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Condom Use and STD Prevention Amongst Males in NSFG Survey 2006-2008

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Abstract

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By Richard Chang

Objective: Using the National Survey of Family Growth we examine the associations of formal education related to sexually transmitted diseases to condom usage outcomes at first sex, and of STD testing to the condom use outcome at last sex and at condom use consistency in the past 12 months for a population of male participants aged 15-44.

Methods: The data source used was a cross-sectional survey design and statistical analyses were conducted using SAS. Survey procedures were used to adjust for the complex sample design of the NSFG dataset. Models with bivariate outcomes for condom use at first sex, condom use at last sex, and condom use consistency for the last 12 months, were analyzed using chi-square tests and logistic modeling. The predictor variables of interest were STD education before first sex for condom use at first sex, and having been tested for STDs in the past 12 months, for condom use at last sex and condom use consistency.

Results: Age at interview, and sexual experiences such as age at last sex, relationships to partners, number of partners, HIV/AIDS education and recent STD advice were significant. The variables that were non-significant across all three condom outcomes were formal instruction about STDs before 18, grade when received instruction on STDs, recent genital warts, and had recent sex with an HIV-positive female.
The models for condom use at first sex and condom use consistency were not significant. Condom use at last sex yielded a final model where having been tested for STDs in the past month was significant ($p<.0001$) when controlling for receiving recent STD advice ($p=0.749$), relationship to partner at last sex ($p=0.0003$), reason for condom use at last sex ($p<.0001$), condom use attitudes ($p=0.1382$), age at interview ($p<.0001$), and race ($p<.0001$).

Conclusion: The findings from this study draw associations between condom usage and STD education and experience, as well as the influence of relationships and condom use attitudes. These results are useful in creating effective strategies to increase condom use behavior by identifying populations at risk, and time periods for intervention and education to control for the spread of STDs.

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TABLE OF CONTENTS

BACKGROUND/LITERATURE REVIEW

Sexually transmitted diseases consist of a category of diseases which are primarily passed through sexual contact. STDs comprise of a large number of diseases, including chlamydia, gonorrhea, viral hepatitis, genital herpes, HIV/AIDS, human papillomavirus, syphilis, and trichomoniasis (1). The Centers for Disease Control and Prevention (CDC) estimates that 45 million Americans have been infected with genital herpes, 20 million with human papillomavirus, and more than 1 million people with HIV. Certain age groups are more exposed, as in the United States, approximately 25% of the sexually experienced population are within the age group 15-24. In the year 2000, there were an estimated 18.9 million new cases of STDs, of which 9.1 million (48%) occurred among the 15-24 age range (2). The severity of these illnesses varies from being inconvenient, to being debilitating and life threatening. STDs if untreated, can cause pelvic inflammatory disease, chronic pelvic pain, ectopic pregnancy, birth complications, and infertility among women, and epididymitis and urethritis among men (3). In addition to this, there is a large economic burden associated with the medical costs for treatment and productivity costs. In 2002, the cost of new HIV infections in the United States was estimated at $36.4 billion; $6.7 billion in direct medical costs and $29.7 billion in productivity losses (4, 5).

STIs are spread through sexual relations with more risk factors occurring with unsafe behaviors. "Unsafe" behaviors include having multiple partners, not using condoms, and drug usage. Having multiple partners increases the risk of STIs. For one to be non-monogamous, defined by having multiple concurrent partners, there is a higher risk of transmitting STIs to others; a partners' non-monogamy is a risk factor for acquiring STIs and mutual non-monogamy is a population level determinant of STI spread (6). Recent research from 2002 indicates that 17.6% of women and 23.0% of men reported non-monogamy. As for drug usage, amongst sexually active adolescents (9^{th}-12^{th} grade) in the 1999-2007 Youth Risk Behavior Surveillance System, males who used alcohol, cigarettes, marijuana, and cocaine were more likely to use no method of contraception

protection or use withdrawal as a method, and females who had six or more partners were more likely to rely on withdrawal or other forms of contraception that do not protect from STIs (7). Forty percent of injecting drug users used condoms at last intercourse, and only 22% of people with increased risk of HIV used condoms at last intercourse within an ongoing relationship (8).Trends such as these are indicative of the potential risks of STIs in the US.

Contraceptive use has been highly advocated in sexual health as a means of birth control and for control of the spread of sexually transmitted infections. The effectiveness of contraceptives varies by type for the purposes of birth control. Recent literature has found the effectiveness of various forms of contraceptives in descending order to be: female sterilization, long-acting hormonal contraceptives, Cu-IUDs with $\geq$ 300 mm2 surface area, Cu-IUDs with < 300 mm2 surface area and short-acting hormonal contraceptives (injectables, oral contraceptives, the patch and vaginal rings), and barrier methods and natural methods (9). The study demonstrates that certain methods may be effective for family planning, but not for STI protection. Barrier contraceptive use has been important in the field of sexual health in terms of control of the spread of sexually transmitted infections, however it is ranked fourth in terms of effectiveness for birth control. Barrier contraceptives include condoms (male and female condoms), cervical caps, and diaphragms. The usage of condoms alone is not the most effective method of birth control, and as such, other forms of contraceptives are sometimes used in replacement of, rather than in conjunction with condoms.

Past research has stressed the importance of condom usage for STI prevention. A study by Nielson, et al. found that consistent condom use is associated with a lower prevalence of the Human Papillomavirus Infection in men (10). In their study they tested a group for men ages 18-40 years for HPV and conducted a questionnaire survey to obtain information such as number of sex partners and frequency of condom usage. The research showed that 37.9% of those who reported “always” using condoms were positive for HPV versus 53.9% of those who “never”

used condoms tested positive for HPV. Having multiple partners also showed interaction effects for HPV. Patients who have previously contracted STDs are also more likely to experience a future STD, including HIV. A study conducted by Scott-Sheldon, et al. applied a behavioral intervention to reduce sexual risk behavior and succeeded in increasing condom usage and decreasing the number of incident STDs in the process (3).

The current rates of condom usage (as of a 2010 study) in a national probability sample is about 21.5% by men and 18.4% for women in the past 10 vaginal intercourse events. Among adolescent men, the reported condom use was 79.1% and 58.1% for women for the past 10 vaginal intercourse events. Condom usage was highest among unmarried adults, higher among adolescents than adults, and higher among black and Hispanic individuals compared to other racial groups (11, 12). Condom use was also associated with fewer previous occurrences of previous intercourse and not using other forms of contraception.

There are several other forms of precautionary measures which can be taken to prevent the spread of STIs in addition to contraceptive usage. These include immunization, male circumcision, and periodic STI testing. For the purpose of this study, we will not examine these methods, however, they may be important in influencing attitudes towards condom usage.

Condom usage is an issue of adhering to a behavior. Whether one practices condom usage depends on a few factors, including whether they have been educated about the practicality and situational necessity of condoms. Individuals who have had STDs are more likely to have another STD in the future, such as HIV. Scott-Sheldon, et al investigated behavioral interventions to reduce sexual risk behavior and incident STDS in a meta-analysis study (3). Behavioral interventions do tend to be effective in reducing the risk amongst groups most at risk for HIV (such as young adults and blacks). For condom use specifically, interventions were effective when targeting specific groups (3). Using condom use self-efficacy (CUSE) as a measurement

tool, condom use was measured to be higher for males and females who reported higher decision making confidence. However, condom use at last sex was weaker for those with a high decision-making approach amongst females (13). This study suggests that condom use may be increased by using interventions geared towards decision-making styles and gender.

For this study, the male respondent data for the NSFG survey contains a wide variety of data which is relevant to gauge the amount of STD knowledge based on parental communication, sexual education, and history of STDs. Also important would be to examine whether the motivations for contraceptive use are based on birth control, through examining histories of pregnancy, having received a vasectomy, and the actual forms of contraceptive use. A similar study was conducted to examine the relationship between formal sex education and the use and type of contraceptive used at coital debut among female adolescents (15). This study focused on females 15-19 years of age and found that 91% reported formal sex education of various methodology. These groups included abstinence only (AO), birth control methods only (MO) and a comprehensive (AM) form of education. The overall use of contraceptive use at first sex did not differ, however, a higher proportion of the MO group used a reliable method of contraception. Amongst male adolescents aged 15-19, Manlove, et al. conducted a study using the National Survey of Family Growth to determine factors associated with condom use at first sex and last sex, as well as for consistency. This study was based on the 2002 dataset and found that male Hispanics, who did not receive formal sex education, had lower odds of condom use and/or consistency, while African-American male adolescents and those with positive condom attitudes had greater odds (14). Other factors that were associated with lower odds of contraceptive use included males who were older at most recent sex, who had an older partner or a casual first partner, a partner who used a method of contraception, who were in longer relationships, or who engaged in more frequent sex.

This study aims to demonstrate the motivations behind condom usage and how it relates to the background of the people who use it. For example, some people may use condoms purely for the purpose of birth control, so when the risk of unplanned pregnancy is removed by other means such as by sterilization/vasectomy, they may cease to use condoms. If condoms are not being considered as a means of lowering STI risk, then they may be considered redundant for the role of birth control if other forms of contraceptives are already being used. In other cases, some subjects may be misinformed of methods of contraceptive use which may be instrumental in prevention of STIs.

The purpose of this study is to examine the factors which influence condom usage for men, focusing on whether previous contraction of an STD and earlier sexual health education promote the usage of condoms, presumably for the purpose of protecting against STD infection and transmission. In terms of STD control, the dataset from the National Survey of Family Growth (NSFG) has many potential applications and can be used to examine various demographic factors and can be applied to the male population to assess different trends. In analyzing this dataset we hope to determine what variables are most influential in the usage of barrier contraceptives and the motivations behind them. The main outcome of interest is condom usage, and the predictors of interest are STD education, and previous experience with STDs. Knowing this information may be helpful in the designing of future sexual health interventions.

METHODS

Subject Population and Study Design:

The data set is taken from the National Survey of Family Growth, which represents the household population of the United States 15-44 years of age. The interviewing and data processing of this cycle was performed by the University of Michigan's Institute for Social Research (ISR) under a contract with the National Center for Health Statistics (NCHS). The sample for Cycle 7 (2006-2008) of this survey includes at least 13,495 interviews. Sampling is conducted in about 33 areas as Primary Sampling Units per year and is nationally representative (not estimated for individual states). In person interviews were conducted with 7,356 women 15-44 years of age, and 6,139 men aged 15-44 for a total sample size of 13,495. For this study, survey data for male responses will be examined. The interviews were conducted by trained female interviewers using laptops, notebooks, and computers, using a procedure called computer-assisted personal interviewing (CAPI). Interviews for women took about 80 minutes and interviews for men took about 60 minutes.

This study is based on survey data of a cross-sectional design from the year 2002. The data was collected through a process of continuous interviewing, which began in June 2006 and ended in December 2008. Interviews are conducted 48 weeks of every year and the data is based on a nationally representative sample. Sampling occurs in 33 areas per year, so for the time period of 2006-2008, data in 66 areas should be representative of the national sample.

A publicly accessible male respondent dataset was available through the NSFG website (16) which contained information relating to background and demographics, sexual education, partner relationships, and health conditions. Obtaining further information relating to STD/HIV risk behaviors required special request of the Audio Computer-Assisted Self-Interviewing (ACASI) data file. The ACASI process was used for more sensitive questions, where the respondents

would hear the questions through headphones or read it from a laptop screen and enter the answers directly into the computer to allow more privacy. Accessing this dataset required submitting a research proposal and a signed user agreement form, but was necessary to acquire the relevant data and variables for STD experiences. IRB approval was not required as this study was analytical research from a public use dataset and human subject research was not conducted.

The primary endpoint of interest for this analysis was the use of barrier contraceptives, specifically condoms. The outcome variables were condom use at first sex and condom use at last sex, and were selected to reflect representative condom usage and attitudes at the beginning of one's sexual history as well as the most recent time point of one's sexual history. An additional variable was selected for the percentage of condom use over the past 12 months, to examine most recent condom use consistency. The survey question was phrased as "During the past 12 months, what percent of the times that you and she had sex together did you use a condom?" and was asked under the condition that the participant reported any birth control method use in the last 12 months with his most recent sexual partner and did not report using any birth control method at his last or first sex with his most recent partner. These variables originally represented different categories of contraceptives, (including withdrawal, pill, female sterilization, etc) however, for the purpose of redefining the variables as dichotomized outcomes, they were coded as either having condom use or not. The purpose of this study was to examine the reasons for condom usage, therefore the cutoff for the percentage of consistent condom use was selected to be a high percentage at 90% to gauge the responses for participants who would almost always use condoms in their current sexual life versus not.

The predictor variables were selected based on four categories of interest: background and demographic information, sexual education and background, risk behaviors, and condom attitudes. In the background and demographic information category, variables included age at the time of the screening, ethnicity, and education level. Race/ethnicity was categorized as Hispanic, non-

Hispanic white, non-Hispanic black, and non-Hispanic other. Hispanics and blacks from ages 15-24 were oversampled in this study, so the races were categorized distinctly. Education was separated as some high school or less (defined by 9^{th} grade or less, 10^{th} grade-11^{th} grade), high school graduate (defined by 12^{th} grade), and some college or more (1 year of college or more). For the outcome variable of condom usage at first sex, the main predictor of interest relates to sexual education in relation to when the participant engaged in first sexual intercourse, however, the survey questions relevant to sex education were asked to participants aged under 25. To account for this, the population of interest for the condom use at first sex variable was limited to participants under 25 years of age.

Sexual education and experience contained variables to gauge the amount of sexual experience of the participant. The variables included age at first sex, age at last sex, relationship to first partner, relationship to last partner, number of partners in a lifetime, number of partners in the past 12 months, number of partners in the past 3 months, and formal sexual education and counseling related to STDS.

For risk behaviors, variables of interest related to whether or not the participant had been tested and /or treated for STDS in the past year. For participants who had been treated for STDs, additional questions were asked for whether they had gonorrhea in the past 12 months or chlamydia in the past 12 months. Whether the participants had herpes or had genital warts was asked to all participants regardless of STD treatment in the past 12 months. The STD specific variables were used for the univariate analysis, but for the purposes of modeling, the variables for being tested for STDs and being treated for STDs were used.

Condom attitudes were gauged by two questions: for the last sex, why was the condom used, and "What is the chance that if you used a condom during sex, you would feel less physical pleasure?". The responses for condom usage were coded as: to prevent pregnancy, to prevent

STDs, both reasons, or for some other reason. For the model, the responses were condensed and coded as: to prevent STDs (defined by prevent STDs and both reasons) and other reasons (defined by prevent pregnancy and other reason). The responses about physical pleasure and condom usage gauged from “no chance”, “little chance”, “50-50 chance”, “pretty good chance”, to “almost certain chance”.

All statistical analyses were conducted using SAS. To account for the complex sample design of the NSFG datasets, analyses needed to be adjusted for weighting, stratification, and clustering. Survey procedures in SAS were used to adjust the variables, using the provided stratum variable, “sest”, cluster variable “secu”, and weighting variable “finalwgt30”. For the outcome variable for condom use at first sex, in order to limit the population to participants 25 years and under, a domain statement was used to define the subpopulation in the surveyfreq and surveylogistic procedures.

Univariate Analysis:

The chi-square tested for the variables that were significantly related to condom use at first sex, condom use at last sex, and 90% or greater condom use consistency over the past 12 months. The null hypothesis was that there was not a significant difference between the predictors and the condom use outcomes. For example, in the chi square test comparing condom use at first sex and age at screener, the null hypothesis is that there are no significant differences between the age categories of the participants who used condoms at first sex and who did not use condoms at first sex. P-values 0.05 or less were considered significant, and variables with p-values less than 0.001 and 0.0001 were noted as being highly significant.

Chi square tests were performed using a proc surveyfreq with a chi sq statement for each of the variables against each of the condom use outcome variables. A positive response for the condom

use at first sex and last sex were the outcomes of interest, as well as a condom use consistency of 90% or higher.

Multivariate analysis:

Three models were created to correspond to each of the condom use outcome variables: condom use at first sex, condom use at last sex, and condom use consistency in the past 12 months. Based on the chi square tests, the variables significant to the condom outcome variables can be determined and chosen to fit in the model.

For Model 1, condom use at first sex, the primary exposure of interest was STD education before first sex. As previously mentioned, the population was limited to participants 25 years and under. Another exposure of interest was formal STD education before age 18. Age at first sex was another predictor of interest, as well as relationship to first partner at first sex. Condom use attitudes, ethnicity, and education were controlled for in the model as potential confounders. For the purpose of modeling, any formal STD education combined the variables for STD education before 18 and HIV/AIDS education before 18, and STD education before first sex combined the variables for STD education before first sex and HIV/AIDS education before first sex, in order to have a simpler, and more comprehensive variable set without potential response overlap.

For Model 2, condom use at last sex, the primary exposure of interest was having been tested for STDs in the past 12 months. Other exposures of interest, which were assessed, included STD treatment, age at last sex, relationship to last partner at last sex, number of partners in the past 3 months, having received STD advice in the past 12 months, reason for condom use at last sex, and condom attitudes. Age at interview and ethnicity were controlled for in the model as potential confounders.

For model 3, condom use consistency in the past 12 months, the primary exposure of interest was also having been tested for STDs in the past 12 months. Other exposures of interested which were

assessed included STD treatment, age at last sex, relationship to last partner at last sex, number of partners in the past 12 months, having received STD advice in the past 12 months, reason for condom use at last sex, and condom attitudes. Age at interview, ethnicity, and education were controlled for in the model as potential confounders.

To determine the best fit model, backwards elimination was used in the full logistic model to remove non-significant variables. The full model was entered into the proc surveylogistic to assess the odds ratio of the main exposure of interest. Using the full model as the gold standard, variables were removed individually to assess whether or not the odds ratio of the predictor changed beyond a 10% range from the standard, and to examine whether precision decreased or increased. If a variable caused the odds ratio to remain within the 10% range and decreased the confidence interval (thus increasing the precision), then the variable could be dropped. If a variable caused the odds ratio to change beyond the 10% scope and/or increased the confidence interval, then the variable was retained in the model to control for as a potential confounder. In each step, the best variable was removed from the model on an individual basis, until nothing further could be removed, based on controlling for potential confounders, and retaining the relevant variables to the model. In running a stepwise logistic model, collinearity is also assessed and problematic variables are removed from the model.

RESULTS

Univariate Chi-Squared Analysis

For the first sex condom use outcome, the significant variables ($p<0.05$) were race, grade when received instruction on STDs, number of partners in the past 12 months, had gonorrhea in the past 12 months, and had herpes ever. The highly significant variables ($p<.0001$) were age at interview, education level, age at first sex, age at last sex, relationship to first partner at first sex, relationship to last partner at last sex, number of partners in a lifetime, formal instruction about HIV/AIDS before 18, received advice about STDs in the past 12 months, received advice about HIV/AIDS in the past 12 months, tested for STDs in the past 12 months, and why condom was used at last sex.

For the last sex condom use outcome, the significant variables ($p <0.05$) were race/ethnicity, received instruction about HIV/AIDS before/after first sex, tested for STDs in the past 12 months, treated for STDs in the past 12 months, and had herpes ever. The more significant variables were relationship to first partner at first sex, number of partners in a lifetime, formal instruction about HIV/AIDS before 18, and received advice about HIV or AIDS in the last 12 months. The highly significant variables ($p<0.0001$) were age at interview, education, age at last sex, relationship to last partner at last sex, number of partners in lifetime, number of partners in the past 12 months, number of partners in the last 3 months, received advice about STDs in the last 12 months, why condom was used at last sex, and chance of less physical pleasure if used condom.

For the condom use consistency, the significant variables ($p<0.05$) were number of partners in the past 12 months, received instruction on STDs before/after first sex, and received advice about STDs in the last 12 months. The more significant variables ($p<0.001$) were received instruction on HIV/AIDS before/after first sex and why condom was used at last sex. The highly significant variables were age at interview, age at last sex, relationship to first partner at first sex,

relationship to last partner at last sex, number of partners in a lifetime, number of partner s in the last 3 months, received advice about HIV or AIDS in the last 12 months, had gonorrhea in the past 12 months, and the chance of less physical pleasure if used condom.

In comparing the three different condom outcomes, there were more significant variables in first and last condom usage than in the condom usage consistency in the past 12 months. Across the three outcomes, age was significant (all highly significant $p<.0001$), as was age at last sex (all highly significant $p<.0001$), relationship to first partner at first sex (varied significance), relationship to last partner at last sex (all highly significant $p<.0001$), number of partners in a lifetime (all highly significant $p<.0001$), number of partners in past 12 months (varied significance), received instruction about HIV/AIDS before/after first sex (varied significance), received advice on STDs in the last 12 months (varied significance), and received advice about HIV/AIDS in the last 12 months, (varied significance). The variables that were non-significant across all three condom outcomes were formal instruction about STDs before 18, grade when received instruction on STDs, had genital warts in the past 12 months, and had sex with an HIV-positive female in the past 12 months.

The variables associated with increased condom use at first sex are younger age, African-American ethnicity, younger age at first sex, somewhat casual relationship statuses, receiving STD instruction at later grade levels, receiving instruction on STDs after first sex, receiving formal HIV/AIDS instruction before 18 and after first sex, receiving STD advice in the past 12 months, receiving HIV/AIDS advice in the past 12 months, having been tested for STDs in the past 12 months, not having herpes in the past 12 months, and having syphilis in the past 12 months.

For last sex, increased condom usage occurs towards younger age, African-American ethnicity, younger age at last sex, having received formal instruction about HIV/AIDS before 18 and before

first sex, receiving STD advice in the past 12 months, receiving HIV/AIDs advice in the past 12 months, having been tested for STDs in the past 12 months, having been treated for STDs in the past 12 months, not having chlamydia in the past 12 months, condom usage to prevent both pregnancy and STDs, and having positive condom use attitudes (no belief of a loss of physical pleasure in sex if using condom).

Finally, for high condom usage consistency, the associated factors were younger age at screening, older age at first sex, younger age at last sex, having a first relationship of living together but not being engaged, having fewer recent partners in the past 3 months, receiving STD instruction before first sex, receiving HIV/AIDS instruction before first sex, received STD advice in the past 12 months, received advice on HIV/AIDs in the past 12 months, having gonorrhea in the past 12 months, and having positive condom attitudes.

Multivariate Analysis:

<u>The logistic model for condom use at first sex:</u>

The logistic model for condom use at first sex yielded a final model where receiving sexual education before first sex (OR= 0.99 p=0.957) was not a significant predictor of condom usage when controlling for sexual education before age 18 (OR=0.31 p=0.113), relationship to partner at first sex (OR=1.06 p=0.550), age at first sex (OR=1.04 p=0.61), condom use attitude (OR=0.85 p=0.048), and race (OR= 0.94 p=0.559).

<u>The logistic model for condom use at last sex:</u>

The model for condom use at last sex yielded a final model where having been tested for STDs in the past month was significant (OR=2.18 p<.0001) when controlling for receiving STD advice in the past 12 months (OR=1.32 p=0.749), relationship to partner at last sex (OR=1.90 p=0.0003), reason for condom use at last sex (OR=1.44 p<.0001), condom use attitudes (OR=0.89 p=0.138),

age at interview (OR=0.63 p<.0001), and race (OR=1.45 p<.0001). In the backwards elimination process, the number of partners in the last 3 months was the first variable dropped, however it did have a significant relationship to the condom use outcome (OR=2.37 {1.70, 3.30}). The next variable removed was age at last sex (OR=2.37 {1.71, 3.29}. The final variable dropped was STD treatment (OR=2.18 {1.73, 2.75}). These variables were statistically significant, however, they were not confounding and did not contribute to the model additionally, so they were dropped. Relationship at last sex, reasons for condom use, age, and race were statistically significant in the final model.

The logistic model for condom use consistency:

The model for condom use consistency yielded a final model where being tested for STDs in the past 12 months (OR=0.63 p=0.170) was not a significant predictor of condom usage consistency, when controlling for having been treated for STDs in the past 12 months (OR=0.19 p=0.114), receiving STD advice in the past 12 months (OR=1.71 p=0.171) , number of partners in the past 12 months (OR=0.59 p=0.021), age at last sex (OR=0.56 p=0.050), relationship to partner at last sex (OR=1.96 p<.0001), reason for condom use (OR=0.82 p=0.814), condom use attitudes (OR=1.09 p=0.800), age (OR=2.05 p=0.114), and race (OR=0.85 p=0.335). The variables for age at last sex, relationship to last partner, and number of partners in the past 12 months were statistically significant in the model.

DISCUSSION

The overarching goal of this study was to determine what experiences promote condom usage, particularly whether or not being tested for STDs or having education regarding STDs increases awareness of the benefits of condom usage. In our study, sexual education before first sex was not found to be correlated with a higher rate of condom usage with first sex and having been tested for STDs was also not significantly related to condom usage consistency over the past 12 months, however, having been tested for STDs in the past 12 months was a predictor of positive condom usage at last sex. In this research topic, condom use at last sex would be the best indicator of condom usage trends in terms of the quality of the defined variable and reliability. Predictor variables were limited to a smaller population for first sex (under 25 years old), and condom use consistency did not account for the actual number of sexual encounters over the 12 month time period. Condom use at last sex takes the entire study population (who had sex) into consideration and measures the behavior at the time of the most recent event. Because of this, we can use the model for condom use at last sex as a representative predictor of condom use behaviors and attitudes.

In examining our variables, the demographics of age, race, and education level had significant relationships to condom use at first sex and condom use at last sex, but only age was significant for condom use consistency. Age has an association with condom use in all three outcome categories, with younger age having higher odds of condom usage, which may be associated with different generational attitudes towards sex, as well as having factors of better communication or awareness of the benefits of condom usage. For race, previous literature has demonstrated that African-American males tend to have a higher condom use, partly because of the greater likelihood of discussing sex and contraception with their parents, peers, and partners (17-19), and this trend is consistent in the NSFG dataset for condom use at first sex and condom use at last sex. The trend does not follow with the condom use consistency variable (a slightly higher percentage

of non-Hispanic others have a higher condom use consistency than African-American males). However, this result is not significant, which may be due to having too limited of a sample of non-Hispanic others (n=101) to accurately represent that part of the population. School education is a significant variable in both first sex and last sex, however, there does not appear to be a consistent trend between education level and condom usage, i.e. a higher education level does not necessarily result in a higher condom usage outcome. Education level can tend to be an indicator of socio-economic status, however, due to the inconsistent trend between condom use and education level of the participants, it may be in fact more related to age. There may be factors of collinearity or confounding effects from socioeconomic status, age and relationship status, so it was ultimately left out of the models after examining the chi squared analyses.

Condom usage trends amongst younger unmarried adults are consistent with previous literature (11, 12). Younger age at first sex had a positive relationship with condom usage at first sex outcome however, it was not found to have a relationship to condom usage at last sex or consistency in the past 12 months outcomes, which is logical in terms of the chronology of events. Younger age at last sex, however, had a positive relationship with condom usage and is significant amongst all three of the outcomes. The relationship between age at last sex and condom use at first sex is highest amongst younger age groups, which may indicate that there is some potential overlap, where the occurrence of "last sex" could also be the "first sex" for younger participants who have only had sex once. There may also be issues of recall bias, where participants are more likely to remember recent events related to the condom use at last sex and condom use consistency variables along with other recent variables, and less likely to recall condom use at first sex and experiences related to first sex, unless the participants are younger and the events have occurred more recently for them. This is also relevant to the set of questions asking the number of partners that a participant had in the periods of a lifetime, 12 months, and 3 months. The number of partners beyond a certain threshold was categorized together as one

group (10 or more partners in a lifetime, 3 or more partners in the past 12 months, and 3 or more partners in the past 3 months). There is a higher use of condoms with the number of partners in the past 3 months (OR=2.37 {1.70, 3.31}) in last sex, which may follow a trend of non-monogamy (6) and a higher perceived STD risk. As previously mentioned, the fewer the experiences and the younger the participant, the less recall bias would be expected. The age range of the study overall was limited to 15-44, so the amount of recall bias should be limited.

The set of questions for sexual education was limited to participants aged 25 and under, so the results for those were only used for the first sex condom use outcome restricted by the domain statement to participants 25 years and under. The idea behind using the STD education before/after first sex was to establish whether or not there education was effective in the chronology of events. Ideally, we would have liked to have found that there was a significant relationship between STD education before first sex and first condom usage, wherein receiving education early on is positively correlated with a higher condom use at first sex. However, the result of receiving education before or after first sex was not significant from the univariate chi square analysis, nor in the logistic model, so such a conclusion cannot be made.

Treatment for STDs was a broad category that was significant in condom use at last sex. Follow up questions to whether the participant has been treated for STDs, were whether they had contracted gonorrhea or chlamydia in the past 12 months. Herpes, genital warts, and syphilis status was also asked about, but to all participants, not just those treated in the past 12 months, which is because of the chronic status versus recent infection. The variables were not used as part of the predictive modeling, however, because the sample sizes were relatively low (for yes n=33 for gonorrhea, n=34 for chlamydia, n=77 for herpes, n=136 for genital warts, and n=39 syphilis), and the chi square analysis showed variable significance in gonorrhea and herpes, and no significance in the others, making them inadequate predictors, so they were kept in the descriptive tables and not included in the models. Similarly, the question about whether a participant had sex

with an HIV-positive female in the past 12 months would be informative about sexual risk behaviors and the relationship to condom use, however, the chi-square analysis was also statistically insignificant and lacking in sample size. For future studies, a way to improve the analysis, if a larger sample size cannot be acquired, would be to categorize similar outcomes as a single variable. In this case, grouping together all STDs (herpes, genital warts, syphilis, chlamydia, and gonorrhea) as a single variable could improve the power of the analysis and provide other informative data. For the purposes of this study, however, the predefined variable for having been tested for STDs was used instead.

Overall, model 1 was expected to be useful in examining first behaviors, most effectively with younger participants who had first sex events in their more recent history. However, the exposure for STD education before first sex was not significant and was limited in several ways, such as by the age group, as previously mentioned. Also many of the descriptive variables were not pertinent to first sex, so they were not included. The chi-square analysis showed significance between several variables in relation to condom use at first sex, but not in a context that would be relevant as a predictor of condom use at first sex, such as tested for STDs in the past 12 months. A possible interpretation for this is that condom use at first sex is indicative of attitudes towards condom use and STD awareness, so that may be the relationship to being tested for STDs. However, with a greater length of time between the first sex and the time of the interview, there may be poor recall bias

For models 2 and 3, we were most interested in the events that occurred within the past year relating to the model 2 outcome (condom use at last sex) and the model 3 outcome (condom use consistency). STD advice and HIV advice in the past 12 months were both found to be relevant to condom use outcomes. The condom use consistency outcome was conceptually interesting, however, the variable provided in the dataset was limited by the skip pattern used for the survey. The survey question required that the participant reported any birth control use in the last 12

months with his most recent partner, and did not report any birth control at his last or first sex with his most recent partner. This condition causes the consistency of condom use, by default, to be greater than 0% and limits the population to only participants who had sex in the past 12 months. Another potential variable that was considered to measure consistency of condom use was "condfreq" which measured condom use consistency with current wife or partner and was asked if the participant's first sex with the partner was within the past 12 months and a method was used or the last sex was within 12 months and a method was used. The same limitations where condom consistency was greater than 0% and the same time frame issue occurred with this variable, and it also limits the population to participants who are currently married or cohabiting, in which we would not expect a high condom use outcome, at least not for the purposes of STD prevention. In addition to that, condom use consistency was measured, but did not account for the actual number of sexual intercourse events of each participant. Participants who engaged in sex very few times and used condoms for a certain ratio of the times was weighted the same as participants who engaged in sex very regular and also used condoms at the same ratio (for example, a participant has sex twice and uses condoms twice, versus a participant who has sex one hundred times and uses condoms fifty times and is exposed to a much greater amount of risk). Overall, condom use at last sex is a better variable to measure because of its reliability.

An overall limitation to this study is that because of the cross-sectional design, the time frame of events cannot be determined for the most part, except when the skip pattern of the survey specifies. Because of this, even though the chi square analysis may determine that there is a significant relationship between, for example, condom use at first sex and chance of less physical pleasure if used condom, there is not enough information to determine whether the attitudes formed because of their first sex experience, or whether the participant always used condoms. There is also an issue in that causality cannot be determined in this design. We can determine associations between the predictors and the outcomes, however, we cannot establish that because

a participant received STD education, or because they have been tested or treated for STDs, that it is the reason for their condom usage. Particularly with having STDs, this study cannot ascertain, for participants who had an STD at the time of the survey, if they began condom use afterwards in order to prevent spread of STDs to their current or future partners, and also protect themselves from future infections, or if having an STD was indicative of their attitudes towards condom usage, and they would not use condoms regardless. Associations at different time points can be examined in this study, however, determining change over time is limited.

There may have been sources of selection bias, reporting bias, confounding bias, and recall bias in this study, but the study design accounted for some of these factors. The NSFG dataset oversampled Blacks and Hispanics aged 15-24 but to account for the selection bias, sampling weight variables were provided and used in the analysis. Even so, because of the questions being limited to certain groups, i.e. aged under 25 years for the exposures of interest for STD education, there is some selection bias, while controlling for recall bias. Confounding bias may be present, as several other potential confounding variables were not assessed in this study. Other variables, such as family structure, religion, and socioeconomic status could have been included to control for additional confounders. Reporting bias may have been present to some extent, for example, some participants may have been more likely to talk about their sexual experiences, while others may not have reported truthfully. For the sensitive information, such as STD history, the ACASI system was used to protect the privacy of the participants. Studies have shown a good amount of agreement between self-responses and evaluations in epidemiologic surveys (20).

Public Health Implications

STDs are highly prevalent in the United States, however, they are fairly preventable and the means of transmission are known. Reducing risky behavior by being tested for STDs, knowing

the status of one's partners, and being aware of the means of protection, via condom usage are important behaviors to incorporate to prevent the infection and transmission of diseases.

A plausible means to change behavior is through education and experience. Sexual education can be easily disseminated through school programs and open communication between parents and children can also be effective. In terms of this study, receiving formal sexual education before or after first sex was not significantly associated with condom usage. When examining the analysis between condom use at first sex and STD general education versus HIV education, HIV education was significant, but not general STD education. The perception of the severity and prevalence of HIV may be greater than STDs as a broad category, so this may be a factor in this statistic. Stressing the importance of condom usage as a means of prevention of all STDs, HIV or otherwise, would be beneficial.

In terms of sexual experiences, having been tested for STDs was significant to the model for condom use at last sex, which may be indicative that those who are aware of their STD status are more likely to take measures to protect themselves. The model included significant variables of relationship at last sex, and reason for condom use, which are all related to previous experiences.

By encouraging sexual education and open communication, there should be a greater awareness of STD risk behaviors and the means of control. In addition to this, making forms of counseling and advice readily available is also beneficial. Education and communication are key factors to increasing awareness and is crucial to adhering to a behavior such as condom usage for the purpose of protecting against STDs. Examining the data in this study provides knowledge on the types of populations at risk and the factors associated with such risks. Interventions can be focused towards the areas in need and doing so should decrease the incidence of STDs and the medical and financial burdens associated with it.

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LIST OF TABLES

TABLE 1: Univariate Analysis of Condom Use Outcomes

	Used condom at first sex					Used condom at last sex					Used condoms at a 90% or higher consistency in the past 12 months				
Individual Characteristics	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**
Age at interview					***					***					***
15-20	810	81.37	2.33			810	77.97	3.86			549	67.03	1.62		
21-30	1910	66.16	3.36	163.18	<.0001	1910	40.07	2.73	302.82	<.0001	821	50.11	3.28	52.64	<.0001
31-40	1707	43.08	2.17			1707	21.65	1.94			418	42.54	2.29		
40+	668	31.85	2.45			668	14.25	0.62			147	32.29	4.16		
Race/Ethnicity					*					*					
Hispanic	1197	48.99	0.81			1197	37.95	1.09			411	53.94	4.77		
Non-Hispanic white	2714	55.93	2.95	9.31	0.026	2714	30.50	2.98	11.16	0.011	985	50.79	2.02	1.15	0.765
Non-Hispanic black	866	58.92	2.20			866	43.03	2.69			438	51.99	1.06		
Non-Hispanic other	318	41.22	7.91			318	33.13	5.70			101	56.20	4.74		
Education					***					***					
9th grade or less	640	40.31	2.45			640	30.63	2.79			205	48.81	11.19		
Some High School	692	60.50	3.46			692	45.16	3.95			326	56.80	5.34		
High school grad	1363	55.44	1.48	97.35	<.0001	1363	29.59	3.35	49.59	<.0001	534	53.14	4.81	1.86	0.762
Some college	1268	59.97	1.29			1268	39.46	1.50			512	53.13	1.77		
College Grad or more	1132	49.71	2.81			1132	27.48	0.64			358	45.95	4.20		
Age at 1st sex					***										
Under 15 years	1141	43.58	1.84			1141	33.36	2.17			513	45.53	2.90		
15-17 years	2283	60.72	1.57	35.79	<.0001	2283	35.03	1.43	4.52	0.211	953	53.46	1.72	4.33	0.228
18-19 years	869	56.38	4.62			869	34.82	4.28			301	53.13	5.39		
20 years or older	802	45.39	3.77			802	29.64	2.04			167	56.97	5.49		

	Used condom at first sex					Used condom at last sex					Used condoms at a 90% or higher consistency in the past 12 months				
Individual Characteristics	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**
Age at last sex					***					***					***
Under 18 years	328	80.24	3.81			328	85.70	2.10			188	76.42	0.87		
18-19 years	394	78.44	4.17			394	72.62	5.01			266	64.88	2.50		
20-24 years	916	70.96	2.85	262.75	<.0001	916	54.85	2.31	305.05	<.0001	489	57.90	2.51	79.92	<.0001
25-34 years	1866	56.48	1.88			1866	28.36	3.58			608	44.48	4.23		
35-44 years	1591	37.40	1.93			1591	17.36	0.92			384	35.65	2.39		
Relationship to 1st partner at 1st sex					***					**					***
Married	219	22.37	3.55			219	17.65	2.74			6	5.52	6.77		
Engaged and living together	39	56.78	19.53			39	46.69	22.14			6	8.48	9.26		
Engaged and not living together	68	49.78	10.51			68	24.42	6.67			11	61.93	15.21		
Living together but not engaged	44	48.05	5.57			44	42.59	4.42			7	85.87	14.55		
Going out with her or going steady	2272	62.25	2.17	87.68	<.0001	2272	36.05	1.41	30.72	0.000	940	55.65	1.07	44.16	<.0001
Going out with her once in a while	586	58.99	4.17			586	33.41	2.72			221	49.39	2.54		
Just friends	1276	46.69	1.09			1276	36.81	3.36			521	52.57	4.14		
Had just met her	408	46.33	4.70			408	23.46	3.67			160	38.89	5.21		
Something else	183	41.01	6.19			183	27.74	3.30			63	25.22	1.30		

	Used condom at first sex					Used condom at last sex					Used condoms at a 90% or higher consistency in the past 12 months				
Individual Characteristics	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**
Relationship to last partner at last sex					***					***					***
Married	1812	43.95	1.71			1812	13.04	0.58			41	21.51	5.79		
Living together in a sexual relationship	719	59.23	2.73			719	27.01	3.19			102	30.56	1.60		
Going out with her or going steady	117	40.59	3.64			117	23.30	7.65			72	23.71	4.01		
Going out with her once in a while	1268	72.32	1.77	207.61	<.0001	1268	64.12	1.21	983.54	<.0001	983	53.38	0.72	125.08	<.0001
Just friends	407	57.86	5.54			407	67.27	3.52			287	61.79	2.70		
Had just met her	575	60.48	0.84			575	68.12	3.60			357	59.76	2.61		
Something else	80	60.47	5.78			80	53.03	10.13			18	37.92	20.06		
Engaged to her (subset asked)	117	57.77	9.52			117	43.31	4.17			75	27.71	3.91		
Number of partners in a lifetime					***					***					***
1	782	51.48	3.62			782	40.13	3.44			192	74.54	7.43		
2-4	1344	62.78	3.74	30.22	<.0001	1344	42.06	2.12	47.12	<.0001	479	66.01	3.16	36.59	<.0001
5-9	1148	55.96	1.70			1148	32.80	3.05			480	49.06	3.48		
10 or more	1821	47.84	1.04			1821	25.34	1.79			784	37.85	2.72		
Number of partners in past 12 months					*					***					*
0	525	52.59	3.93			525	51.62	1.28			30	62.65	5.74		
1	3390	52.72	1.91	12.44	0.006	3390	26.79	1.17	306.17	<.0001	1026	55.24	2.52	9.68	0.022
2	557	63.26	3.47			557	56.30	4.82			403	52.38	3.57		
3 or more	623	57.05	3.04			623	52.15	3.96			476	43.54	3.41		

	Used condom at first sex					Used condom at last sex					Used condoms at a 90% or higher consistency in the past 12 months				
Individual Characteristics	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**
Number of partners in last 3 months					***					***					***
0	1115	58.21	2.63			1115	56.03	1.03			389	66.09	3.49		
1	3495	52.86	2.23	4.97	0.174	3495	26.90	1.58	630.84	<.0001	1173	50.68	2.00	38.44	<.0001
2	318	55.63	1.76			318	47.72	4.34			238	44.23	2.02		
3 or more	167	57.27	7.03			167	53.01	5.88			135	31.69	5.51		
Formal instruction about STDs before 18 (if under 25 years old)															
Yes	1423	75.94	1.78	1.16	0.281	1423	65.96	2.67	1.43	0.232	879	62.99	2.10	0.20	0.655
No	102	69.78	5.26			102	51.44	10.78			58	68.36	10.12		
Grade when received instruction on STDs					*										
3rd-5th	140	78.20	5.56			140	66.18	4.51			79	57.94	15.14		
6th-8th	754	72.44	1.06	9.75	0.008	754	68.16	2.74	1.59	0.451	463	67.03	2.27	1.27	0.531
9th-12th	518	80.59	2.40			518	62.60	5.20			329	58.51	5.32		
Received instruction on STDs before/after 1st sex (if received STD instruction)															*
Before	1210	76.58	2.30	0.69	0.406	1210	67.23	2.35	2.59	0.108	740	65.10	1.17	5.82	0.016
After	212	71.71	4.51			212	57.61	7.24			138	49.20	8.14		
Formal instruction about HIV/AIDS before 18 (if under 25 years old)					***					**					
Yes	1392	76.90	1.77	15.95	<.0001	1392	66.33	1.92	11.36	0.001	857	64.18	2.37	0.57	0.451
No	128	60.34	3.58			128	51.37	5.50			78	55.38	10.12		

	Used condom at first sex					Used condom at last sex					Used condoms at a 90% or higher consistency in the past 12 months				
Individual Characteristics	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**
Received instruction on HIV/AIDS before/after 1st sex					*					*					**
Before	1194	77.31	2.21	0.34	0.562	1194	67.75	2.12	6.53	0.011	732	66.44	1.66	13.79	0.000
After	198	74.31	3.98			198	57.38	3.67			125	47.56	7.26		
Received advice about STDs in the last 12 months					***					***					*
Yes	617	68.85	2.24	9061.17	<.0001	617	49.38	3.65	18.99	<.0001	362	56.10	1.06	7.54	0.006
No	4478	52.47	1.81			4478	32.05	1.90			1573	51.01	1.66		
Received advice about HIV or AIDS in the last 12 months					***					**					***
Yes	621	68.78	2.60	127.83	<.0001	621	49.86	4.73	14.12	0.000	347	55.27	1.19	25.27	<.0001
No	4474	52.48	1.81			4474	32.00	1.84			1588	51.24	1.49		
Tested for STDs in the last 12 months					***					*					
Yes	981	67.54	1.49	25.44	<.0001	981	41.51	4.23	5.13	0.024	528	47.24	3.47	2.65	0.104
No	4114	51.38	2.33			4114	32.18	1.79			1407	53.58	1.55		
Treated for STDs in the last 12 months										*					
Yes	166	58.98	5.37	2.15	0.143	166	44.99	5.51	10.09	0.002	91	39.73	7.44	2.73	0.098
No	4884	53.98	1.86			4884	33.37	1.75			1829	52.37	1.47		
Had Gonorrhea in the last 12 months					*										***
Yes	33	41.99	7.30	3.96	0.047	33	54.44	15.57	2.11	0.147	19	15.93	6.75	20.05	<.0001
No	5017	54.18	1.94			5017	33.55	1.82			1901	52.16	1.41		

	Used condom at first sex					Used condom at last sex					Used condoms at a 90% or higher consistency in the past 12 months				
Individual Characteristics	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**
Had Chlamydia in the last 12 months															
Yes	34	63.98	12.40	0.81	0.367	34	34.69	4.05	0.11	0.740	21	25.66	18.80	1.33	0.249
No	5016	54.05	1.90			5016	33.67	1.83			1899	52.15	1.70		
Had Herpes Ever					*					*					
Yes	77	30.44	12.80	3.99	0.046	77	27.02	3.49	4.03	0.045	31	39.45	16.35	0.64	0.424
No	4975	54.48	1.77			4975	33.79	1.82			1891	52.08	1.25		
Had Genital Warts Ever															
Yes	136	50.21	6.01	0.54	0.463	136	17.01	7.98	2.70	0.100	49	26.64	17.22	1.50	0.220
No	4914	54.26	1.95			4914	34.23	1.90			1873	52.79	2.09		
Had Syphilis Ever															
Yes	39	39.02	12.21	1.90	0.169	39	29.03	7.16	0.38	0.536	14	46.69	10.78	0.22	0.638
No	5009	54.39	1.87			5009	33.89	1.84			1908	52.20	1.58		
Had sex with an HIV-positive female in the past 12 months															
Yes	13	65.10	14.81	0.39	0.531	13	57.29	13.31	3.50	0.061	4	19.08	13.39	3.16	0.075
No	4593	54.45	2.08			4593	32.77	1.79			1887	52.04	1.59		

	Used condom at first sex					Used condom at last sex					Used condoms at a 90% or higher consistency in the past 12 months				
Individual Characteristics	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**	**n**	**%**	**SE**	**Rao-Scott χ^2**	**P value**
Why Condom was used at last sex (if used condom at last sex)					***					***					**
Prevent pregnancy	800	65.55	2.50			800	89.02	1.47			375	80.65	2.12		
Prevent STDs	114	57.23	4.53	35.04	<.0001	114	88.35	4.99	203.98	<.0001	72	77.76	9.14	20.75	0.000
Both Reasons	1130	75.23	2.45			1130	92.49	0.17			710	84.33	2.14		
Other reason	65	46.67	3.17			65	44.50	1.95			22	35.62	9.38		
Chance of less physical pleasure if used condom										***					***
No chance	451	61.38	1.54			451	47.27	1.98			174	69.63	3.23		
A little chance	896	54.99	2.78			896	43.01	4.23			399	65.33	5.28		
50-50 chance	912	57.02	1.06	3.51	0.476	912	37.49	1.25	30.09	<.0001	368	53.63	2.00	55.34	<.0001
Pretty good chance	873	55.82	4.00			873	32.42	2.34			390	47.51	2.70		
Almost certain chance	493	60.72	4.34			493	26.77	6.54			207	36.81	2.35		

*** Significant: p-value <.05 ** More significant: p-value <.001 *** Highly significant: p-value <.0001**

Table 2: Backwards Elimination and Confounding Assessment for Model 1: Condom Use at first sex

Full Model: firstsexcond = sexedsx sexed firstrel vry1stag lessplsr hisprace

Final Model	**χ^2**	**p-value**	**OR**	**lower**	**upper**
Sex Ed before last sex	0.003	0.957	0.99	0.61	1.59
Sex ed before 18	11.05	0.113	0.31	0.15	0.62
Relationship to first partner	0.36	0.547	1.06	0.87	1.30
Age at first sex	0.25	0.615	1.04	0.89	1.22
Condom use attitudes	3.93	0.048	0.85	0.72	0.99
Race	0.34	0.556	0.94	0.75	1.17

Notes: Exposure outcome variable not significant

Table 3: Backwards Elimination and Confounding Assessment for Model 2: Last Sex Condom Use

Full Model: lastsexcond = stdtest stdtreat stdadvice agelastsex lastrel conduse lessplsr nump3mos age2 hisprace

		OR	Lower	Upper	Notes
	Full model: Gold standard (GS)	2.37	1.69	3.33	10% range from gold standard: (2.1339 - 2.6081)
Step1:	GS - Treated for STDs	2.19	1.71	2.80	
	GS – Received advice for STDs	2.54	1.51	4.28	
	GS – Age at last sex	2.37	1.70	3.32	Odds ratio changes by 0.003 and somewhat large increase in precision
	GS – Relationship to last partner	2.26	1.42	3.57	
	GS – Reason for condom use	1.11	0.87	1.40	
	GS – Condom use attitudes	1.65	1.07	2.53	
	GS – # partners in past 3 months	2.37	1.70	3.31	Odds ratio changes by 0.003 and largest increase in precision

Decision: Drop # partners in past 3 months

Reduced Model: lastsexcond = stdtest stdtreat lastrel conduse lessplsr age2 edulvl

Step2:	Reduced - Treated for STDs	2.19	1.72	2.79	
	Reduced - Received advice for STDs	2.54	1.46	4.41	
	Reduced - Age at last sex	2.37	1.71	3.29	Odds ratio changes the least and increases precision.
	Reduced - Relationship to last partner	2.26	1.46	3.50	
	Reduced - Reason for condom use	1.14	0.87	1.50	
	Reduced - Condom use attitudes	1.65	1.06	2.54	

Decision: Drop Age at last sex

Step 3:

Reduced - Treated for STDs	2.18	1.73	2.75	Odds ratio remains within 10% range and precision increases
Reduced - Received advice for STDs	0.65	0.34	1.24	
Reduced - Relationship to last partner	2.23	1.47	3.38	
Reduced - Reason for condom use	1.13	0.86	1.50	
Reduced - Condom use attitudes	1.62	1.07	2.45	

Decision: Drop Treated for STDs

Step 4:

Reduced - Received advice for STDs	2.34	1.46	3.73	Stays within 10% of the gold standard, but precision decreases
Reduced - Relationship to last partner	2.19	1.46	3.27	
Reduced - Reason for condom use	1.07	0.83	1.39	
Reduced - Condom use attitudes	1.50	1.09	2.08	

Decision: Use final model from decision of step 3

Final Model: lastsexcond = stdtest stdadvice lastrel conduse lessplsr age2 hisprace

Final Model	**χ^2**	**p-value**	**OR**	**lower**	**upper**
Tested for STDs	43.88	<.0001	2.18	1.73	2.75
Received advice for STDs	0.10	0.749	1.32	0.24	7.20
Relationship to last partner	13.24	0.0003	1.90	1.35	2.69
Reason for condom use	24.27	<.0001	1.44	1.25	1.67
Condom use attitudes	2.20	0.138	0.89	0.77	1.04
Age	18.79	<.0001	0.63	0.52	0.78
Race	17.01	<.0001	1.45	1.21	1.72

Table 4: Backwards Elimination and Confounding Assessment for Model 3: Condom Use Consistency

Full Model: condcons = stdtest stdtreat stdadvice agelastsex lastrel conduse lessplsr recentsex age2 hisprace

Final Model	χ^2	p-value	OR	lower	upper
Tested for STDs	1.88	0.170	0.63	0.32	1.22
Treated for STDs	2.50	0.114	0.19	0.03	1.49
Received advice for STDs	1.87	0.171	1.71	0.79	3.71
Age at last sex	3.86	0.050	0.56	0.31	0.99
Relationship to last partner	17.29	<.0001	1.96	1.43	2.69
Reason for condom use	0.06	0.814	0.82	0.16	4.23
Condom use attitudes	0.06	0.800	1.09	0.58	2.03
# of partners in past 12 months	5.33	0.021	0.59	0.38	0.92
Age	2.51	0.114	2.05	0.84	4.96
Race	0.93	0.335	0.85	0.62	1.18

Notes: Exposure outcome variable not significant

APPENDIX A

EMORY UNIVERSITY | Institutional Review Board

TO: Richard Chang
Principal Investigator

DATE: December 21, 2010

RE: **Notification of Submission Determination: No IRB Review Required**
IRB00047740
STD Education and Contraceptive Use Amongst the Male Population in the United States

The above-referenced study has been vetted by the Institutional Review Board (IRB), and it was determined that it does not require IRB review because it does not meet the definition of "Research involving Human Subjects" under applicable federal regulations. Based on the information included in the submission, the purpose of the study is to examine the behaviors and attitudes of contraceptive usage among men to determine if there is a relationship between type of contraception with whether they received counseling, sexual education and/or had previous experience with STDs. The PI will conduct a secondary data analysis using the de-identified, publically available data from the National Survey for Family Growth. The PI will not have access to identifiable data or coded-links to identifiers now or in the future. Accordingly, IRB review is not required.

45 CFR Section 46.102(f)(2) defines "Research involving Human Subjects" as follows:

> Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains:
>
> (1) data through intervention or interaction with the individual, or
> (2) identifiable private information
>
> Intervention includes both physical procedures by which data are gathered (for example, venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. Interaction includes communication or interpersonal contact between investigator and subject. Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.

Please note that any changes to the protocol could conceivably alter the status of this research under the federal regulations cited above. Accordingly, any substantive changes in the protocol should be presented to the IRB for consideration prior to their implementation in the research.

Sincerely,

Carol Corkran, MPH, CIP
Senior Research Protocol Analyst
This letter has been digitally signed

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