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ASSOCIATION OF CONDOM USE AND ATTITUDES AMONG SEXUALLY ACTIVE ADOLESCENT AND YOUNG ADULT MALES

BY

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Degree to be awarded: MPH
Career MPH

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ABSTRACT

ASSOCIATION OF CONDOM USE AND ATTITUDES
AMONG SEXUALLY ACTIVE
ADOLESCENT AND YOUNG ADULT MALES

BY

Nancy Bedrosian Pollard, MD

Adolescent and young adult males are more likely to use condoms than any other contraceptive, but they don't use them consistently in spite of the known consequences of unprotected intercourse. Beliefs about condoms and their interference with the sexual experience may influence the decisions to use condoms. The purpose of this study was to explore the relationship of attitudes about condoms and condom use among the sexually active unmarried teen and young adult men surveyed by the National Survey of Family Growth, 2006-2008. Responses to questions about the perceptions of loss of pleasure, embarrassment, and partner appreciation from condoms were tested for association with reports of condom use at last heterosexual intercourse. Effect modification of this association by age, race/ethnicity, education level, and four measures of sexual experience (age of sexual debut, number of partners in lifetime, number of partners in last year, and number of current partners) was considered. These factors were further investigated for independent associations with condom use while adjusting for the condom attitudes. In this retrospective cohort of 889 males, the beliefs that condoms diminish sexual pleasure, are embarrassing to discuss, and are not appreciated by partners were associated with reduced likelihood of condom use at last intercourse. No evidence of effect modification by any covariate was detected. Fewer current partners and fewer partners in lifetime were each independently associated with greater likelihood of condom use even while adjusted for the condom attitudes. Results from this study can direct public health efforts and inform condom promotion programs to address negative condom attitudes and increase condom usage in this population.

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Introduction and Rationale

The United States Department of Health and Human Services (HHS) declared in its *Healthy People 2010* campaign that increasing the use of condoms by sexually active teens and adults is a national priority (1). By reducing the proportion of sexually active people who engage in unprotected sexual intercourse, the negative consequences including unintended pregnancies, sexually transmitted illnesses (STIs), and Human Immunodeficiency Virus (HIV), should also be reduced. The most reliable barrier method of protection against pregnancy, STIs, and HIV is the use of a condom (2).

In the past, research efforts on the determinants of pregnancy and STI prevention have focused on women, but the recent changes in teen boys' sexual behavior and the simultaneous decrease in teen pregnancies has steered researchers to the other participants in the "protected versus unprotected" intercourse dilemma: the men (3). The focus of this project is to investigate several possible determinants of condom use for unmarried and non-cohabitating sexually active adolescents and young adult males. Is the use of condoms by these males related to their attitudes toward condoms? If so, is that relationship modified by age, race, sexual experience, number of current partners, or education level attained? Do individual characteristics and sexual experience predict condom use when considering condom attitudes?

Problem Statement

Most adolescent and young adult men are sexually active. Almost 60 per cent of teen boys age 15 to 18 years and nine out of ten young adult men age 19 to 25 years have

had sexual intercourse with a female (4, 5). Teenaged boys are more likely to choose condoms over other type of contraception, and in fact, about 70 % claim to have used a condom at their first heterosexual intercourse experience and at their most recent (5). But less than half (48%) of all sexually experienced male teens used a condom at *every* intercourse episode in the last year, and even fewer (44%) used condoms at *some* of the episodes. The remaining 8 % never used condoms during any intercourse in the previous year (6). These sexually active adolescents and young men could regularly use condoms to reduce their exposures to sexually transmitted infections, HIV, and unintended pregnancies---but not all do. Only half report consistently using condoms with their current sexual partners (7). In spite of the consequences of unprotected sexual intercourse, many teen and young adult males do not use condoms consistently if at all.

Previous investigations have shown that male adolescents understand the risks of unprotected sexual intercourse and the health benefits offered by condoms, and this information influences their decisions to use or not use condoms (8). These decisions are not made based on the facts alone, however. Both partners' beliefs and perceptions about condoms and their interference with the experience may determine the final decision. In a recent study of college-aged men and women, both (although men more than women) reported that condoms interfered with physical pleasure, and that this opinion correlated with their lack of condom use (9). Other studies have shown that young people are embarrassed and therefore reluctant to discuss condoms with their sexual partners (10, 11). The opinion that a new partner might appreciate the use of a condom, held by about 80 % of teen boys (6), might be an additional factor.

Are negative attitudes and perceptions the reasons more sexually active male adolescents and young adults do not use condoms consistently? If it is true that attitudes do influence the choice to use condoms, is that relationship modified by characteristics known to affect sexual behaviors such as age, race/ethnicity, educational level attained, and sexual experience? If negative condom attitudes are associated with less condom use, then sex education and intervention programs could be altered to address these specific attitudes and remove some of the hindrances to consistent condom usage. Evidence of variation by age, race/ethnicity, education, or sexual experience would allow for further tailoring of condom promotion efforts.

Theoretical Framework

At least two theories are useful to describe the factors shaping the decision to use condoms. The Theory of Planned Behavior, an extension of the Theory of Reasoned Action, attempts to connect attitudes and beliefs about certain actions with the actual performance of that action by considering intention as the link. Both the individual's own beliefs and attitudes and those of significant others (normative beliefs) influence intentions, which in turn impact behavior (12). In this case, a young man's positive beliefs about condoms (e.g., a partner would appreciate it) may influence him to plan to use condoms, and that plan makes him more likely to do just that. Conversely, negative attitudes (e.g., condoms diminish pleasure or condoms are embarrassing to discuss) held by the male or important others result in no plan or forethought and therefore reduce the likelihood of condom use.

The Health Belief Model explains an individual's willingness to adopt healthy behaviors by evaluating his view of the risks and benefits from that behavior. The perceived susceptibility to the risks of unprotected sexual intercourse, the believed severity of the consequences of those risks (unwanted pregnancies, STIs), the perceived benefits of the protections, and the barriers that make acquiring and using condoms difficult all contribute to the final decision. Teens and young adults will use condoms if they believe that the risks of unprotected intercourse are real and that benefits outweigh the barriers to condom use (8).

Purpose Statement

The purpose of this study was to determine if an association exists between attitudes towards condoms and condom usage among sexually active male adolescents and young adults and if so, to what extent.

Research Question

This study investigates the association of attitudes about condoms and condom use among unmarried and non-cohabitating sexually active teen and young adult males by examining data from the 2006-2008 National Survey of Family Growth (NSFG). Specifically,

- Are attitudes toward condoms associated with condom use among unmarried and non-cohabitating men aged 15 to 24 years old who had heterosexual intercourse in the last 4 weeks?

- Is this association modified by age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, or education level attained?
- Is condom use associated with age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained when adjusted for attitudes toward using condoms?

Research Hypotheses

Based on the three questions posed above, the hypotheses that this study will test are as follows:

Study hypothesis 1: Among sexually active men aged 15 to 24 years old, condom use is associated with attitudes toward using condoms.

Null hypothesis 1: Among sexually active men aged 15 to 24 years old, condom use is *not* associated with attitudes toward using condoms.

Study hypothesis 2: Among sexually active men aged 15 to 24 years old, the association of condom use with attitudes toward using condoms is modified by age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained.

Null hypothesis 2: Among sexually active men aged 15 to 24 years old, the association of condom use with attitudes toward using condoms is *not* modified by age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, *nor* education level attained.

Study hypothesis 3: Among sexually active men aged 15 to 24 years old, condom use is associated with age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained when adjusted for attitudes toward using condoms.

Null hypothesis 3: Among sexually active men aged 15 to 24 years old, condom use is *not* associated with age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained when adjusted for attitudes toward using condoms.

Significance Statement

Evidence either supporting or disputing an association between condom attitudes and condom use could direct both public health funds and efforts, and inform sex education curricula. Public health programs that promote condom use could be amended to address negative condom attitudes if they indeed influence condom use. Further targeting based on race/ethnicity, age, education level, and sexual experience if found to affect the condom attitude-usage relationship would increase the effectiveness of these programs. Similarly, sex education curricula also could be adjusted based on the association findings, and enhance the impact of increasingly scarce sexual health education dollars.

The ultimate goal of these activities is to reduce the undesirable sequelae of unprotected intercourse: unintended pregnancies, STIs, and HIV infections, and the associated morbidity. By expanding the knowledge of the reasons why teenage and

young adult males choose to use condoms, and then implementing that information by addressing those specific concerns, we can effectively promote condom use and healthy sexual behaviors in this critical population.

Definitions of Terms

ACASI - audio computer-assisted self-interviewing interview method
adolescent – a person age 15 to 18 years old
age – measured in years
age at first intercourse - heterosexual
AIC - Akaike Information Criterion
AIDS – Acquired Immune Deficiency Syndrome
AOR – adjusted odds ratio
CAPI - computer-assisted personal interviewing
CCHS - Canadian Community Health Survey
CDC – Centers for Disease Control and Prevention
CI - Confidence interval (95% unless otherwise stated)
d.f. – degrees of freedom
HIV – Human Immunodeficiency Virus
M - Mean
NCHS - National Center of Health Statistics
NCHS - National College Health Assessment
NIH – National Institutes of Health
NSFG – National Survey of Family Growth
number of current partners - heterosexual
number of partners in lifetime - heterosexual
number of partners in the last year- heterosexual
OR - odds ratio
PSU - Primary Sampling Units
SD - standard deviation
sexually active – history of sexual intercourse
STIs – sexually transmitted infections
teen – a person age 15 to 18 years old
X^2 – Rao-Scott Chi-square test, unless otherwise specified
Yc-PCR - Y-chromosome polymerase chain reaction
young adult – a person age 19 to 24 years old
YRBS - Youth Risk Behavior Survey

Chapter II: Review of Literature

Introduction

The body of knowledge of the association of condom use and condom attitudes of teenage and young adult males is much smaller and less broad that similar literature on the contraceptive choices of teen and young adult females. Some investigators have recently begun to explore why young men choose to use or not use condoms to protect themselves and their partners from unplanned pregnancies, HIV, and STIs. If the determinants of those decisions were known or better understood, then education and prevention efforts could be focused to effectively encourage consistent condom use.

In this review of literature, the relevant sources and findings for the dependent variable (condom use at last sexual intercourse) and each main independent variable (less pleasure, embarrassment, and partner appreciation) will be discussed. Individual characteristics (age, race/ethnicity, and education level attained) and measures of sexual experience (age at first sexual intercourse and numbers of lifetime, year, and current partners) and the corresponding literature will then be reviewed.

Literature Search Methods

This literature search was conducted by several methods. Publications and websites from CDC, National Institutes of Health (NIH), and other publically available sources were found by using the Google search engine. PubMed, Library of Congress, and Web of Science databases were accessed through Emory University's library system to locate electronic resources, e-journals, and journal articles. Bibliographies from comprehensive articles provided another source of applicable literature.

Search key words included variations of condom use and male teens or adolescents, condom use and young adult men, condom use by age, condom attitudes and use, condom use and pleasure, condom use and embarrassment, condom use and partner appreciation, condom use and school grade, condom use and education level, condom use and sexual experience, condom use and sexual initiation, condom use by number of partners, and condom use by number of lifetime partners.

Review of Literature

Outcome variable

The selection of an outcome variable for a study is dictated by the focus of the inquiry and should be made cautiously so as to maximize validity. The use of condoms as a dependent variable can be difficult to assess accurately as most studies concerning sexual behaviors rely on voluntary participation. Respondents are asked to recall and then truthfully report their sexual activities---even those that are they may view as socially unacceptable. These factors introduce sources of error including selection, recall, and self-report biases. Several studies have investigated the recall and self-reporting biases, though none have specifically measured the effects of selection bias. Additionally, the definitions and measurements of "condom use" are far from standard.

Richard Crosby, in an article published in 1998, discussed the Type I and Type II errors possible with inconsistently defined and measured condom use outcomes in evaluation studies of HIV prevention interventions (13). He notes that many published studies "failed to specify" the definitions of condom use and prevent the problems that led to these errors. Because the outcome measurements are incompatible across studies,

studies with small sample sizes cannot be analyzed together. Crosby made several recommendations to avoid these issues; one is especially pertinent to this current study. The measurement of condom use should be based on "quantifying acts" of condom use as opposed to ratios or rates. Ratios, such as the number of condom-protected sexual intercourse events as a percentage of all intercourse events, mask the total number of unprotected events. The effect is, for example, to lump those who use condoms 50% of the time together - whether they had intercourse twice or a hundred times per month. Obviously, one episode of unprotected intercourse isn't as risky as fifty in the same time span. Rates of condom use result in the same problem: the absolute number of unprotected events is not clear.

Respondents' reports of quantified episodes of condom-protected sexual intercourse, however, are still subject to recall error and the temptation to give socially correct answers. Choosing condom use at last intercourse as the outcome variable is no exception, but it does have the advantage of the shortest possible time interval between action and recall. No published studies empirically showed that condom use at last sex is the most accurate measure of condom use. Of course, the accuracy of any self-reported behavior is difficult to verify.

One study attempted to validate self-reported condom use by detection of a sperm biomarker in vaginal fluids. Eve Rose and colleagues matched condom use responses with the presence of a Y-chromosome polymerase chain reaction (Yc-PCR) assay (14). Participants were unmarried female African American aged 15 to 22 years patients at HIV prevention clinics in Atlanta, Georgia, who wished to avoid pregnancy. The women answered condom use questions on an audio computer-assisted self-interviewing

(ACASI) survey and then collected their own vaginal specimens after instruction on correct vaginal sweep technique. The specimens were analyzed for Yc-PCR, which persists in vaginal fluids for 14 days after intercourse, indicating Y chromosomes in the vaginal fluid. Of the women who had engaged in vaginal intercourse in the prior 14 days (n = 537), 484 had usable assays. Evidence of Y chromosomes in vaginal fluids was found in 63 of the 186 women (39%) who reported consistent condom use, defined as condom use at 100% of intercourse events. The authors conclude that Yc-PCR does not corroborate self-reported consistency of condom use among female African American teens, and so recall of condom use may not actually measure condom use accurately.

Another study compared last intercourse condom use with condom use over longer time periods. Sinead N. Younge *et al*, compared last episode condom use to condom use recall periods of 14 and 60 days in unmarried 15 to 21 year old African American females who were enrolled in a randomized HIV prevention program trial (n = 566) (15). Participants' average age was 17.9 years. Approximately 65% were students and 84% were in a relationship at the time of the study. Using the responses to the ACASI survey, Younge found that those who used a condom at last sex (57% of n = 408) were more likely to have used condoms in the 14 day recall period [mean percentage of condom use (M) = 0.87, standard deviation (SD) = 0.25] than those who did not use a condom at last sex (M = 0.27, SD = 0.38), $P < 0.001$. This was the case for the 60 day recall period as well. Last episode condom users reported greater condom use in last 60 days (M = 0.82, SD = 0.26) compared to those who didn't use condoms at last sex (M = 0.28, SD = 0.35), $P < 0.001$. Those who used condoms at last sex also were more consistent (defined as used condoms every time) in the 14 day recall period (73%)

compared to those who didn't use a condom at most recent sex (16%), $P < 0.001$, and in the 60 day period (52% versus 7%), $P < 0.001$. They conclude that condom use at last sexual intercourse is a valid proxy for condom use over longer periods of time in African American females.

Although the conclusions from these studies may not be externally valid, there is a dearth of similar (or even any) investigations using this current study's population of teen and young adult males of various races. In light of that, this study of condom use and attitudes chose condom at last intercourse as the measurement of condom use.

Independent variables

The three main independent variables in this study are the responses to the condom attitudes questions regarding the perceptions of reduction of physical pleasure, embarrassment, and partner appreciation due to the use of condoms. As most studies involving attitudes toward condoms do not consider these questions conjointly, the literature pertaining to each will be discussed separately.

Feel less pleasure with condoms

In an article published in 2007, Mary Randolph *et al* investigated the relationship between condom use and perceived pleasure ratings (9). Students at a large urban university in California who had vaginal intercourse in the prior three months (males n = 35, women n = 80) completed an anonymous questionnaire about their sexual practices and perceptions of pleasure. Most self-identified as heterosexual (90%) and claimed a steady sexual partner (68%). Their ages ranged from 20 to 40 years, with a mean of 22

years. Approximated 41% were White, 27% Asian/Pacific Islander, 17% Hispanic, and only 2% African American. Participants reported the numbers of vaginal intercourse events in the prior three months and the percentages of those events protected with condoms. Using a five point Likert scale where 1 means "not pleasurable at all" and 5 means "very pleasurable", they rated the pleasure of unprotected and condom-protected vaginal intercourse. Randolph found that both men and women rated intercourse with condoms as less pleasurable than unprotected intercourse *(P* < 0.001), but the men more strongly (M = 4.85 for unprotected, M = 3.54 for intercourse with condom) than the women (M = 4.65 for unprotected, M = 3.84 for intercourse with condom) *(P* = 0.03). The men attributed the diminished pleasure to the condoms more than women did *(P* = 0.03). Men who had used condoms in the last three months reported higher pleasure ratings for condom protected intercourse (n = 21, M = 3.94) than those men (n = 14, M = 2.93) who never used condoms *(P* = 0.02). Ratings for unprotected intercourse pleasure were not associated with condom use. The belief that condoms reduced pleasure was associated with lower likelihood of condom use in logistic regression analysis (OR = 0.37, *P* = 0.01, 95% CI = 0.17, 0.80). Randolph concluded that men believe that unprotected intercourse is more pleasurable and that condoms reduce intercourse pleasure, and this perception is related to condom use in this adult population.

An exploratory study by Richard Crosby investigated the specific reasons that condoms are unappealing (16). Almost 2000 people were recruited from an electronic mailing list for a sexual enhancement product to complete a web-based questionnaire. All claimed to be at least 18 years old (range 19 to 67 years, M = 35, SD = 9.7) and had used condoms in the prior three months. Of these, 368 men (52%) reported that condoms had

"turned them off" at their last use. They were then asked to describe why by assessing 15 different reasons for the "turn off" such as the condoms' look, smell, taste, comfort, ease of use, mood disruption, and interference with pleasurable sensations. The most common reason given by both men (77%) and women (40%) was decreased sensation. Interestingly, this effect was not modified by age, education, or marital status.

A large community based study of adolescents at high risk for HIV sought to determine the relationship between condom use and anticipation of less pleasure. Larry K. Brown *et al* enrolled adolescents aged 15 to 21 who had unprotected intercourse in the 90 days previous to recruitment from four sites of the larger HIV prevention intervention study group Project SHIELD (17). Those pregnant, trying to conceive, HIV positive, or in another HIV prevention study were excluded. Participants completed an ACASI regarding condom use at last intercourse and number of unprotected sex acts in prior 90 days as the outcomes, and perceptions about condoms, among other questions. About half of the 1410 enrolled were male (43%) and 18-21 years old (45%, mean age not given). By race or ethnicity, 51% identified as African American, 24% as Hispanic, and 19% as white. Among the males, 58% did not use condoms at the last sex, and 51% reported 5 or more unprotected sex acts in prior 90 days. Using logistic regression analysis, Brown determined that the perception of loss of pleasure predicted less condom use in both outcomes (at last intercourse and in number of unprotected sex acts) even when controlled for race, age, gender, and clinic site.

In a smaller study limited to younger teens, J.G. Rosenberger recorded interviews with 30 boys aged 14 to 15 years from a clinic in a community with high STI rates (18). The responses to open-ended questions about condom knowledge, perception, and use

were recorded and coded. Of the 30, 16 claimed to be sexually experienced at the time of the interview. The mean age was 14.9 years, and included 27 African Americans, 2 Caucasians, and 1 Latino. Most (n = 19) thought that condoms would alter the sensations of sexual intercourse, and loss of pleasure and decreased sensation were the most common reasons given. Rosenberger surmised from this study that young male teens, even those sexually inexperience, believe that condoms will reduce sexual pleasure.

Another qualitative study explored condoms and loss of pleasure as a barrier to their use in a sample of young adult urban males. S. B. Kennedy and colleagues recruited a convenience sample of 18 to 24 year old sexually active African American men from Chicago community centers for four 90 minute moderated focus groups to discuss sexual, condom use, and substance behaviors (19). Of the original 25 eligible, 22 men participated. No other characteristics of the men were given. The discussions were recorded and transcribed, and then summarized by the authors. The most frequent rationale given for not using condoms was related to the "feel" and diminished sensations. The authors thus believe that loss of pleasure is a determinant of condom use in this population.

Richard Charnigo *et al* also investigated condom use in African American young men (20). His cross sectional study compared condom use with psychosocial measures and attitudes toward condom use in 18 to 29 year old men newly diagnosed with an STI who were participating in an ongoing HIV prevention trial. Of those, 266 volunteers who reported using a condom at least once in the previous 3 months, were HIV negative at the time, and self-identified as heterosexual completed a 20 minute self-administered questionnaire about their condom use and attitudes. The mean age was 23 years (SD =

3.29). Only 48% of the men reported using a condom at last sexual intercourse. Charnigo found in single variable logistic regression analysis that loss of sensation was associated with no condom use at last intercourse (OR 1.06, CI 1.02, 1.11; $P = 0.008$). In multivariate logistic regression analysis associating last sex condom use and the psychosocial measures, a single variable denoting specific attitudes about condom use (including pleasure) was a significant covariate (OR = 0.95, CI 0.91, 0.99; $P = 0.21$), although the pleasure variable itself was not. His results aligned with those of the Kennedy study.

Taken as a whole, this body of literature indicates that young adult and teen males believe that condoms will reduce pleasure from sexual intercourse, and their perceptions influence the decision to use or not use condoms.

Feel embarrassment with condoms

In a recent study of condom usage in Vancouver, Canada, Sarah G. Moore and colleagues investigated how embarrassment was related to condom purchase, storage, use, and disposal, and the consequences of that embarrassment (21). Focus groups were used to develop survey instruments to measure the embarrassment. Next, participants between 18 and 26 years old who had previously purchased condoms were recruited at nightclubs, shopping malls, and a university campus and completed the surveys in private. Data collected from the sample of 497 individuals (209 females, 280 males) included demographic information, sexual experience, relationship status, frequency of sex in the last 3 months, number of lifetime sexual partners, frequency and location of condom acquisition, number of condoms normally purchased, number of condoms stored,

and condom use. Participants described their embarrassment at the various stages of condom use with a seven point scale. Moore found that 58% of males were embarrassed by at least one stage. Females were more embarrassed by purchasing condoms than males ($P < 0.001$), but males were more embarrassed with condom use ($P < 0.002$). Both age and sexual experience were negatively correlated with condom embarrassment (both $P < 0.01$). Moore concludes that embarrassment is a significant impediment to condom use.

A paper by Jo Bell published in 2008 attempts to explain why embarrassment hinders condom use (10). She used data collected by the United Kingdom Government's Teenage Pregnancy Unit Living on the Edge (LOTE) study which recruited school children aged 12 through 17 years for individual (n = 116) and group interviews (n = 183 female and n = 126 male). Participants answered open-ended questions including those about school-based sexual education, sexual health and behaviors, and contraceptive attitudes. In response to the question why they don't use their information about contraceptives, the "majority" mentioned embarrassment as the reason, without any prompting. Common themes specifically stated include embarrassment in accessing condoms, using condoms, and suggesting their use to a partner. Bell states that for young men, fear of not knowing how to use condoms or using condoms incorrectly is the source of the embarrassment that impedes condom use.

These studies reveal that embarrassment about all aspects of condoms (purchasing, storing, discussing, and using) exists for young men and teens, and is at least correlated with inconsistent or reduced condoms use. The NSGF question used in this current study only concerns discussing condom use with a new partner.

Partner would appreciate a condom

The third condom attitude addressed by this study is that of partner appreciation. In the previously described study of high HIV risk adolescents, Larry K. Brown explored the idea that the male's perception of a new partner's appreciation for condom use could influence condom use, and not just their own pleasure (17). The items are phrased "a casual partner would prefer that we use a condom during sex" and "my main partner would get mad if we used a condom." Brown reports that in the logistic regression analysis, the perception of a partner's desire for condom use (yes for a casual partner and no for a main partner) predicted condom use in the outcomes condom use at last intercourse and in number of unprotected sex acts even when controlled for race, age, gender, and clinic site. He concludes that the partner's expectation affects the male's decision to use or not use condoms.

Gaynor L. Edwards *et al* also considered how partners' feeling influenced condom use (22). Young adult Australian university students were recruited for an anonymous online survey about their sexual behaviors and condom usage. Of the 1, 144 participants, 152 reported current casual sexual relationships and were included in this analysis. Their mean age was 21 years (SD = 2.09), and 23% were male. Participants used a 5 point scale to rank how often they wanted to use a condom, and how often their partner wanted to use a condom, and how often they recalled using condoms with their partner. The participants' desires were significantly correlated with their perceptions of the partners' desires ($r = 0.41$, $P < 0.01$). Males wanted to use condoms less than they thought their partners did in longer term "romantic" relationships ($P < 0.05$), but showed no significant difference in casual sexual relationships. In regression analyses for both

romantic and casual relationships, a participant's desire to use condoms was associated with increase condom use. Interestingly, in separate analyses, the perception of the partner's desire was also. The authors conclude that although young adults expect to use condoms more in casual sexual relationships than with longer term partners, their perceptions of their partners' expectations predicted condom use.

In a study to determine condom negotiation strategies and condom use by young Latino Americans, Jeanne M. Tschann and colleagues recruited and interviewed 694 sexually active Latinos aged 16 to 22 years from adolescent medicine and teen community health clinics (23). The mean age was 18 years (SD = 1.65), and 39% were male. Bilingual interviewers asked about sexual behaviors in the prior month during the one hour interviews. Specific questions concerned condom use negotiation strategies, perceptions of partners' condom desires, and proportion actual condom use (calculated as number of condom-protected sexual events per total sexual events). Overall, the Latino males reported using condoms at 58% of sexual events (SD = 0.44) which was significantly more than the Latino women did (M = 44%, SD = 0.44, $P < 0.001$). Also, the men perceived that their partners' wanted to use condom more often that the women did ($P < 0.002$). In a multiple regression analysis, participants (gender not specified) who thought their partners wanted to use condoms showed higher proportions of condom use. The authors inferred that young Latino males consider and act on what they think are their partners' preferences.

These studies reveal the importance of males' perceptions of their partners' expectations or desires for condom use and the decision to use condoms.

All three condom attitudes

One publication reviewed combined all three condom attitudes into a single variable and tested it against condom use in male teenagers in the United States. Jennifer Manlove and associates examined whether various family, individual, partner, or sex education factors were related to condom use frequency and consistency (7). She used data from the NSFG 2002 to study males 15 to 19 years old who had had heterosexual intercourse designated as "sexually experienced" (n = 542). The sample was limited to those who had sexual intercourse in the prior 3 months called "sexually active" (n = 366) when using the outcome condom use at last sex. Analysis with condom consistency as outcome was restricted to 347 males. For the outcome condom consistency in the last four weeks, only those males who had sex within those four weeks were considered (n = 285). The responses to the three condom attitude questions were recoded into a new variable of positive condom attitude rated 1 to 5 with 5 the most positive. For sexually experienced males, 71% reported condom use at first sexual intercourse, and 71% of sexually active male used condoms at their most recent sex event. Both groups had similar racial compositions: 19% Hispanic, 61% non-Hispanic white or other, and about 20% non-Hispanic black. The mean for positive condom attitude for sexually active males (the only grouped asked) was 3.9 out of a high rating of 5. Bivariate analysis showed significant relationships between the condom attitude variable and the measures of condom use. For the outcome used condom at last sex (n = 366), 56% had positive attitude score of 1-3 (low) and 82% had score of 4-5 (high, $P < 0.001$). For used condom consistently (100% of time with last partner, n = 347), 36% had the lower scores, and 61% had the higher scores ($P < 0.01$). For the outcome used condom 100% of time for

sex in last 4 weeks (n = 285), 52% reported the lower scores, and 81% the more positive attitude scores *(P* < 0.001). Additionally, more positive condom attitudes as denoted by the single attitude score were significantly predictive of each of the condom use outcomes in logistic regression models *(P* < 0.01 or *P* < 0.001). Manlove's study is especially relevant in that it was based on a similar outcome measure, several covariates, and sample population (male teens in the NSFG). This current condom attitude study, however, considers each of the three condom attitude independent variables (less pleasure, embarrassment, and partner appreciation) individually and then together, whereas Manlove analyzed a "positive condom attitude" variable created from the three. Furthermore, Manlove studied only teenaged males using 2002 NSFG data. This study includes young adult and teen males who participated in the most recently released 2006-2008 NSFG.

Covariates: Characteristics

Many studies of the condom behaviors of male teens and young adults have explored the relationships between age, race and/or ethnicity, and condom use. Fewer have investigated the effect of education level attained. For this study of condom attitudes and condoms use, these characteristics were considered as covariates that could modify the effects of the main independent condom attitude variables (feel less pleasure, feel embarrassed, and partner would appreciate). Each of these covariates will be discussed individually, even when reported from the same studies, for comparison and clarity.

<u>Age</u>

Most of the studies reviewed so far have examined the determinants of condom use in either teens or young adults, but not both. Because the dependent and independent variables are not consistent across these report, direct comparisons of condom use and attitudes by age group is difficult, if not impossible. William Masiglio, in his chapter in the National Campaign to Prevent Teen Pregnancy publication *It's a Guy Thing,* used data collected by the Youth Risk Behavior Survey (YRBS) to show that sexual experience increases with increasing age (3). The YRBS is a national cross-sectional survey of high school students in the United States that uses anonymous self-administered questionnaires. In ninth grade, 37% of boys are sexually active. By twelfth grade, 61% claim to be sexually experienced. Young adults were not included in the YRBS. In a 2008 Child Trend Fact Sheet by Erun Ikramullah based on NSFG 2002 data, older teen males were less likely to use condoms at their last sexual intercourse than younger teens (no *P* value given) (24). Again, this publication only reviewed condom use by teens.

The study of condom embarrassment among young adult 18 to 26 years old by Sarah Moore did find that age was negatively correlated with condom embarrassment *(P* < 0.01) (21). This study did not attempt to associate age or embarrassment with condom use.

One study, by Shayesta Dhalla *et al,* did link condom use and age among a wide range of ages with data from the 2006 Canadian Community Health Survey (CCHS) 3.1 (25). The CCHS is a large (n = 132,221) biennial, population based, cross sectional interview survey of Canadians on a variety of health topics with a stratified multistage cluster design. Dhalla's study sample (n = 20,975) was limited to the participants who

responded to questions about mood disorders and last time condom use, which was only asked of unmarried participants 15 to 49 years of age. Participants were grouped by age into 15-17, 18-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49 years categories. The majority of the males (n = 10,670) were aged 20 to 24 years (31.8), and of white race (82%). Age group was significant in predicting condom use at last sex in multivariate logistic regression analysis, with condom use decreasing as age increased. With the 15-16 years age group as reference, the adjusted odds ratio for condom usage for males ages 18-19 years was 0.48 (CI 0.37, 0.63) and trended to 0.12 (CI 0.09, 0.15) for males age 45-49 years. The authors speculate that increased stability in the sexual relationships of older adults or the choice of other forms of contraception may account for the reduced condom usage. The very large size of this study makes it particularly strong.

Race/ethnicity

Race and ethnicity as determinants of condom use are considered in most studies of teens and young men, but few relate that characteristic to the association of condom attitudes on condom use. Manlove found that male African American teens as compared to whites have higher odds of condom use at last sex (OR = 2.58, $P < 0.10$), condom consistency in last sex (OR = 1.83, $p < 0.10$), and 100% use of condom in last four weeks (OR = 3.95, $P < 0.05$). Hispanic males as compared to whites were less likely to use condoms at last sex (OR = 0.66, $P < 0.05$) or to use condoms 100% of the time in the last four weeks (OR = 0.49, $P < 0.05$). More positive condom attitudes using the all-in-one variable, while increasing the odds of condoms use, weakened the race association

for all three outcomes (7). Manlove and her colleagues conclude that race does affect the association of condoms attitudes to condom use.

Melissa A. Farmer and Cindy M. Meston analyzed the factors, including race, that influenced condom self-efficacy in a large, ethnically diverse sample of university students (26). Selected students were sexually active and were awarded course credit for participation. In the total sample of 665 students, the males (n = 208) had a mean age of 18.9 years (SD = 1.29) with a range from 16 to 26 years. Of the males, 148 were Caucasian, 34 were Hispanic, and 26 were Asian American. Participants completed surveys asking about sexual risk behavior and self-efficacy, and if condoms were used at most recent sexual event. No differences were found for self-efficacy, condom attitudes, or barriers to use scores by ethnicity. Likewise, Farmer found no differences for condom use at last sex based on ethnicity.

The Dhalla study also investigated the race of participants in association with condom use at last sexual intercourse (25). The race categories, limited to those on the CCHS, were white and "visible minority," which was undefined. Using "visible minority" as the reference, the adjusted OR for white males and last sex condom use was 0.71 (CI 0.64, 0.79), indicating that whites were less likely to have used condoms. Again, the large number of participants in this study speaks to its strength despite the constrained and vague race categories.

Sunny Kim *et al* compared condom use among unmarried Hispanic and non-Hispanic students by analyzing data from the National College Health Assessment (NCHA) survey from a predominantly Hispanic university (27). The NCHA is a 30 minute, anonymous, self-administered, English language questionnaire comprised of

health and health behavior questions. Students were chosen by stratified cluster sampling design. Of the 815 participants, 38% were males, the mean age was 23 years, and 50% were Hispanic, 21% non-Hispanic white, and 16% non-Hispanic black. Kim found that in this sample condom use at last vaginal sex was not associated with ethnicity once age and sex were controlled. In contrast, in Manlove's study (described previously) of male adolescents using NSFG data, Hispanics teen males were about half as likely to use condoms as whites (7).

Education level attained

The association of condom use and sex education has been addressed frequently in studies of teens and young adults. Few have considered the effect of general education level attained on the choice to use condoms in this population. Perhaps that is because grade or education degree is contingent on age and so the two must be matched in order to tease out any education level specific association. Dhalla, in the study of Canadians aged 15 to 49 years, explored condom use at last intercourse with education attainment by categorizing all respondents based on current student status (25). Of the 10, 670 males, 31% were current students. Males who claimed student status were more likely to use condoms than those who were not students (AOR = 1.28, CI 1.16, 1.42)

The studies reviewed here examined the relationships between condom use and age, condom use and race, and condom use and student status, and a few associated those factors with attitudes towards condoms. Some findings appear contradictory, though it is difficult to evaluate those inconsistencies as the outcome measurements and source populations were so dissimilar.

Covariates: Sexual Experience

It is reasonable to expect that condom use by teen and young adult males would be influenced by degree of sexual experience. The age of sexual initiation, the total number of partners, the number of partners in the last year, and the number of current partners are ways of assessing sexual experience and quantifying sexual risk behaviors. Several studies have investigated the relationships between condom use and sexual experience.

Age at first intercourse

Some male teens and young adults began sexual intercourse activity at an early age. In fact, according to a Centers For Disease Control and Prevention's report based on the Youth Risk Behavior Survey 2009, 8.4% of boys had sexual intercourse before they were 13 years old (28). This includes 4.4 % of white males, 25% of black males, and 10% of Hispanic males.

Carl D. Sneed investigated whether these early initiators were more likely to engage in risky sexual behavior than teens who delayed sexual debut (29). Sneed used data from the YRBS 2007 and limited his participants to those age 16 to 18 years who had had intercourse at least once (n = 5315). Of these, 52% were male, 55% white, 21% African American, 18% Hispanic, and 7% other. Early initiators (n = 630, defined as first sexual intercourse before 13 years old) were compared to later initiators (n = 4685, first intercourse at 13 or older) in number of current, recent, and lifetime partners, and in condom use at last sex. Of the males, 16% were early initiators as compared to only 6% of the females ($P < 0.001$). Logistic regression analysis predicting condom use at last sex

showed that male early initiators were less likely to use condoms than late initiators (OR = 0.79, CI 0.61, 1.03; not significant). When grouped by age and using 16 year olds as the reference, this relationship is significant for 18 year old early initiators (OR = 0.62, CI 0.46, 0.83, $P < 0.05$), though not for 17 year olds. Sneed inferred that males who initiated sexual intercourse at a younger age are more likely to use condoms than those who debut later.

Rose M. Colon and colleagues, in their study of African American adolescents, explored psychosocial and other factors as predictors of condom use (30). A random, cross section subsample of African American male teens (n = 229) was selected from a longitudinal study of a school based HIV intervention. The boys' ages ranged from 14 to 19 years, with a mean age of 16. The males answered questions about psychosocial issues, age at first intercourse, and risky sexual behavior. Colon found that of the boys that had experienced sexual intercourse (88%), 60% of those were 13 years old or younger at sexual initiation. More than half of those early initiators claimed to "always" or "usually" use condoms. Her findings concur with those of Sneed.

In the Manlove investigation of male adolescent condom use, age at first sexual intercourse was tested as a predictor of condom use at first sex only---not with the other outcomes (condom at last sex and condom consistency)(7). In this population of 15 to 19 year old males from the NSFG 2002, first sexual intercourse at a younger age predicted condom use at that first sex. For those boys who were 14 or younger, 72% used condoms. If the first sex occurred at age 15 or 16, a condom was used 77% of the time. A condom was used only 59% time if the first sex occurred at age 17 to 19 years *(P <*

0.001). The authors concluded that males who engaged in their first intercourse at younger ages are more likely to use condoms at that episode.

Number of lifetime partners

The 2009 YRBS data reported by the CDC shows that 16% (CI 13.7, 19.1) of high school age males have had sexual intercourse with four or more partners in their lifetimes (28). This represents a continuation of the downward trend from 1991 with 23% and 2003 with 18% (31). The 2009 percentages increase with higher grade level as expected: 9th graders, 11.1%; 10th grade, 15.3%; 11th grade 17.5%, and 12th grade, 22.7%. Several previously described studies considered the impact of the number of partners in a lifetime as a measure of sexual experience on the decisions to use condoms, though only one considered the both the number of partners and condom attitudes.

Male teens (15 to 19 years old) who had intercourse in the prior 3 months had an average of 2.8 lifetime sexual partners according to Manlove's investigation (7). The number of lifetime partners was not significantly associated with any of the three condom use outcomes (use at last intercourse, consistency with last partner, or 100% use in the prior four weeks) in any model. As discussed previously, the single condom attitude variable was significant with all three condom measurements.

Almost half (46%) of African American teenaged males claimed to have had more than 5 sexual partners according to the study of psychosocial factors and condom use by Colon *et al* (30). The percentages of teens that "usually" or "always" used condoms generally increased with total number of partners according to Colon. As a percentage of the total number of sexually active participants (n = 172), approximately

3% used condoms regularly with one partner, 5% with 2 lifetime partners, 7% with three, 25% with four, and 39% with five or more. Measures of significance were not published. However, due to the unequal distribution, when the males who "usually" or "always" use condoms are compared to males with the same number of lifetime partners, the proportions are fairly similar. Calculated from the percentages of the total sample published, the new calculations reveal that about three quarters of males, *regardless of number of lifetime partners*, used condoms at least usually: one partner, 80%; two partners, 74%; three partners, 73%; four partners, 83%; and five or more, 78% (NB Pollard calculations).

Farmer and Meston, in their study of 665 ethnically diverse university students, found that the mean number of lifetime sexual partners was 4.79 (SD = 4.59) (26). This was not significantly correlated with condom self-efficacy, condom use attitudes, or condom use barriers. In their regression analysis of males and females together, the number of lifetime partners was not a significant predictor of last time condom use. They surmise that the decision to use a condom is not determined by the number of partners in one's lifetime.

Number of partners in last year, and number of current partners

Sexual experience can also be represented by the number of current partners and number of partners during the previous year. Among the never married 15 to 19 year old males who had sexual intercourse in the previous year, 22% had one partner, 12% had two or three partners, and 4% had four or more partners, according to the NSFG 2006-2008 (32). Most of the literature reviewed used the number of lifetime partners and /

or current sexually activity status as measures of sexual experience when investigating condom use instead of the number of partners in a year or currently. In others, it isn't clear if the variable for number of partners represents sequential partners in a given time period or concurrent partners.

Summary of Current Problem and Study Relevance

A review of the literature pertaining to condom use and the influence of attitudes toward condoms for unmarried teen and young adult males reveal that many questions remain. In most studies, the perceptions of loss of pleasure and embarrassment from condoms are associated with reduced condom use. The idea that a partner might appreciate using a condom also is related to actually using condoms. Manlove's combination positive condom attitude is consistent with those results. The samples from these studies do not match the current study sample exactly, but may offer clues to condom attitudes and use relationships in this population.

Younger teens and those whose first sexual intercourse occurred at a younger age seem to use condoms more frequently than older teens or those who delay sexual debut. The effects of race/ethnicity, education level attainment, and the other measures of sexual experience (number of lifetime, year, and current partners) are not so clear.

This study will attempt to answer those questions and improve the understanding of the determinants of condom use. By clarifying the associations of condom perceptions and condom behavior, and the characteristics that influence those relationships, sex education and condom promotion programs can more effectively and efficiently reach this vulnerable population.

Chapter III: Methodology

Introduction

Why do teen and young adult males choose to use condoms? This study questions the importance of condom attitudes among sexually active teen and young adult males as components in that decision. To answer that question, the attitudes and recent condom use behavior of the males surveyed in the National Survey of Family Growth were investigated.

Population and Sample

The Centers for Disease Control and Prevention (CDC) is interested in measuring and tracking trends in all aspect of family growth. To accomplish this task, the CDC's National Center of Health Statistics (NCHS) administers the National Survey of Family Growth (NSFG) to provide estimates of various aspects of family and reproductive behaviors. The NSFG asks questions concerning sexual activity, contraception, marriage, divorce, fertility, infertility, sterilization, pregnancy outcomes, and births among the United States population. The NSFG is funded by the NCHS and the U.S. Department of Health and Human Services (4). At its inception in 1973, the NSFG was designed to intermittently survey just ever-married women of childbearing ages, 15 to 44 years old. In 1982 it was expanded to included women of any marital status, and a questionnaire for 15 to 44 years old males was added in 2002. In 2006, the NSFG replaced the episodic cycles for a continuous collection using the three separate questionnaires: female, pregnancy, and male (33).

The NSFG 2006-2008 employed a national area probability sample to randomly select respondents from 85 geographic areas called Primary Sampling Units (PSU). Blacks, Hispanics, and 15-24 years olds were oversampled to create a nationally representative sample of 15 to 44 year old men and women (34). Trained female interviewers administered the surveys face-to-face in the participants' homes from June 2006 until December 2008. Responses were collected using computer-assisted personal interviewing (CAPI) for the majority of sections and audio computer-assisted self-interviewing (ACASI) for the last more sensitive sections. All respondents were informed that the interviews were voluntary, and those 18 years old or older were asked, but not required, to sign consent forms. Consent from both the teen and a parent or guardian was obtained for those aged 15 to 17 years. Participants were offered 40 dollar incentives for completing the 60 minute (male) or 80 minute (female) interviews.

The overall response rate was 75% for men and women, and 73% for males alone. The NSFG 2006-2008 contains 6,139 records of the male questionnaire --- one for each man interviewed. Both the male questionnaire and the dataset are available from the NSFG website at http://www.cdc.gov/nchs/nsfg.htm.

Research Design

This study of condom attitudes and condom use among teen and young adult males was a cross-sectional study. The study population was composed of the 924 respondents of Continuous NSFG 2006-2008 male questionnaire who met these inclusion criteria:

- Aged 15 to 24 years old at time of screening

- Never married
- Never cohabitated
- Reported intercourse with a female at least once in the last year

Measures

Dependent variable

The dependent variable measured condom use at the most recent heterosexual vaginal intercourse. This variable was recoded from the responses to two questions:

1. "The last time that you had sexual intercourse, did you or she use any methods to prevent pregnancy or sexually transmitted disease?"
2. "That last time, what methods did you and she use to prevent pregnancy or sexually transmitted disease?"

If the male reported condom use either as the first or second method mentioned, then the respondent was credited with condom use at last intercourse. If he did not mention condoms as a method used, then the response was coded as no condom used.

Independent variables

The main independent variables in this study measured the three attitudes concerning condoms and their use addressed in the NSFG male questionnaire. Respondents were asked these questions:

1. "What is the chance that if your partner used a condom during sex, you would feel less physical pleasure?"

2. “What is the chance that it would be embarrassing for you and a new partner to discuss using a condom?”
3. “What is the chance that if you used a condom, a new partner would appreciate it?”

Possible choices for each were “no chance”, “a little chance”, “50-50 chance”, “a pretty good chance”, “an almost certain chance”, “don’t know”, or refusal to answer.

For question 1 regarding feeling less pleasure, these responses were combined and a new variable with the categories of “little or no chance”, “50-50 chance”, and “more than 50-50 chance” created. New variables were created for the responses to questions 2 and 3 also with just two categories each because of small numbers for certain categories. Refusals and “don’t know” were coded as “missing” and those respondents eliminated. See Table 1.

Table 1. Original responses for condom attitudes variables from male questionnaire, NSFG 2006-2008, and new variables responses.

original response	new variable response
feel less pleasure	
No chance A little chance	little or no chance
50-50 chance	50-50 chance
A pretty good chance An almost certain chance	more than 50-50 chance
embarrassing	
No chance A little chance	little or no chance
50-50 chance A pretty good chance An almost certain chance	50-50 or greater chance
partner would appreciate	
No chance A little chance 50-50 chance	50-50 or less chance
A pretty good chance An almost certain chance	more than 50-50 chance

Covariates

Individual characteristics and sexual experience were considered as potential modifiers of a condom use and attitudes association. Respondents were categorized by age at the time of interview as either "teens" (15 to 18 years old) or "adults" (19 to 24 years old). Race and ethnicity were originally designated by the NSFG by these four categories: "non-Hispanic white, non-Hispanic black, Hispanic, and non-Hispanic other". In this study, a new variable maintained the first three categories and eliminated the respondents that reported "non-Hispanic other" because of the low number in that category. The third individual characteristics measured attempted to capture the highest

education level attained by each male. By matching age at screening to highest degree completed or current school grade, each respondent was categorized as "at appropriate education level" or not. "Appropriate education level" was defined as explained in Table 2.

Table 2. Age from male questionnaire, NSFG 2006-2008, and new variable appropriate education level.

age at screening	appropriate grade or degree
15 years old	at least 9th grade
16 years old	at least 10th grade
17 years old	at least 11th grade
18 years old	at least 12th grade
19 to 24 years old	high school diploma

Four different characteristics related to sexual history were measured and analyzed as possible modifiers to an association between attitudes about condoms and their use. Participants were asked at what age they first had sexual intercourse with a female and the responses were categorized as younger than 14 years old, 14 to 18 years old, and older than 18 years. The number of lifetime female sexual partners further described the males' sexual experiences and were grouped as 1 partner, 2 to 3 partners, 4 to 6 partners, and 7 or more partners. Similarly, the number of female partners in the last year was put into one of the following categories: 1 partner, 2 partners, or 3 or more partners. Lastly, each male's number of female partners at the time of interview was measured as 0, 1, or 2 to 3 partners.

Statistical Methods

Of the 6,139 NSFG 2006-2008 male questionnaire records collected, 924 represented sexually active, unmarried, non-cohabitating males aged 15 to 24 years old and were selected for this study. Males who otherwise met the inclusion criteria but reported their race/ethnicity as "non-Hispanic other" were excluded from this analysis (n = 35). Consequently, 889 were analyzed.

Condom use was tested for independence by bivariate analyses against each condom attitude and covariate (age group, race/ethnicity, and appropriate education level, age at first intercourse, number of lifetime female partners, number of female partners in the last year, and number of current female partners). *P*-values for unmodified Rao-Scott chi-square tests were compared to an alpha of 0.05, the significance criterion.

Multivariate logistic regression analyses were used to test for an association between condom use at last intercourse and one of the three condom attitudes (less pleasure, embarrassment, or partner appreciation) separately. The initial full models contained the attitude variable, the seven covariates, and the seven possible attitude-covariate interaction terms. Potential effect modifiers were initially removed by backwards elimination using less than or equal to 0.05 as the significance criteria. Many second order interaction terms were significant at this level. Assessing the impact of these significant interaction terms became difficult due to both the number and contradictory trends. In order to not distract from the original question of the association of condom attitudes on condom use, the significance criterion was changed to less than or equal to 0.01. Interaction terms that were significant at the new criterion and the corresponding covariates remained in the model. Next, each of the retained independent variables was

considered as a confounder. Confounding was defined as changing the condom attitude variable's odds ratio by plus or minus 10%. This procedure repeated for each of the three attitude variables.

Table 3. Models with separate attitude variables, NSFG 2006-2008.

attitude variable	covariates	interaction terms
model 1: feel less pleasure	age group race/ethnicity appropriate education level age at first intercourse partners in lifetime partners in last year current partners	pleasure*age group pleasure*race/ethnicity pleasure*appropriate educ. level pleasure*age at first intercourse pleasure*partners in lifetime pleasure*partners in last year pleasure*current partners
model 2: feel embarrassed	age group race/ethnicity appropriate education level age at first intercourse partners in lifetime partners in last year current partners	embarrassed*age group embarrassed*race/ethnicity embarrassed*appropriate educ. level embarrassed*age at first intercourse embarrassed*partners in lifetime embarrassed*partners in last year embarrassed*current partners
model 3: partner appreciates	age group race/ethnicity appropriate education level age at first intercourse partners in lifetime partners in last year current partners	appreciates*age group appreciates*race/ethnicity appreciates*appropriate educ. level appreciates*age at first intercourse appreciates*partners in lifetime appreciates*partners in last year appreciates*current partners

A similar strategy of multivariate logistic regression analysis tested for an association between condom use at last intercourse and the three condom attitudes

together. The initial full model contained all three attitude variables, the seven covariates, and the 21 possible attitude-covariate interaction terms. Interaction was assessed as previously described and significant terms retained. Next, only the seven covariates were considered as confounders and eligible for removal from the model. A subsequent analysis considered the condom attitudes (less pleasure, embarrassment, or partner appreciation) as potential confounders of the association between condom use and attitudes as well, and subject to removal.

Table 4: Full model with all 3 attitude variables, NSFG 2006-2008.

attitude variables	covariates	interaction terms
feel less pleasure feel embarrassed partner appreciates	age group race/ethnicity appropriate education level age at first intercourse partners in lifetime partners in last year current partners	pleasure*age group pleasure*race/ethnicity pleasure*appropriate educ. level pleasure*age at first intercourse pleasure*partners in lifetime pleasure*partners in last year pleasure*current partners embarrassed*age group embarrassed*race/ethnicity embarrassed*appropriate educ. level embarrassed*age at first intercourse embarrassed*partners in lifetime embarrassed*partners in last year embarrassed*current partners appreciates*age group appreciates*race/ethnicity appreciates*appropriate educ. level appreciates*age at first intercourse appreciates*partners in lifetime appreciates*partners in last year appreciates*current partners

The fully adjusted, final three attitude, and significant attitude models, described in Chapter IV, were compared by evaluation of the Akaike Information Criterion (AIC) and the log likelihood statistic (-2 log L).

Data analysis for this study was generated using SAS software, version 9.2 of the SAS system for Windows *Vista*. Copyright © 2002-2008 SAS Institute Inc. (Cary, North Carolina, USA). To compensate for the complex sample design, analyses were conducted with the appropriate procedures (SURVEYFREQ and SURVEYLOGISTIC), and were weighted with the sampling weights supplied by the NSFG to account for the various sampling and response rates.

Limitations and Delimitations

Like all studies that investigate NSFG data, this study is subject to limitations based on systematic error. In spite of efforts to minimize misinterpretation during data collection interviews, interviewers and respondents could misunderstand each other (33). The respondents might also have chosen to give more acceptable answers instead of the more accurate ones in efforts to please the interviewers. This tendency may have persisted in spite of the use of ACASI. The survey questions referred to past events, so the responses were subjected to recall error. Because the males volunteered to participate in the NSFG, selection bias may have occurred.

The scope of inquiry for this study was limited by the number of questions and topics addressed in the NSFG. All of the questions concerning attitudes toward condoms use were included for completeness sake, although the response categories were collapsed from 5 to 2 or 3 categories due to low numbers of responses as described previously and may obscure small trends. Outcomes such as condom use frequency could have been substituted as the

measurement of condom use but were rejected in favor of the dichotomous outcome variable indicating condom use at last sex. Other condom use variables as outcomes would perhaps expose different associations.

Numerous other independent variables were considered as covariates as well and could have interesting associations with condom use. The variables selected for inclusion yielded sufficient numbers of responses for this study's particular population and built on previous literature. The covariate that denotes self-reported race and ethnicity revealed insufficient numbers in the "non-Hispanic other" category so those respondents were omitted from the analyses. This delimitation may preclude generalizations based on this study to that population of teens and young men. Other delimitations inherent in surveys may be mitigated by the national scope of the NSFG 2006-2008 and its weighting to adjust for differing response rates.

Emory University Institutional Review Board Clearance

This study involved the analyses of a publically available and de-identified dataset that does not contain identifiable private information. As such, the Emory University Institutional Review Board (IRB) determined no review was required. A letter of clearance is attached in Appendix A.

Summary

Single and multivariate logistic regression analyses were used to find the associations of attitudes toward condoms with actual condom use at the last intercourse. All potential interaction terms of the three attitude variables and seven covariates were considered as well.

If the reasons why teen and young adult males chose to use condoms could be determined, and what contributed to those choices, then programs could be designed and implemented to encourage consistent condom use. By targeting those influential factors, scarce public health and sex education funds can be used more effectively and efficiently to promote healthy sexual behaviors.

Chapter IV: Results

Introduction

The findings presented in this chapter include descriptive statistics of the study population, the dependent variable condom use at last intercourse, the condom attitudes independent variables, and the seven covariates. Bivariate analyses of the dependent variable with the independent variables and covariates, and the multivariate logistic regression models and selection procedure are shown.

Findings

Sample Characteristics

Out of the 6,139 NSFG 2006-2008 male questionnaire respondents, 925 met the inclusion criteria of never married, non-cohabitating males aged 15 to 24 years old who had been sexually active in the four weeks prior to their interview. Participants who self-identified as of "non-Hispanic other" race (n = 35) were excluded as explained in the methodology chapter. Therefore, the unweighted sample size for this study was 889 and corresponded to a weighted sample size of 7,130,101 males.

Approximately 36% of these males were "teens" aged 15 to 18 years old and 64% were "adults" aged 19 to 24 years old. By race and ethnicity, 20% identified as Hispanic, 18% as non-Hispanic black, and the rest as non-Hispanic white. Almost 80% reported using a condom at his last intercourse and 20% did not.

The distribution of responses to the condom attitude questions were as follows. About 37% thought that there was little or no chance of condoms reducing intercourse pleasure, 25%

said there was a 50-50 chance of loss of pleasure, and 38% thought more than 50-50 chance. Almost 87% agreed that there was little or no chance of embarrassment in discussing condoms with partners, and only 13% thought 50-50 or greater chance of embarrassment. The majority, 87%, said that a partner would appreciate using a condom, and 13% thought there was only a 50-50 or less chance that she would. These frequencies, as well as the frequencies and weighted percentages for the age appropriate education level attained, age at first intercourse, number of lifetime sexual partner, number of partners in previous year, and number of current partners, are displayed in Table 5.

Table 5. Characteristics of 15 to 24 year old sexually active neither ever-married nor cohabitated males, NSFG 2006-2008.

Characteristic	*unweighted* n = 889	*weighted* n = 7,130,101	*weighted percent ‡*
Used condom at last intercourse			
yes	706	5,694,496	*79.87%*
no	183	1,435,606	*20.13%*
Condom attitudes			
Feel less pleasure			
more than 50-50 chance	300	2,692,586	*38.01%*
50-50 chance	229	1,743,782	*24.62%*
little or no chance =3	354	2,647,268	*37.37%*
missing	*6*		
Feel embarrassed			
50-50 or more chance	136	933,780	*13.11%*
little or no chance	750	6,187,749	*86.89%*
missing	*3*		
Partner would appreciate			
more than 50-50 chance	761	6,197,390	*86.96%*
50-50 or less chance	126	929,450	*13.04%*
missing	*2*		
Characteristics			
Age at survey			
15-18 years ("teen")	369	2,553,370	*35.81%*
19-24 years ("adult")	520	4,576,731	*64.19%*
Race			
Hispanic	226	1,442,709	*20.23%*
non-Hispanic black	207	1,286,120	*18.04%*
non-Hispanic white	456	4,401,273	*61.73%*
Age-appropriate education level			
below appropriate grade	449	3,942,997	*55.30%*
at appropriate grade	440	3,187,105	*44.70%*

‡ percentages exclude missing data

Table 5 (cont) Characteristics of 15 to 24 year old sexually active neither ever-married nor cohabitated males, NSFG 2006-2008.

Characteristic	*unweighted* n = 889	*weighted* n = 7,130,101	*weighted percent ‡*
Sexual Experience			
Age at first sexual intercourse			
13 years old or younger	123	775,163	*10.87%*
14-18 years old	683	5,401,783	*75.76%*
19 years old or older	83	953,155	*13.37%*
Female sex partners in lifetime			
1 partner	179	1,754,396	*24.61%*
2-3 partners	248	1,792,856	*25.14%*
4-6 partners	250	1,815,917	*25.47%*
7 or more partners	212	1,766,933	*24.78%*
Female sex partners in last year			
1 partner	493	3,915,841	*54.92%*
2 partners	188	1,634,928	*22.93%*
3 or more partners	208	1,579,333	*22.15%*
Current sex partners			
none	376	3,265,967	*45.81%*
1 partner	464	3,539,456	*49.64%*
2-3 partners	49	324,678	*4.55%*

‡ percentages exclude missing data

Bivariate analyses

Bivariate analysis of the dependent variable condom use at last intercourse with the condom attitude variables shows that the association of the perception of less pleasure with condoms is significant (Rao-Scott Chi-square test (X^2) = 37.802, degrees of freedom (d.f.) = 2, $P < 0.0001$), as is the association with perception of a partner's appreciation (X^2 = 7.5833, d.f. = 1,

P = 0.0059). Embarrassment to discuss condoms with a partner is not associated with condom use at last intercourse (X^2 = 0.6730, d.f. = 1, *P* = 0.4120). The other characteristics and indicators of sexual experience that have significant associations with condom use at last intercourse are age group (teen versus adult) at time of survey (X^2 = 0.6730, d.f. = 1, *P* = 0.0385), number of lifetime partners (X^2 = 19.846, d.f. = 3, *P* = 0.0002), number of partners in previous year (X^2 = 10.603, d.f. = 2, *P* = 0.005), and number of current partners (X^2 = 15.4928, d.f. = 2, *P* = 0.0004). Neither race, nor age appropriate education level, nor age at first sexual intercourse were significantly associated with condom use in this analysis. The weighted percentages and Rao-Scott Chi-square tests with *P* values are given in Table 6.

Table 6. Characteristics of 15 to 24 year old neither ever married nor cohabitated sexually active males by use of condoms at last intercourse, NSFG 2006-2008.

Characteristic	used condom			did not use condom				
	unweighted n = 706	*weighted* n = 5694496	*weighted* %	*unweighted* n = 183	*weighted* n = 1435606	*weighted* %	X^2 (d.f.)*	*p-value*
Condom attitudes								
Feel less pleasure								
more than 50-50 chance	203	1796115	*66.71%*	97	896472	*33.29%*		
50-50 chance	193	1499119	*85.97%*	36	244663	*14.03%*		
little or no chance	305	2357291	*89.05%*	49	289978	*10.95%*	37.802‡ (2)	*<0.0001*
missing	*5*			*1*				
Feel embarrassed								
50-50 or more chance	107	707034	*75.72%*	29	226747	*24.28%*		
little or no chance	597	4983384	*80.54%*	153	1204366	*19.46%*		
missing	*2*			*1*			0.6730 (1)	*0.4120*
Partner would appreciate								
more than 50-50 chance	620	5107382	*82.41%*	141	1090008	*17.59%*		
50-50 or less chance	84	583852	*62.82%*	42	345597	*37.18%*	7.5833 (1)	*0.0059*
missing	*2*			*0*				

‡ Chi-square test excludes missing data

* Rao-Scott Chi-square test, d.f. = degrees of freedom

Table 6 (cont). Characteristics of 15 to 24 year old neither ever married nor cohabitated sexually active males by use of condoms at last intercourse, NSFG 2006-2008.

Characteristic	used condom			did not use condom				
	unweighted n = 706	*weighted* n = 5694496	*weighted* *%*	*unweighted* n = 183	*weighted* n = 1435606	*weighted* *%*	X^2 (d.f.)*	*p-value*
Characteristics								
Age at survey								
15-18 years ("teen")	315	2178214	*85.31%*	54	375156	*14.69%*		
19-24 years ("adult")	391	3516282	*76.83%*	129	175048	*23.17%*	4.440 (1)	*0.0385*
Race								
Hispanic	166	1134245	*78.62%*	60	308464	*21.38%*		
non-Hispanic black	179	1028843	*80.00%*	28	257277	*20.00%*		
non-Hispanic white	361	3531408	*80.24%*	95	869865	*19.76%*	0.075 (2)	*0.9631*
Age-appropriate education level								
below appropriate grade	336	3029782	*76.84%*	113	913215	*23.16%*		
at appropriate grade	370	2664714	*83.61%*	70	101542	*16.39%*	2.634 (1)	*0.1046*

‡ Chi-square test excludes missing data

* Rao-Scott Chi-square test, d.f. = degrees of freedom

Table 6 (cont). Characteristics of 15 to 24 year old neither ever married nor cohabitated sexually active males by use of condoms at last intercourse, NSFG 2006-2008.

Characteristic	used condom			did not use condom				
	unweighted n = 706	*weighted* n = 5694496	*weighted* *%*	*unweighted* n = 183	*weighted* n = 1435606	*weighted* *%*	X^2 (d.f.)*	*p-value*
Sexual Experience								
Age at first sexual intercourse								
13 years or younger	104	653726	*84.33%*	19	121437	*15.67%*		
14-18 years	537	4251938	*78.71%*	146	1149845	*21.29%*		
19 years or older	65	788831	*82.76%*	18	164324	*17.24%*	1.147 (2)	*0.5636*
Female sex partners in lifetime								
1 partner	147	1538863	*87.71%*	32	215534	*12.29%*		
2-3 partners	211	1494479	*83.36%*	37	298377	*16.64%*		
4-6 partners	206	1501770	*82.70%*	44	314147	*17.30%*		
7 or more partners	142	1159385	*65.62%*	70	607549	*34.38%*	19.846 (3)	*0.0002*
Female sex partners in last year								
1 partner	398	3270930	*83.53%*	95	644911	*16.47%*		
2 partners	152	1337005	*81.78%*	36	297923	*18.22%*		
3 or more partners	156	1086561	*68.80%*	52	492772	*31.20%*	10.603 (2)	*0.0050*
Current sex partners								
none	329	2871690	*87.93%*	47	394277	*12.07%*		
1 partner	340	2606586	*73.64%*	124	932870	*26.36%*		
2-3 partners	37	216220	*66.60%*	12	108458	*33.40%*	15.4928 (2)	*0.0004*

‡ Chi-square test excludes missing data

* Rao-Scott Chi-square test, d.f. = degrees of freedom

Multivariate analyses

Multivariate logistic regression was used to test the hypotheses that in this population condom attitudes are determinants of condom use at last intercourse, and if so, that the covariates modify the association and are associated with condom use even when adjusted for condom attitudes.

Study hypothesis 1: Among never married and never cohabitated sexually active men aged 15 to 24 years old, condom use is associated with attitudes toward using condoms.

Study hypothesis 2: Among sexually active men aged 15 to 24 years old, the association of condom use with attitudes toward using condoms is modified by age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained.

Study hypothesis 3: Among sexually active men aged 15 to 24 years old, condom use is associated with age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained when adjusted for attitudes toward using condoms.

Each of the three condom attitudes (less pleasure, embarrassment, or partner appreciation) was tested individually with condom use at last intercourse. The initial full models contained the single attitude variable, the seven covariates, and the seven possible attitude-covariate interaction terms as described in the methods chapter. Backwards

elimination directed the removal of non-significant interaction terms (criterion $P = 0.01$). Significant interaction terms and the corresponding covariates were retained in the model. To detect confounding (a change in odds ratio greater than 10%), each covariate was removed and the change of an attitude's odds ratio noted. Covariates found to be confounders were retained in the models as well.

Feel less pleasure with condoms

For the attitude feel less pleasure, no lower order interaction terms were significant ($P < 0.01$) so all were eliminated from the model. Feels less pleasure itself was significant at the more that 50-50 chance level (fully adjusted OR = 0.24, CI 0.14, 0.41) when compared to the little or no chance level. The intermediate category, 50-50 chance of feel less pleasure with a condom, was not (fully adjusted OR = 0.85, CI 0. 0.41, 1.76). The number of partners in the prior year was significant ($P = 0.012$) and confounds the association of condom use and feel less pleasure at the more than 50-50 chance level (unadjusted OR = 0.27, fully adjusted OR = 0.24) when compared to little or no chance. The parsimonious model for condom use at last intercourse and the attitude feel less pleasure is:

$$\log\left(\frac{\text{used condom}}{\text{did not use condom}}\right) = \beta_0 + \beta_1(\text{feel less pleasure}) + \beta_2(\text{number of partners last year})$$

The steps and the results of this analysis are shown in Table 7

Table 7. Backwards elimination of covariates in used condom and feel less pleasure model, NSFG 2006-2008.

Fully Adjusted Model	**Odds Ratio**	**95% C.I.**	**±10%**
feel less pleasure			
more than 50-50 chance	0.24	*0.14-0.41*	0.22-0.26
50-50 chance	0.85	*0.41-1.76*	0.77-0.94
little or no chance	1		
Step 1: age appropriate education level		*P* = 0.6854 (removed)	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.24	*no*	0.22-0.26
50-50 chance	0.85	*no*	0.77-0.94
little or no chance	1		
Step 2: age group		*P* = 0.4710 (removed)	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.23	*no*	0.22-0.26
50-50 chance	0.84	*no*	0.77-0.94
little or no chance	1		
Step 3: race		*P = 0.3512 (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.26	*no*	0.22-0.26
50-50 chance	0.82	*no*	0.77-0.94
little or no chance	1		
Step 4: number of partners in year		*P = 0.3227 (retained)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.27	*yes*	0.22-0.26
50-50 chance	0.85	*no*	0.77-0.94
little or no chance	1		
Step 5: age at first sexual intercourse		*P = 0.2213 (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.25	*no*	0.22-0.26
50-50 chance	0.81	*no*	0.77-0.94
little or no chance	1		

^p-value = chunk test for overall significance of variable in model

Table 7 (cont). Backwards elimination of covariates in used condom and feel less pleasure model, NSFG 2006-2008.

Step 6:	number of partners in lifetime		*P = 0.488^ (removed)*	
		Odds Ratio	**confounder**	**±10%**
	feel less pleasure			
	more than 50-50 chance	0.25	*no*	0.22-0.26
	50-50 chance	0.80	*no*	0.77-0.94
	little or no chance	1		
Step 7:	number of current partners		*P = 0.021^ (removed)*	
		Odds Ratio	**confounder**	**±10%**
	feel less pleasure			
	more than 50-50 chance	0.25	*no*	0.22-0.26
	50-50 chance	0.78	*no*	0.77-0.94
	little or no chance	1		
PARSIMONIOUS MODEL:	used condom = PLSR YRPART			
	term	***p-value^***		
	less pleasure	*<0.0001*	attitude variable	
	number of partners in year	*0.012*	confounder	

^p-value = chunk test for overall significance of variable in model

Feel embarrassment with condoms

For the attitude feel embarrassed, no lower order interaction terms were significant at the $P < 0.01$ level so none were retained in the model. The attitude variable feels embarrassed was not itself significant (fully adjusted OR = 0.67, CI 0.33, 1.38). The number of sexual partners in lifetime was significant ($P = 0.0019$) and confounds the association of condom use and feel embarrassment at the 50-50 or greater chance level (unadjusted OR = 0.82, fully adjusted OR = 0.67) when compared to the referent less than 50-50 chance. The covariate number of current partners also is significant ($P = 0.0080$) and is a confounder at the 50-50 or greater chance of embarrassment level (unadjusted OR = 0.54, fully adjusted OR = 0.67) when compared to the lower chance level.

The parsimonious model for condom use at last intercourse and the attitude feel embarrassed is:

$$\log\left(\frac{\text{used condom}}{\text{did not use condom}}\right) = \beta_0 + \beta_1(\text{feel embarrassed}) + \beta_2(\text{number of currentpartners}) + \beta_3(\text{number of partners in lifetime})$$

The results of this analysis are in Table 8.

Table 8. Backwards elimination of covariates in used condom and feel embarrassed model, NSFG 2006-2008.

Fully Adjusted Model	**Odds Ratio**	**95% C.I.**	**±10%**
feel embarrassed			
50-50 or more chance	0.67	*0.33-1.38*	*0.60-0.74*
little or no chance	1		
Step 1: race		*P = 0.9247^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel embarrassed			
50-50 or more chance	0.67	*no*	*0.60-0.74*
little or no chance	1		
Step 2: number of partners in year		*P = 0.5146^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel embarrassed			
50-50 or more chance	0.65	*no*	*0.60-0.74*
little or no chance	1		
Step 3: age appropriate education level		*P = 0.7502^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel embarrassed			
50-50 or more chance	0.65	*no*	*0.60-0.74*
little or no chance	1		
Step 4: number of current partners		*P = 0.0051^(retained)*	
	Odds Ratio	**confounder**	**±10%**
feel embarrassed			
50-50 or more chance	0.59	*yes*	*0.60-0.74*
little or no chance	1		
Step 5: age at first sexual intercourse		*P = 0.2213^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel embarrassed			
50-50 or more chance	0.68	*no*	*0.60-0.74*
little or no chance	1		
Step 6: age group		*P = 0.1295^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel embarrassed			
50-50 or more chance	0.69	*no*	*0.60-0.74*
little or no chance	1		

^p-value = chunk test for overall significance of variable in model

Table 8 (cont). Backwards elimination of covariates in used condom and feel embarrassed model, NSFG 2006-2008.

Step 7:	number of partners in lifetime		*P = 0.0019^ (retained)*	
		Odds Ratio	**confounder**	**±10%**
feel embarrassed				
	50-50 or more chance	0.82	*yes*	*0.60-0.74*
	little or no chance	1		
PARSIMONIOUS MODEL:				
	term	***p-value^***		
	feel embarrassed	*0.2886*	attitude variable	
	number of current partners	*0.0080*	confounder	
	number of partners in lifetime	*0.0019*	confounder	

^p-value = chunk test for overall significance of variable in model

Partner would appreciate a condom

For the independent variable partner would appreciate the use of a condom, no lower order interaction terms were significant ($P < 0.01$) so none were retained in the model. The variable representing the perception that a partner would appreciate a condom was significant (fully adjusted OR = 2.77, CI 1.44, 5.35). Only the age of first intercourse was retained as a significant confounder ($P = 0.1871$) of the association at the more that 50-50 chance level (unadjusted OR = 2.33, fully adjusted OR = 2.77) as compared to the 50-50 or less chance. The parsimonious model for condom use at last intercourse and the attitude that a partner may appreciate the use of a condom is:

$$\log\left(\frac{\text{used condom}}{\text{did not use condom}}\right) = \beta_0 + \beta_1(\text{partner would appreciate}) + \beta_2(\text{age at first intercourse})$$

The results of this analysis are in Table 9.

Table 9. Backwards elimination of covariates in used condom and partner appreciation model, NSFG 2006-2008.

Fully Adjusted Model	**Odds Ratio**	**95% C.I.**	**±10%**
partner would appreciate			
more than 50-50 chance	2.77	*1.44-5.35*	*2.49-3.05*
50-50 or less chance	1		
Step 1: race		*P = 0.8049^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
partner would appreciate			
more than 50-50 chance	2.71	*no*	*2.49-3.05*
50-50 or less chance	1		
Step 2: age appropriate education level		*P = 0.7972^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
partner would appreciate			
more than 50-50 chance	2.71	*no*	*2.49-3.05*
50-50 or less chance	1		
Step 3: number of partners in year		*P = 0.5370^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
partner would appreciate			
more than 50-50 chance	2.74	*no*	*2.49-3.05*
50-50 or less chance	1		
Step 4: age group		*P = 0.1873^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
partner would appreciate			
more than 50-50 chance	2.74	*no*	*2.49-3.05*
50-50 or less chance	1		
Step 5: age at first sexual intercourse		*P = 0.0223^ (retained)*	
	Odds Ratio	**confounder**	**±10%**
partner would appreciate			
more than 50-50 chance	2.33	*yes*	*2.49-3.05*
50-50 or less chance	1		
Step 6: number of current partners		*P = 0.0133^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
partner would appreciate			
more than 50-50 chance	2.99	*no*	*2.49-3.05*
50-50 or less chance	1		

^p-value = chunk test for overall significance of variable in model

Table 9 (cont). Backwards elimination of covariates in used condom and partner appreciation model, NSFG 2006-2008.

Step 7:	number of partners in lifetime		*P = 0.0001^ (removed)*	
		Odds Ratio	**confounder**	**±10%**
	partner would appreciate			
	more than 50-50 chance	2.91	*no*	*2.49-3.05*
	50-50 or less chance	1		
PARSIMONIOUS MODEL:				
	term	***p-value^***		
	partner would appreciate	*0.0028*	attitude variable	
	age at first sexual intercourse	*0.1871*	confounder	

^p-value = chunk test for overall significance of variable in model

<u>All three condom attitudes</u>

A similar strategy of multivariate logistic regression analysis tested for an association between condom use at last intercourse and the three condom attitudes together. The initial full model contained all three attitude variables, the seven covariates, and the 21 possible attitude-covariate interaction terms (see Table 4). None of the interaction terms were found to be significant ($P < 0.01$). In order to assess confounding, two different strategies were employed.

First, backwards elimination was limited to just the covariates; all three attitude variable were retained in the model regardless of significance. The resulting model included two confounders. Age at first intercourse ($P = 0.0095$) was a confounder of the partner appreciation variable for more that 50-50 chance compared to 50-50 or less chance (unadjusted OR = 2.74, fully adjusted OR = 3.09). The number of partners in the prior year ($P = 0.1717$) confounded the feel less pleasure variable at the highest chance (more than 50-50) as compared little or no chance (unadjusted OR = 0.26, fully adjusted OR = 0.23). Only two of the three attitude variables were significant: feel less pleasure

(P < 0.0001) and partner would appreciate (P = 0.0002). Feel embarrassed was not significant (P = 0.5251). The reduced model for condom use at last intercourse and three condom attitude variables together is:

$$\log\left(\frac{\text{used condom}}{\text{did not use condom}}\right) = \beta_0 + \beta_1(\text{feel less pleasure}) + \beta_2(\text{feel embarrassed}) + \beta_3(\text{partner would appreciate}) + \beta_4(\text{age at first intercourse}) + \beta_4(\text{number of partners prior year})$$

The steps and results are displayed in Table 10.

Table 10. Backwards elimination of covariates in used condom and all 3 attitudes model, NSFG 2006-2008.

Fully Adjusted Model	**Odds Ratio**	**95% C.I.**	**±10%**
feel less pleasure			
more than 50-50 chance	0.23	*0.13-0.41*	0.21-0.25
50-50 chance	0.97	*0.46-2.07*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.8000	*0.39-1.61*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.0900	*1.64-5.91*	2.78-3.40
50-50 or less chance	1		
Step 1: age appropriate education level		*P = 0.6583^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.23	*no*	0.21-0.25
50-50 chance	0.96	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.80	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.09	*no*	2.78-3.40
50-50 or less chance	1		
Step 2: race		*P = 0.5594^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.25	*no*	0.21-0.25
50-50 chance	0.97	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.76	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.18	*no*	2.78-3.40
50-50 or less chance	1		

^p-value = chunk test for overall significance of variable in model

Table 10 (cont). Backwards elimination of covariates in used condom and all 3 attitudes model, NSFG 2006-2008.

Step 3: number of partners in year		*P = 0.4866^ (retained)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.26	*yes*	0.21-0.25
50-50 chance	0.99	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.73	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.26	*no*	2.78-3.40
50-50 or less chance	1		
Step 4: age group		*P = 0.4596^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.25	*no*	0.21-0.25
50-50 chance	0.97	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.76	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.20	*no*	2.78-3.40
50-50 or less chance	1		
Step 5: age at first sexual intercourse		*P = 0.0515^ (retained)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.24	*no*	0.21-0.25
50-50 chance	0.93	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.78	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	2.74	*yes*	2.78-3.40
50-50 or less chance	1		

^p-value = chunk test for overall significance of variable in model

Table 10 (cont). Backwards elimination of covariates in used condom and all 3 attitudes model, NSFG 2006-2008.

Step 6: number of partners in lifetime		*P = 0.0254^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.24	*no*	0.21-0.25
50-50 chance	0.91	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.88	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.08	*no*	2.78-3.40
50-50 or less chance	1		
Step 7: number of current partners		*P = 0.0030^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.25	*no*	0.21-0.25
50-50 chance	0.90	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.82	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.30	*no*	2.78-3.40
50-50 or less chance	1		
Reduced 3 attitudes model:			
term	***p-value^***		
feel less pleasure	*<0.0001*	attitude variable	
feel embarrassed	*0.5251*	attitude variable	
partner would appreciate	*0.0002*	attitude variable	
age at first intercourse	*0.0095*	confounder	
number of partners in year	*0.1717*	confounder	

^p-value = chunk test for overall significance of variable in model

Table 11 shows the three attitude multivariate logistic regression models and the corresponding odds ratios for each independent variable, the covariates and known confounders. The fully adjusted model includes all three condom attitude variables (feel less pleasure, feel embarrassment, and partner would appreciate) and all seven covariates (age group, race/ethnicity, appropriate grade level, age at first sexual intercourse, number of lifetime partner, number of partners in previous year, and number of current partners). The reduced three attitude model contains all three attitude variables regardless of significance and two confounders and does not include the non-significant covariates. Model A is made up of the three attitude variables, confounders age at first intercourse and number of partners in previous year, and the significant variables number of partners in lifetime and number of current partners. Model B is similar to Model A but omits age at first intercourse.

Table 11. Logistic regression summary: fully adjusted, reduced, and other models with all three attitudes.
Condom attitudes and condom usage among 15 to 24 year old never married or cohabitated males, NSFG, 2006-2008.

	Fully adjusted model			Reduced 3 attitudes model			Model A			Model B		
	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^
Condom attitudes												
feel less pleasure			*<0.0001*			*<0.0001*			*<0.0001*			*<0.0001*
more than 50-50 chance	0.23	*0.13-0.41*		0.25	*0.15-0.42*		0.25	*0.14-0.43*		0.24	*0.14-0.42*	
50-50 chance	0.97	*0.46-2.07*		0.90	*0.43-1.86*		0.97	*0.46-2.04*		0.93	*0.45-1.95*	
little or no chance	1			1			1			1		
feel embarrassed			*0.5217*			*0.5251*			*0.4134*			*0.4542*
50-50 or more chance	0.80	*0.39-1.61*		0.82	*0.44-1.53*		0.76	*0.39-1.47*		0.78	*0.41-1.49*	
little or no chance	1			1			1			1		
partner would appreciate			*0.0007*			*0.0002*			*0.0003*			*0.0027*
more than 50-50 chance	3.09	*1.64-5.91*		3.30	*1.76-6.18*		3.20	*1.69-6.04*		2.74	*1.42-5.30*	
50-50 or less chance	1			1			1			1		
Characteristics												
Age at survey			*0.4652*									
15-18 years ("teen")	1.42	*0.55-3.66*										
19-24 years ("adult")	1											
Race			*0.6431*									
Hispanic	0.68	*0.30-1.55*										
non-Hispanic black	0.93	*0.48-1.80*										
non-Hispanic white	1											
Eeducation level			*0.6583*									
below appropriate grade	1.23	*0.50-3.04*										
at appropriate grade	1											

*OR=Odds Ratio
†95% C.I. = 95% Confidence Interval
^p-value = chunk test for overall significance of variable in model

Table 11 (cont). Logistic regression summary: fully adjusted, reduced, and other models with all three attitudes. Condom attitudes and condom usage among 15 to 24 year old never married or cohabitated males, NSFG, 2006-2008.

	Fully adjusted model			Reduced 3 attitudes model			Model A			Model B		
	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^
Sexual experience												
Age at first intercourse			*0.0796*		confounder	*0.1717*			*0.0515*		confounds APPR	
13 years or younger	3.05	*0.91-10.24*		2.04	*0.67-6.22*		3.42	*1.02-11.50*				
14-18 years	1.17	*0.56-2.47*		1.02	*0.48-2.24*		1.29	*0.58-2.86*				
19 years or older	1			1								
Female sex partners-lifetime			*0.0135*						*0.0125*			*0.0254*
1 partner	2.70	*1.11-6.57*					3.05	*1.21-7.66*		2.52	*1.01-6.30*	
2-3 partners	1.76	*0.92-3.39*					1.92	*1.00-3.68*		1.76	*0.91-3.40*	
4-6 partners	2.70	*1.45-5.05*					2.63	*1.42-4.90*		2.39	*1.32-4.32*	
7 or more partners	1											
Female sex partners-year			*0.4307*		confounder	*0.0095*			*0.4892*			*0.4883*
1 partner	1.39	*0.70-2.78*		2.09	*1.27-3.42*		1.28	*0.67-2.47*		1.20	*0.62-2.31*	
2 partners	1.57	*0.77-3.22*		2.07	*0.99-4.31*		1.54	*0.75-3.17*		1.53	*0.76-3.06*	
3 or more partners	1			1						1		
Current sex partners			*0.0049*						*0.0041*			*0.0070*
none	2.74	*1.22-6.14*					2.79	*1.20-6.48*		2.50	*1.01-6.30*	
1 partner	1.10	*0.54-2.35*					1.14	*0.50-2.61*		1.06	*0.43-2.60*	
2-3 partners	1											

*OR=Odds Ratio
†95% C.I. = 95% Confidence Interval
^p-value = chunk test for overall significance of variable in model

Significant attitudes only

In the next strategy, each condom attitude variable, as well as the covariates, was eligible for removal by backwards elimination. The final model included just two significant attitude variables and one confounder. Feel less pleasure ($P < 0.0001$) and partner would appreciate ($P = 0.0024$) remained as they showed significant associations with the dependent variable condom use at last intercourse. The number of partners in the prior year ($P = 0.0363$) still confounded the feel less pleasure variable at the highest chance (more that 50-50) as compared little or no chance (unadjusted OR = 0.26, fully adjusted OR = 0.23). The feel embarrassed variable was not significant (P = 0.5251). The ORs and steps are shown in Table 12.

Table 12. Backwards elimination of attitudes and covariates in used condom model, NSFG 2006-2008.

Fully Adjusted Model	**Odds Ratio**	**95% C.I.**	**±10%**
feel less pleasure			
more than 50-50 chance	0.23	*0.13-0.41*	0.21-0.25
50-50 chance	0.97	*0.46-2.07*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.80	*0.39-1.61*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.09	*1.64-5.91*	2.78-3.40
50-50 or less chance	1		
Step 1: age appropriate education level		*P = 0.6583^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.23	*no*	0.21-0.25
50-50 chance	0.96	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.80	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.09	*no*	2.78-3.40
50-50 or less chance	1		
Step 2: race		*P = 0.5594^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.25	*no*	0.21-0.25
50-50 chance	0.97	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.76	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.18	*no*	2.78-3.40
50-50 or less chance	1		

^p-value = chunk test for overall significance of variable in model

Table 12 (cont). Backwards elimination of attitudes and covariates in used condom model, NSFG 2006-2008.

Step 3: number of partners in year		*P = 0.4866^ (retained)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.26	*yes*	0.21-0.25
50-50 chance	0.99	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.73	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.26	*no*	2.78-3.40
50-50 or less chance	1		
Step 4: age group		*P = 0.4596^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.25	*no*	0.21-0.25
50-50 chance	0.97	*no*	0.87-1.07
little or no chance	1		
feel embarrassed			
50-50 or more chance	0.76	*no*	0.72-0.88
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.20	*no*	2.78-3.40
50-50 or less chance	1		
Step 5: feel embarrassed		*P = 0.4134^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.25	*no*	0.21-0.25
50-50 chance	0.94	*no*	0.87-1.07
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.31	*no*	2.78-3.40
50-50 or less chance	1		

^p-value = chunk test for overall significance of variable in model

Table 12 (cont). Backwards elimination of attitudes and covariates in used condom model, NSFG 2006-2008.

Step 6: age at first sexual intercourse		*P = 0.0524^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.24	*no*	0.21-0.25
50-50 chance	0.91	*no*	0.87-1.07
little or no chance	1		
partner would appreciate			
more than 50-50 chance	2.84	*no*	2.78-3.40
50-50 or less chance	1		
Step 7: number of partners in lifetime		*P = 0.0357^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.24	*no*	0.21-0.25
50-50 chance	0.88	*no*	0.87-1.07
little or no chance	1		
partner would appreciate			
more than 50-50 chance	2.78	*no*	2.78-3.40
50-50 or less chance	1		
Step 8: number of partners in lifetime		*P = 0.0071^ (removed)*	
	Odds Ratio	**confounder**	**±10%**
feel less pleasure			
more than 50-50 chance	0.24	*no*	0.21-0.25
50-50 chance	0.86	*no*	0.87-1.07
little or no chance	1		
partner would appreciate			
more than 50-50 chance	3.09	*no*	2.78-3.40
50-50 or less chance	1		
Reduced significant attitudes model:			
term	***p-value^***		
feel less pleasure	*<0.0001*	attitude variable	
partner would appreciate	*0.0024*	attitude variable	
number of partners in year	*0.0363*	confounder	

^p-value = chunk test for overall significance of variable in model

The multivariate models with the corresponding odds ratios for each significant independent variable, the covariates and/or known confounders are shown in Table 13. The fully adjusted model includes all three condom attitude variables (feel less pleasure, feel embarrassment, and partner would appreciate) and all seven covariates (age group, race/ethnicity, appropriate grade level, age at first sexual intercourse, number of lifetime partner, number of partners in previous year, and number of current partners). The reduced model is made up of only the significant independent variables (feel less pleasure and partner would appreciate) and the confounder number of partners in prior year. Model C is comprised of the significant attitude variables, the confounder, and the two significant sexual experience covariates, number of lifetime partner and number of current partners. Model D is identical to Model C except for the omission of the number of partners in prior year.

Table 13. Logistic regression summary: fully adjusted, reduced, and other models of significant attitudes.
Condom attitudes and condom usage among 15 to 24 year old never married or cohabitated males, NSFG, 2006-2008.

	Fully adjusted model			Reduced significant attitudes model			Model C			Model D		
	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^	OR	95% C.I.†	*p-value* ^	OR	95% C.I.†	*p-value* ^
Condom attitudes												
feel less pleasure			*<0.0001*			*<0.0001*			*<0.0001*			*<0.0001*
more than 50-50 chance	0.23	*0.13-0.41*		0.24	*0.14-0.41*		0.24	*0.14-0.42*		0.24	*0.14-0.43*	
50-50 chance	0.97	*0.46-2.07*		0.86	*0.43-1.76*		0.91	*0.44-1.88*		0.93	*0.45-1.91*	
little or no chance	1			1			1			1		
B. feel embarrassed			*0.5217*									
50-50 or more chance	0.80	*0.39-1.61*										
little or no chance	1											
C. partner would appreciate			*0.0007*			*0.0006*			*0.0014*			*0.0009*
more than 50-50 chance	3.09	*1.64-5.91*		3.09	*1.63-5.86*		2.84	*1.50-5.41*		2.95	*1.56-5.57*	
50-50 or less chance	1			1			1			1		
Characteristics												
Age at survey			*0.4652*									
15-18 years ("teen")	1.42	*0.55-3.66*										
19-24 years ("adult")	1											
Race			*0.6431*									
Hispanic	0.68	*0.30-1.55*										
non-Hispanic black	0.93	*0.48-1.80*										
non-Hispanic white	1											
Age-appropriate education level			*0.6583*									
below appropriate grade	1.23	*0.50-3.04*										
at appropriate grade	1											

*OR=Odds Ratio
†95% C.I. = 95% Confidence Interval
^p-value = chunk test for overall significance of variable in model

Table 13 (cont). Logistic regression summary: fully adjusted, reduced, and other models of significant attitudes. Condom attitudes and condom usage among 15 to 24 year old never married or cohabitated males, NSFG, 2006-2008.

	Fully adjusted model			Reduced significant attitudes model			Model C			Model D		
	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^	OR	95% C.I.†	*p-value* ^	OR	95% C.I.†	*p-value* ^
Sexual experience												
Age at first sexual intercourse			*0.0796*									
13 years or younger	3.05	*0.91-10.24*										
14-18 years	1.17	*0.56-2.47*										
19 years or older	1											
Female sex partners in lifetime			*0.0135*						*0.0357*			*0.0113*
1 partner	2.70	*1.11-6.57*					2.43	*0.98-6.02*		2.57	*1.24-5.34*	
2-3 partners	1.76	*0.92-3.39*					1.68	*0.86-3.30*		1.91	*1.07-3.42*	
4-6 partners	2.70	*1.45-5.05*					2.31	*1.27-4.20*		2.49	*1.33-4.67*	
7 or more partners	1						1			1		
Female sex partners in last year			*0.4307*	confounder		*0.0199*			*0.4260*	not a confounder		
1 partner	1.39	*0.70-2.78*		1.89	*1.19-3.02*		1.23	*0.63-2.38*				
2 partners	1.57	*0.77-3.22*		2.00	*0.98-4.09*		1.56	*0.80-3.04*				
3 or more partners	1			1			1					
Current sex partners			*0.0049*						*0.0071*			*0.0062*
none	2.74	*1.22-6.14*					2.58	*1.05-6.30*		2.80	*1.14-6.86*	
1 partner	1.10	*0.54-2.35*					1.08	*0.44-2.67*		1.18	*0.49-2.86*	
2-3 partners	1						1			1		

*OR=Odds Ratio
†95% C.I. = 95% Confidence Interval
^p-value = chunk test for overall significance of variable in model

Selection of final model

The model that best explains the association of condom attitudes and condom use at last intercourse in this population of teen and young adult males is the fully adjusted model. The log likelihood and the AIC model fit statistics where used as the selection criteria. Comparisons of these statistics are shown in Table 14.

The fully adjusted model includes the three attitude variables feel less pleasure, feel embarrassed, and partner would appreciate, and the known confounders age at first intercourse and number of sex partners in the prior year. It also retains the two significant covariates number of partners in lifetime ($P = 0.0135$) and number of current partners ($P = 0.0049$). The other included covariates age ($P = 0.4652$), race ($P = 0.6431$), and appropriate education level attainment ($P = 0.6583$) are neither confounders nor reach significance. However, the model fit statistics reveal that they do add to the explanation of the association of condom attitude and condom use. Eliminating these covariates and main independent variable feel embarrassed either singularly or as a group does not meaningfully change the size of the feel less pleasure or partner would appreciate associations with condom use. The odds ratios' confidence intervals for the three attitudes confirm that no gains in precision are made with dropping one or all of these four variables. Table 15 displays the odds ratios and confidence intervals for each of these models.

Table 14. Comparison of the model statistics, NSFG 2006-2008.

Model	attitude variables	covariates	d.f. *	Log likelihood	diff from full	AIC
fully adjusted	plsr, embar, appr	now, year, lifetime, 1st sex, ongrade, race, age	17	5,950,142.4	0.0	5,950,178.4
w/o grade	plsr, embar, appr	now, year, lifetime, 1st sex, race, age	16	5,953,255.2	3,112.8	5,953,289.2
w/o embar	plsr, appr	now, year, lifetime, 1st sex, ongrade, race, age	16	5,955,263.0	5,120.6	5,955,297.0
w/o age	plsr, embar, appr	now, year, lifetime, 1st sex, ongrade, race	16	5,957,862.9	7,720.5	5,957,896.9
w/o race	plsr, embar, appr	now, year, lifetime, 1st sex, ongrade, age	15	5,968,278.1	18,135.7	5,968,310.1
model A	plsr, embar, appr	now, year, lifetime, 1st sex	13	5,980,669.0	30,526.6	5,980,697.0
model B	plsr, embar, appr	now, year, lifetime	11	6,064,432.1	114,289.7	6,064,456.1
model C	plsr, appr	now, year, lifetime	10	6,070,896.0	120,753.6	6,070,918.0
model D	plsr, appr	now, lifetime	8	6,092,187.9	142,045.5	6,092,205.9
reduced 3	plsr, embar, appr	now, 1st sex	8	6,332,079.8	381,937.4	6,332,097.8
reduced 2	plsr, appr	year	5	6,376,215.2	426,072.8	6,376,227.2

*d.f. = degrees of freedom

Table 15. Comparison of the fully adjusted model to models with one covariate removed, NSFG 2006-2008.

	Fully adjusted model			without grade			without embarrassed		
Condom attitudes	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^
feel less pleasure			*<0.0001*			*<0.0001*			*<0.0001*
more than 50-50 chance	0.23	*0.13-0.41*		0.23	*0.13-0.41*		0.23	*0.13-0.41*	
50-50 chance	0.97	*0.46-2.07*		0.96	*0.45-2.06*		0.95	*0.45-2.01*	
little or no chance	1			1			1		
feel embarrassed			*0.5217*			*0.5369*			
50-50 or more chance	0.80	*0.39-1.61*		0.80	*0.40-1.62*				
little or no chance	1			1					
partner would appreciate			*0.0007*			*0.0007*			*0.0004*
more than 50-50 chance	3.09	*1.64-5.91*		3.09	*1.61-5.90*		3.17	*1.68-5.97*	
50-50 or less chance	1			1			1		

	without age			without race			without grade, race, age, embar.		
Condom attitudes	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^	OR*	95% C.I.†	*p-value* ^
feel less pleasure			*<0.0001*			*<0.0001*			*<0.0001*
more than 50-50 chance	0.23	*0.13-0.40*		0.25	*0.14-0.44*		0.24	*0.14-0.43*	
50-50 chance	0.96	*0.45-2.05*		0.98	*0.46-2.07*		0.94	*0.45-1.95*	
little or no chance	1			1			1		
feel embarrassed			*0.5421*			*0.4140*			
50-50 or more chance	0.81	*0.40-1.61*		0.75	*0.38-1.48*				
little or no chance	1			1					
partner would appreciate			*0.0006*			*0.0005*			*0.0002*
more than 50-50 chance	3.10	*1.63-5.89*		3.17	*1.66-6.07*		3.31	*1.77-6.02*	
50-50 or less chance	1			1					

*OR=Odds Ratio

†95% C.I. = 95% Confidence Interval

^p-value = chunk test for overall significance of variable in model

Therefore, the final model for condom use at last intercourse and condom attitudes is:

$$\text{Log}\left(\frac{\text{used condom}}{\text{did not use condom}}\right) =$$

$$\beta_0 + \beta_1(\text{less pleasure}) + \beta_2(\text{embarrassed}) + \beta_3(\text{partner appreciates})$$
$$+\beta_4(\text{age group}) + \beta_5(\text{race}) + \beta_6(\text{appropriate education level}) + \beta_7(\text{age at first intercourse})$$
$$+\beta_8(\text{partners in lifetime}) + \beta_9(\text{partners in year}) + \beta_{10}(\text{current partners})$$

Positive attitudes toward using condoms (the perceptions that condoms don't reduce pleasure, are embarrassing to discuss, or a partner might appreciate using a condom) are associated with greater odds of condom use at last intercourse. This association is altered by the covariates age at first intercourse (a confounder), number of partners in lifetime, number of partners in the last year (a confounder), and the number of current partners. Younger age at sexual debut and fewer partners in lifetime, during the prior year, and currently increase the odds of condom use. Additionally, age, race, and age appropriate education level while not significant did improve the fit between condom attitudes and usage and so were retained in the model.

Summary

In bivariate analysis, only six of the independent variables and covariates were significantly associated with the dependent variable condom use at last intercourse (Table 6). Males who felt that condoms were likely to reduce pleasure, didn't think that a partner would appreciate a condom, were 19 to 24 years old, had more sexual partners in their lifetimes, more partners in the last year, and more current partners were less likely to use

condoms at their last intercourse. Those who felt that condoms were unlikely to reduce pleasure, thought that a partner would appreciate a condom, were 15 to 18 years old, had fewer lifetimes sexual partners, fewer partners in the last year, and fewer current partners were more likely to use condoms at their last intercourse. Embarrassment, race, age appropriate education level, and age at first sexual intercourse were not significantly associated with condom use when controlling for attitudes in this analysis.

When considered separately in logistic regression, the belief that condoms interfere with pleasure was significantly associated with reduced condom use at last intercourse and confounded by the number of partners in the prior year (fewer partners, slightly more condom use) (Table 7). The relationship of condom use at last intercourse and the attitude feel embarrassed was not significant, though fewer current partners increasing the effect of embarrassment (fewer current partners, less condom use) while fewer partners in lifetime mitigated (fewer partners, more condom use) (Table 8). The perception that a partner may appreciate the use of a condom on condom use was significant and confounded by age at first intercourse, with sexual debut at younger age decreasing the association of appreciation on condom use (Table 9). No significant interaction terms were discovered in any model.

In the three attitudes model, two covariates confounded the association of all three attitudes together to condom use at last intercourse. Younger age at first intercourse and fewer partners in the previous year each tempered the effect of the attitudes on condom use. When the three attitudes are eligible for removal, feel embarrassed was dropped. Only the number of partners in the prior year confounded the relationship by decreasing

the effect of less pleasure and partner appreciation on condom use. Again, no interaction terms were significant.

The fully adjusted model, with all three condom attitude variables and the seven covariates, was selected as the final model based on model fit statistics. This regression model shows that condom use at last intercourse *is* related to attitudes toward condoms, and this relationship is affected by sexual experience.

Chapter V: Discussion

Introduction

This final chapter will begin with a summary of the questions, methodology, and findings of this study. Discussion of the conclusions and implications based on the findings follows. Finally, recommendations are addressed.

Summary of Study

In order to better focus STI and pregnancy prevention efforts, the determinants of condom use in teen and young adult males must be identified. This study attempted to expand that understanding by answering these three questions:

- Are attitudes toward condoms associated with condom use among unmarried and non-cohabitating men aged 15 to 24 years old who had heterosexual intercourse in the last 4 weeks?
- Is this association modified by age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, or education level attained?
- Is condom use associated with age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained when adjusted for attitudes toward using condoms?

This study was a cross-sectional study of respondents of the NSFG 2006-2008 male questionnaires. Participants were selected to include only never married or cohabitating sexually active teen and young adult males who had engaged in sexual

intercourse with a female in the four weeks prior to the survey. This data was analyzed to discover what associations, if any, existed between the report of the use of a condom at last intercourse and three condom attitudes (feel less pleasure, feel embarrassment, and partner would appreciate). Seven covariates, including age group, race/ethnicity, and appropriateness of education level attained, and sexual experience (age at sexual debut and numbers of partners in lifetime, recent year, and currently) were tested for effect modification of the condom attitude and condom use association. Associations between these covariates and condom use at last intercourse were then tested while adjusting for condom attitudes.

The findings from these analyses reveal that attitudes toward condoms are associated with condom use in sexually active male teens and young adults. Of the three attitudes studied, the perceptions that condoms reduce intercourse pleasure and partners would not appreciate condoms were significantly associated with lower odds of condom use at last intercourse. In regression models with all three attitudes, younger age at first intercourse and fewer partners in the previous year each confounded the effect of the attitudes on condom use. No effect modification of the condom attitude condom use association by any covariate was detected.

Using model fit statistics as the criteria, the fully adjusted model with all three condom attitude variables and the seven covariates was selected as the final model. This regression model shows that condom use at last intercourse *is* related to attitudes toward condoms and this relationship is further explained by individual characteristics and sexual experience. Greater odds of condom use at last intercourse are associated with positive attitudes toward using condoms (*i.e.*, the perceptions that condoms don't reduce

pleasure, are not embarrassing to discuss, or a partner might appreciate using a condom). Younger age at sexual debut and fewer current partners, fewer partners during the prior year, and fewer in lifetime increase the odds of condom use. Age, race, and age appropriate education level, although not significant, were retained in the model as they improved the condom attitudes and usage model.

Therefore, study hypothesis 1, that an association exists between condom attitudes and condom usage, and study hypothesis 3, that the covariates are associated with condom use even when adjusted by condom attitudes, can be accepted. The association of condom attitudes and condom use at last intercourse is not modified by the covariates, and so study hypothesis 2 can neither be accepted nor the null of hypothesis 2 rejected.

Conclusions

This study builds on previous literature by further investigating the determinants of male teen and young adult sexual behavior. Exploring the associations of condom use at last intercourse with condom attitudes and the characteristics that may affect those associations could confirm or refute findings from earlier studies. The results of these analyses will be discussed in terms of the study hypotheses and then a brief discussion of the theoretical framework applicable to this study.

Study hypothesis 1

Based on the findings discussed above, the null hypothesis can be rejected and the study hypothesis accepted. Study hypothesis 1 and the null hypothesis are

Study hypothesis 1: Among sexually active men aged 15 to 24 years old, condom use is associated with attitudes toward using condoms.

Null hypothesis 1: Among sexually active men aged 15 to 24 years old, condom use is *not* associated with attitudes toward using condoms.

This study has shown that an association does exist between attitudes toward condoms and condom use in this population. The perceptions that condoms reduce sexual pleasure, are embarrassing, and would not be appreciated by a partner contribute to lower odds of condom use at last intercourse.

Feel less pleasure with condoms

It is not surprising that the attitude that condoms diminish sexual pleasure decreases the odds of using a condom at last intercourse, and is consistent with findings from other recent studies. Randolph found that adult men who believed that condoms reduced pleasure were less likely to use condoms (9). Brown reported similar results in his study of 15 to 21 year olds at high STI risk (17).

Approximately 38% of males in this study believed in a more than 50-50 chance that condoms interfere with intercourse pleasure, 24% in a 50-50 chance, and 38% in little or no chance of loss of pleasure. In bivariate analysis, only two thirds of those who thought condoms were very likely to reduce pleasure used condoms, as compared to the 90% of those who thought there was little or no chance of interference ($X^2 = 37.802$, d.f. = 2, $P < 0.0001$). In multivariate analysis, the less pleasure from condoms attitude was consistently and significantly associated with lower odds of condom use when analyzed as a single attitude ($P < 0.0001$). This association was confounded by the number of partners in a year ($P = 0.0120$) at the more than 50-50 chance level when compared to

little or no chance, with the fewer number of partners weakening the effect of less pleasure to reduce the odds of condom use.

Feel embarrassment with condoms

The attitude that condoms are embarrassing was not found to be significantly associated with condom use at last intercourse in this analysis. Only 13% felt a 50-50 or greater chance of embarrassment with condoms, and 87% felt little or no chance of embarrassment. In contrast, both Moore and Bell showed that condoms were a source of embarrassment for the majority of young males and that embarrassment impeded condom use (10, 21). In bivariate analysis, neither of the two different levels of embarrassment showed a significant difference in condom use. The feel embarrassed variable was not significant in multivariable logistic regression as a single attitude, and was confounded by both number of current partners and number of partners in lifetime. Fewer current partners exacerbated the effect of embarrassment to reduce the likelihood of condom use, but fewer lifetime partners diminished that effect. This lack of significance for the feeling of embarrassment, then, is different from the findings reported by previous investigations. Those studies, however, included embarrassement from purchasing, storing, and using condoms as well as discussing with a partner. This study's question only concerned discussing condoms with a new partner.

Partner would appreciate a condom

The use of a condom at last intercourse in this population was significantly associated with the perception that a sexual partner would appreciate it. Other studies

have confirmed this relationship between condom use and partners' desires, although in more limited populations. Brown concurred in his study of high HIV risk adolescents at a STI clinic (17). Tschann reported that young Latino males considered their partners' preferences for condoms (23). Young adult Australians' condom use could be predicted by their perceptions of partners' expectations according to Edwards (22).

Almost 90% of the 889 males in this current study agreed with a more that 50-50 chance that a partner would appreciate a condom. Of these, 80% used a condom, as compared to the 20% that did not. Only about 60% of those who doubted that a partner would appreciate a condom used one. In multivariate regression as a single attitude variable, appreciation was significantly associated with greater odds of condom use at last intercourse. Age a first intercourse confounded this association. Younger age at sexual debut reduced the effect of partner appreciation to increase condom use.

All three condom attitudes

In multivariate analysis of all three condom attitudes together, the perceptions that condoms don't reduce pleasure, are embarrassing to discuss, or a partner might appreciate using a condom are associated with greater odds of condom use at last intercourse. The less pleasure from condoms and partner would appreciate a condom attitudes were consistently and significantly associated with the odds of condom use while the feel embarrassed with condoms attitude was not. In the final model, the association of condom use with less pleasure, embarrassment, and partner appreciation was confounded by age at first intercourse and number of partners in the prior year. Younger age at first

intercourse and fewer partners in the previous year each weakened the effect of the attitudes on condom use.

The finding that the three condom attitudes together are associated with odds of condom use at last intercourse is consistent with one previous study. In her study of adolescent boys, Manlove found that more condom use was associated with one new positive condom attitude variable created by combining the three attitude variables (7). This current study did not recode the attitude variables into a single attitude variable, but the conclusions are similar. The fully adjusted regression model shows that condom use at last intercourse *is* related to attitudes toward condoms.

Study hypothesis 2

The second study hypothesis considered effect modification by the covariates on the association of condom use and condom attitudes. Based on the findings of this study, the null hypothesis that no effect modification exists *cannot* be rejected. Study hypothesis 2 and the null hypothesis are

> *Study hypothesis 2*: Among sexually active men aged 15 to 24 years old, the association of condom use with attitudes toward using condoms is modified by age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained.
>
> *Null hypothesis 2*: Among sexually active men aged 15 to 24 years old, the association of condom use with attitudes toward using condoms is *not* modified by age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, *nor* education level attained.

All possible second order interaction terms with each attitude variable were tested in both single attitude models (Table 3) and models with all three attitudes (Table 4). No evidence of significant interaction (alpha = 0.01) was found. The effects of condom attitudes on condom use at last intercourse is consistent across the various strata of the covariates age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained. Therefore, this study fails to prove that the null hypothsis is untrue and so the study hypothesis 2 is rejected.

Study hypothesis 3

The final hypothesis in this study considered the independent associations of the seven covariates to condom use at last intercourse while adjusting for condom attitudes. Study hypothesis 3 and the null hypothesis are

> *Study hypothesis 3*: Among sexually active men aged 15 to 24 years old, condom use is associated with age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained when adjusted for attitudes toward using condoms.
>
> *Null hypothesis 3*: Among sexually active men aged 15 to 24 years old, condom use is *not* associated with age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained when adjusted for attitudes toward using condoms.

As with hypothesis 1, study hypothesis 3 can be accepted and the null hypothesis 3 rejected; several of the individual characteristics and sexual experience covariates are associated with condom use even when adjusted by the condom attitudes less pleasure, embarrassment, and partner appreciation.

Individual characteristics

Age at time of the NSFG interview was significantly associated with condom use in bivariate analysis with teens more likely to use condoms than adults. This is consistent with the findings of Dhalla and Ikramullah of more condom use among teen males than older males (24, 25). In the final regression model that included all three condom attitudes, males age 15 to 18 years had increased odds of condom use as compared to young adult males aged 19 to 24 years, but is not significant ($P = 0.4652$).

Race/ethnicity was not associated with condom use in either bivariate or multiple logistic regression with the condom attitude variables. Previous studies have found varied results between race and condom use, albeit in different populations. Farmer reported no differences in condom use at last sex based on race/ethnicity, but Dhalla's large study showed that white were less likely to use condoms (25, 26). Hispanics male teens were half as likely and black male teens almost twice as likely to use condoms as white male teens, according Manlove. She also found that the positive condom attitude weakened the effects of race on condom use (7). The findings of no significant association ($P = 0.6431$) from this current study differ from Manlove's findings.

Age appropriate education level attainment also was not significantly associated with condom use at last intercourse in either bivariate or multiple logistic regression

analyses. The review of literature found no similar measures of education, so no specific influence was expected.

Sexual experience

Of the sexual experience covariates, the numbers of lifetime partners, partners in previous year, and current partners were significantly associated with condom use in bivariate analysis in that fewer current partners, fewer partners in the previous year, and fewer partners in lifetime each were associated with greater condom use. In multivariate logistic regression analysis of condom use with condom attitudes, the number of current partners and the number of partners in a lifetime were significant. The number of partners in the previous year was not significant, but did confound the condom attitude - condom use association. Both Manlove and Farmer reported that the number of lifetime partners has no effect on condom use (7, 26). The number of current partners and partners in prior year are rarely used in the literature, so direct comparisons of this study's finding to previous literature are not possible.

In bivariate analysis, age of first sexual intercourse was not significantly associated with condom use. Age at first intercourse was barely insignificant (P = 0.0796) in the final regression model for condom use when adjusted with condom attitudes. It was, however, a confounder of the relationship of condom attitudes and condom use in the final model as mentioned earlier. Sexual debut at younger ages decreased the influence of partner appreciation on condom use at last intercourse. Previous literature shows that younger age of sexual debut increased condom use, though

no studies have reported its effect on condom attitudes' relationship to condom use at last intercourse (7, 29, 30).

The final model, which includes all three attitude variables and all seven covariates, was selected as the best predictor of condom use at last intercourse in this population of sexually active young adult and teen males. The significant covariates (number of current partners and number of lifetime partners) and the non-significant covariates (age, race/ethnicity, education level, age at first intercourse, and number of partners last year) each improve the prediction of condom use even when including the condom attitude variables. Therefore, the third null hypothesis can be rejected.

In summary, null hypotheses 1 and 3 can be rejected but not null hypothesis 2. Attitudes toward condoms *are* associated with condom use in sexually active unmarried and non-cohabitating male teens and young adults (*study hypothesis 1*). These associations are *not* modified by age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, or education level attained (*null hypothesis 2*). Finally, when adjusted for attitudes toward using condoms, condom use *is* independently associated with age, race, age at first intercourse, number of lifetime partners, number of partners in the last year, number of current partners, and education level attained even when adjusted for the condom attitudes (*study hypothesis 3*).

Theoretical Framework

The decision to use condoms can be explained in terms of two theoretical frameworks of behavior. The Theory of Planned Behavior proposes that intention is the

link between attitudes about a specific action and the implementation of that action. The beliefs of the individual and his significant others influence his intentions, which in turn determine his behavior (12). As applied to this study, the Theory of Planned Behavior predicts that a young man's positive attitudes about condoms will influence him to plan to use condoms, and that plan makes him more likely to use condoms. Conversely, negative attitudes (e.g., condoms diminish pleasure or are embarrassing to discuss) will result in no intention to use condoms, and therefore reduce the likelihood of condom use.

The findings in this study are consistent with the Theory of Planned Behavior. The negative attitude about condom use as measured by the perception of loss of pleasure (the belief) is associated with a reduced likelihood of condom use (the action). The positive attitude toward condoms as measured by the perception that a partner would appreciate using a condom (the belief) is associated with an increased likelihood of condom use (the action). The perception of embarrassment with condoms, will not itself a significant predictor of condom use, did help to improve the final fully adjusted model of the three condom attitudes and covariates to condom use at last intercourse. The plan to use condoms (the intention) was not directly measured by the NSFG and so not addressed in this study.

The second relevant framework, the Health Belief Model, states that an individual will consider the risks and benefits of a certain behavior in his decision to adopt a health behavior. If the benefits of a behavior outweigh the risks, then he is more likely to take that action. When the beliefs that condoms interfere with sexual pleasure and cause embarrassment (risks of condom use) appear to be more important than protection from pregnancy and STIs (the benefits of condom use), reduced condoms use (the healthy

behavior) results. The associations of negative condom attitudes (less pleasure and embarrassment) with reduced odds of condom use, and of positive condom attitudes (partner appreciation) with increased odds of condom use seen in this study are predicted by the Health Belief Model.

Implications

The findings of this study of unmarried non-cohabitating sexually active teen and young adult males reinforce the findings of previous studies that positive attitudes towards condoms are associated with greater likelihood of condom use and that negative attitudes are associated with reduced likelihood of condom use. These studies together can be used to encourage condom promotion programs to focus on the negative and positive perceptions of condoms in the expectation that changed beliefs will result in changed behavior. By stressing the benefits of condoms (partner appreciation and the prevention of unplanned pregnancies and STIs, including HIV) as more important than the perceived costs (loss of sexual pleasure or embarrassment), these young men may plan to use condoms, and then follow through on those plans.

Additionally, the effects of the condom attitudes on condom use are consistent across age, race/ethnicity, education achievement, and sexually experience categories. This implies that all young adult and teen males could be influenced to use condoms by sex education curricula that address the negative and emphasize the positive attitudes toward condoms.

The number of partners in a lifetime and the number of current partners have been shown to be significant predictors of condom use even when adjusted for the condom

attitudes. Young men and teens with more current partners are less likely to have used condoms at their last intercourses than those with the fewest current partners. Similarly, those with more lifetime partners were less likely to use condoms than those with few partners in their lifetimes. As the risk of STIs increases with the number of sexual partners, this is the exact group that could benefit the most from condoms yet is the least likely to use them. Targeting these young men for education about the benefits and the relative unimportance of the more negative aspects of condoms could convince them to adopt condoms. Concentrating on particular groups that are especially predisposed to condom avoidance can help stretch the effectiveness of scarce condom promotion and health education funds.

Of course, the real goal of sexual education program is to reduce the risks of sexual intercourse: unintended pregnancies, STIs, and HIV infections, and the associated morbidities. Any study that furthers our understanding of why sexually active males do or do not choose to have protected intercourse can inform the efforts to effectively promote condom use and healthy sexual behaviors in this vulnerable population.

Recommendations

The findings of this study augment those from previous literature in identifying condom attitudes as determinants of condom use. Why do some young men have negative attitudes about condoms? Older males or those with more sexual experience may assume that their partners are also more experienced and using other contraception methods. Dissatisfaction with fit, limited or inconvenient access to condoms, and lack of confidence in correct use are additional possible reasons for negative perceptions.

Further investigations are needed to discover exactly what influences these males to believe that the loss of sexual pleasure, embarrassment, or indifference of their partners is worth the risks of unprotected intercourse.

In the meantime, the growing body of evidence confirms that males are instrumental in the condom decision process. This warrants continued focus on teens and young adult men in condom promotion efforts. Programs for males that focus on attitudes may be instrumental in changing condom use intentions and beliefs. Once those attitudes improve, condom use should increase. Girls-only programs could incorporate information about the boys' concerns of embarrassment and loss of pleasure. Since the perception of a female partner's appreciation was significantly associated with increased likelihood of condom use, girls should be encouraged to voice their preferences. Both male and female teens would benefit from learning how to discuss condom use with their partners without embarrassment. The impact of these changes in sex education curricula and condom promotion programs must then be evaluated based on actual change in condom behavior.

Increasing condom use by sexually active teens and adults, a health behavior priority as declared in the *Healthy People 2010* campaign, will reduce the risks of unprotected sexual intercourse including unintended pregnancies, STIs, and HIV (1). By expanding our knowledge of the multiple determinants of condom behavior, and then addressing those determinants in condom promotion efforts, this important public health goal is a little closer.

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Appendix A

Emory University Institutional Review Board Letter

EMORY
UNIVERSITY

Institutional Review Board

October 5, 2010

Nancy Pollard
Rollins School of Public Health
Emory University
Atlanta, GA 30322

RE: Determination: No IRB Review Required
Association of Condom Use and Attitudes Among Sexually Active Adolescent and Young Adult Males
PI: Nancy Pollard

Dear Ms. Pollard:

Thank you for requesting a determination from our office about the above-referenced project. Based on our review of the materials you provided, we have determined that it does not required IRB review because, although it is research, it does not meet the definition of research involving "human subjects" as set forth in Emory policies and procedures and federal regulations.

Specifically, in this project, you will be using a publicly available, deidentified dataset to examine the relationship between male condom use and attitudes toward condom use. You will not intervene or interact with human subjects and will not obtain private, identifiable information. Thus, IRB is not required.

This determination could be affected by substantive changes in study design, subject populations, or identifiability of data. If the projects changes in any substantive way, please contact our office for clarification.

Thank you for consulting the IRB.

Sincerely,

Scott Jenkins, BS
Education and Quality Assurance Analyst Assistant

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