*	0.0237*	0.0831*	0.0182	0.0247**	0.0090	0.0546**
	(3.32)	(2.57)	(2.30)	(2.13)	(0.52)	(2.69)	(1.18)	(3.04)
avg_grade	-0.0153***	-0.0244***	-0.0087	0.0095	-0.0166	-0.0224***	-0.0115**	-0.0194*
	(-3.57)	(-3.68)	(-1.61)	(0.79)	(-1.02)	(-4.26)	(-2.62)	(-2.09)
good_grade	-0.0147***	-0.0192***	-0.0103**	-0.0353*	-0.0280*	-0.0102***	-0.0110**	-0.0207***
	(-4.77)	(-3.81)	(-2.82)	(-2.23)	(-2.01)	(-3.54)	(-2.81)	(-4.09)
no_sports	0.0102***	0.0092*	0.0111**	0.0244	0.0248*	0.0060*	0.0087**	0.0114*
	(3.78)	(2.36)	(3.01)	(1.93)	(2.47)	(2.08)	(3.00)	(2.47)
sad_stop	0.0173***	0.0186***	0.0152***	0.0182	0.0345**	0.0143***	0.0191***	0.0141**
	(5.51)	(4.12)	(3.54)	(1.68)	(2.96)	(4.16)	(5.25)	(2.86)
N	44267	23424	20843	3717	6845	28105	24866	19289

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A6. Marginal Effects at the Means for Estimation on Whether an Individual Used Condoms at Last Sexual Intercourse

	All	Female	Male	Hispanic/ Latino	African American	White	Freshman/ Sophomore	Junior/ Senior
AIDS_edu	0.0175	0.0123	0.0244	0.0291	0.0246	0.0136	0.0151	0.0227
	(1.73)	(0.87)	(1.55)	(1.25)	(0.82)	(1.00)	(1.35)	(1.27)
fem	-0.0363***			-0.1210***	-0.0870***	-0.0126	-0.0495***	-0.0241*
	(-5.44)			(-4.76)	(-4.18)	(-1.65)	(-6.16)	(-2.18)
jun_sen	0.0923***	0.0993***	0.0801***	0.0707***	0.0759**	0.0982***		
	(12.70)	(11.01)	(7.60)	(3.55)	(3.27)	(12.23)		
af_am	0.2430***	0.1950***	0.2930***				0.2610***	0.2160***
	(15.52)	(11.13)	(13.37)				(14.98)	(9.20)
his_lat	0.0929***	0.0324	0.1530***				0.1170***	0.0592**
	(7.11)	(1.70)	(6.79)				(7.63)	(2.63)
thrt_sch	0.0259	0.0241	0.0268	0.0274	0.0873*	0.0173	0.0154	0.0289
	(1.76)	(1.21)	(1.31)	(0.61)	(2.00)	(1.13)	(1.00)	(1.15)
drug_sch	0.0144	0.0036	0.0224*	0.0497	0.0237	0.0089	0.0243*	-0.0029
	(1.78)	(0.30)	(2.01)	(1.96)	(0.97)	(0.97)	(2.32)	(-0.23)
risk_alc	0.1120***	0.0751***	0.1570***	0.0354	0.0164	0.1270***	0.1200***	0.0957***
	(12.59)	(6.59)	(11.91)	(1.46)	(0.46)	(13.42)	(9.15)	(7.24)
risk_mar	0.0633***	0.0606***	0.0595***	0.0663	0.1530***	0.0395***	0.0829***	0.0353*
	(6.25)	(4.32)	(3.96)	(1.91)	(5.55)	(3.56)	(5.84)	(2.37)
use_drugbf	0.2270***	0.2240***	0.2300***	0.2000***	0.1590***	0.2340***	0.2750***	0.2010***
	(16.12)	(11.17)	(11.99)	(3.35)	(3.93)	(14.45)	(12.30)	(10.12)
risk_cig	0.0802***	0.0878***	0.0654***	0.0782	0.0232	0.0850***	0.0953***	0.0750***
	(6.91)	(6.46)	(3.55)	(1.85)	(0.54)	(6.79)	(5.62)	(4.36)
risk_coc	-0.1190***	-0.0986***	-0.1370***	-0.0907	-0.3130***	-0.0886***	-0.0864***	-0.1500***
	(-7.42)	(-5.00)	(-5.68)	(-1.62)	(-4.31)	(-5.13)	(-4.39)	(-5.51)
avg_grade	-0.0152	0.0179	-0.0416**	0.0190	-0.0293	-0.0172	-0.0210	0.0174
	(-1.40)	(1.23)	(-2.68)	(0.72)	(-1.01)	(-1.30)	(-1.81)	(0.90)
good_grade	-0.0922***	-0.0706***	-0.1220***	-0.1490***	-0.1830***	-0.0650***	-0.0982***	-0.0828***
	(-11.80)	(-7.28)	(-10.64)	(-5.37)	(-6.93)	(-7.72)	(-11.73)	(-6.98)
no_sports	-0.0428***	-0.0161	-0.0678***	-0.0767**	-0.0685***	-0.0317***	-0.0474***	-0.0412***
	(-5.87)	(-1.67)	(-6.26)	(-3.22)	(-3.43)	(-3.79)	(-5.71)	(-3.44)
sad_stop	0.0010	0.0197*	-0.0214	-0.0033	-0.0295	0.00455	0.0223*	-0.0250*
	(0.13)	(2.26)	(-1.60)	(-0.15)	(-1.35)	(0.50)	(2.20)	(-2.17)
N	44516	23548	20968	3746	6928	28231	24955	19449

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A7. Marginal Effects at the Means for the Estimation on Whether an Individual used the Withdrawal Method at Last Sexual Intercourse

	All	Female	Male	Hispanic/ Latino	African American	White	Freshmen/ Sophomore	Junior/ Senior
AIDS_edu	0.0036	0.0025	0.0047	0.0132	0.0005	0.0002	-0.0015	0.0103
	(1.09)	(0.54)	(1.04)	(1.57)	(0.06)	(0.04)	(-0.36)	(1.93)
fem	0.0056*			-0.0047	-0.0042	0.0081**	0.0035	0.0082
	(2.41)			(-0.67)	(-0.52)	(2.90)	(1.40)	(1.83)
jun_sen	0.0197***	0.0215***	0.0172***	0.0210**	0.0337***	0.0154***		
	(7.23)	(6.60)	(4.48)	(2.94)	(4.64)	(4.99)		
af_am	0.0054	0.0014	0.0088				-0.0017	0.0165
	(1.22)	(0.28)	(1.27)				(-0.56)	(1.64)
his_lat	0.0016	-0.0036	0.0076				0.0015	0.0009
	(0.37)	(-0.68)	(1.04)				(0.29)	(0.10)
thrt_sch	-0.0004	-0.0103	0.0061	-0.0123	-0.0106	0.0020	0.0009	-0.0047
	(-0.11)	(-1.94)	(1.12)	(-1.38)	(-1.41)	(0.41)	(0.22)	(-0.66)
drug_sch	0.0058*	0.0108**	0.0008	0.0006	-0.0010	0.0060*	0.0059	0.0052
	(2.37)	(3.01)	(0.23)	(0.08)	.	(2.09)	(1.94)	(1.21)
risk_alc	0.0087**	0.0089	0.0085	0.0093	0.0171	0.0071*	0.0078	0.0100
	(2.62)	(1.87)	(1.77)	(1.02)	(1.26)	(1.97)	(1.95)	(1.64)
risk_mar	0.0178***	0.0164**	0.0190**	0.0192	0.0318*	0.0169***	0.0149**	0.0217**
	(4.20)	(2.93)	(3.21)	(1.06)	(2.46)	(3.73)	(2.96)	(3.06)
use_drugbf	0.0236***	0.0206**	0.0261***	0.0016	0.0272	0.0247***	0.0176**	0.0332***
	(4.55)	(2.80)	(3.90)	(0.13)	(1.42)	(4.27)	(3.02)	(3.48)
risk_cig	0.0100**	0.0123*	0.0072	0.0066	-0.0080	0.0116**	0.0104*	0.0114
	(2.81)	(2.49)	(1.39)	(0.50)	(-0.91)	(2.83)	(2.41)	(1.94)
risk_coc	0.0117	0.0142	0.0082	0.0212	0.0154	0.0076	-0.0005	0.0317*
	(1.92)	(1.50)	(1.20)	(0.93)	(0.49)	(1.15)	(-0.11)	(2.28)
avg_grade	-0.0017	0.0012	-0.0042	0.0058	-0.0069	-0.0010	-0.0021	0.0018
	(-0.50)	(0.23)	(-1.02)	(0.69)	(-0.64)	(-0.23)	(-0.66)	(0.26)
good_grade	-0.0075**	-0.0119***	-0.0023	-0.0139	0.0101	-0.0107***	-0.0071**	-0.0081
	(-2.68)	(-3.47)	(-0.48)	(-1.64)	(0.77)	(-3.71)	(-2.80)	(-1.37)
no_sports	0.0006	0.0018	-0.0002	0.0125	0.0004	-0.0007	-0.0011	0.0026
	(0.26)	(0.55)	(-0.07)	(1.62)	(0.07)	(-0.25)	(-0.47)	(0.57)
sad_stop	0.0096***	0.0090*	0.0102**	0.0119	0.0261***	0.0062	0.0072*	0.0128*
	(3.41)	(2.49)	(2.64)	(1.37)	(3.34)	(1.93)	(2.49)	(2.46)
N	44267	23424	20843	3564	6742	28105	24866	19289

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A8. Marginal Effects at the Means for the Estimation on Whether an Individual Has Ever Had or Caused a Pregnancy

	All	Female	Male	Hispanic/ Latino	African American	White	Freshmen/ Sophomore	Junior/ Senior
AIDS_edu	-0.0116***	-0.0085	-0.0122**	-0.0145	-0.0110	-0.0138***	-0.0110***	-0.0133
	(-3.48)	(-1.83)	(-2.73)	(-1.04)	(-0.71)	(-3.96)	(-3.38)	(-1.94)
fem	0.0139***			0.0158	0.0381***	0.0105***	0.0081***	0.0226***
	(7.14)			(1.79)	(3.65)	(5.91)	(4.75)	(5.04)
jun_sen	0.0191***	0.0234***	0.0142***	0.0390***	0.0591***	0.0108***		
	(8.92)	(7.12)	(4.79)	(5.26)	(4.77)	(5.76)		
af_am	0.0588***	0.0699***	0.0459***				0.0335***	0.0963***
	(7.48)	(6.67)	(4.73)				(5.84)	(5.79)
his_lat	0.0283***	0.0363***	0.0198				0.0182**	0.0458**
	(3.82)	(3.52)	(1.89)				(2.99)	(3.27)
thrt_sch	0.0199***	0.0208**	0.0141*	0.0326*	0.0222	0.0180***	0.0057	0.0431***
	(4.14)	(2.71)	(2.57)	(2.37)	(1.10)	(4.03)	(1.93)	(3.56)
drug_sch	0.0019	0.0017	0.0019	0.0112	-0.0074	0.0023	0.0008	0.0023
	(0.82)	(0.47)	(0.71)	(1.36)	(-0.61)	(1.12)	(0.42)	(0.45)
risk_alc	0.0059*	0.0025	0.0093*	-0.0029	0.0480*	0.0027	0.0071*	0.0035
	(2.08)	(0.57)	(2.46)	(-0.35)	(2.49)	(1.15)	(2.41)	(0.65)
risk_mar	0.0127***	0.0159**	0.0097*	0.0478**	0.0571**	0.0042	0.0094**	0.0162*
	(3.44)	(2.91)	(2.20)	(3.13)	(2.61)	(1.42)	(3.28)	(2.17)
use_drugbf	0.0135***	0.0148*	0.0103**	0.0201	0.0317	0.0113**	0.0059	0.0252***
	(3.85)	(2.13)	(2.81)	(1.48)	(1.82)	(3.20)	(1.90)	(3.65)
avg_grade	-0.0121***	-0.0184***	-0.0075	-0.0130	-0.0482*	-0.0072*	-0.0086***	-0.0161
	(-3.85)	(-3.38)	(-1.85)	(-1.65)	(-2.50)	(-2.51)	(-3.36)	(-1.95)
good_grade	-0.0083**	-0.0153***	-0.0010	-0.0129	-0.0175	-0.0062**	-0.0040	-0.0153**
	(-3.24)	(-4.19)	(-0.23)	(-1.50)	(-1.23)	(-2.66)	(-1.94)	(-2.96)
no_sports	0.0076***	0.0136***	0.0017	0.0183*	0.0156	0.0055**	0.0036*	0.0138**
	(3.85)	(4.47)	(0.68)	(2.52)	(1.49)	(2.93)	(2.11)	(3.22)
sad_stop	0.0091***	0.0091**	0.0095**	0.0157*	0.0306**	0.0052*	0.0085***	0.0103*
	(4.54)	(2.90)	(3.12)	(2.04)	(3.25)	(2.54)	(4.24)	(2.43)
risk_cig	0.0217***	0.0374***	0.0084*	0.0053	0.0157	0.0229***	0.0164***	0.0318***
	(5.10)	(5.46)	(2.00)	(0.44)	(0.93)	(5.56)	(3.54)	(4.35)
risk_coc	0.0181**	0.0074	0.0223**	-0.0057	0.0669	0.0125*	0.0157**	0.0161
	(3.12)	(1.01)	(3.17)	(-0.44)	(1.61)	(2.52)	(3.08)	(1.39)
N	41354	21844	19510	3404	6575	26544	23233	18013

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A9.
Marginal Effects at the Means for Each Dependent Variable for the Analysis Including Parent_talk

	sex_ young	***w/out parent_ talk***	***many_ lifpar***	***w/out parent_ talk***	***told_ STD***	***w/out parent_ talk***	***HIV_ test***	***w/out parent_ talk***	***no_bc***	***w/out parent_ talk***	***use_con***	***w/out parent_ talk***	***with-drawal***	***w/out parent_ talk***	***had_ preg***	***w/out parent_ talk***
AIDS_ edu	-0.0123	-0.0121 **	-0.0174 ***	-0.0206 ***	-0.0090 **	-0.0083 **	-0.0049	0.0016	-0.0125 ***	-0.0143 ***	0.0139	0.0276 ***	0.0018	0.0006	-0.0041	-0.0105 ***
	(-1.93)	(-2.64)	(-4.18)	(-5.81)	(-2.89)	(-2.81)	(-0.64)	0.22	(-3.44)	(-6.23)	(-1.64)	-4.9	(-0.82)	-0.32	(-1.92)	(-4.55)
parent_ talk	0.0098 *	-	0.0067 *	-	0.0048 **	-	0.0338 ***	-	-0.0039	-	0.0452 ***	-	-0.0015	-	0.0039 *	-
	(-2.38)	-	(-2.38)	-	(-2.59)	-	(-7.49)	-	(-1.75)	-	(-9.22)	-	(-0.78)	-	(-2.25)	-
N	62379	161641	61069	160259	40262	44543	19858		60614	158700	60844	159503	60614	158700	51793	99579

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A10. Estimation Results for AIDS_edu Including the Variable age						
	All	**14**	**15**	**16**	**17**	**18 and over**
sex_young	-0.0179*	0.00487	-0.0426**	-0.0288	-0.0122	0.0324*
	(-2.08)	(0.20)	(-2.66)	(-1.65)	(-0.60)	(2.05)
many_lifpar	-0.0139	-0.00359	-0.00647	-0.0203	-0.0496*	0.0300
	(-1.96)	(-0.57)	(-1.09)	(-1.91)	(-2.13)	(1.53)
told_STD	-0.00290	0.00524	-0.000430	-0.00510	-0.0138	0.00707
	(-0.94)	(1.30)	(-0.07)	(-0.87)	(-1.79)	(1.22)
HIV_test	0.00217	0.00361	-0.00288	0.0135	-0.00760	0.00305
	(0.32)	(0.25)	(-0.25)	(0.97)	(-0.41)	(0.11)
no_bc	-0.0130**	-0.0126	-0.00455	-0.00673	-0.0155	-0.0280*
	(-3.12)	(-1.09)	(-0.90)	(-1.00)	(-1.60)	(-2.08)
use_con	0.0186	0.00899	-0.00310	0.0394*	0.00374	0.0543
	(1.85)	(0.43)	(-0.19)	(1.97)	(0.15)	(1.69)
withdrawal	0.00339	0.00218	-0.00298	-0.00384	0.00886	0.0226*
	(1.06)	(1.12)	(-0.52)	(-0.48)	(1.19)	(2.56)
had_preg	-0.0105***	0.0009	-0.0024	-0.0229**	-0.0145	-0.0152
	(-3.38)	(0.53)	(-0.91)	(-3.25)	(-1.41)	(-1.07)

Marginal effects; *t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

APPENDIX B

Table B1. Correlation Matrix for Independent Variables

	AIDS_edu	*fem*	*jun_sen*	*fre_sop*	*his_lat*	*white*	*thrt_sch*	*drug_sch*	*risk_alc*	*risk_mar*	*risk_cig*	*use_drugbf*	*good_grade*	*avg_grade*	*no_sports*	*sad_stop*
AIDS_edu	1															
fem	0.0141	1														
jun_sen	0.0402	0.0042	1													
fre_sop	-0.0375	-0.0037	-0.995	1												
his_lat	-0.0544	0.0022	-0.0247	0.0243	1											
white	0.0644	-0.0118	0.0326	-0.031	-0.4122	1										
thrt_sch	-0.0612	-0.0728	-0.0497	0.0471	0.009	-0.0351	1									
drug_sch	-0.0116	-0.0939	-0.0044	0.0034	0.012	0.0176	0.164	1								
risk_alc	-0.0136	-0.0509	0.1251	-0.1257	-0.0236	0.1364	0.1091	0.2327	1							
risk_mar	-0.0088	-0.0654	0.0747	-0.0763	-0.0304	0.0265	0.1186	0.2878	0.4452	1						
risk_cig	-0.0213	0.0116	0.0946	-0.0962	-0.0518	0.0982	0.1054	0.2041	0.3334	0.3816	1					
use_drugbf	-0.0407	-0.057	0.0821	-0.0851	-0.0133	0.0182	0.1245	0.1969	0.3605	0.3607	0.2979	1				
good_grade	0.0333	0.1142	0.0117	-0.0116	-0.0914	0.1486	-0.067	-0.1025	-0.1038	-0.1557	-0.1368	-0.0943	1			
avg_grade	0.0561	0.0875	0.0787	-0.0751	-0.0786	0.1089	-0.0844	-0.0915	-0.0697	-0.1326	-0.1329	-0.1031	0.2213	1		
no_sports	-0.0103	0.0978	0.0668	-0.0681	0.066	-0.0809	-0.0037	0.0012	-0.0303	0.0396	0.1162	0.0264	-0.1217	-0.116	1	
sad_stop	-0.0302	0.1522	0.0023	-0.0032	0.0479	-0.0546	0.1466	0.1374	0.1127	0.123	0.16	0.0971	-0.1056	-0.0996	0.0982	1

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