PAA Abstract
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Unhealthy Sex: Discomfort with Sexuality and Sexually Transmitted Infections in the United States

Kirsten P. Smith*

* Population Studies Center, University of Pennsylvania, 3718 Locust Walk, Philadelphia, PA 19104.

Numerous authors have attributed higher sexually transmitted infection (STI) rates in the United States (US) compared to other developed countries to a pervasive discomfort with sexuality, which is manifested as a culture of secrecy surrounding sexuality and reproductive health. In this study, I explore this hypothesis by using longitudinal data from the National Longitudinal Study of Adolescent Health (Add Health) to analyze the extent to which discomfort with sexuality is associated with STI risk in the US. I also assess the extent to which the relationship is mediated by other factors argued to increase individual-level STI risk or to contribute to the unusually high STI rates in the US.

Background, Significance, and Research Objectives

STIs are of major concern because they are cofactors for HIV/AIDS, incur high medical and economic costs, and are widespread. For example, in the US, five STIs are among the ten most frequently reported diseases, and the estimated direct and indirect costs associated with STIs exceed $4 billion annually (Eng and Butler 1997). Despite being similar to other countries in the average age of sexual initiation among young people (Darroch, Singh, and Frost 2001, Westoff 1988) and the mean number of sexual partners among adults (Michael et al. 1998), as well as large investments made in healthcare, the US has among the highest levels of STIs in the developed world (Eng and Butler 1997, Panchaud et al. 2000). To illustrate, in the late 1990s, the gonorrhea rate among US adolescents was 74 times higher than in the Netherlands and France, ten times higher than in Canada, and seven times higher than in Britain (Alford 2003). During the same period, American teens were 20 times more likely than French teens, five times more likely than British teens, and twice as likely as Canadian teens to have Chlamydia (Darroch et al. 2001).

Numerous authors have attributed the higher STI rates in the US to sexual culture, in particular, discomfort with sexuality (e.g., Brooks-Gunn and Furstenberg 1989, Satcher 2001, AGI 2001, Berne and Huberman 1999). The general argument is that in the US, a refusal to view sex as natural and healthy, combined with a moralistic (as opposed to pragmatic) approach to sexual issues, engender heightened discomfort with sexuality and reproductive health and a general unwillingness to engage in or encourage honest discussion about sex. These, in turn, lead to inadequate sex education for youth, a dearth of public discussion of sex and reproductive health, denial by parents and politicians of the sexual activities of adolescents, unbalanced media representations of sex, and suppressed communication about sex between parents and children, patients and doctors, and sexual partners. As a result, levels of knowledge about STIs, their symptoms, and where to receive services are low, and at-risk individuals (especially adolescents) are reluctant to seek STI screening or to adopt protective behaviors such as negotiating condom use and asking sexual partners about their sexual histories. Furthermore, due to the stigma associated with STIs, individuals who suspect that they are infected are more likely to delay seeking treatment and, consequently, more likely to infect others (Eng and Butler 1997, Berne and Huberman 1999, Satcher 2001).

As an illustration, the esteemed Institute of Medicine (IOM) in its influential work, *The Hidden Epidemic*, argues that a culture of secrecy surrounding sexuality in the United States is largely responsible for the high prevalence of STIs in that country (Eng and Butler 1997). Most of the analysis is focused exclusively on the US, but in a section on cross-national differences in STI rates, the authors reiterate the importance of secrecy in accounting for the high rates in the US, stating that other countries are more comfortable with sexuality and with adolescent sexuality, in particular, resulting in attitudes, behaviors, and policies that are more conducive to reducing the

prevalence of STIs. A second factor that they suggest likely contributes to the unusually STI prevalence in the US is reduced access relative to other countries to health care, which is essential for diagnosing and treating STIs.

In the summary report for "Teenage Sexual and Reproductive Behavior in Developed Countries: Can More Progress Be Made?," an expansive multinational study of teenage pregnancy and STI rates in five developed countries conducted by the Alan Guttmacher Institute (AGI), the authors make a similar claim: that discomfort with sexuality, and especially adolescent sexuality, is largely responsible for the US's higher pregnancy, abortion, and STI rates relative to those of France, Canada, Sweden, and England. The report implicates specific factors, namely skewed media representations of sexuality, insufficient sexual education, barriers to accessing contraceptives and other reproductive health services, and lack of clear expectations regarding pregnancy prevention, the appropriate age for becoming a parent, and what constitutes a healthy sexual relationship; but underlying discussions of all of these factors is the notion that in the United States, a moralistic, restrictive approach to sex is fundamentally to blame. Thus, the authors conclude, "Where young people receive social support, full information and positive messages about sexuality and sexual relationships, and have easy access to sexual and reproductive health services, they achieve healthier outcomes and lower rates of pregnancy, birth, abortion and STIs" (AGI 2001:10). As before, a second factor argued to contribute to high STI rates in the US is reduced access to healthcare, which operates largely independently of sexual factors.

Despite the focus in the literature on sexual culture as a dominant explanation for cross-national differences in STI rates, little empirical research has been conducted to directly test this hypothesis. Part of the problem is that comparable international data on discomfort with sexuality and associated factors do not exist. However, nationally representative data do exist for the US. Moreover, if Americans' discomfort with sexuality in the aggregate is responsible for the country's unusually high STI levels, then differences in comfort levels *within* the United States should also differentially impact STI risk.[1] Consequently, in this study, I use longitudinal data from the Add Heath survey to determine whether this proposition is true; that is to say, whether discomfort with sexuality in the US is positively associated with the likelihood of acquiring an STI. Using theory to guide my selection of variables, I then explore possible mediating mechanisms through which discomfort operates to affect STI risk. I also test whether relationships are robust to controls for access to healthcare and other factors shown to affect STI risk in the US.

By investigating the relationship between discomfort with sexuality and STI infection, this study will broaden understanding of the factors that place young people at risk of STIs in the US. By focusing on a factor inculpated by the literature on cross-national differences in STI rates, it will also shed light on the potential role played by discomfort with sexuality in contributing to the unusually high STI rates in the US.

[1] The only instance in which this might not be the case is if variation within a country were substantially less than between-country variation, as would occur if a population were internally homogenous in regard to the factors of interest. This is not the case for the US, which is characterized by extensive variation in both STI risk and attitudes towards sex.

Data and Methods

The data for this analysis come from Waves I and III of the Add Health survey, a nationally representative study of health-related behaviors of American adolescents and young adults (Bearman, Jones, and Udry 1997, Resnick et al. 1997). The Add Health survey is especially well suited to study the effects of discomfort with sexuality on STI risk for four reasons: (1) It is unique in containing indicators of discomfort with sexuality. It also includes indicators of many of the mechanisms through which discomfort is argued to affect STI risk. (2) The literature on the role of discomfort in producing high STI levels in the US focuses on young people, and most STIs are acquired between the ages of 15 and 30. Consequently, the age range covered by the Add Health survey--adolescence and young adulthood--is ideal. (3) The longitudinal nature of the survey facilitates assessment of causality. (4) It is one of the few nationally representative data sets that contains STI biomarker data. In contrast, most surveys rely on self-reported STI histories, which are problematic due to recall and reporting bias. Differential diagnosis of existing conditions also poses a problem for self-reported data, as the likelihood of diagnosis often varies with the characteristics of interest. Because it includes biomarker data, the Add Health data set enables researchers to eliminate differential reporting or diagnosis as possible explanations for observed relationships.

The Add Health study is a complex, stratified, multistage probability-cluster survey with a school-based design. The original sampling frame consisted of all US high schools, from which 80 eligible schools were selected following stratification by region, urbanicity, school type (public, private, parochial), ethnic mix, and size. Since the target sample was students in grades 7 through 12, younger students were sampled from "feeder" schools that send graduates to the sampled high schools, raising the total number of participating schools to 134. Participating schools provided student rosters, and over 90,000 enrolled students completed an in-school, self-administered survey. From the union of these two sources, the student sample was drawn. The student sample consists of a core sample of 12,105 students, which is nationally representative of adolescents enrolled in grades 7-12 in the 1994-5 school year, and several targeted oversamples, including disabled students, siblings, and students of certain ethnicities. Students and their parents (preferably, their mothers) participated in face-to-face interviews in their homes, and Automated Computer-Assisted Interviewing (ACASI) technology was used to improve reporting of sensitive information. School administrators also completed self-administered surveys, which were then merged with the student and parent data to create the sample that is used in these analyses. The response rate for students and parents in Wave I was 80% and 85%, respectively. Wave II, which is not used for this analysis, consists of re-interviews in 1996 with 13,568 of the original 20,745 respondents (Chantala and Tabor 1999).

Wave III, which provides the outcome data for this analysis, consists of re-interviews in 2001-2 with 15,197 of the original Add Health respondents, as well as 1507 of their married, cohabiting, or dating partners (Add Health Biomarker Team 2003). The follow-up rate for Wave III was 73%. At the time of the Wave III interview, the original respondents ranged in age from 18 to 26 years old. Interviews took place mostly in respondents' homes or another location of their choice, although some respondents were interviewed on military bases, in penitentiaries, or in other institutions, as necessary. Respondents were asked to provide a urine specimen to test for Chlamydia trachomatis and Neisseria gonorrhoeae; 14,012 consented (a refusal rate of 7.8%).[2] A

[2] I will check whether respondents who refused differ significantly in their levels of discomfort with sex from respondents who consented to the STI tests.

Ligase Chain Reaction (LCR) assay (Abbott LCx) was used to detect the presence of chlamydia and gonorrhea. For chlamydia, the reported sensitivity and specificity of the assay for asymptomatic women is 94.1% and 95.2%, respectively. The respective figures for asymptomatic men are 90.0% and 97.9%. For gonorrhea, the reported sensitivity and specificity for asymptomatic women is 100.0% and 98.5%, and for asymptomatic men 100.0% and 100.0%, respectively. Urine specimens were also tested for Trichomonas vaginalis using a Polymerase Chain Reaction-Enzyme-Linked Immunosorbent Assay (PCR-ELISA) developed at the University of North Carolina. The PCR-ELISA is not FDA approved and is currently used for research purposes only. The reported sensitivity and specificity of the assay for asymptomatic women is 91.8% and 95.3%, and for asymptomatic men 90.9% and 92.7%, respectively. Of those tested, 4.2% of respondents tested positive for chlamydia, 0.38% tested positive for gonorrhea, and 2.24% tested positive for trichomoniasis.

In this analysis, the sample is limited to respondents interviewed in Waves I and III. Because the question used to construct the primary independent variable of interest was only asked of respondents 15 years of age or older, respondents ages 14 or younger in Wave I are excluded. Discomfort with sexuality is operationalized as responses of "agree" or "strongly agree" to the statement, included in the Wave I questionnaire, "If you had sexual intercourse, afterward, you would feel guilty." The primary dependent variable of interest is testing positive for gonorrhea, chlamydia, or trichomoniasis in Wave III.[3] However, I also experiment with two additional dependent variables derived from Wave III data: reporting having been told by a doctor or nurse in the past 12 months that you have an STI, and having visited a doctor or nurse because you experienced what you believed were symptoms of an STI.

To the extent possible, all predictor variables will come from Wave I. Exceptions are, for example, mediator variables for respondents who were not sexually active at Wave I, for whom values will of necessity come from Wave III. In some cases, this will not be problematic (e.g., condom use at first sex). In other cases, however, the necessity of using variables that come from Wave III will make it impossible to establish with certainty the temporal ordering of events (e.g., determining which came first, the STI infection or the mediator variable). This is a limitation that I will have to acknowledge in the paper.

Because the IOM, AGI, and others blame a culture of discomfort and secrecy arising from that discomfort, I utilize variables derived from multiple different levels, each of which has been hypothesized to affect STI risk: the adolescent himself, his family, and his school. I begin by presenting descriptive statistics for the variables used in the analysis and investigating the extent to which respondents who associate sex with guilt differ from respondents who do not associate sex with guilt. I then proceed to multivariate analysis using logistic regression in a nested modeling framework. Models are estimated using maximum-likelihood estimation methods in STATA that take account of the complex sampling design of the Add Health survey. Weights are used to account for oversampling and survey nonresponse and to make the full sample representative of adolescents enrolled in grades 7-12 in the 1994-5 school year. In addition, I will investigate the extent to which

[3] I combine the different STIs in the outcome variable for two reasons: to increase the power of the analysis, and because an analysis that used Add Health data to look at relationships between individual, family, and neighborhood characteristics and self-reported STI infection found similar patterns for gonorrhea and chlamydia (Upchurch and Mason 2002).

patterns vary by race/ethnicity and sex[4] and will structure the analysis accordingly (i.e., include interaction terms or analyze groups separately).

The first set of regression results are zero order associations between all the predictor variables analyzed and STI risk. In the first multivariate model, I test whether the relationship between discomfort with sexuality and STI risk is robust to sociodemographic controls: age, sex, race/ethnicity,[5] religion, religiosity, family structure, and parents' education. In addition, an indicator for whether or not the respondent was sexually active at Wave I and a variable indicating the number of years the respondent was sexually active between Waves I and III are included in this and all subsequent models. In the second model, I add controls for parental factors shown elsewhere to be associated with STI infection or STI risk behaviors: closeness to parents, perceived extent to which parents care about respondent, and perceived parental disapproval of respondent having sex.[6] The second model also includes indicators for whether or not the respondent's school offers contraceptive services and STI treatment. In the third model, I add behavioral factors shown to be associated with STI risk: prostitution, homosexuality, cocaine use, and incarceration history. Lastly, because access to care has also been argued to contribute to the high STI levels in the US relative to other countries, in the fourth model I test whether the association between discomfort with sexuality and STI risk is robust to controls for access to healthcare. Factors analyzed are health insurance status, urbanicity, perceived accessibility of healthcare, and household income.

In the final set of models, I explore possible mediating mechanisms through which discomfort operates to affect STI risk. Factors investigated are contraceptive knowledge, condom use, contraceptive self-efficacy, utilization of reproductive health services, discussing contraception or STIs with a partner, discussing contraception or STIs with a parent, combining alcohol or drugs with sex, having concurrent partners, having casual partners, and lifetime number of partners.

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[4] Studies have shown that due to patterns of assortative mating combined with higher disease prevalence among African Americans, STI risks are higher for African Americans than whites, even controlling for individual risk factors. Similarly, risks to males and females differ for biological and behavioral reasons.

[5] As previously noted, depending on the extent to which patterns vary by race/ethnicity or sex, these variables may be interacted with other variables in the model, or the analysis may be conducted separately by race/ethnicity or sex.

[6] I analyze perceived disapproval rather than parents' actual reports of disapproval, for which data also exist, because studies suggest that the former construct is more important in determining adolescents' behavior (Dittus and Jaccard 2000, Jaccard, Dittus, and Gordon 1998).

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