

**THE ASSOCIATION AMONG SEXUAL RISK BEHAVIORS, SEXUALLY
TRANSMITTED DISEASE, AND SUBSTANCE USE BEHAVIORS IN OREGON
HIGH SCHOOL STUDENTS**

June Elizabeth Bancroft

A MASTERS THESIS

**Presented to the Department of Public Health and Preventative Medicine
And the Oregon Health Sciences University in partial fulfillment of the
requirements for the degree of Master of Public Health**

June 1999

School of Medicine
Oregon Health Sciences University

CERTIFICATE OF APPROVAL

This is to certify that the M.P.H. thesis of
June Elizabeth Bancroft
has been approved

[Redacted Signature]

[Redacted Name] Ph.D.

[Redacted Signature]

[Redacted Name] M.D., Ph.D.

Donald Austin, M.D.

[Redacted Signature]

Jodi L. [Redacted] Ph.D.

[Redacted Signature]

Ronald Barry, Ph.D.

[Redacted Signature]

Associate Dean of Graduate Studies

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
List of Tables and Figures	ii
Acknowledgements	iii
Abstract	iv
Introduction	1
Objectives	12
Methods	13
Instrument	13
Sample	16
Statistical Analysis	16
Variables	21
Results	
Demographic characteristics	24
Univariate analysis	27
Multiple logistic regression models	31
Condom use	31
Sexually transmitted disease infection	34
Multiple lifetime sexual partners	38
Discussion	40
Limitations	47
Conclusions	48
References	50
Appendix A	54

LIST OF TABLES AND FIGURES

Figures

Figure 1. Potential risk factors for STD infection in adolescents	7
Figure 2. Sexual behavior outcomes and their associated risk factors	17
Figure 3. Multiple logistic regression models of adolescent sexual behavior....	18
Figure 4. Interaction between years of sex and multiple lifetime sex partners ..	37

Tables

Table 1. Demographic characteristics of sexually active students	24
Table 2. Sexual risk behavior among sexually active students	25
Table 3. Selected characteristics of sexually active students	26
Table 4. Association among selected behaviors and non-use of condoms	28
Table 5. Association among selected behaviors and sexually transmitted disease infection.....	29
Table 6. Association among selected behaviors and multiple lifetime sex partners.....	30
Table 7. Multiple logistic regression model predicting condom non-use in sexually active males	32
Table 8. Multiple logistic regression model predicting condom use in sexually active females	33
Table 9. Multiple logistic regression model predicting sexually transmitted disease infection in sexually active males	34
Table 10. Multiple logistic regression model predicting sexually transmitted disease infection in sexually active females	36
Table 11. Multiple logistic regression model predicting multiple lifetime sex partners in sexually active males.....	38
Table 12. Multiple logistic regression model predicting multiple lifetime sex partners in sexually active females.....	39

Acknowledgments:

The candidate wishes to acknowledge the support of Victor Stevens, Thomas Becker, Jodi Lapidus, Donald Austin, and Ronald Barry for their time, participation, direction and support of this project and enthusiasm for public health. Additional thanks to the researchers at the Oregon Health Division who collected and provided the data for this analysis.

Abstract:

Adolescents have the highest incidence of sexually transmitted disease (STD) infection and they engage in behaviors that increase the likelihood of transmission. A secondary data analysis of the Oregon Youth Risk Behavior Survey (YRBS) was used to assess risk factors for three different outcomes: STD infection, not using a condom, and multiple lifetime sex partners. Multiple logistic regression analysis was performed on 5160 sexually active students stratified by gender. Substance use behaviors were examined by two methods: a continuum model (never using any drug to cocaine and other illicit drug use), and an individual substance use model (tobacco, alcohol, marijuana, cocaine/other illicit drugs).

Among males, non-use of a condom was positively associated with partner oral contraceptive pill (OCP) use (odds ratio (OR) 4.5-9.5) and former cocaine/other illicit drug use (OR 1.6), and was negatively associated with concern about STD infection (OR 0.7) and current alcohol use (OR 0.6). When substance use was considered using the continuum model, substance use was negatively associated with condom non-use. Among females, non-use of a condom by their partner was positively associated with being 17 years or older (OR 1.5), prior pregnancy (OR 1.7), and current cocaine/other illicit drug use (OR 1.5), and was negatively associated with pregnancy concern (OR 0.6).

STD infection among males was positively associated with being non-white (OR 2.3), current cigarette (OR 2.4) or marijuana use (OR 2.6), prior abuse (OR 1.6), and multiple lifetime sex partners (OR 1.6). For females, STD infection was positively associated with STD concern (OR 1.8), prior pregnancy (OR 1.8), multiple

lifetime sex partners (OR 3.0), prior abuse (OR 1.9), OCP use (OR 2.1), marijuana use (OR 2.1).

For males, multiple lifetime sex partners was positively associated with being non-white (OR 1.5), low SES (OR 1.3), using alcohol or drugs before sex (OR 2.3), involvement in a prior pregnancy (OR 2.8), STD infection concern (OR 1.4), and current marijuana (OR 1.6) or cocaine (OR 2.0) use. For females, multiple lifetime sex partners was positively associated with prior abuse (OR 1.6), OCP use (OR 2.4), prior pregnancy (OR 2.5), concern about STD infection (OR 1.6), current cigarette (OR 1.6), former (OR 2.0) or current (OR 3.0) marijuana use, and former cocaine use (OR 2.0).

These findings show an association among risk behaviors in adolescents and suggest that prevention programs need to be broadly based. Interventions need to address not only the outcome, but associated behaviors, attitudes, and experiences. Oral contraceptive use and involvement in a prior pregnancy were associated with risky sexual behaviors and require contact with a health professional. This is an avenue for counseling and intervention. A history of abuse was common in the sexually active students and was positively associated with STD infection and multiple lifetime sex partners. Abuse in adolescents is not well understood and the role it plays in risky behaviors should be studied further.

Introduction:

Public health has historically been focused on the control of infectious diseases such as measles, mumps, rubella, hepatitis or pertussis. Epidemiology, as the foundation of public health, has moved from identifying infectious pathogens to understanding the latent effects of behaviors. Public health researchers are finding that understanding behavior is not as simple as looking under the microscope and finding the pathogen. Many of the behaviors that have negative health effects begin in adolescence and continue into adulthood. To measure and monitor changes in adolescent behaviors, the national Youth Risk Behavior Surveillance System (YRBS) was created by the Center for Disease Control and Prevention (CDC).

Some adolescent behaviors such as substance abuse or drunken driving are openly discussed, and are targeted by prevention programs. In American society the use of cigarettes or alcohol in adolescents is seen as wrong, and it is illegal for minors to drink or smoke. Sexual behaviors, on the other hand, are addressed less often. There are no laws about having sex unless abuse is involved. Furthermore, the cultural taboos surrounding sexual activity make it difficult to talk about. This silence surrounding teen sexual behaviors hinders public health efforts to address the high incidence of sexually transmitted disease (STD) infection in adolescents.

Control of STD infections has not been a priority in our national health policy. Except for human immunodeficiency virus (HIV) funding, the federal government spent more on STDs in 1950 than it does today (MacPherson, 1996). Health surveys indicate that societal ignorance about STDs is a long standing problem, and the fact that in 1994

there were three million cases of infection in teens appears to have gone unnoticed by the population at large (Hitchcock, 1996).

Although sex and sexuality pervade many aspects of American culture, sexual behavior and the decision to engage in it are often considered private and confidential topics not to be discussed. This reluctance to openly discuss sexual behavior hinders public health efforts to disseminate information regarding sexuality and its health consequences. In fact, the Committee on Prevention and Control of Sexually Transmitted Disease identified the “paradoxical depiction” of sexuality in the U.S.A. as an obstacle to prevention (Jadack,1998). Adolescents are bombarded with sexual images through the media, yet they are not encouraged to talk about their sexuality or sexual behaviors.

Despite the lack of public awareness of the high incidence of STD infection in this population, numerous studies have demonstrated that STDs have been of concern to adolescents. The 1990 Youth Risk Behavior Survey (YRBS) found that 4% of high school students in the United States reported having had a STD. (MMWR,1993). Yarber (1994) reported that 25% of sexually active teens will develop a STD before graduation from high school. Of the 12 million cases of STDs reported annually, 3 million occur in adolescents (The Hidden Epidemic,1997). Unfortunately, this is an under-reporting of the true incidence as many of these infections do not manifest obvious symptoms. For example, 70% of female and 30% of male chlamydia infections are asymptomatic (Gaiter, 1994;STD Surveillance, 1997). Surveillance reports show that the highest rates of gonorrhea and cervical chlamydia occur among 15-19 year old females (STD surveillance, 1997). This is of particular concern as there is evidence that individuals

with other STDs are 2-5 times more likely to spread and acquire HIV (Yarber,1992). Furthermore, untreated chlamydia infection can result in pelvic inflammatory disease (PID), the incidence of which approximates 200,000 cases/year in teens. Twenty-five percent of these cases will have long term consequences, including ectopic pregnancies, chronic pelvic pain, and infertility (Yarber,1992).

In addition to treatable bacterial infections such as gonorrhea and chlamydia, incurable viral infections such as hepatitis B and C, human papillomavirus (HPV), HIV, and herpes are increasing in incidence in adolescents (STD Surveillance,1997). Additionally, if one considers the 7-10 year incubation period for those currently diagnosed with HIV, 20% acquired infection as teenagers. In fact, epidemiological data from the first 6 months of 1995 indicate a 524% increase in teen AIDS cases over 1994 (Hitchcock, 1996). Research indicates that the number of physician office visits in 15-19 year old girls for herpes and HPV is increasing, and unfortunately, the HPVs associated with cervical cancer are those most common in adolescents (Van Muyden, 1999). Since many of these viral infections are incurable, each case becomes a chronic medical and societal burden.

These findings prompted the Institute of Medicine's special report *The Hidden Epidemic: Confronting Sexually Transmitted Disease*, a comprehensive analysis of STDs in the United States. In this report, adolescents were identified as a high-risk group due to the prevalence of infection, inadequate access to health care, and co-occurrence of other health risk behaviors common to their developmental stage.

Prevention of teen pregnancy through abstinence promotion has been the major

focus of public health programs addressing adolescent sexual activity in the U.S.A. According to the YRBS, sexual activity among adolescents is decreasing, but the most recent survey, conducted in 1997, reported that 48% were sexually experienced (MMWR, 1998). Other studies report that one-half of women and three-quarters of all men are sexually active by age 18 (Hitchcock, 1996). Even with the decreasing trend of sexual activity in teens, those who are sexually active are not protecting themselves. The impetus behind teen pregnancy prevention has been the economic impact of teen motherhood. However, the impact of adverse pregnancy outcomes related to both STDs and inadequate health care have not been adequately funded or addressed. When syphilis in teens peaked at 30/100,000 in 1990, a concurrent increase in congenital syphilis was reported (STDs, 1994; STD surveillance, 1997). Since STDs are often asymptomatic in adolescents, they are more likely to pass infection onto their offspring. In spite of this, public opinion and fear of political retribution keep many educational facilities from intervening.

Societal norms and political policies which promote and fund “abstinence only” sexual education for teens create obstacles and block opportunities for prevention. Despite student support of school based clinics, they continue to be controversial. Adult role models often disagree on the appropriate time and place for discussion of sexual activity, resulting in little discussion of sexual behavior before it begins. This promotes secrecy and silence, leaving adolescents to seek out other sources of information that may or may not be accurate. Studies indicate that accurate information about sex given by schools, parents and family planning services results in safer, more responsible choices

(Zadack, 1998; Kirby, 1999). Due to the stigma associated with sexuality, less than 20% of existing school based clinics provide contraceptive services including the distribution of condoms. However, studies measuring the impact of school condom availability on student's sexual and contraceptive behaviors indicated that sexual activity did not change significantly and half found significant increases in condom use (Kirby, 1999). In general, school based STD curricula focus on the biological or physical features of infection and do not adequately address the behavioral issues and appropriate skill development (Garrison, 1995).

In 1994, diagnosis and treatment services for STDs were available in 16% of all middle and junior high settings and in 20% of U.S. high schools (Leavy, 1995). School based sex education programs are required in some states but are under-funded and restrictive. In fact, nineteen states prohibit or restrict distribution of contraceptive information (Garrison, 1994). Research on contraceptive availability in U.S. schools observed that only 2.2% of all public high schools and 0.3% of all high school districts make condoms available. Concurrently, factors identified as important for contraceptive use include access, availability, confidentiality, and cost. In Multnomah County, Oregon, most school clinics do not dispense contraceptives.

The HIV epidemic has resulted in new programs that address safe-sex practices and condom use. Trend analysis of the national YRBS from 1991 to 1997 showed a 23% increase in condom use, but 43% of adolescents reported not using a condom during last time they had sex (MMWR, 1998). Although condom use has increased, many adolescents remain at risk and the data consistently show that as grade increases condom

use decreases (MMWR,1998; Shrier,1996).

Numerous studies have looked at the behavioral factors associated with condom use. Orr and Langefield identified the predictors of condom use in a population of males 15-19 years in a Midwestern city attending reproductive health clinics (Orr, 1993).

Outcome measures included attitudes and beliefs about STD's, condom use, cognitive maturity, health risk behaviors, and sexual behaviors. Condom use was consistent with the health belief model; use was influenced by perceived benefit. Those individuals who were more positive and highly motivated about condom use were more likely to use them as contraceptive devices. Those with more behavioral risk factors (substance abuse, delinquency, and suicide ideation) were less likely to use condoms (Orr, 1993). Males that were concerned with HIV transmission engaged in fewer behavioral STD risks.

The number of sexual partners one has greatly increases the likelihood of acquisition of a STD. From 1971-1988, the proportion of sexually active teens aged 15-19 with more than one lifetime sex partner increased nearly 60% (Jadack, 1997). It is known that multiple sex partners over a short period of time increase acute bacterial infections and the cumulative lifetime risk of viral infection. The 15-19 year old age interval appears to be the highest one for multiple sex partners. In one survey, 20-25% of 18-19 year old subjects had more than six lifetime sexual partners (Gaiter,1994). According to the 1997 YRBS, 61% of 12th graders were sexually active and 21% had more than 4 lifetime partners (MMWR,1998).

The factors related to STD infection among teens can be better understood by using a mathematical model. The formula $R=\beta cd$ can be use to evaluate the extent to

which an infection can move through a population. This model facilitates the identification of risk factors and how they interact to create infection. In this formula, $R =$ reproductive rate of infection, β =infectivity rate, c = the rate at which new partners are chosen and d =duration of infection (Hitchcock, 1996). Each of the factors listed below play a role in the transmission of infection.

Figure 1. Potential risk factors for STD infection in adolescents

β	c	d
genetic susceptibility	number of partners	host response
sexual practices	age	health care behaviors
contraceptive use	age of first intercourse	routine screening
alcohol and drug use		early Rx and Dx
smoking		partner notification
co-infections		Rx compliance

The only non-behavioral risk factors listed above are genetic susceptibility, host response, and age. Behavioral risk factors: sexual practices, contraceptive use, alcohol and other drug use, are the exact ones that aren't adequately addressed in society today. Any intervention would require a major paradigm shift on the part of adolescents and society.

The mechanics of transmission combined with the developmental stage of adolescence bring many challenges to the field of public health. Adolescents often engage in risky behaviors to satisfy their developmental needs. These behaviors serve to gain social acceptance from peers, establish autonomy from parents, and repudiate societal norms and authority.

Several lines of research address how adolescents develop risky behavior. One

theory looks at risk markers and risk factors for these behaviors with a focus on demographic characteristics, psychosocial factors and the physical environment (Lowry,1996). This theory focuses on the underlying psychosocial and developmental causal factors of risk behaviors and the needs that they are satisfying. In their research, Irwin and Millstein (1986) observed that gender and both chronological and physiological age need to be considered to understand an adolescent's perception of risk. Older adolescents perceived less risk than younger adolescents for behaviors representing many of the antecedents of morbidity and mortality including substance use and sexual activity (Irwin, 1986). This may be associated with experience and a greater understanding of risk or that as adolescents participate in risky behaviors they underestimate the risk associated with them.

Another line of research examines the hypothesized progression of these behaviors with certain behaviors preceding others such as tobacco and alcohol use leading to other drug use. This "Gateway" hypothesis implies that preventing early behaviors in the chain may reduce the likelihood that later behaviors will occur. According to this theory, determinants of progressive involvement may vary, but the sequence of substance use is consistent. This progression moves from substances that are legal for adults, such as alcohol and cigarettes, to marijuana and then other illicit drugs, such as cocaine. (Kandel,1992)

A third line of research looks at the interrelationship of health risk behaviors. This theory suggests that individuals who engage in one type of behavior such as substance use are more likely to engage in another, such as unprotected sexual intercourse

or injury related behaviors. Jessor's problem behavior theory proposes that multiple risk behaviors may occur as a function of a single behavioral syndrome with clear risk factors of hopelessness and low self-esteem (Jessor, 1991). Most adolescents engage in several health risk behaviors before adulthood. The 1995 YRBS reported that 71% of students had tried cigarettes, 80% have had at least one drink and 53% have had sexual intercourse (Brener,1998). The 1997 YRBS reports similar results (MMWR,1998). Researchers, using Jessor's Problem Behavior Theory, observed that high risk sexual behaviors appear to cluster in individuals at an early age and with earlier onset there is an increase in frequency and severity (Gaiter,1994). Although numerous researchers have used Jessor's theory as a framework to understand adolescent sexual behavior, the majority of studies have focused on high risk youth in non-traditional settings such as juvenile detention facilities, STD clinics, or among homeless, inner city youth (Yarber,1992; Shafer,1993; Sieving,1997).

Shrier (1996) found significant associations between the lifetime number of sex partners and the frequency and age of onset of problem behaviors including smoking, alcohol use, and illicit drug use. They found that young age and ever or recent use (previous 30 days) of substances were associated with an increased number of partners and non-use of condoms. This study was also consistent with other studies showing that females and older adolescents are less likely to use condoms consistently. (Shrier,1996)

Research on adolescent sexual behaviors has shown that risk factors for both STDs and pregnancy include having had multiple sex partners and not using condoms (Sieving,1997). In a cross-sectional study measuring behavioral factors associated with

partner pregnancy by Springarn and DuRant (1996), the 13% of male high school students involved in a pregnancy had significantly higher frequencies of eight health risk and problem behaviors and a greater number of sexual partners in the previous 30 days. In addition, those informed that they had a STD by a health professional were more apt to be involved with a pregnancy (Springarn,1996). Other research on females observed that pregnant adolescents are more likely to have had an STD than their non-pregnant counterpart (STDs,1994).

These observations are consistent with Jessor's theory of high risk behavioral clustering in teens. An additional study looking at drug abuse in adolescents further exemplifies this point. In a study of 222 crack-using adolescents in San Francisco, 41% had a history of STD. These same individuals traded sex for money and had multiple sex partners (Fullilove, 1990). Other studies have associated non-injection drug use with lack of condom use and the number of sex partners. It is well documented that inner city minority teens have high rates of STDs. Factors such as poor role models, lack of educational and economic opportunity and inaccessibility to health care are major contributors to this phenomenon (Yarber,1992).

Societal doctrines focused only on abstinence are not allowing educators and health professionals an opportunity to respond and intervene in the rising rates of both bacterial and viral STDs. The HIV epidemic has brought sexual risk-taking behavior to the attention of the American population, but many perceive AIDS as a disease of high-risk populations only. The 524% increase in adolescent AIDS cases from 1994-1995, the majority of whom are heterosexual females, should be cause for public alarm. Although

this should have resulted in increased attention to STDs, in many schools, STD curriculum is not required and if STD infection is discussed, it is focused on HIV education and abstinence promotion.

It is a public health priority to identify those factors, both demographic and behavioral, which put one at risk for any STD. Primary prevention is the only method of control in light of the incurable viral diseases and asymptomatic bacterial infections that are infiltrating the adolescent population. From previous studies, and the increasing prevalence of infections in the adolescent population, it is clear that it is necessary to sort out the factors associated with the sexual risk behaviors leading to STD infection.

Objectives

This study examined the attitudes and behaviors associated with sexual risk-taking. The first objective was to explore demographic characteristics of individuals who engage in three sexual risk behaviors: not using condoms, having multiple sexual partners in a lifetime, and prior STD infection. A second objective was to examine the relationship among sexual risk behaviors and individuals' perceived risk.

Since Jessor's problem behavior theory indicates that risky behaviors cluster in youth, the third objective was to look at the relationship among sexual risk behaviors and substance use. The final objective was to look at oral contraceptive use in relationship to sexual risk behaviors. Is the increase in oral contraceptive use associated with STD infection?

Methods

Instrument

The Youth Risk Behavior Survey questionnaire was first administered in 1990 by the Centers for Disease Control and Prevention (CDC) to assess the prevalence of behaviors that influence adolescent health and measure progress towards the national goals of Healthy People 2000. Through this survey, the CDC hoped to focus the nation's attention on specific behaviors among youth that cause the most health problems, to assess how these problems are changing over time, and to provide comparable data among national, state, and local samples of youth (Brener, 1995). A panel of experts was convened to analyze the leading causes of morbidity and mortality among youth. This revealed that contributing behaviors could be categorized within six areas: (1) behaviors that result in unintentional and intentional injuries; (2) tobacco use; (3) alcohol and other drug use; (4) sexual behaviors that contribute to unintended pregnancy and STDs; (5) dietary behaviors that result in disease; and (6) physical inactivity. The survey asks questions about health behaviors and attitudes as well as their perception of risk in the six content areas.

Other researchers have carried out validity and reliability tests of the YRBS. In a validity study of two alcohol use questions in a college age population, it was determined that the questions provided a valid measure of drinking in that group (Gast, 1995). Brener (1995) studied the reliability of the YRBS through a test-retest study in which 1,679 students in grades 7-12 were administered the survey 14 days apart. Kappa statistics were calculated for 53 behavioral items that did not reference a time period of "yesterday",

“last time”, or “in the past 7 days”. Since the surveys were taken two weeks apart the time frame for these questions would have changed and the responses would be expected to be different. Responses of the seventh grade students were less consistent than those of higher grade students and the researchers concluded that students in higher grades report personal health risk behaviors with reasonable reliability over time (Brener, 1995).

The 1995 YRBS was conducted in over 40 states. The national school-based survey employed a three-stage cluster sample design to produce a nationally representative sample of students in grades 9-12. The first stage contained 1,955 primary sampling units (PSU) consisting of large counties or groups of smaller adjacent counties. Sixteen strata were formed based on the degree of urbanization and the relative percentage of Black and Latino students in the PSU. Fifty-two PSUs were selected from these strata with a probability proportional to school enrollment. In stage two, 157 schools were selected with probability proportional to school enrollment size. Schools with high numbers of Black and Latino students were sampled at higher rates. The third stage of sampling was a random selection of one or two classes of a required subject in each grade. (Kann, 1996) Respondent participation is voluntary and anonymous.

The Oregon 1995 YRBS was used as the data source for this study. Forty Oregon schools were randomly selected using the CDC method. However, only 17 chose to participate. Non-participation at the district or school level was due to various reasons: feeling over-surveyed, competition for classroom time, or anticipated controversies over questions concerning sexual behaviors. Due to low participation, the stratified cluster sampling procedure recommended by CDC was not used and the 17 selected schools

were combined with 33 other volunteer schools. Due to the low response rate, the Oregon data were not included in the national YRBS results. For this study, the Oregon sample of 50 volunteer schools was used.

A comparison of respondent schools to the non-respondents did not show substantially different sociodemographic characteristics. The 50 volunteer schools then drew a random sample of classes in which every student had an equal chance of being selected. Some schools, however, chose to survey their entire enrollment. Adjustments for absences and non-participation yielded a total of 14,891 surveys, for a response proportion of 80%. Surveys were checked visually and then by computer for consistency of response. Six percent of the original surveys (819) were eliminated due to inconsistencies in related questions (drank more alcohol in the last month than in their life), out of range answers (answered h when choices were a-d), multiple answers (where only one answer was allowed), or lack of gender and or grade. Surveys with fewer than 10 inconsistencies were included in the data set but the inconsistent questions were considered missing data. If the student reported never having used cocaine or marijuana but reported injection drug use, the injection drug use question was counted as missing. Thus, usable questionnaires were completed by 13,992 ninth through twelfth grade students in 50 Oregon public schools (Oregon YRBS, 1995).

Demographic characteristics of the students and distribution of school socioeconomic status and enrollment size was similar to that of all public schools in Oregon. In terms of geographic distribution, Clackamas, Washington and Marion counties were under-represented. Survey data were weighted based on socioeconomic

status (SES) and school enrollment size adjusted by the Oregon school population. The SES was a composite index based on percentage of students eligible for free or reduced price lunch, educational level of most educated parent, student mobility, and student attendance. (Oregon Dept of Education, statewide assessment). Appendix A contains the specific questions and response categories used in survey.

Sample

Data were obtained in SPSS 7.5 format from the Center for Health Statistics, Oregon Health Division. Only sexual active students were included in the analysis. Students who reported never having sex on any of the sexual activity questions were excluded. Out of the 13,992 valid surveys, 5160 students were sexually active. Specific questions are included in Appendix A.

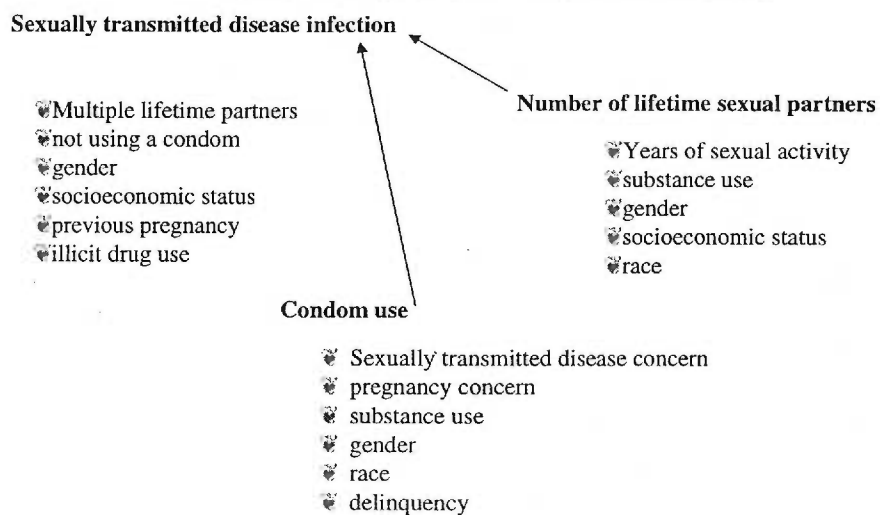
Statistical Analysis

Initial analysis began with exploration of the demographic variables: age, gender and race. Unweighted frequencies and weighted percents were presented. (Oregon,1996) Given gender differences in risk behaviors, the data were stratified by gender (Coker, 1994; MMWR,1998). The first step in data analysis was an investigation of the frequency distribution of the variables of interest. Based on this exploratory analysis, variables were recoded and new variables were created. (for variable coding see the following section) Univariate analysis of dichotomous variables was performed using Pearson's chi-square. The three dichotomous outcomes: multiple lifetime sex partners,

condom use, and STD infection were analyzed. Correlation between both independent and dependent variables was checked with the gamma statistic (Agresti, 1990). If two of the independent predictor variables were correlated ($\text{gamma} \geq 0.60$), then the variable with the larger crude odds ratio (based on univariate logistic regression) was included as an independent variable in the multiple logistic regression model. However, for the substance use variables, all categories were entered regardless of their correlation. Crude odds ratios were calculated (Hosmer, 1989). For variables with more than two response categories, the referent level was set at the lowest risk group. Variables significant at the 0.20 level were considered for multiple logistic regression models (Hosmer, 1989). Stepwise logistic regression was used to calculate the odds ratio.

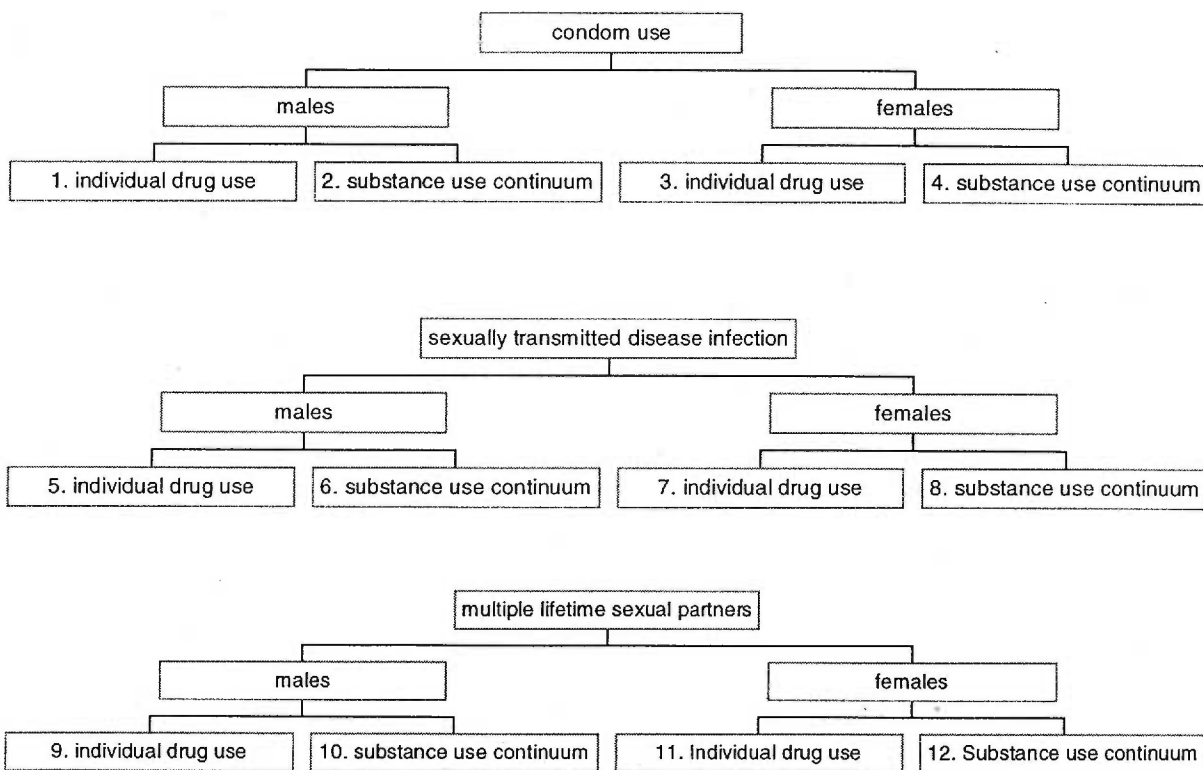
Twelve different models were developed based on the three outcomes of interest for males and females. The known risk factors for each model are presented in Figure 2.

Figure 2. Selected risk factors for sexual behavior and the association with sexually transmitted disease infection



For each outcome and gender two models were built. One model looked at illicit substance abuse behaviors according to the “Gateway” theory on a continuum from (1) never used any substance (2) alcohol and cigarette use (3) marijuana use (4) cocaine and other illicit drug use. The second model looked at each individual substance on a three category scale including never, former, and current use of cigarettes, alcohol, marijuana, and other illicit drugs. Figure 3 outlines the 12 models that were examined.

Figure 3. Multiple logistic regression models of adolescent sexual behavior



Individual drug use: each substance: cigarettes, alcohol, marijuana, cocaine/illicit drugs was a variable coded according to its use. A total of 4 variables were created with three categories: never used, former use, current use (last 30 days)

Substance use Continuum: one variable was created with four categories: never have used any substance, used alcohol or cigarettes (legal for adults) but had not tried marijuana or illicit drugs, had used marijuana but not other illicit drugs, had used cocaine/illicit drugs.

Former use was defined as answering that they had used the specific drug but not in the past 30 days. Current use was defined as having used the specific drug in the 30 days prior to the survey.

For each model, years of sex, socioeconomic status, and race were forced into the model. Years of sex was used as a surrogate for age and to control for the number of years an individual had been at risk for STD infection. Years of sex was computed from the age of onset of sexual activity to the age at time of the survey. Socioeconomic status (SES) and race were forced into the model because previous studies indicate that they are factors in adolescent risk behaviors (Lowry, 1996; Lowry, 1994; Coker, 1994, Richter, 1993).

Model building was done in blocks. First, the forced variables (race, SES, years of sexual activity) were entered, then variables with a significant crude odds ratios were added with forward step-wise regression using the likelihood ratio test (LRT) statistic with a statistical level $p < .10$ to enter and $p > .25$ to exit. These levels were chosen to narrow potential variable selection while still capturing predictors of interest (Hosmer, 1989). The LRT statistic is used to assess the effect that an independent predictor variable has on the model. The likelihood function is used to estimate model parameters so that the probability of obtaining the observed data is maximized. The LRT statistic measures the change in the value of the $-2 \log$ likelihood when a variable is not included in the model..

The formula is as follows:

$$G = (-2 \log \text{likelihood (w/out variable)}) - (-2 \log \text{likelihood (with variable)})$$

When sample sizes are large, this difference follows a chi square distribution with one degree of freedom. If the variable being tested contributed to the model, the hypothesis that the parameter estimate is zero was rejected using the values of a chi square distribution with one degree of freedom, and it was concluded that the variable significantly contributed to the model.

A third block entered the substance use variable(s) using the same forward selection criteria. These models were checked at each step for confounding by looking at changes in the regression coefficients and the significance of the LRT statistic when variables were added or removed from the model. A 10% change in the odds ratio was used to indicate confounding (Hosmer, 1989). Models were then run using backward stepwise regression with the LRT statistic and the same exit and enter criteria. The two techniques were compared and the better model was chosen based on the -2 log likelihood value, the Hosmer and Lemeshow goodness-of-fit test (GOF) and the biological plausibility of the predictors.

After the main effect variables were selected, interaction terms were tested for significance. Interaction terms were selected based on previous studies, the change in the significance of the LRT statistic when a specific variable was added to the model, and biological plausibility. The interaction terms were then added to the existing models using the previously stated forward stepwise criteria. Interaction terms significant by Wald Chi Square statistic ($p < .05$) level in the model, or in which the significance level of the LRT statistic changed indicating that the interaction had an effect on the model were examined further. The terms were examined by plotting the logit equation at different

levels of the variables in the interaction. Main effects for variables were left in the model when their interaction terms were significant.

Assessment of model fit was done using the Hosmer and Lemeshow GOF test. The Hosmer and Lemeshow GOF test is a test of model calibration and indicates how closely the observed and predicted probabilities match. The cases are divided into ten groups based on the probability of the event occurring and the test compares the predicted and observed numbers of events and nonevents. The test statistic follows a chi square distribution with 8 degrees of freedom. If the chi square $p > .05$ the null hypothesis that there is no difference between the observed and predicted values is not rejected, and thus, the model appears to fit the data reasonably well (SPSS 9.0). For the identification of influential cases in the model, the squared studentized residuals and leverage values were plotted. Outlying data points were identified by plotting the predicted probabilities against the change in deviance or the studentized residuals squared. In addition, leverage values were graphed against the individual record number. Leverage values allow the detection of observations having a large impact on the predicted probabilities (SPSS 9.0; Hosmer, 1989). If outliers were identified they were removed and the model was run again. Any change in the model was noted.

Variables

Outcome variables were all dichotomous and included STD infection, non-use of a condom at last intercourse, and having had multiple sex partners. STD-positive individuals were sexually active students who responded "yes" to having a STD in the

past twelve months and who had been treated by a health care professional for their infection. Multiple lifetime sex partners was defined as having 2 or more partners within the last 3 months or having 3 or more ever.

Due to the small percentage of minority populations in Oregon, all minority groups (Black, Latino, Asian or Pacific Islander, and American Indian) were combined into one category and compared to the non-Latino White population. White was designated as the referent category. Socio-economic status (SES) was recoded from the initial four level index into a dichotomous variable with the three lower categories collapsed into low and the referent category was high SES. This was done since the median fell into the upper middle category. The three lower categories: low, low middle and upper middle made up 60% of the sample.

The following variables were considered independent predictors and were recoded to a dichotomous response: history of physical or sexual abuse, oral contraceptive (OCP) use at last intercourse, involvement in a prior pregnancy, alcohol or other drug use before sex, concern about getting an STD infection, and concern about being involved in a pregnancy. All unknown responses were coded to a missing value and were not included in the analysis.

The gateway theory of substance abuse suggests that there is a progression in an individual's use of drugs. A four-category variable "substance use continuum" was created based on drug use: no/never use, alcohol/cigarette use, marijuana use, illicit drug use. This variable was classified according to the following scheme: never users were identified by having answered "no" to all questions concerning smoking, alcohol and

other drug use. Alcohol, cigarette use was code “yes” if the individual had ever tried either drug but did not respond to heavier substance use. Marijuana use and other illicit drug use were coded “yes” for lifetime use of the respective drug. If this substance use continuum variable did not remain in the model based on the model building criteria (in $p < .10$, out $p > .25$), it was forced into the model to measure the effect that substance use had on the model.

Drug use was also categorized by individual substance use (alcohol, cigarette, marijuana, cocaine/illicit) . Each was re-coded into four different categorical variables with three levels: never, former, current use. Current users were defined as having used the drug within the last 30 days. Former users were individuals who reported ever using the drug but not within the last 30 days.

The number of years of sexual intercourse was included in all models to control for the age of onset of sexual intercourse and the time in which to accumulate sexual risk behaviors. This variable was computed from the age at time of survey and the age of first sexual intercourse. All data analysis was done on weighted data using SPSS 8.0 (SPSS, 1998).

Results:

Demographic characteristics: gender, race, and age

From the total 13,992 surveys, 5160 respondents were sexually active and were included in the analysis. The characteristics of the sample by gender are presented in Table 1. Gender distribution was approximately equal, however, the age distribution of sexually active students was skewed toward seventeen or older. The sample distribution of race was similar to the total surveyed population.

Table 1. Demographic characteristics of sexually active students

		Females, N=2598	Males, N=2562
		%	%
Age group	<= 14 years	7.3	5.1
	15 years	21.7	21.7
	16 years	26.3	24.7
	>=17 years	44.7	48.5
Race	white	81.0	77.9
	non-white	19.0	22.1
Low socioeconomic status	yes	66.7	63.8
Grade	9th	20.2	21.8
	10th	23.1	23.4
	11th	26.2	27.6
	12th	30.5	27.2
Years of sexual activity	<1 year	19.2	16.6
	1 year	33.2	29.4
	2 years	23.4	20.6
	3 years	13.2	13.2
	4 years	7.2	10.7
	5 years	2.8	5.0
	6 years	0.8	3.1
7 years	0.2	1.4	

Of the 5160 sexually active respondents, 641 or 12% responded yes to having had a STD in the previous 12 months. Of these 641, 122 reported having a STD but did not

seek treatment. These students tended to be younger, non-white, males, with higher relative frequencies of substance abuse behaviors. These surveys were removed from the analysis since it was unclear whether they had a STD infection, leaving 519 students with a STD outcome. Infections were more prevalent in females. This gender difference increased with age, with the percentage of females reporting infection increasing from 10% to 14% and males from 3% to 6%. A higher proportion of non-white students reported a history of STD infection. This finding remained consistent across age group and gender.

Non-use of a condom was more common in females (47%) than males (37%) consistently across the racial category. However, younger, white students were more unlikely not to use a condom (35%) when compared to their non-white peers (26%). This difference is not observed in older students where non-use of a condom is roughly 47% in both racial groups. In general, 9th grade students of both genders used condoms more frequently than 12th grade students. Not using a condom ranged from 36% to 57% in females and from 29% to 44% in males. Frequencies and weighted percents of sexual risk behavior outcomes by gender are summarized in Table 2.

Table 2. Sexual risk behavior outcome among sexually active students

		Females, N=2598	Males, N=2562
		%	%
Condom use	no	46.6	36.6
Outcome STD	yes	13.5	7.2
Multiple partners	yes	38.8	41.6

Multiple lifetime sex partners were more common in males than females. This

was consistent for both racial groups. Multiple lifetime sex partners were more prevalent in non-whites across all age groupings but the difference between racial groups decreased with age. The number of students with multiple lifetime sex partners increased with age from 32% in students ≤ 14 years of age to 42% of those 17 years old or older. Other predictor variables examined in the analysis are presented in Table 3.

Table 3. Characteristics of sexually active students

		Males, N=2551	Females, N=2588
		%	%
Ever abused	yes	32.0	55.9
Alcohol/drugs before sex	yes	26.8	22.6
Use oral contraceptives	yes	15.5	18.8
Involved in pregnancy	yes	7.8	13.2
Years of sexual activity	<1 year	16.6	19.2
	1 year	29.4	33.2
	2 years	20.6	23.4
	3 years	13.2	13.2
	4 years	10.7	7.2
	5 years	5.0	2.8
	6 years	3.1	0.8
	7 years	1.4	0.2
Concerned about STDs	yes	79.2	83.8
Concerned about pregnancy	yes	77.4	85.7
Use cigarettes	never	32.4	27.4
	former	27.2	25.8
	current	40.4	46.9
Use alcohol	never	8.9	6.1
	former	21.3	27.4
	current	69.8	66.5
Use marijuana	never	33.4	34.9
	former	22.3	26.9
	current	44.3	38.2
Use cocaine/drugs	never	82.6	82.7
	former	11.1	10.6
	current	6.3	6.8
Substance abuse	nonuser	6.8	5.6
	alcohol & cigarettes	26.0	29.2
	marijuana	33.0	32.7
	cocaine/illicit drugs	34.2	32.6

Females showed a higher prevalence of prior abuse, condom non-use, STD infection, involvement in a prior pregnancy, concern about STD infection, concern about becoming pregnant, and current cigarette use. Among males there was a higher prevalence of alcohol/drug use before having sex and they had been sexually active for longer than females.

Crude Odds Ratios:

Association between each variable and the three outcomes was determined via Pearson's chi square test statistic, gamma statistic, and the logistic regression. The chi square analysis of dichotomous factors and the univariate logistic regression of categorical variables on the three outcomes, non-use of a condom, STD infection and multiple lifetime sex partners by gender are presented in Tables 4-6.

Univariate analysis, with not using a condom as the dependent variable, identified similar risk factors in both males and females. Not using a condom was associated with prior abuse, multiple lifetime sex partners, oral contraceptive use, involvement in a previous pregnancy, concern about STD infection, marijuana use, and the substance use continuum. Among females, concern over becoming pregnant and low SES were positively associated with condom non-use. In males, non-use of a condom was positively associated with former cocaine use. However, among males, the substance use continuum variable was positively associated with condom use.

Table 4. Association among selected behaviors and non-use of a condom in sexually active students

	Males					Females				
	p value	gamma	OR*	Lower**	Upper**	p value	gamma	OR*	Lower**	Upper**
Nonwhite	0.03	-0.11	0.80	0.66	0.98	0.67	0.02	1.04	0.86	1.27
Abuse	0.12	-0.12	1.26	1.05	1.51	0.03	0.09	1.19	1.01	1.40
Alcohol/drugs before sex	0.42	-0.04	0.93	0.77	1.11	0.67	-0.02	0.96	0.80	1.15
Multiple partners	0.06	0.08	1.17	1.00	1.38	<.001	0.22	1.55	1.32	1.81
Oral contraceptive	<.001	0.70	5.73	4.51	7.27	<.001	0.59	3.84	3.08	4.78
Previous pregnancy	<.001	0.44	2.56	1.91	3.43	<.001	0.38	2.23	1.76	2.83
STD concern	<.001	-0.20	0.67	0.55	0.82	0.01	-0.14	0.76	0.62	0.94
Pregnancy concern	0.52	-0.03	0.94	0.78	1.34	<.001	-0.28	0.56	0.45	0.70
SES	0.21	-0.05	1.14	0.94	1.32	0.02	0.10	1.22	1.04	1.44
Cigarettes										
former	0.67		0.96	0.78	1.18	0.81		0.97	0.80	1.19
current	0.49		0.93	0.74	1.15	0.62		0.95	0.78	1.17
Alcohol										
former	0.96		1.01	0.72	1.41	0.20		0.78	0.56	1.13
current	0.09		0.77	0.57	1.04	0.32		0.85	0.61	1.18
Marijuana										
former	0.32		0.89	0.72	1.12	0.08		1.19	0.98	1.46
current	0.07		0.84	0.70	1.01	0.54		1.06	0.88	1.27
Cocaine										
former	0.01		1.44	1.09	1.91	0.51		1.09	0.83	1.46
current	0.36		0.84	0.57	1.23	<.001		1.66	1.17	2.35
Substance										
Alcohol/cigarettes	0.02		0.65	0.46	0.93	0.13		0.76	0.53	1.08
Marijuana	<.001		0.57	0.40	0.81	0.08		0.73	0.51	1.04
Other illicit drugs	0.02		0.66	0.47	0.93	0.71		0.93	0.66	1.33

*OR=crude odds ratio

** lower and upper 95% confidence interval for odds ratio

The association between selected behaviors and STD infection was similar for both genders. Being non-white, prior abuse, using alcohol or drugs before sex, multiple lifetime sex partners, involvement in a previous pregnancy, cigarette use, marijuana use, cocaine or illicit drug use, and the substance use continuum variable were all positively associated with STD outcome for males and females. Among females, STD infection was negatively associated with pregnancy concern. Among males, STD infection was negatively associated with condom non-use, but for females there was a positive

association between STD infection and non-use of a condom by their partner. Oral contraceptive use was positively associated with infection for females but not for males.

Table 5. Association among selected behaviors and sexually transmitted disease infection in sexually active students

	Males					Females				
	p value	gamma	OR	Lower**	Upper**	p value	gamma	OR	Lower**	Upper**
Nonwhite	<.001	0.33	1.98	1.44	2.71	0.04	0.14	1.33	1.01	1.74
Abuse	<.001	0.26	1.70	1.23	2.45	<.001	0.34	2.04	1.59	2.62
Alcohol/drugs before sex	<.001	0.27	1.74	1.28	2.38	<.001	0.23	1.61	1.26	2.06
Multiple partners	<.001	0.39	2.30	1.70	3.12	<.001	0.48	2.87	2.28	3.62
No condom	0.04	-0.16	0.72	0.52	0.99	<.001	0.21	1.52	1.21	1.90
Oral contraceptives	0.49	-0.08	0.86	0.55	1.33	<.001	0.50	2.08	1.61	2.68
Previous pregnancy	<.001	0.36	2.13	1.38	3.30	<.001	0.36	2.14	1.62	2.84
Std concern	0.53	0.06	1.13	0.77	1.64	<.001	0.29	1.83	1.28	2.63
Pregnancy concern	0.10	-0.14	0.75	0.54	1.05	0.01	-0.18	0.69	0.51	0.92
SES	0.14	0.12	1.28	0.93	1.75	0.75	-0.02	0.96	0.76	1.22
Cigarette	0.25					0.04				
former	0.03		0.66	0.45	0.97	0.04		0.73	0.55	0.98
current	0.02		0.62	0.41	0.93	0.04		0.73	0.54	0.98
Alcohol	0.08					0.91				
former	0.16		0.63	0.33	1.20	0.71		1.10	0.65	1.87
current	0.90		1.03	0.61	1.76	0.67		1.12	0.68	1.84
Marijuana	<.001					<.001				
former	0.79		0.94	0.59	1.50	<.001		1.94	1.43	2.65
current	0.01		1.65	1.16	2.36	<.001		2.08	1.56	2.78
Cocaine	0.04					<.001				
former	0.82		0.94	0.54	1.63	<.001		1.87	1.30	2.69
current	0.01		2.01	1.17	3.46	<.001		3.12	2.17	4.62
Substance	0.05					<.001				
Alcohol & cigarettes	0.11		0.59	0.31	1.12	0.48		0.81	0.46	1.45
Marijuana	0.84		1.06	0.59	1.92	0.36		1.29	0.74	2.25
Other illicit drugs	0.87		0.95	0.52	1.73	0.04		1.76	1.01	3.04

*OR=crude odds ratio

** lower and upper 95% confidence interval for odds ratio

The associations between selected behaviors and multiple sex partners were similar for males and females. (Table 6) There were positive associations between multiple lifetime sex partners and prior abuse, using alcohol or drugs before sex, non-use of a condom, involvement in a previous pregnancy, concern about STD infection,

pregnancy concern, cigarette use, alcohol use, marijuana use, cocaine/illicit drug use, and the substance use continuum variable. Among males, multiple lifetime sex partners was also associated with non-white race, and low SES. Oral contraceptive use was associated with multiple lifetime partners among females.

Table 6. Association among selected behaviors and multiple lifetime sex partners in sexually active students

	Males					Females				
	p value	gamma	OR	Lower**	Upper**	p value	gamma	OR	Lower**	Upper**
Nonwhite	<.001	0.27	1.73	1.43	2.09	0.42	0.04	1.08	0.89	1.33
Abuse	0.02	0.10	1.23	1.03	1.47	<.001	0.43	2.50	2.11	2.96
Alcohol/drugs before sex	<.001	0.47	2.73	2.28	3.28	<.001	0.33	1.99	1.66	2.41
No condom	0.06	0.08	1.17	1.00	1.38	<.001	0.22	1.55	1.32	1.81
Oral contraceptive	0.53	-0.04	0.93	0.75	1.16	<.001	0.27	1.74	1.43	2.13
Previous pregnancy	<.001	0.61	4.17	3.03	5.75	<.001	0.55	3.42	2.70	4.33
STD concern	<.001	0.25	1.67	1.37	2.05	<.001	0.22	1.56	1.24	1.95
Pregnancy concern	<.001	-0.15	0.74	0.62	0.89	<.001	-0.19	0.68	0.55	0.85
SES	0.02	0.10	1.21	1.03	1.43	0.23	0.05	1.11	0.94	1.31
Cigarette										
former	<.001		0.54	0.44	0.67	<.001		2.09	1.62	2.72
current	<.001		0.62	0.50	0.76	<.001		3.49	2.78	4.40
Alcohol										
former	0.97		1.00	0.71	1.44	<.001		3.15	1.93	5.15
current	<.001		1.84	1.34	2.52	<.001		5.03	3.12	8.09
Marijuana										
former	<.001		1.77	1.42	2.12	<.001		2.61	2.09	3.24
current	<.001		2.34	1.94	2.83	<.001		4.06	3.32	4.97
Cocaine										
former	<.001		3.51	2.62	4.71	<.001		4.89	3.62	6.59
current	<.001		4.07	2.75	6.02	<.001		3.72	2.61	5.31
Substance										
Alcohol /cigarettes	0.78		0.95	0.65	1.39	0.01		1.94	1.17	3.19
Marijuana	0.01		1.65	1.14	2.38	<.001		4.39	2.69	7.18
Other illicit drugs	<.001		2.43	1.68	3.50	<.001		7.28	4.46	11.88

*OR= crude odds ratio

** lower and upper 95% confidence intervals for odds ratio

Multiple logistic regression models:

Condom use:

For males, variables that remained in the regression model included years of sexual activity, history of abuse, oral contraceptive use by a partner, and former cocaine use. The two variables that measured an individual's perceived health risk from engaging in behaviors were concern over getting a STD and concern over becoming or getting someone pregnant. Since these variables were previously found to be highly correlated with a gamma >0.6 , one or the other was used in the models.

The substance use continuum variable which looked at progression of drug use behaviors indicated that individuals who use alcohol, cigarettes, marijuana or illicit drugs were more likely to have used condoms compared to the never using group. There was evidence of an interaction between age group and oral contraceptive (OCP) use, with older students more likely to have used OCP and not a condom. Due to the interaction, odds ratios for each age group are presented separately for individuals whose partners were on OCPs or not. In comparison to students less than 14 years of age, the odds of males not using a condom ranged from 5.7 to 9.5 as the students' age increased. Models were built both with and without the age variable and the odds ratios for all variables except oral contraceptive use remained stable, thus age did not have a confounding effect on the model. The results are presented in Table 7.

The individual drug use variables that remained in the model were different for males and females. For males, both alcohol use and cocaine or illicit drug use remained in the models. Male, former cocaine/illicit drug users were most likely not to wear a

condom. Current alcohol users were actually more likely to have worn a condom. Non-use of a condom was negatively associated with concern about getting a STD infection.

Table 7. Multiple logistic model predicting not using a condom in sexually active male students

	Individual Drug Use				Substance Use Continuum				
	p value	OR*	Lower**	Upper**	p-value	OR*	Lower**	Upper**	
Non-white	0.08	0.79	0.61	1.03	0.02	0.75	0.60	0.95	
Years of sex ⁺	<.001	1.15	1.08	1.23	<.001	1.15	1.09	1.22	
SES	0.90	0.98	0.78	1.24	0.99	1.00	0.82	1.21	
Age and OCP use									
Age <=14	OCP no	0.10	1.00		0.02	1.00			
	OCP yes		5.52	0.72	42.0		5.76	1.36	24.32
Age 15	OCP no	.002	1.00		.001	1.00			
	OCP yes		4.50	2.00	9.90		2.47	1.42	4.29
Age 16	OCP no	<.001	1.00		<.001	1.00			
	OCP yes		4.90	2.60	9.30		4.77	2.80	8.13
Age >=17	OCP no	<.001	1.00		<.001	1.00			
	OCP yes		9.50	6.20	14.50		7.72	5.52	10.79
Alcohol/drugs before sex		0.08	0.78	0.58	1.03				
STD concern		<.001	0.67	0.52	0.86	<.001	0.67	0.54	0.84
Ever abused		0.11	1.21	0.96	1.52				
Alcohol use									
	former	0.62	0.90	0.61	1.34				
	current	0.01	0.62	0.43	0.90				
Cocaine/illicit drug use									
	former	0.01	1.64	1.15	2.34				
	current	0.99	1.00	0.63	1.57				
Substance use									
	Alcohol & cigarettes					0.02	0.63	0.42	0.94
	Marijuana					<.001	0.56	0.38	0.82
	Other illicit drugs					0.02	0.62	0.42	0.91

*adjusted odds ratio

** lower and upper 95% confidence intervals of adjusted odds ratio

+ forced into model

Odds ratios for non-use of a condom among females are presented in Table 8.

Positive associations were observed among males and females for condom non-use and years of sexual activity and OCP use. However, among females not using a condom was

positively associated with low SES, involvement in a prior pregnancy, and current cocaine/illicit drug use. This association between cocaine/other illicit drugs was not observed in the substance use continuum model. For females, non-use of condoms was negatively associated with concern over becoming pregnant. Older females were more likely not to use a condom than younger females. The Hosmer and Lemeshow GOF test statistic indicated that there was a good model fit and the plot of leverage values against record number identified three outliers; however, the coefficient did not change when those cases were excluded. The plot of predicted probability against the change in deviance indicated that the model fit the data well.

Table 8. Multiple logistic regression model predicting not using a condom among sexually active females

	Individual Drug Use				Substance Use Continuum			
	p-value	OR*	Lower**	Upper**	p-value	OR *	Lower**	Upper**
Non-white	0.29	1.13	0.90	1.43	0.27	1.13	0.91	1.40
Years sex	<.001	1.22	1.13	1.31	<.001	1.21	1.13	1.29
SES	0.07	1.20	0.99	1.47	0.04	1.20	1.01	1.43
Age group	0.03				0.02			
15 years	0.92	0.98	0.64	1.49	0.67	1.08	0.74	1.58
16 years	0.19	1.32	0.87	2.01	0.18	1.29	0.89	1.87
>= 17 years	0.11	1.38	0.93	2.07	0.03	1.50	1.05	2.15
Previous pregnancy	0.02	1.42	1.06	1.90	<.001	1.69	1.31	2.19
Pregnancy concern	<.001	0.55	0.42	0.71				
Cocaine/illicit drug								
former	0.48	0.89	0.66	1.22				
current	0.04	1.49	1.02	2.18				
Substance use								
Alcohol & cigarettes					0.21	0.79	0.54	1.15
Marijuana					0.08	0.71	0.49	1.04
Illicit drugs					0.48	0.87	0.60	1.28

*adjusted odds ratio

** lower and upper 95% confidence intervals of adjusted odds ratio

STD infection:

STD infection among males was associated with being non-white, prior abuse, number of years of sexual activity, and multiple lifetime sex partners. Adjusted odds ratios are presented in Table 9. The individual drug use model showed a positive association between STD infection and current cigarette or marijuana use. Alcohol use was negatively associated with STD infection. The substance use continuum variable had to be forced into the model and no pattern was observed across the continuum.

Table 9. Multiple logistic regression model predicting sexually transmitted disease infection among sexually active males

	Individual Drug Use				Substance Use Continuum			
	p-value	OR*	Lower**	Upper**	p-value	OR*	Lower**	Upper**
Non-white	<.001	2.35	1.53	3.61	0.01	1.62	1.13	2.32
Years of sex	<.001	1.21	1.08	1.36	0.09	1.09	0.99	1.21
SES	0.25	1.30	0.83	2.04	0.15	1.30	0.91	1.86
Alcohol/drugs before sex	0.15	1.44	0.88	2.37	0.06	1.44	0.99	2.08
Multiple partners					0.02	1.56	1.07	2.28
Ever abused					0.01	1.59	1.14	2.22
Condom non-use					0.02	0.64	0.44	0.92
Cigarettes								
former	0.63	1.17	0.62	2.18				
current	0.01	2.38	1.34	4.20				
Alcohol								
former	<.001	0.34	0.16	0.72				
current	<.001	0.35	0.17	0.71				
Marijuana								
former	0.03	0.66	0.32	1.36				
current	0.01	2.56	1.42	4.61				
Cocaine/illicit drugs								
former	0.01	0.38	0.18	0.79				
current	0.30	0.69	0.34	1.40				
Substance use								
Alcohol/drugs					0.11	0.55	0.26	1.16
Marijuana					0.72	0.88	0.44	1.75
Other illicit drugs					0.36	0.72	0.35	1.46

*adjusted odds ratio

** lower and upper 95% confidence intervals of adjusted odds ratio

In the substance use continuum model, multiple lifetime sex partners had a confounding effect on years of sex with a 12% change in the odds ratio for years of sexual activity when multiple lifetime sex partners was added to the model. An interaction term was explored, but no significant interaction was found and the odds ratios for STD infection with and without multiple lifetime sex partners at different years of sexual activity were constant. Plots of the leverage values versus case number indicated that there were a few outliers, however, removing those cases did not change the significant predictor variables in the model. The plot of change in deviance versus predicted probability did not have a cup shaped pattern, indicating there were some problems with model fit. However, the Hosmer and Lemeshow GOF test did not reject the assumption that the model fit.

Among females, STD infection was positively associated with number of years of sexual activity, OCP use, prior pregnancy, prior abuse, concern about STD infection, multiple lifetime sex partners, and marijuana use. The substance use continuum variable was not significantly associated with STD infection, but the odds ratios increased across the continuum. These findings are summarized in Table 10.

Table 10. Adjusted odds ratios from multiple logistic regression model predicting STD infection among sexually active females

	Individual Drug Use				Substance Use Continuum			
	p-value	OR*	Lower**	Upper**	p-value	OR*	Lower**	Upper**
Non-white	0.70	1.08	0.74	1.57	0.23	1.20	0.89	1.63
Years of sex	0.01	1.25	1.07	1.48	0.01	1.21	1.06	1.39
SES	0.65	0.93	0.67	1.28	0.45	0.91	0.70	1.17
STD concern	0.01	1.85	1.13	3.04	0.50	1.07	0.88	1.29
Previous pregnancy	<.001	1.79	1.20	2.68				
Ever abused	<.001	1.87	1.34	2.63	<.001	1.69	1.29	2.22
Oral contraceptive use	<.001	2.14	1.51	3.03	<.001	1.80	1.37	2.38
Multiple partners	<.001	2.99	1.68	5.31	<.001	2.17	1.38	3.40
Cigarettes								
former	0.05	0.64	0.41	1.01				
current	0.13	0.71	0.45	1.11				
Alcohol								
former	0.05	1.93	1.00	3.73				
current	0.84	1.04	0.71	1.53				
Marijuana								
former	<.001	2.11	1.37	3.25				
current	<.001	2.12	1.31	3.43				
Cocaine/illicit drugs								
former	0.91	1.03	0.64	1.64				
current	0.04	1.78	1.03	3.08				
Substance use								
Alcohol & cigarettes					0.12	0.61	0.33	1.13
Marijuana					0.89	0.96	0.53	1.75
Other illicit					0.85	1.06	0.58	1.94

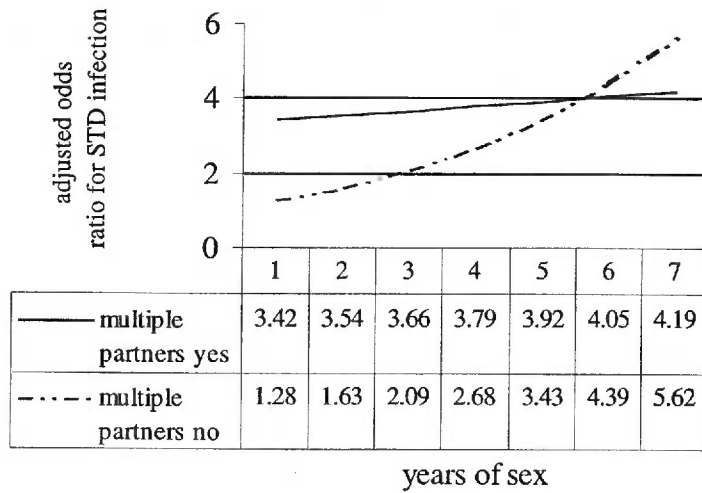
*adjusted odds ratio

** lower and upper 95% confidence intervals of adjusted odds ratio

***see interaction Odds ratios in Table 11

Models were built both with and without age in the model and the odds ratios were similar. In assessing model fit, the Hosmer and Lemeshow GOF test statistic was significant indicating that the model did not fit the data well. An interaction between multiple lifetime sex partners and years of sex was analyzed and it was found that as years of sex increased, the odds of infection for both those with and without multiple lifetime sex partners converged. (Figure 4.)

Figure 4. Interaction between years of sex and multiple lifetime sex partners among sexually active females



With increasing years of sexual activity, the effect of multiple partners on the association between years of sex and STD infection decreases. This is represented by the crossing of the plots of the adjusted odds ratios for STD infection as the number of years of sexual activity increase.

Multiple lifetime sexual partners:

Among males, multiple lifetime sex partners was positively associated with being non-white, low SES, number of years of sexual activity, alcohol or drug use before having sex, involvement in a prior pregnancy, concern about getting an STD infection, marijuana use, and cocaine/illicit drug use. Increased odds ratios were observed across the substance use continuum. The GOF test indicated that the models did not fit the data overall, however, no outliers were identified with plotting. Adjusted odds ratios are presented in Table 11.

Table 11. Multiple logistic regression model predicting multiple lifetime sex partners among sexually active male students

	Individual Drug Use				Substance Use Continuum			
	p-value	OR*	Lower**	Upper**	p-value	OR*	Lower**	Upper**
Non-white	<.001	1.50	1.17	1.93	<.001	1.46	1.16	1.83
Years of sex	<.001	1.81	1.68	1.94	<.001	1.89	1.77	2.02
SES	0.03	1.29	1.02	1.63	<.001	1.37	1.12	1.67
Alcohol/drugs before sex	<.001	2.31	1.76	3.01	0.01	2.35	1.88	2.92
Previous pregnancy	<.001	2.79	1.80	4.33	<.001	2.98	2.04	4.37
STD concern	0.01	1.41	1.08	1.84	<.001	1.61	1.27	2.04
Marijuana								
former	0.05	1.32	1.00	1.75				
current	<.001	1.61	1.22	2.13				
Cocaine/illicit drugs								
former	<.001	1.97	1.37	2.84				
current	<.001	2.05	1.27	3.32				
Age group								
15 years					0.12	0.70	0.44	1.09
16 years					0.01	0.55	0.35	0.86
>=17 years					0.01	0.55	0.36	0.85
Substance use								
alcohol/drugs					0.68	1.10	0.69	1.76
marijuana					0.05	1.57	1.00	2.47
Cocaine/illicit drugs					0.01	1.93	1.22	3.07

*adjusted odds ratio

** lower and upper 95% confidence intervals of adjusted odds ratio

Among females, race was not positively associated with having multiple lifetime sex partners, however, low SES was associated with increased odds of multiple lifetime sex partners in the substance use continuum model. Positive associations were observed between multiple lifetime sex partners and prior abuse, OCP use, prior pregnancy, concern about STD infection, alcohol or drug use before sex, and all substance use variables except alcohol. The results of regression models for females are presented in Table 12.

Table 12. Multiple logistic regression model predicting multiple lifetime partners among sexually active females

	Individual Drug Use				Substance Use Continuum			
	p-value	OR*	Lower**	Upper**	p-value	OR*	Lower**	Upper**
Non-white	0.75	0.95	0.69	1.31	0.91	1.01	0.79	1.30
Years of sex	<.001	1.79	1.62	1.99	<.001	1.87	1.72	2.02
SES	0.31	1.15	0.88	1.48	0.03	1.26	1.03	1.54
Ever abused	<.001	1.59	1.23	2.04	<.001	1.69	1.39	2.05
Oral contraceptive	<.001	2.37	1.74	3.24	<.001	1.62	1.28	2.06
Previous pregnancy	<.001	2.52	1.72	3.70	<.001	2.00	1.50	2.67
STD concern	0.01	1.61	1.13	2.29	0.01	1.45	1.10	1.91
Alcohol/drugs before sex	0.01	1.51	1.11	2.06	<.001	1.70	1.35	2.13
Cigarettes								
former	0.28	1.21	0.86	1.71				
current	0.01	1.62	1.13	2.33				
Marijuana								
former	<.001	2.00	1.45	2.77				
current	<.001	3.03	2.11	4.35				
Cocaine/illicit drugs								
former	<.001	2.02	1.35	3.02				
current	0.27	1.34	0.79	2.28				
Substance use								
Alcohol & cigarettes					0.03	1.89	1.07	3.33
Marijuana					<.001	4.39	2.51	7.68
Cocaine/illicit drugs					<.001	6.03	3.43	10.59

*adjusted odds ratio

** lower and upper 95% confidence intervals of adjusted odds ratio

Discussion:

Sexual risk taking behaviors in adolescents have been gaining more attention due to the economic impact of teen pregnancy and the high incidence of STDs in this population. Many studies that have addressed teen sexual behaviors focused on high risk youth in non-traditional settings (Yarber,1992; Orr,1993). The aim of this study was to elucidate the factors associated with three sex risk behaviors in a population of Oregon high school students. Multiple logistic regression analysis was used to examine the importance and interactions of multiple factors in a particular sex risk behavior. To show a more complete picture of adolescent sexual behavior three outcomes were analyzed: not using a condom, STD infection, and having had multiple sex partners,

Years of sexual activity was forced into all models as a control for the number of years that an individual had to develop multiple lifetime sex partners or an STD infection. In all models it was positively associated with the sex risk outcome. This finding has been supported by others (Shrier,1996). Although racial differences in sexual behavior have been reported (Springarn,1996; Orr,1993; Coker,1994), race was only significant in the male regression models. Males who were non-White were more likely to have reported a STD infection and have multiple lifetime sex partners; however, they were also more likely to wear condoms. Other studies have shown that non-Whites have a higher prevalence of multiple lifetime sex partners (MMWR,1998), and are more likely to use condoms (Richter,1993; MMWR,1998; Lowry,1996; Coker,1994). Socioeconomic status(SES) is another variable that has been looked at extensively in the literature (Lowry,1996; STD surveillance,1997), and it was a risk factor for all three outcomes for

females, and for having multiple lifetime sex partners among males.

Due to the HIV epidemic, the prevalence of condom use (“safe sex”) is increasing, but less than 50% of the sexually active students surveyed use them. In this study, the use of oral contraceptive (OCP) had the strongest association with condom non-use for both genders. In these data, White students and females were less likely to use condoms. This is supported by others. (Richter,1993; MMWR,1998; Shrier,1996) Among males, a significant interaction was found between oral contraceptive use by their female partner and age. The odds associated with not using a condom increased with age for those whose partners were on OCPs. The increased use of OCP and decreased use of condoms with age has been found by others (MMWR, 1994). This finding could be due to the increase in OCP use to protect against pregnancy with age or it could be that an individual’s perception of their risk decreases as they mature and begin to engage in sexual activity (Millstein,1986). In this study, the correlation between oral contraceptive use and not wearing a condom was strong ($r \geq 0.6$) and, therefore, it is not surprising that there was a confounding effect on the model when both condom use and OCP use were included since they are correlated with each other.

The fact that adolescents using OCP are less likely to use a condom is a concern due to the high prevalence of STD infection in this population. The data support this finding, and furthermore, use of OCP was found to be associated with multiple lifetime sexual partners and STD infection. In a longitudinal study by Sieving (1997), OCP use was an indicator of increased STD risk behavior, whereas skills in condom use self-efficacy females were found to be negatively associated with STD risk behaviors

(Sieving, 1997). In this study, 18% of sexually active females and 15% of sexually active males reported that either they or their partners used OCP. Males were 5.7 times less likely to wear a condom if their partners were on OCPs. Since OCPs are a prescribed medication, these individuals are in contact with health professionals, allowing an avenue for intervention.

One of the study objectives was to look at the role of perceived risk in protecting an adolescent from engaging in risk behaviors. Two measures of perceived risk were concern over getting a STD and concern over becoming pregnant. This study found that 86% of the females and 77% of males were concerned about pregnancy, however, only 13% of females and 8% of males had been involved in a previous pregnancy. This indicates that teen pregnancy prevention programs may be increasing the awareness of the impact of pregnancy. In this study, concern about STDs and concern about pregnancy were highly correlated, and so either one or the other was entered into the models depending on the crude odds ratio obtained in the univariate analysis. For both genders, concern about STDs increased the likelihood of using a condom. Among females STD concern was a risk factor for STD infection and for both genders it was a risk factor for multiple lifetime sex partners. Since the data are cross-sectional one cannot determine if concern over STD infection is due to a prior infection or if one has multiple sex partners it generates concern about STD infection. It might be that adolescents who perceive themselves at risk take precautions in the form of using a condom, but at the same time have multiple lifetime sex partners and have reported a STD infection. From the data it appears that the condom use "safe sex" message is getting across, but adolescents still put

themselves at risk. Once again, since these data are cross-sectional and it is unclear whether having an infection increased concern and therefore condom use or if the concern about STD infection is the impetus for condom use. Concern about STD infection was greatest in younger students and this concern decreased among older students. This was also observed in by Irwin and Millstein (1986) in their work on perceived risk in adolescence.

Physical and sexual abuse in these adolescents was found to be a positively associated with STD infection (OR=1.65) and multiple lifetime sex partners (OR=2.17) among females. The odds of both outcomes increased 50% for sexually active students who reported a history of abuse. In previous studies, individuals who report a history of abuse have been excluded from analyses because they are somehow different from their peers in their sexual development and behaviors (Resnick, 1994). Among males in this sample, the prevalence of abuse was 44% and it was positively associated with STD infection (OR=1.59). The high prevalence of abuse in this population argues that it is a problem for teens and should be included in analysis as it is associated with their sexual risk behaviors. In addition, more precise measures of abuse should be developed to more adequately measure the role that it plays in sexual risk-taking behavior. Due to the cross-sectional nature of these data it is impossible to determine if engaging in sex risk behaviors leads to reporting abuse or if individuals who are abused have a different perception of risk. Melzer-Lange found that both males and females reported the influence of alcohol and drugs in their unwanted sexual experiences, and the students who reported sexual abuse were more likely to report current risk taking behavior and

health problems than students who did not have a history of abuse (Melzer-Lange, 1998).

Other studies using the YRBS have found a high prevalence of abuse in sexually active adolescents and this needs further exploration. (Burm, 1999) Leaving these individuals out of studies of sexual activity, especially when it affects the majority of sexually active adolescents, should be questioned. The fact that abuse questions were not added to the national YRBS until 1999 and the survey does not actually use the word abuse speaks to the societal taboo associated with abuse. Documenting that abuse is a factor in other risky behaviors is the first step in bringing attention to this issue.

The exploration of substance use in relationship to sexual risk behaviors indicated that there is much work to be done in this area. In this study, the prevalence of substance use was high with nearly a quarter of the students having used alcohol or other drugs the last time that they had sex. This observation is supported by others (Melzer-Lange, 1998). Looking at the frequency distribution of the substance use continuum variable, only 6% of females and 7% of males had never used any substance, and approximately one third of the sample had used illicit drugs. Males who currently were using alcohol or who used alcohol or drugs before sex were more likely to wear a condom. This was supported by all models of male sexual behavior, and the only variable positively associated with condom non-use among males was former cocaine/illicit drug use. Among females the findings were mixed. The only variable that was positively associated with non-use of condoms by their partner was current cocaine use. Other studies of substance use indicate that recent marijuana use and former cocaine use were associated with not using a condom (Shrier, 1996).

There were stronger associations between substance use and STD infection. Among males, current cigarette (OR=2.4) and marijuana use (OR=2.6) were positively associated with STD infection. Among females, marijuana use (OR=2.1) was positively associated with STD infection, and an increasing odds ratio was observed across the continuum of drug use variable with increased risk as heavier drug use occurred.

Multiple lifetime sex partners was most strongly associated with substance use. For both genders, the use of either marijuana or cocaine/illicit drugs was associated with an increased risk for multiple lifetime sex partners. The largest risk was associated with cocaine/illicit drugs, but all of the substance use variables were positively associated with multiple lifetime sex partners. Yarber (1992) reported that 41% of the individuals who used cocaine had a STD and all had an increased number of sex partners. Other studies have found recent and lifetime substance use associated with number of sex partners (Shrier, 1996).

These findings support the association with substance use and risky sexual behavior in adolescents, but also points out that there are other factors playing a role that might be more significant. For example, female models of condom use, STD infection and multiple lifetime sex partners all point to being involved in a previous pregnancy as a risk factor. However, these factors could have played a role in why they had a prior pregnancy. Other studies have pointed to being involved in a previous pregnancy as risk factors for substance use, multiple lifetime sex partners, STD infection and non-use of a condom (STDs,1994; Springarm,1996). The fact that both oral contraceptive use and previous pregnancy remained in all female models could indicate that pregnancy

prevention programs that put females on the pill are doing them an injustice. These results are consistent with the possibility that females on OCPs continue to behave in ways that put them at risk for STD infection and have a lower perceived susceptibility.

From this study, the chronological role of the factors involved in risky sexual behaviors can not be determined. Do adolescents gravitate towards substance use to escape the fact that they are being abused? Are females of lower socioeconomic status more likely to become pregnant, start using oral contraceptives, and increase their risk for STD infection because neither they nor their partners are concerned about getting an infection? There is still much to be learned in the area of sexual behaviors in teens and it is clear that intervention programs cannot approach these issues from a single angle, the problem of the week approach just won't work.

Limitations

The data were gathered from high school volunteers and might not be representative of the national adolescent population. Additionally, Oregon is over-represented by non-Latino Whites and therefore the conclusions would not be generalizable to all populations. The STD prevalence in the study population is 18% which is less than the 25% reported by the CDC. It is difficult to predict the influence of this under-representation but could be influenced by the ethnic differences between the Oregon population and the national high school population.

An additional limitation to this study is the lack of information on the effects of individual experiences and upbringing. There is only one question concerning parental interaction and it concerns HIV, a widely publicized topic. In addition, it would be advantageous to ask additional questions on alcohol use and sexual practices, especially in regards to condom use. These limitations are the result of using secondary data.

Conclusions:

Despite some limitations, these data suggest some avenues for intervention in the adolescent population. Jessor's problem behavior theory indicates that low self-esteem is the route of many adolescent risk behaviors, one could surmise that a history of abuse is also associated with low self-esteem and was a factor in many of the sexual risk models. The role that abuse plays in adolescent risk behavior needs to be studied further and abused individuals should not be excluded from analysis of sexual risk behaviors. Furthermore, more detailed abuse questions should be included in the national YRBS.

The use of modeling indicated an association among substance use and sex risk behaviors controlling for other factors. Research indicates that these behaviors serve social and developmental roles for teens. To alleviate them, there must be alternatives. These behaviors are used to deal with anxiety, frustration and failure. Society needs to move away from the "problem of the week" approach and engage multiple risk domains and their interaction. The "just say no" phenomena with which society confronts these issues with just won't work. Research needs to focus on uncovering the thinking of adolescents, why they make the choices they do even when they are educated on the risk involved. The programs that deal only with one aspect such as teen pregnancy or drinking and driving are unlikely to be successful or have lasting effects if not taken in the social/developmental context of the individual. Programs aimed at decreasing risk need to promote protection at the same time.

For example, oral contraceptive use and involvement in a prior pregnancy was shown to be positively associated with all models of female sexual risk behavior. Since

oral contraceptives require a prescription there is contact between these females and health professionals. A previous pregnancy would also involve contact with the medical community. These are routes for intervention in an otherwise hard to reach population. Using the health visit to educate about the risks of multiple lifetime sex partners, not using a condom, to discuss the individuals concerns, and to connect them with support networks is an easy step for health professionals to take. Oral contraception removes the fear of pregnancy, lowering an adolescent's perceived susceptibility, however, it does not protect against STD infection. Females need condom negotiation skills, not just education about "safe sex". Sex education curriculums need to take this into account. In this study there was not a profound gender difference.

Teens need alternatives to their risky behavior and society needs to understand that sexual activity in teens can't be ignored. Much research implies that sex during adolescence is "risky" behavior that is unacceptable, however, many developed countries of the world view adolescent sexual activity as normal and acceptable. If the wealth of a nation is measured by the health of its children America is impoverished.

This study adds to a body of knowledge that adolescents are engaging in behaviors that put them at risk for chronic infections and lifelong medical conditions. Primary prevention is the only method of control and requires an acceptance of sexual activity as a natural life process that requires a knowledge and understanding of the risks. Adolescents should not be suffering in silence because politics and stigmas prevent people from talking about sex.

References

1. Brener, ND, Collins, JL, Warren, CW, Williams, BI (1995) Reliability of the Youth Risk Behavior Survey Questionnaire, *Am J of Epidemiol*, 141(6), 575-580.
2. Brener, ND, Collins, JL, (1998) Co-occurrence of Health-Risk Behaviors Among Adolescents in the United States, *J Adolesc Health*, 22, 209-213.
3. Burge, V, Felts, M., Chenier, T, Parrillo, AV, (1995) Drug use, sexual activity, and suicidal behavior in U.S. high school students, *J Sch Health*, 65(6), 222-227.
4. Burm, M., Youth Risk Behavior Survey of Homeless Adolescents at Two Drop-In Centers in Portland, Oregon, June 1999.
5. Centers for Disease Control and Prevention, (1993) 1993 Sexually transmitted diseases treatment guidelines. *MMWR*, 42 (NoRR-14).
6. Coker, AL, Richter, DL, Valois, RF, McKeown, RE, Garrison, CZ, Vincent, ML. (1994) Correlates and Consequences of Early Initiation of Sexual Intercourse. *J Sch Health*, 64(9), 372-377.
7. Division of STD Prevention. Sexually Transmitted Disease Surveillance, 1996. (1997) U.S. Dept of Health and Human Services, Public Health Service. Atlanta: Centers for Disease Control and Prevention, September 1997.
8. Fullilove, RE, Fullilove, MT, Bowser, DP, Griss, SA, (1990), Risk of sexually transmitted disease among black adolescent crack users in Oakland and San Francisco, Calif. *JAMA*, 263(6):851-5.
9. Gaiter JL, Berman, SM, (1994) Risky sexual behavior imperials teens. *The Brown University Child and Adolescent Health Behavior Letter*, 10:1-3.
10. Garrison, J, Smith, MD, (1994) Sexuality and American Social Policy. A seminar series, Sex education in schools, Menlo Park, CA. Henry Kaiser Family Foundation, 1-41.
11. Gast, J, Caravella, T, Sarvels, PD, McDermitt, RJ, (1995) Validation of the CDC's YRBS alcohol questions, *Health Values*, 18(2):38-43.
12. Health Risk Behaviors among persons aged 12-21 years - United States 1992, (1994) *MMWR*, 43(13) 231-5.

13. Healthy People 2000, Benchmarks for the nation, 1990.
14. Hitchcock, PJ, (1996) Adolescents and sexually transmitted diseases. *AIDS Patient Care and STDS*, 10:79-84.
15. Hosmer, DW, Lemeshow, (1989) Applied Logistic Regression, New York, NY: John Wiley & Sons, p 86.
16. Institute of Medicine. The Hidden Epidemic. Washington, D.C.: National Academy Press, 1997.
17. Irwin, CE, Millstein, SG, (1986) Biopsychosocial correlates of risk-taking behaviors during adolescence: can the physician intervene?, *J Adolesc Health Care*, supp7: 82-96.
17. Jessor, Richard, (1991) Risk behavior in adolescence: A psychosocial framework for understanding and action, *J Adolesc Health*, 12:597-605.
18. Kandel, DB, Yamaguchi, K, Chen, K, (1992), Stages of progression in drug involvement from adolescence to adulthood: further evidence for the gateway theory, *J Stud Alcohol*, 53(5):447-57.
19. Kann, L, Kinchen, SA, Williams, BI, Ross, JG, Lowry, R, Hill, CV, Grunbaum, J, Blumson, PS, Collins, JL, Kolbe, LJ, (1998) Youth Risk Behavior Surveillance--United States, 1997, *MMWR*, 47(SS-3):1-89.
20. Kann, L, Warren, CW, Harris, WA, Collins, JL, Williams, BI., Ross, JG, Kolbe, L.J., (1996), Youth Risk Behavior Surveillance-United States, 1995, *J of School Hlth*, 66(10):365-377.
21. Kirby, D, Brener, ND, Brown, NL, Peterfreund, N, Hillard, P, Harrist, R, (1999) The Impact of Condom Distribution in Seattle Schools on Sexual Behavior and Condom Use. *Am J Public Health*, 89(2):182-187.
22. Kirby, D, Waszak, C, Zeigler, J, (1991) Six school based clinics: Their reproductive health services and impact on sexual behavior. *Fam Plann Perspect*, 23:6-16.
23. Leavy, SM, Smith, ML, Allensworth, DD, Farquhar, BD, Kann, L, Pateman, BC, (1995) School Health Services. *J of Sch Hlth*, 65:316-26.
24. Lowry, R, Holtzman, D, Truman, BI, Kann, L, Collins, JL, Kolbe, LJ, (1994) Substance Use and HIV-Related Sexual Behaviors among US High School Students: Are They Related?, *Am J of Public Health*, 84(7):1116-1120.

24. Lowry, R, Kann, L, Collins, JL, Kolbe, LJ, (1996) The effect of socioeconomic status on chronic disease risk behaviors among US adolescents, *JAMA*, 276(10):792-797.
25. MacPherson, , P, (1996) In the dark about safe sex, *Hosp Health Netw*, 70:42-3.
26. Melzer-Lange, MD, (1998) Violence and associated high-risk health behavior in adolescents: substance abuse, sexually transmitted diseases, and pregnancy of adolescents, *Pediatr Clin North Am*, 45(2):307-317.
27. Oregon 1995 YRBS summary, (1996) Vital Statistics, Oregon Health Division, 1996.
28. Orr, DP, Langefeld, CD, (1993) Factors associated with condom use by sexually active male adolescents at risk for sexually transmitted disease, *Pediatrics*, 91:873-7.
29. Personal communication Multnomah County Health Department.
30. Resnick, MD, Blum, RW, (1994) The association of consensual sexual intercourse during childhood with adolescents health risk and behaviors, *Pediatrics*, 94(6):907-913.
31. Richter, DL, Vloais, RF, McKeown, RE, Vincent, ML, (1993) Correlates of condom use and number of sexual partners among high school students, *J Sch Health*, 63(2):91-96.
32. Sexually Transmitted Diseases, (1994), Committee on Adolescence, *Pediatrics*, 94:568-72.
33. Shafer, MA, Hilton, JF, Ekstrand, M, (1993), Relationship between drug use and sexual behaviors and the occurrence of sexually transmitted diseases among high-risk male youth, *Sex Transm Dis*, 20:307-313.
34. Shrier, LA , Emans, SJ , Woods, ER , DuRant, RH, (1996) The Association of Sexual Risk Behaviors and Problem Drug Behaviors in High School Students, *J Adolesc Health*, 20:377-383.
35. Sieving, R, Resnick, MD, Bearinger, L, Remafedi, G, Taylor, BA, (1997) Cognitive and behavioral predictors of sexually transmitted disease behavior among sexually active adolescents, *Arch Pediatr Adolesc Med*, 151:243-251.
36. Springarn, RW, DuRant, RH, (1996), Male adolescents involved in pregnancy: Associated health risk and problem behaviors, *Pediatrics*, 98:262-68.

37. SPSS Inc. SPSS software, Release No 8.0, (1998), Chicago, IL.
38. SPSS Regression Models 9.0, 1999, Chicago, IL: SPSS Inc.
39. Trends in Sexual Risk Behaviors Among High School Students - United States, 1991-1997, (1998) *MMWR*, 47(36):749-752.
40. Van Muyden, RC, ter Harmsel, BW, Smedts, FM, Hermans, J, Kuijpers, JC, Raikhlin, NT, Petrov, S, Lebedev, A, Ramaekers, FC, Trimbos, JB, Kleter, B, Quint, WG, (1999) Detection and typing of human papillomavirus in cervical carcinomas in Russian woman: a prognostic study, *Cancer*, 85(9): 2011-16.
41. Warren, CW, Santelli, JS, Everett, SA, Kann, L, Collins, JL, Cassell, C, Morris, L, Kolbe, LJ, (1998) Sexual behavior among U.S. high school students, 1990-1995, *Fam Plann Perspect*, 30(4): 170-2, 200.
42. Yarber, WL, Parrillo, AV (1992), Adolescents and Sexually transmitted Diseases, *J Sch Health*, 62:331-38.
43. Youth Risk Behavior Survey, U.S., 1993, (1995), *MMWR*, 44:SS1.

APPENDIX A

1. How old are you?

- a. 12 years old or younger
- b. 13 years old
- c. 14 years old
- d. 15 years old
- e. 16 years old
- f. 17 years old
- g. 18 years old or older

2. What is your sex?

- a. Female
- b. Male

3. In what grade are you?

- a. 9th grade
- b. 10th grade
- c. 11th grade
- d. 12th grade
- e. Ungraded or other

4. How do you describe yourself?

- a. White - not Hispanic
- b. Black - not Hispanic
- c. Hispanic or Latino
- d. Asian or Pacific Islander
- e. American Indian or Alaskan Native
- f. Other

25. Have you ever been physically abused (hit, kicked or struck by someone when you were not involved in a fight)?

- a. Yes
- b. No
- c. Don't know

28. Have you ever been sexually abused (For example: touched sexually when you did not want to be, or forced to have sexual intercourse when you did not want to)?

- a. Yes
- b. No
- c. Don't know

34. How old were you when you smoked a whole cigarette for the first time?
- a. I have never smoked a whole cigarette
 - b. 8 years old or younger
 - c. 9 or 10 years old
 - d. 11 or 12 years old
 - e. 13 or 14 years old
 - f. 15 or 16 years old
 - g. 17 years old or more
35. During the past 30 days, on how many days did you smoke cigarettes?
- a. 0 days
 - b. 1 or 2 days
 - c. 3 to 5 days
 - d. 6 to 9 days
 - e. 10 to 19 days
 - f. 20 to 29 days
 - g. All 30 days
36. During the past 30 days, on the days you smoked, how many cigarettes did you smoke per day?
- a. I did not smoke cigarettes during the past 30 days
 - b. Less than 1 cigarette per day
 - c. 1 cigarette per day
 - d. 2 to 5 cigarettes per day
 - e. 6 to 10 cigarettes per day
 - f. 11 to 20 cigarettes per day
 - g. More than 20 cigarettes per day
48. How old were you when you had your first drink of alcohol other than a few sips?
- a. I have never had a drink of alcohol other than a few sips
 - b. 8 years old or younger
 - c. 9 or 10 years old
 - d. 11 or 12 years old
 - e. 13 or 14 years old
 - f. 15 or 16 years old
 - g. 17 years old or older
49. During your life, on how many days have you had at least one drink of alcohol?
- a. 0 days
 - b. 1 or 2 days
 - c. 3 to 9 days
 - d. 10 to 19 days
 - e. 20 to 39 days
 - f. 40 to 99 days
 - g. 100 or more days

50. During the past 30 days, on how many days did you have at least one drink of alcohol?

- a. 0 days
- b. 1 or 2 days
- c. 3 to 5 days
- d. 6 to 9 days
- e. 10 to 19 days
- f. 20 to 29 days
- g. All 30 days

53. How old were you when you tried marijuana for the first time?

- a. I have never tried marijuana
- b. 8 years old or younger
- c. 9 or 10 years old
- d. 11 or 12 years old
- e. 13 or 14 years old
- f. 15 or 16 years old
- g. 17 years old or older

54. During your life, how many times have you used marijuana?

- a. 0 times
- b. 1 or 2 times
- c. 3 to 9 times
- d. 10 to 19 times
- e. 20 to 39 times
- f. 40 to 99 times
- g. 100 or more times

55. During the past 30 days, how many times did you use marijuana?

- a. 0 times
- b. 1 or 2 times
- c. 3 to 9 times
- d. 10 to 19 times
- e. 20 to 39 times
- f. 40 or more times

57. How old were you when you tried any form of cocaine, including powder, crack, or freebase, for the first time?

- a. I have never tried cocaine
- b. 8 years old or younger
- c. 9 or 10 years old
- d. 11 or 12 years old
- e. 13 or 14 years old
- f. 15 or 16 years old
- g. 17 years old or older

58. During your life, how many times have you used any form of cocaine, including powder, crack, or freebase?
- a. 0 times
 - b. 1 or 2 times
 - c. 3 to 9 times
 - d. 10 to 19 times
 - e. 20 to 39 times
 - f. 40 or more times
59. During the past 30 days, how many times have you used any form of cocaine, including powder, crack, or freebase?
- a. 0 times
 - b. 1 or 2 times
 - c. 3 to 9 times
 - d. 10 to 19 times
 - e. 20 to 39 times
 - f. 40 or more times
63. During your life, how many times have you used any other type of illegal drug, such as LSD, PCP, ecstasy, mushrooms, speed, ice, or heroin?
- a. 0 times
 - b. 1 or 2 times
 - c. 3 to 9 times
 - d. 10 to 19 times
 - e. 20 to 39 times
 - f. 40 or more times
64. During your life, how many times have you used a needle to inject any illegal drug into your body?
- a. 0 times
 - b. 1 or 2 times
 - c. 3 to 9 times
 - d. 10 to 19 times
 - e. 20 to 39 times
 - f. 40 or more times
67. How concerned are you personally about getting a sexually transmitted disease other than AIDS?
- a. Not concerned
 - b. Somewhat concerned
 - c. Very concerned
 - d. Extremely concerned
 - e. Don't know how I feel

70. Have you ever had sexual intercourse?

- a. Yes
- b. No

71. How old were you when you had sexual intercourse for the first time?

- a. I have never had sexual intercourse
- b. 11 years old or younger
- c. 12 years old
- d. 13 years old
- e. 14 years old
- f. 15 years old
- g. 16 years old
- h. 17 years old or older

72. During your life, with how many people have you had sexual intercourse?

- a. I have never had sexual intercourse
- b. 1 person
- c. 2 people
- d. 3 people
- e. 4 people
- f. 5 people
- g. 6 or more people

73. During the past 3 months, with how many people did you have sexual intercourse?

- a. I have never had sexual intercourse
- b. I have had sexual intercourse, but not during the past 3 months
- c. 1 person
- d. 2 people
- e. 3 people
- f. 4 people
- g. 5 people
- h. 6 or more people

74. Did you drink alcohol or use other drugs before you had sexual intercourse the last time?

- a. I have never had sexual intercourse
- b. Yes
- c. No

75. The last time you had sexual intercourse, did you or your partner use a condom?

- a. I have never had sexual intercourse
- b. Yes
- c. No

76. **The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?**

- a. I have never had sexual intercourse
- b. No method was used to prevent pregnancy
- c. Birth control pills
- d. Birth control shot (Depo Provera)
- e. Condoms
- f. Withdrawal
- g. Some other method
- h. Not sure

77. **How many times have you been pregnant or gotten someone pregnant?**

- a. 0 times
- b. 1 time
- c. 2 or more times
- d. Not sure

78. **How concerned are you personally about being pregnant or making someone else pregnant?**

- a. Not concerned
- b. Somewhat concerned
- c. Very concerned
- d. Extremely concerned
- e. Don't know how I feel

During the past 12 months, did you have any of the following health care needs? If so, where did you go for each of the following reasons (You may have gone to more than one place for each reason. On your answer sheet, mark all that apply)

Questions:

- 99. Check-up or sports physical
- 100. Injury or accident
- 101. Illness
- 102. Birth control/condoms
- 103. Sexually Transmitted disease
- 104. Pregnancy test
- 105. Female Exam
- 106. Alcohol or other drug problem
- 107. Immunization
- 108. Personal or emotional problem

Answers:

- a. Didn't need care
- b. Needed care, but didn't see anyone
- c. School based health center
- d. Family doctor or community clinic
- e. Emergency room