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This explorative study of YRBS 2003 data provides the prevalence of HIV-related risky sexual behaviors and predictors of such behaviors across gender, race/ethnicity, and metro status (N=15, 214) during 2003. Overall, more urban male adolescents engaged in health-compromising behaviors. A significant association was found between gender, race/ethnicity, and metro status and sexual behaviors and associated risk behaviors such as alcohol, drug use, and mental health indicators. These associated risk behaviors were not only associated among themselves and with sexual behaviors variables but also turned out to be responsible predictor variables for HIV related sexual risk behaviors. Minority groups especially black adolescents were at higher risk of contracting HIV infection as having multiple sexual partners was highest (8 fold) among black adolescents compared to mixed & other race, and Hispanic adolescents. Suburban adolescents were nearly two times more likely than rural and urban adolescents to having multiple partners. Results indicated that younger the age more the involvement in sexual and other risky behaviors.

HIV RELATED RISK BEHAVIORS: A COMPARATIVE STUDY OF URBAN, SUBURBAN, AND RURAL U.S. ADOLESCENTS

Godavari D. Patil, Ph.D.

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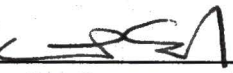

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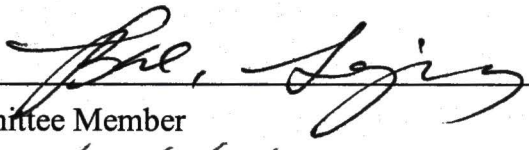

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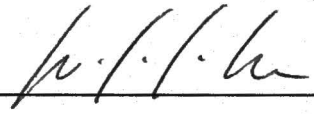

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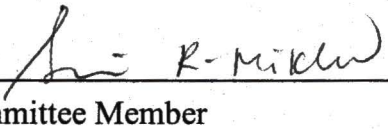

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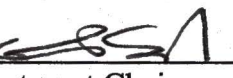

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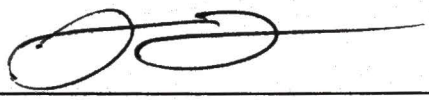

Dean, School of Public Health

HIV RELATED RISK BEHAVIORS: A COMPARATIVE STUDY OF URBAN, SUBURBAN, AND RURAL U.S. ADOLESCENTS

THESIS

Presented to the School of Public Health

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Dedicated to

My late father and sister:

Sri. Devendrappa M. Patil

And

Kumari. Chinnu D. Patil

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CHAPTER I

INTRODUCTION

Background

Health risk behaviors once considered the result of faulty decision-making, impulsive behavior, or characteristic of psychosocial development, were now considered as dynamic conditions evolving across the lifespan (National Institutes of Health [NIH], 2004). Research on the Human Immunodeficiency Virus (HIV) positive population revealed that those young adults who engage in risky sexual behavior begin such behavior in their adolescent years (Petosa & Jackson, 1991). According to Torres and Fernandez (1995), during adolescence, many personal and social behaviors were acquired or strengthened. The attitudes and behaviors adolescents develop during their adolescence may turn into health patterns in their adult lives and be passed on to their next generation. It was for this reason that understanding the teenager's health risk behavior pattern was important.

Adolescence represents a critically vulnerable period in the development of adolescents. Adolescents were known to easily compromise their health by engaging in behaviors that lead to a variety of health problems including sexually transmitted infections (STIs) and HIV. A vast majority of adolescents remain uninformed about sex and not well informed at best about STIs. Although many may have heard of AIDS, they do not know how HIV was spread and do not believe that they themselves were at risk.

The adolescents that do know about HIV often do not protect themselves because they lack the skills, the support or the means to adopt safe sexual behaviors (Centers for Disease Control and Prevention (CDC), 1996; 2001a; United Nations Children's Fund, & World Health Organization, 2002). Recently, researchers discovered the links between HIV infections and the lifestyles unique to the infected individuals. In spite of this recognition, HIV infection had been the major epidemics of the 20th century, and in the ensuing two decades (Kaiser Foundation, 2003; Kotchick, Shaffer, Forehand, & Miller, 2001; Low & Lee, 2002).

Adolescent health-compromising behaviors were prevalent and occurring increasingly early in the life of adolescents. Overall, 7.4% of the adolescents reported having had sex before the age of 13 years. Of these, 10.4% of the male and 4.2% of the female adolescents reported having had sex before the age of 13 (CDC, 2004). Having sex at a younger age was happening particularly among minority groups in the United States. Various risk behaviors often co-occur with sexual behaviors (Forehand, et al., 2005). Rates of HIV/AIDS and other sexually transmitted infections remain consistently high among U.S. adolescents aged 15–24 (CDC, 2002a; 2003a). National data indicated gender and ethnic disparities in prevalence rates of infectious Diseases. According to CDC, nearly 89% of all recent adolescent heterosexually-acquired HIV infections occurred in girls (CDC, 2004c). In sexually transmitted infections, around 40% of the chlamydia cases reported in 2002 were among young women 15 to 19 years of age. Among male and female teens, 15 to 19 years old, chlamydia prevalence was

approximately twelve percent for African Americans, six percent for Mexican Americans, and nearly four percent for Caucasian Americans. These Disproportionate high rates of STIs among adolescent girls were particularly significant since the presence of STIs was known to facilitate HIV transmission (CDC, 2000). Despite the evidence that condom use prevents STI and HIV transmission (Holmes, Levine, & Weaver, 2004; Warner & Hatcher, 1998), adolescents continue to engage in behaviors that increase their risk for infection (Morrison-Beedy, Cwerey, & Aronowitz, 2003).

Life in rural areas has also been linked to sexual risk. DiClemente and colleagues reported that rural adolescents were more likely to be sexually experienced than their urban peers (DiClemente et.al, 2001). Rates of substance use for rural and urban adolescents were gradually becoming similar (Edwards, 1992). National representative sample studies have reported only non-metropolitan-metropolitan comparisons. Nevertheless, studies have shown that while alcohol and drug use were considerably lower in non-metropolitan than metropolitan communities, the gap had been disappearing (Johnston et al., 1992, 1993; Courtless, 1994). The difference between rural and non-rural adolescents may be that rural adolescents may have easy access to alcohol and drugs and perceive less threat of STD/HIV infection.

Research has shown that many health risk behaviors occur in combination with one another, nevertheless it was often difficult to state which behavior comes first (Eisen, Pallitto, Bradner, & Bolshun, 2000). Research has found associations between risk sexual behaviors and alcohol and illicit drug use, including binge drinking and polydrug use, and

depression and suicidality (DiClemente et al., 2001; Leigh & Stall, 1993; McEwan, McCallum, Bhopal, & Madhok, 1992; Parker, Harford, & Rosenstock, 1994; Rector, Johnson, & Noyes, 2003; Stein, Newcomb & Bentler, 1994). Adolescents face many pressures in dealing with health-compromising behaviors.

Adolescents, therefore, constitute an interesting subpopulation for the study of risky sexual behaviors for a number of reasons. First, adolescence was a period of experimentation in which patterns of behavior, both healthy and unhealthy, were initiated. Initially, adolescents begin to experiment with sex, alcohol, and other drugs and, therefore, increase their risk of developing serious health problems (Blum, 1987; Jessor, Turbin, & Costa, 1998). Second, adolescents may be particularly prone to a group of deviant behavior patterns (e.g., smoking, alcohol, and drug use) that may be related to or co-exist with sexual-risk taking (Donovan, Jessor, & Costa, 1991; Morris, Backer, Valentine, & Pennisi, 1998). Third, the school provides a leading opportunity to educational efforts. From HIV risk reduction standpoint, adolescents were important because they were there in the school for their study period to be taught about preventing STI, HIV/AID related risky behaviors by following safe sexual practices.

The present study uses 2003 The National Adolescents Risk Behavior Survey (YRBS) dataset. The National Adolescents Risk Behavior Survey uses a three-stage cluster sampling design to produce a nationally representative sample of high school students in grades 9-12 in the United States. The target population consisted of all public school students in grades 9-12 in the 50 states and the District of Columbia. The YRBS

was part of a biennial national effort led by the CDC. The present study attempts to shed light on two important aspects using Adolescents Risk Behavior Survey (YRBS) data. First, this study seeks to identify and examine the prevalence of important HIV related sexual risk behaviors (ever had sex, multiple partners (lifetime), alcohol/drug use before sex, and use of condom, and age of initiation of sexual activity) and associated predictor variables such as alcohol use (lifetime, binge, and age of alcohol initiation), drug use (life time marijuana, cocaine, and intravenous drug use (IDU), and mental health indicators (ever felt sad and hopeless, and suicidality) across gender, race/ethnicity and metro status. Second, it explores the associations among and between these outcome and predictor variables and finds out the predictors of risky sexual behaviors among adolescents.

Statement of the problem

Sexual risk behaviors were correlated with a number of other behaviors, including alcohol and drug use, and mental health status. Problem behavior theory (Jessor & Jessor, 1977; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995) implied that sexual risk behavior would co-occur with other problem behaviors such as alcohol and illicit drug use during adolescence. In fact, substantial evidence supports the association between sexual risk practices and involvement in other risk behaviors. A study by Lowery, et al., (1994) and Digests, (2000) indicated that risky sexual behaviors (multiple partners, condom nonuse/use at last sexual activity) were most prevalent among adolescents who had used illicit substances during the past year.

Others have found that a history of alcohol and/or drug use correlated with inconsistent condom use (Brown, DiClememte, & Park, 1992; Cooper, Peirce, & Huselid, 1994; Miller& Kotchick, 1999; Millstein & Mosscicki, 1995; Shrier, Emans, Woods, & DuRant, 1996) and having multiple sexual partners (Duncan, Strycker, & Duncun, 1999; Koniak-Griffin & Brecht, 1995; Tubman, Windle, & Windle, 1996). Other researches demonstrate strong relationship between alcohol problems and symptoms of mental health problems (Nwashimura, Goebert, Ramwasetty-Mikler, & Caetano, 2005). Changes in symptoms of mental health problems were associated specifically with those risk behaviors that were initiated primarily in young adulthood: IDU, sex, and choice of risky partners (Stiffman, Dore, Earls, & Cunningham, 1992).

Significance of the study

Sexual risk behavior of adolescents, like other problematic behavior of adolescents, had been studied for quite some time (Brooks-Gunn & Furstenberg, 1989; Miller & Moore, 1990; CDC, 1998a, 2000, 2002b, 2003b, 2004a). Researches did thus far leave several important issues unaddressed. First, existing literature on adolescent sexuality has covered all problematic sexual behavior among adolescents; little attention has been given to the factors involved in following unhealthy sexual practices. Second, much of the empirical focus has been on self-oriented factors that relates to sexual behavior, with considerably less attention devoted to factors that influence adolescent sexual behavior. Third, little effort has been made to integrate these factors into

conceptual framework that simultaneously considers multiple factors of influence and complexity of their combined effects on adolescent's sexual behavior.

Many studies have demonstrated that adolescents become sexually active at an early age, have multiple partners and engage in unsafe sexual activities (CDC, 1997, 2001a, 2001b 2003c). These risk behaviors pose an emerging concern for rural adolescents who may not be suitably prepared with information and skills for dealing with risk-taking situation (Little & Rankin, 2001; Maynard, 1997; Tapert, Aarons, Sedlar, & Brown, 2001). But nationally representative studies specifically investigating urban, suburban, and rural differences in HIV related risk behaviors among adolescents have not been published. Hence, at present times, the understanding of the occurrence and magnitude of health compromising behaviors among high school students in urban, suburban, and rural areas across demographic characteristics of adolescents was important, since rural dwellers were less likely to seek STI/HIV testing and were more likely to travel to urban areas for treatment due to lack of behavioral health care services (Mulder et al., 2000).

A vast majority of adolescents risk behavior researches and the subject of adolescent health care research have been focused on urban teens. Eberhardt, Ingram, & Makuc (2001) reported that for overview of health in the United States, the National Center for Health Statistics and CDC focused on the fact that urbanization and its accompanying demographic, economic, and social characteristics influence the types and magnitude of health problems in a community. A review of the adolescents risk behavior

literature noted the paucity of research on rural, suburban, and urban adolescents. However, studies that have looked at "metropolitan status" as a predictor variable specifically in adolescent health and behaviors have differed in their conclusions (The National Center on Addiction and Substance Abuse [CASA], 2002; Cronk & Sarvela, 1997; Forsyth & Barnard, 1999)

Understanding the breadth and depth of the health compromising behavior of adolescents requires data beyond the prevalence data alone and an examination of the association between various risk behaviors across socio-demographic characteristics of adolescents. So, it was important to understand factors that contribute to the development of each risky behavior independently, as well as the possible dynamic interaction of these risk behaviors. Other risk behaviors, including alcohol and drug use, often co-occur with adolescents' sexual behavior (Kotchick et al. 2001). Hence, adolescent health tops the lists among the health objectives and priorities and Healthy People 2010 considers the promotion of responsible sexual behavior among adults as one of the top ten leading health indicators (U.S. Department of Health and Human Services [USDHHS], 2000).

Purpose of the Study

The purpose of the current study was to examine differences in the prevalence of HIV-related sexual risk behaviors and associated alcohol/drug use, mental health indicators based on metro status (rural, suburban, and urban) of schools, gender and race/ethnicity. This study used the YRBS 2003 dataset which was a nationally representative sample. This study considered one set of outcome variables a) sexual

behaviors (sexual activity of lifetime, past three month, number of lifetime sexual partners, number of sexual partners in the past three months), age of initiation, alcohol/drug use before sex, condom nonuse) and three sets of predictor variables b) lifetime, and past 30 days use of alcohol, binge drinking (five or more drinks in couple of hours), c) drug use (lifetime, and past 30 days use of marijuana, cocaine, and intra venous drug use [IDU]), and d) mental health (ever felt sad and hopeless, and suicidality).

Objectives

The following were the objectives of the study:

Objective 1. To identify disparities in the prevalence of sexual risk behaviors, alcohol and illicit drug use, and mental health indicators with respect to gender, race/ethnicity, and metro status.

Objective 2. To explore relationships between key study variables with an aim to understand how such relationships vary across metro status, gender, and ethnicity, and which were predictors of sexual behaviors.

Hypotheses

To examine the difference in the prevalence of HIV-related sexual risk behaviors among urban, suburban, and rural areas across gender, race/ethnicity, the study has four primary and four secondary hypotheses. Based on the literature the following hypotheses were formulated. New evidence indicated not only a convergence of rural and urban

usage rates but also a higher rate, for certain substances such as alcohol, inhalants (Donnermeyer, 1997; Oetting, Edwards, Kelly, & Beauvais, 1997).

Primary Hypotheses (PH)

PH_1: Rural adolescents were more likely to engage in sexual behaviors (ever had sex, having multiple partners, alcohol/drug use before sex, not using condoms, and initiating sex at younger age) than suburban and urban adolescents.

PH_2: Rural adolescents were more likely to engage in alcohol (lifetime alcohol use, binge drinking, and age of initiation) than suburban and urban adolescents.

PH_3: Rural adolescents were more likely to engage in drug use (lifetime marijuana, cocaine, and IDU) than suburban and urban adolescents.

PH_4: Rural adolescents were more likely to report having mental health issues (ever felt sad and hopeless, and suicidality) compared to suburban and urban adolescents.

Secondary Hypotheses (SH)

SH_1: Rural African American male and female adolescents were more likely to engage in sexual behaviors (ever had sex, having lifetime multiple partners, use alcohol/drug before sex, condom nonuse, and initiating sex at a younger age,) than suburban, and urban African American male and female adolescents.

SH_2: Rural Caucasian male and female adolescents were more likely to engage in alcohol use (lifetime, alcohol use, binge drinking, and age of initiation,) than suburban and urban Caucasian male and female adolescents.

SH_3: Rural Hispanic male and female adolescents were more likely to engage in drug use (lifetime marijuana, cocaine, IDU) than suburban and urban Hispanic male and female adolescents.

SH_4: Rural Hispanic female and male adolescents were more likely to report having mental health issues (ever felt sad and hopeless, and suicidality) than suburban and urban Hispanic female and male adolescents.

CHAPTER II

LITERATURE REVIEW

Review of literature focuses on the prevalence and patterns of risky sexual behaviors and the factors that influence such behaviors among adolescents. In this study, risky sexual behaviors as outcome variables included ever had sex in one's life, age of initiation, multiple sexual partners, alcohol/drug use before the last sexual activity, and condom nonuse. Under predictor variables, alcohol and illicit drug use (marijuana, cocaine, and intravenous drug use, and mental health indicators (felt sad and hopeless, and suicidality) were covered

A. *Risky Sexual Behaviors*

Adolescent engagement in sexual behaviors was an issue of great concern in the United States. The most apparent consequences of this kind of behaviors were sexually transmitted Diseases. The sheer presence of an STI directly increased the likelihood of transmission of HIV infection (Flemming & Wasserheit, 1999). This was an infection that that causes an increased risk for contracting HIV (Rosenberg & Biggar, 1998). The rate of syphilis and gonorrhea among 15-19 year olds was 6.4 and 571.8 per 100,000 respectively (Panchaud, Susheela, Feivelson, & Darroch, 2000). Studies indicated that the levels of involvement of adolescents with risky behavior and its effect on their sexual activity vary widely by race, gender, and metro status.

1) *Gender Differences*

According to the YRBS report (Grunbaum et al., 2002) 45.6% of high school students (48.5 percent of males and 42.9 percent of females) reported having had sex. Early sexual initiation leads to important health issues because it was an important indicator of exposure to risk of pregnancy and sexually transmitted infections [STDs]. Gender differences in early sexual activity were due to large gender differences among African American and Hispanics while Caucasian males and females were both equally likely to have an early sexual experience. Young males were more likely to be having sex early and in the recent years, the proportion of those who have had sex at an early age, has increased (Abma, Chandra, Mosher, Peterson, Piccinino, 1997; Cyranowski, Frank, Young, & Shear, 2000; Doswell, & Braxter, 2002; Sonenstein et al., 1988; Ventura et al., 2001;). According to Resnick et al. (1997) around 7-17% of them initiated sex before the age of 13. The median age at first sex was 16.9 years for male adolescents and 17.4 years for female adolescents (The Alan Guttmacher Institute, 2002). The percentage of teens 15-19years old who had initiated sex before age 14 has decreased in recent years, from a high of 8% of female adolescents and 11% of male adolescents in 1995 to a low of 6% of female adolescents and 8 % of male adolescents in 2002 (Abma et al., 2004). CDC (1992a, 1999a, 1999b) indicates males were more likely than females to report having had sex.

Currently sexually active refers to having multiple sexual partners during the past three months. Approximately one third (34.3%) of adolescents have had sex in the past three months (CDC, 2004). The percentage of high school students, who report having

had four or more sexual partners, has declined in recent years from 19% in 1993 to 14% in 2003. In 2004 overall, the prevalence of having had more than 4 sex partners was higher among male (17.5%) than female (11.2%) students (CDC, 2004). Nationwide, 14.4% of students have had sex during their lifetime with more than 4 sex partners. Adolescent males (18%) were more likely than adolescent females (11%) to report multiple sexual partners and multiple concurrent partners (Grunbaum et al., 2001; CDC, 2002b).

According to CDC (2004), 25% of sexually active 9-12th grade students report using alcohol or drugs during their most recent sexual encounter. Males (30%) were more likely than females (21%) to report having used alcohol/drug before sex. The Wisconsin Adolescents Risk Behavior Survey (2003) reported that about 29% male adolescents and 22% female adolescents used alcohol or drugs before the last sexual activity

Santelli et al. (1998) reported that having multiple sexual partners represents an important behavioral risk factor for STDs among adolescents and young adults, if they fail to use condoms correctly and consistently. In 2004, overall, the prevalence of condom nonuse during the last sexual activity was higher among male (57.4%) than female (31.2%) students (CDC, 2004). YRBS trend data for the past decade indicated that adolescent females' condom nonuse was significantly higher compared to same-age males (CDC, 1998a, 1998b). Consistent use of condom declines as adolescents' age increased and in turn increasing the chances of risky sexual behavior (Kegeles et al., 1988; Pleck et al., 1993). Among the 34.3% of currently sexually active students

nationwide, approximately 37% reported that either they or their partner did not use a condom during their last sexual activity (CDC, 2004).

2) *Racial/Ethnic Differences*

According toYRBS report (CDC, 2004) the prevalence of sexual activity was disproportionately distributed among gender and ethnic groups. African American and Hispanic female adolescents face the challenge of being female and being a member of minority groups (Doswell & Braxter, 2002). The prevalence of having had sex was higher among African American male (73.8%) than Hispanic male (56.8%) and Caucasian male (40.5%) students; higher among African American female (60.9%) than Hispanic female (46.4%) and Caucasian female (43.0%) students.

There are enduring disparities in the age of sexual initiation among Caucasian, Hispanic and African American adolescents. In 2004, 42% of high school students were sexually experienced and about 4% of Caucasian students reported having had sex before age 13. In contrast, 19% of African American and 8% of Hispanic adolescents reported having had sexual intercourse before age 13 (CDC, 2004). African American and Hispanic adolescents reported higher rates of sexual involvement and sexual initiation at younger ages than their Caucasian peers (Grunbaum et al., 2002; Leigh, Morrison, Trecki, & Temple, 1994; Romer et al., 1994; Seidman & Reidor, 1994; Stanton et al., 1994). Evidence showed that African American students were significantly more likely to report engaging in sexual activities, initiating sex at younger age, and having four or more lifetime sexual partners than Caucasian and Hispanic students (Warren, Santelli, Everett, et. al., 1998; Santelli, Lindburg, Abma, McNeely, & Resnick, 2000).

Non-Hispanic African American teens reported higher levels of early sexual experience. Approximately, 34% of non-Hispanic African Americans reported having sex before age 15 as compared to 21% of Hispanics and 16% of non-Hispanic Caucasians (Terry-Humen & Manlove, 2003). In every ethnic subgroup, males were significantly more likely than females to initiate sexual intercourse before age 13 (Grunbaum et al., 2002).

In 2001, among high school students, 27% of African American adolescents and 15% of Hispanic adolescents reported having four or more sexual partners in one's lifetime compared to 12% of Caucasian students (Grunbaum et al., 2002). A study involving South Carolina high school students reported that among 70% of young sexually experienced African American women, 20% have had one partner, 24% have had 2-3 and 26% four or more; among 88% of the African American male adolescents who have had sex, 10% have had sex with one partner, 22% with 2-3 and 56% with four or more (Digests, 2000). Having had sex with multiple partners was higher among African American male (41.7%) and Hispanic male (20.5%) than African American female (16.3%) and Hispanic female (11.2%) students (CDC, 2004).

The prevalence of being currently sexually active was higher among Caucasian female (33.1%) and African American male (54.0%) than Caucasian male (28.5%) and African American female (44.2%) students (CDC, 2004). Other studies also reported that the prevalence of being currently sexually active was higher for Caucasian female adolescents than for African American female adolescents (CDC, 2004b; Hines & Graves, 1998; Morris et al., 198l; Holmes et al., 2004).

From 1991-2003, the percentage of currently sexually active students who had drunk alcohol or used drugs before the last sexual activity also increased significantly (from 21.6% to 25.4%) (CDC, 2003c). Overall, the prevalence of having used alcohol/drugs before the last sexual activity was higher among Caucasian male (30.5%), African American male (23.8%), and Hispanic male (29.5%) than Caucasian female (23.6%), African American female (14.6%), and Hispanic female (18.8%) students (CDC, 2004).

Among sexually experienced high school students in 2001, African American (67%) adolescents were significantly more likely than Caucasian (57%), or Hispanic (54%) adolescents to report condom use at most recent sex (Grunbaum et al., 2002). However, the number of sexually active students declined (from 54.1.1% in 1991 to 34.3% in 2003) and currently, about 37% of them did not use condoms during the last sexual activity and 14.4% had four or more sexual partners (CDC, 2004). Among sexually active adolescents, 80- 90% of them did not use condoms consistently (Kann, Kinchen,Williams, Ross, Lowry, Grunbaum, & Kolbe, 1995). The consistent use of condoms seems to be lower for minority adolescents relative to Caucasian adolescents (Brown, DiClemente, & Parker, 1992). Caucasian female adolescents were less likely to report use of condom during the last sexual activity than African American female adolescents (CDC, 2004b; Hines & Graves, 1998; Morris et al., 198l; Holmes et al., 2004). Condom use was higher among Caucasian male (69.0%), African American male (81.2%), and Hispanic male (62.5%) than Caucasian female (56.5%), African American female (63.6%), and Hispanic female (52.3%) students (CDC, 2004).

3) *Rural-Urban Differences*

Grunbaum et al. (2002) reported that rural and urban adolescents differed in sexual experience. For example, nearly 33% of high school students in mostly rural Illinois reported ever having sex compared to 58.1% of students in Chicago (Grunbaum et al., 2002). Crosby, Yarber, Ding, Diclemente, and Dodge. (2000) reported that rural adolescent females were also more likely to report having had early sex, having three or more lifetime sex partners, and having more than one sex partner in the last three months. African American rural adolescents, particularly females, may run a greater risk for contracting an STD/HIV infection than do their non-rural counterparts.

African American males and females living in urban areas were more likely than those of other racial/ethnic group males or residents of non-urban areas to have had two or more sexual partners. Urban males were significantly more likely than suburban males to have had multiple sexual partners irrespective of race/ethnicity (Santelli et al., 1998). Condom nonuse was reported by 85%, 92%, and 94% of the respondents from the largest 100 cities, suburban/other urban areas, and rural areas, respectively (Feinleib & Michael, 1998).

B. *Predictors of risky sexual behaviors*

Risk behaviors were important correlates and predictors of sexual risk behaviors. As Jessor & Jessor (1977, 1991) stated, sexual risk behaviors among adolescents in general often cluster with alcohol and illicit drug use as components of problem behavior syndrome. Some other studies demonstrated that alcohol and illicit drug use and mental health coorelates occur frequently among people whose lifestyle or personality

predwasposes them to high-risk behaviors in general (Avins, Woods, Lindan, et al., 1994; Justus, Finn, & Steinmetz, 2000; Stall, Paul, Greenwood, Pollock, Bein, 2001). The present study, therefore, identified and focused on alcohol (lifetime, past 30 days, age of initiation, episodic drinking) and illicit drug use (life time use of marijuana, cocaine, and injecting illegal drugs), and mental health indicators (felt sad and hopeless, suicidality) as predictors of HIV-related sexual risk behaviors among adolescents.

a) *Alcohol use*

According to the Rural Healthy People 2010 survey, substance abuse ranked as the sixth rural health priority. The U. S. Department of Health and Human Services reported that substance abuse was one of the ten "leading health indicators." It was also recognized as a major rural health concern among state offices of rural health (Hutchison & Blakely, 2003). Although rates of alcohol use for persons aged 12 years or older have declined in the past 20 years, that is from72.9% in 1979 to 63.7% in 2001 (Office of Applied Studies, 2002; Johnston, O'Malley, & Bachman, 2002) it was still the leading drug of abuse by teenagers and they can become addicted to it. It interrupts with their academic progress and increases chances of risky sexual behavior and teenage pregnancy (American Medical Association, 2002; Levy, Miller, & Cox, 1999; National Center on Addiction and Substance Abuse, 2002). A national survey reported that among respondents of ages 12 to17, current alcohol use increased from 16.5 % in 1999 to 17.7 % in 2003 (SAMHSA, 2002).

The proportion of children who started drinking in eighth grade or earlier had increased by 33% between 1975 to 2001 (Johnston, et al., 2002). The National Household

Survey on Drug Abuse (NHSDA) (2000) showed that the mean (SD) age of initiation of alcohol use among 12 to 20year-olds was now 14 years (Office of Applied Studies, 2002).

According to the NIAAA report (1995), episodic/binge drinking often begins around age 13, tends to increase during adolescence, peaks in young adulthood (ages 18 to 22), and then gradually decreases. Binge drinking during the past 30 days was reported by 8% of adolescents ages 12 to 17 and 30 percent of those ages 18 to 20. Among persons under the legal drinking age (12 to 20 years old), 15% were binge drinkers and 7% were heavy drinkers (NIDA & MFS, 1998).

Approximately 78% of high school students tried alcohol (i.e., had at least one drink of alcohol other than sips of wine for religious purposes) and more than 5 million (30%) admitted binge drinking at least once a month. (Grunbaum et al., 2002). Among 12 to 20 years old, alcohol was the drug of choice with 28.5 % reported having used alcohol in the last 30 days.

About 10.4 million adolescents between ages 12 to 20 reported using alcohol. Of those, 5.1 million were binge drinkers, including 2.3 million heavy drinkers who binged at least five times a month (SAMHSA, 1999a, 2003). Some recent studies reported that there is a gender, race/ethnicity, and regional and metro and non-metro variation in the level of alcohol use and prevalence of its use (Gamma, Hutchison, Bellamy, & Dabney 2002).

1) *Gender differences*

According to SAMHSA 's (1998) the National Household Survey on Drug Abuse (NHSDA), indicated that 38% of female adolescents ages 12 through 17 reported ever using alcohol. Nearly 19% of these female adolescents reported using alcohol in the past month compared with 20% who reported alcohol use in the past year. This survey also indicated that nearly 7% of female adolescents ages 12 through 17 reported binge drinking (having five or more drinks in a row at least once in the past month) (SAMHSA, 1999a). Female adolescents were more likely than male adolescents to drink to fit in with their friends, while male adolescents drink largely for other reasons and then join a group that also drinks (Donovan, 1991).

In 1999, nearly 9% of male adolescents and 7% of female adolescents ages 12 to 17 reported binge drinking in the previous month. In 2003, the percentage of male adolescents and female adolescents rose to 11.1% and 10.1% respectively (SAMHSA, 1999a, 2003).

2) *Racial/Ethnic Differences*

The information provided by YRBS on adolescents in grades 9-12 indicated that rates of alcohol initiation and consumption were higher for Caucasian adolescents than for African American adolescents (CDC, 2004b; 1999b; Johnson et al., 2002). Lifetime alcohol use was higher in Hispanic female (81.4%) than in African American female (74.0%) students; higher among Caucasian male (74.3%) and Hispanic male (77.5%) than African American male (68.6%) students. The prevalence of current alcohol use was higher in Hispanic female (48.4%) than in Hispanic male (42.7%) students (CDC, 2004).

The percentage of students who had at least one drink of alcohol on one or more days during their life was higher among female students (76.1%) as compared to (73.7%) male students. The lifetime alcohol use was found higher among Hispanic students as compared to Caucasian (75.4%), African American (71.4%), and other racial groups (68.4%) (YRBS, 2005). The percentage of students who had their first drink of alcohol other than a few sips before age 13 was 27.8%. Similar trends were observed with regard to current alcohol use as well (CDC, 2004). According to SAMHSA (1999b), Hispanic adolescents were as likely as Caucasian non-Hispanic adolescents to be current drinkers. African American non-Hispanic adolescents were the least likely of the racial/ethnic groups to be current drinkers. According to the CDC report (1999b), approximately 32.3% of 9-12 grade students engaged in episodic heavy drinking (four or five drinks per occasion at one time) while in 2003 only 28.3% engaged in such drinking. Male students (29.0%) had a higher episodic heavy drinking rate as compared to female students (27.5%).

In 1999, Caucasian non-Hispanic adolescents ages 12 to 17 reported the highest frequency of binge drinking (9%) as compared with 6% of Hispanic and 3% of African American non-Hispanic adolescents. In 2003, nearly 12.8% Caucasian, 9.4% Hispanic, and 4.6% African American reported binge drinking (SAMHSA, 1999a, 2003).

3) *Rural-Urban Differences*

There were variations in findings when comparing urban and rural differences in alcohol use. Current research studies reported that rates of all drugs including alcohol

appeared to be increasing in rural areas (CASA, 2001; Johnston et al., 2002; Cronk & Sarvela, 1997).

The rural excess prevalence in binge drinking was apparent in both sexes. The rural students have similar or higher use prevalence than urban students for alcohol, particularly binge drinking. The urban-rural difference in daily alcohol use paralleled that for binge drinking in males, but not in females. Trends were similar for both sexes, though rural female adolescents demonstrated a later catch-up in alcohol use levels of urban female adolescents. Rural students were currently at risk approximately equal to urban students (Cronk & Sarvela, 1997). A number of other studies on smaller regional samples corroborate the finding of greater alcohol use among rural students (Kelleher et al., 1992). Binge drinking among adolescents of ages 12 to 17 appears to occur most frequently in the North Central region of the United States and in metropolitan areas (SAMHSA, 1999a, 2003).

The information on lifetime, current alcohol use, and age of initiation across rural and urban areas was not available.

b) *Drug use*

Illicit drug use ranks as the ninth leading "actual cause of death" in the United States (Hutchison & Blakely, 2003). Drug use, nevertheless considerably less prevalent than tobacco and alcohol, affects 7% of the population, or 15.9 million users (SAMHSA, 2002). Among 12 – 17 years olds, 10.8% reported using illicit drug (SAMHSA, 2001). The use of marijuana has increased at a much faster rate than the use of other drugs, particularly among the youngest teens. One danger of adolescents' using marijuana was

that it placed them at higher risk for using more dangerous drugs. Overall rates of drug use were roughly equal among Caucasian and Hispanic adolescents, and slightly lower among African American adolescents. The specific drug use varied somewhat by ethnicity. Behavior associated with injecting illegal drug use (IDU) was a single leading factor in the spread of HIV infection in the United States. Injection drug use had been responsible for more than one-third of all adult and adolescent AIDS cases reported in the U.S. (NIDA, 1999).

1) *Gender differences*

Illicit drugs were considered to be primarily a male problem. Current epidemiological studies indicate that use of drugs increases with age and that males generally use drugs more frequently than females, (Kann et al., 2000). Overall, the prevalence of current marijuana use was higher among male (25.1%) than female (19.3%) students. Among adolescents aged 12 to 17, the rate of current illicit drug use was higher for male adolescents (11.4 percent) than for female adolescents (10.2 percent). In 2004, about 9% of female and male adolescents aged 12 to 17 were dependent on or abusing alcohol or an illicit drug (SAMHSA, 2004). Nearly 16% of female adolescents compared with 11% of male adolescents were classified as polydrug users (Kim & Fendrich, 2002).

2) *Racial/Ethnic Differences*

According to SAMSHA (2003), there was no significant difference in the rates of current illicit drug use for racial/ethnic subgroups and gender. Overall, lifetime marijuana use among adolescents accounted for 40.2%. Its use was higher among male students (37.6%) as compared to female (42.7%) students; higher among African American male

(49.0%) as compared to Hispanic male (46.7%) students, African females (39.8%), and Hispanic female (38.9%) students as well. Similar trends were observed with current marijuana use and intravenous drug use among students. Racial and ethnic minority populations in the United States were most heavily affected by injection drug use-associated HIV/AIDS (CDC, 2004). Drug use was higher among African American male (29.8%) and Hispanic male (27.1%) than African American female (18.1%) and Hispanic female (20.4%) students (CDC, 2003).

3) *Rural-Urban Differences*

In 2000, individuals who lived in metropolitan areas were more likely than those in non-metropolitan areas to have used an illicit drug during the past year (NHSDA, 2000). Rural areas were more likely to show greater variations in levels of adolescent substance use than were urban areas. The percentage of twelfth grade students who had tried marijuana was significantly higher for the metropolitan areas than it was for the non-metropolitan areas. Illicit drug use was viewed as a problem that has major negative consequences for African Americans, especially those who lived in inner-city, and urban communities (Fullilove et al., 1990; Lillie-Blanton et al., 1993). There was increasing concern that African-Americans and others who were concentrated in urban social environments may be at greater risk for the HIV infection due in part to the high level of intravenous heroin and cocaine use and the exchange of sexual favors for crack cocaine (Day Houston-Hamilton, Deslondes, & N lson, 1988; Friedman, Young, & Snyder, 1993; Fullilove et al., 1990).

Across all ages, the average illicit drug use ranked highest in metro counties followed by non-metro and rural counties whereas among adolescents the prevalence of illicit drug was highest in rural areas followed by non-metro and metro areas (SAMHSA, 2002). Some other research studies reported variations in other kinds of drug use among adolescents by grades, rural and urban areas (SAMHSA, 2001; Johnston et al., 2002; Edwards, 2001).

Cronk and Sarvela, (1997) also found that for marijuana and cocaine, urban use exceeded rural use throughout the study period (1976–1992), but the differences were markedly smaller at the end of the period. CASA, (2000), report found significantly more drug use among rural adolescents than their more urbanized counterparts.

c) *Mental Health Indicators*

Suicide was the third leading cause of death among 15 to19 year olds. Although both depression symptoms and suicidality had been associated with drug use and early sexual activities, the relationship had not been systematically studied in a nationally representative sample (Hallfors et al., 2004). According to the 2003 YRBS, 29% of the surveyed adolescents experienced depression symptoms, including feelings of sadness and hopelessness that lasted for two weeks or more and led them to stop participating in normal activities (CDC, 2004). Depressed adolescents, for example, often experienced feelings of hopelessness and lowered self-esteem which may lead to feelings of sadness and hopelessness which in turn may make them less likely to engage in self-protective behaviors. Many people who suffered from mental health problems turn to substance use as a means of coping with their problems. Substance use shown to decrease inhibitions

and impair judgment, which may contribute to HIV risk-taking behaviors. Research also indicated that injection drug users (IDUs) who suffered from depression symptoms were at higher risk for needle sharing (Mandel, Kim, Latkin, et al., 1999).

Environmental factors such as poverty, racism, and marginalization can lead to mental health problems such as low self-esteem which in turn, can lead to feelings of sadness and hopelessness, substance use, and other HIV risk behaviors. Inner-city young adults with high rates of HIV risk behaviors also experience higher rates of suicidality, substance misuse, and antisocial behaviors (Stiffman et al., 1992).

1) *Gender Differences*

Nationwide, during the past twelve months, 28.3% of the students had felt so sad or hopeless almost every day for more than two weeks in a row that they stopped doing some usual activities. Overall, female students (35.7%) were significantly more likely than male students (21.0%) to have felt sad or hopeless almost every day for more than two weeks. This significant difference for the two sexes was identified for all the racial/ethnic subpopulations (CDC, 2001).

Smucker, Craighead, Craighead, and Green (1986) found that acting-out behaviors were more highly correlated with overall depression symptoms for adolescent males than for adolescent females. Teri (1982) found that adolescent females experienced higher levels of depression symptoms than did males. McGee, Feehan, Williams, and Anderson (1992) found that male adolescents had higher rates of depression symptoms than female adolescents up to age 12; after that age, adolescent females had higher rates.

Depression symptoms can also be a risk factor for risky sexual behavior. Analyses conducted on the National Longitudinal Survey of Adolescent Health Data demonstrated that among male adolescents, depression symptoms were associated with a decreased likelihood of condom use, while among female adolescents, depression symptoms were associated with a history of STTs (Millstein, Moscicki, & Broering, 1994). William, Gagn, Ryan, and Dec (2002) reported that this relationship was often found even at a preclinical level; feelings of depression symptoms and stress in the general adolescent population were associated with the nonuse of birth control.

Overall, female students (10.9%) were significantly more likely than male students (5.7%) to have attempted suicide (CDC, 2004). Studies suggested that there was a higher prevalence of depressed mood among adolescent females than males. This can be related to a number of factors, including hormonal changes and changing affiliative needs (i.e., needs for belonging to peer groups, family, school, and community organizations), which may interact with negative life events (Cyranowski, Frank, Young, & Shear, 2000; Petersen et al., 1993).

2) Racial/*Ethnic Differences*

There were no clear evidences regarding the prevalence of depression symptoms and suicidality among racial/ethnic groups and its association with other health risk factors. A study based on representative samples (Saluja, Iachan, Scheidt, Overpeck, Sun, & Giedd, 2004) found no difference in the prevalence of depression symptoms among Caucasian and African American adolescents, (Hayward, Gotlib, Schraedley, & Litt, 1999) while other studies showed differences reported that African American and

Caucasian adolescents had lower depression symptoms compared to Asian or Hispanic adolescents. At the same time, however, other studies showed that minorities had higher depression symptoms than Caucasians (Sen, 2004). It is, then, important to explore the influence of depression symptoms and suicidality in drawing adolescents into risky sexual behaviors.

This significant sex difference was identified among Caucasian and Hispanic students. Overall, Hispanic students (12.8%) were significantly more likely than African American and Caucasian students (6.7% and 7.3%, respectively) to have attempted suicide. Hispanic female students (18.9%) were significantly more likely than Caucasian and African American students (9.0% and 7.5% respectively) to have attempted suicide (CDC, 2001).

Overall, Hispanic students (37.0%) were significantly more likely than African American and Caucasian students (28.9% and 24.9%, respectively) to have felt sad or hopeless almost every day for more than two weeks, and African American students (28.9%) were significantly more likely than Caucasian students (24.9%) to report this behavior. Hispanic female students (46.1%) were significantly more likely than African American and Caucasian female students (37.7% and 31.3%, respectively) to have felt sad or hopeless almost every day for more than two weeks, and African American female students 37.7%) were significantly more likely than Caucasian female students (31.3%) to report this behavior. Hispanic male students (27.7%) were significantly more likely than Caucasian male students (19.0%) to have felt sad or hopeless almost every day for more than 2 weeks. Across state surveys, prevalence ranged from 22.9% to 34.9%

(median: 27.4%). Across local surveys, prevalence ranged from 27.4% to 34.4% (median: 30.2%) (CDC, 2001). Other studies reported greater levels of depression symptoms for African-American adolescents (Emslie, Weinberg, Rush, Adams, & Rintelmann, 1990; Schoenbach, Kaplan, Grimson, & Wagner, 1982).

While adolescent males commit suicide at greater rates, adolescent females were more likely to exhibit non-lethal suicidal behavior and ideation. Among high school students in 2003, twice as many females attempted suicide as males (11.5% vs. 5.4%). The percentage of students who reported an attempted suicide in the past year increased slightly from 7.3% in 1991 to 8.5% in 2003 (CDC, 2004).

3) *Rural-Urban Differences*

Rural women reported higher levels of anxiety and depression symptoms (41% compared to 13-20% in urban areas). This was coupled with lower physical, mental, and general health (Shellenberger, Kenkel, Mulder et al.,2006). Suicide rates were highest in rural areas of the western states; suicide rates for young women in rural western regions were three times higher than those of their metropolitan counterparts. Rural residents of both genders were more likely to use firearms in suicides than urban residents (Shellenberger, Kenkel, Mulder et al., 2006).

C. Association among alcohol, drug us, mental health indicators, and sexual behaviors

Recent studies indicated that adolescent sexual risk behavior do not occur in a vacuum (Millstein, Irwin, Adler et. al, 1992; Johnston, O. Malley, & Bachman, 1990; Kann et. al., 1995) and confirmed that adolescents engage in several health risk behaviors before reaching adulthood. It has also been observed that certain health risk factors (e.g.,

alcohol use) pave the way for others (e.g., drug use) in a rather steady pattern (Kandel &Yamaguchi, 1993). Other studies showed that there was an interrelationship among risk behaviors, that is, adolescents who engaged in one type of health risk behavior such as substance use were more likely to engage in another type such as unprotected sex or injury related behavior (Jessor, 1991; Millstein et. al, 1992; Lowry, Holtzman, Truman, et al., 1994).

A study by Stanton et al. (1999) indicated that an increased use of alcohol and marijuana at younger ages were related to subsequent riskier sexual activity and increased drug misuse. Existing literature showed that early drinking was associated with drug use and sexual risks through mid-adolescence. Another study also indicated that early drinkers were more likely to report subsequent alcohol problems (Wells, Horwood, & Fergusson, 2004), unprotected sexual practices, multiple partners, and use of alcohol/drug before sex. Studies indicated that on the whole, the initiation of alcohol use at a younger age (Office of Applied Studies, 2002), increased the chances for those teenagers who became adult heavier drinkers with alcohol problems later in life (DeWit, Adlaf, Offord, & Ogborne, 2000; Grant & Dawson, 1997). Heavy drinking may lead to Engage in risky sexual behaviors which in turn may results in higher rates of unintended pregnancy and exposes the adolescents to the risk of contamination with HIV and other STIs (CDC, 1998a; Donohew et al., 2000; Hops, Andrews, Duncan, Duncan, & Tildesley, 2000; NIAAA, 2006; Robinson, Telljohann, & Price, 1999; Stueve & O'Donnell, 2005).

Individuals who begin drinking before the age of 15 were four times more likely to become alcohol dependent than those who did not drink before the age of 21(Grant &

Dawson, 1997). The incidence of lifetime alcohol abuse and dependence were greatest for those who begin drinking between the ages of 11 and 14 (DeWit, Adlaf, Offord, & Ogborne, 2000). In comparison with students who did not report any recent alcohol use, adolescents who reported recent alcohol use were about seven times more likely to report recent marijuana use (52% vs. 8%) or methamphetimine use (14% vs. 2%), and eight times more likely to report lifetime use of cocaine (16% vs. 2%) or other drugs such as LSD, PCP, or ecstasy (33% vs. 4%), and over twice as likely to have attempted suicide in the past year (11% vs. 5%) (Massachusetts Adolescents Risk Behavior Survey, 1999).

Drug and alcohol use can interfere with judgment about sexual (and other) behaviors and thereby affect the likelihood of engaging in unplanned and unprotected sex. This increased the risk for contracting HIV from infected sex partners (NIDA, 2004). Behavioral research showed that drug use increased the likelihood that these adolescents engage in risky sexual behavior and decrease the likelihood that they would be able to effectively negotiate safer sex practices with partners (Morrison-Beedy et, al., 2003).

Substance abuse, in particular, can play an important role in the etiology of both voluntary and involuntary sexual behavior among adolescents and these two were highly likely to be occurred together (Millstein, Moscicki, & Broering, 1994). Some adolescents who abused substances, both illegal "hard" drugs like cocaine, heroine, and PCP, and legally attainable or "softer" drugs, like alcohol and marijuana, may frequently found themselves in compromising situations where it was more likely that they would engage in risky sexual behaviors (e.g., unprotected sex with others) or be the victim of unwanted sexual advances from others (e.g., during acute intoxication) (Hall et al., 2004).

Recent studies reported that alcohol consumption was one of the primary adolescents-reported risk behaviors associated with the intention of having sex (Forehand et al., 2005). Drug users have a high risk of contracting gonorrhea, syphilis, hepatitis, tuberculosis, and HIV (Office of National Drug Control Policy, 1999). Alcohol use among adolescents was a major factor in suicides (Perera and Tangirala, 2000). Heavy alcohol among adolescents was associated with other risk behaviors including drug use and sexuality/high-risk sexual activity (CDC, 2006). Heavy drinking was associated with a depression symptoms and suicide (Naimi, Brewer, & Gilbert, 2003a; Naimi, Brewer, Mokdad, & Denny, 200b).

Findings from many studies indicated that adolescents with severe emotional disorders have a high prevalence of STD/HIV associated sexual risk behaviors and relative to a normative adolescent sample, they had higher rates of these behaviors (Brown, Danovsky, Lourie, DiClemente, & Ponton, 1997; DiClemente, R. J., Brown, L. K., Beausoleil, N. I., Lodico, M.1993a; DiClemente & Ponton, 1993b). The association between depression symptoms and substance abuse was well supported in the clinical literature (Bukstein, Glancy, & Kaminer, 1992; Clark & Neighbors, 1996; Deykin, Levy, & Wells, 1987; Deykin, Buka, & Zeena, 1992; Friedman, & Silver, 1991; Greenbaum, Prange, Rohde, Lewinsohn, & Seeley, 1996). Kessler, McGonagle, & Zhao (1994) suggested that this association may be stronger in adolescents than in adults. Other non-clinical studies demonstrated relationships between substance abuse and depression symptoms (Christie, Burke, Regier, Rae, & Locke, 1988; Dielman, Campanelli, Shope, & Butchart, 1987; Paton, Kessler, & Kandel, 1977). It has also been observed that

depression symptoms were associated with sexual risks in several studies. (Castillo, Tarter, Giancola, Lu, Kirisci, & Parks, 1997; DiClemente et al., 2001). Other studies showed that marijuana use and alcohol use were related to depression symptoms, suicide behavior, and sexual activities (Borges, Walters, & Kessler, 2000; Brook, Cohen, & Brook, 1998; Brooks, Harris, Thrall, & Woods, 2002; Burge, Felts, Chenier, & Parrillo, 1995; Felts, Chenier, & Barnes, 1992; Kandel, Ravewas, & Davies, 1991; King, Schwab-Stone, Flisher, et al., 2001; Rector, Johnson, & Noyes, 2003). According to CDC (2004), priority health risk behaviors contributed to the morbidity and mortality rates among adolescents and adults.

DiClemente et al. (2001) reported that adolescents with major distress at baseline were more likely than their peers, after six months, to be pregnant, have had unprotected sex, had non-monogamous sex partners, and did not use any form of contraception. Stiffman et al. (1992) found that depression symptoms during adolescence period were associated with risk behaviors five years later as a young adult. Further, they reported that young adults who had three or more depression symptoms as an adolescent were more than five times more likely than their peers to engage in prostitution.

There was strong evidence that heavy marijuana use and episodic/binge drinking increase the likelihood of depression symptoms among male adolescents and that any alcohol, drug, or sexual experimentation increase the likelihood of depression symptoms for female adolescents (Hallfors et al., 2004). Engaging in sex and drug behaviors placed adolescents, especially female adolescents, at risk for future severe depression symptoms (Hallfors, 2005).

A strong correlation between psychiatric disorders, substance misuse, and risky sexual behavior in a birth cohort of 21 year olds was important (Kessler, Berglund, & Foster, 1997; Ramrakha, Caspi, Dickson, Moffitt, & Paul, 2000). Bardone et al. (1998) found risky sexual behaviour associated only with conduct disorders, and not with depression symptoms or anxiety, in a cohort of female adolescents followed from ages 15 to 21. Another study also reported associations between mental health and the risk of HIV infection (Broom et.al., 1997).

The studies also revealed that the use of alcohol or drug immediately before the sexual act was also related to decreased condom use (Jemmott & Jemmott, 1993a; Strunin & Hingson, 1992). Jemmott and Jemmott (1993b) reported that among inner-city African American male adolescents, those who reported a higher frequency of having had sex while "high" were more likely to have unprotected sex, a greater number of sexual partners, and a greater number of risky sexual partners. According to a longitudinal study of urban adolescents, early sexual debut was related to multiple aspects of risky sexual behavior, including inconsistent condom use, pregnancy, and multiple partners (Smith, 1997).

Other studies also showed that younger the adolescent is at the initiation of sexual activity, the lesser the condom use is at first sexual activity (Melchert & Burnett, 1990; St. Lawrence et al., 1995) and in subsequent sexual encounters (Melchert & Burnett, 1990; Rosa, Tein, Reinholtz, & Angelini, 1997; Smith ,1997). Rates of pregnancy are higher compared to those who were older at sexual initiation. Researches found that the number sexual partners and condom use were inversely related. The number of years that

an adolescent had been sexually active was positively correlated to a variety of sexual behaviors that increase one's risk for contracting sexually transmitted disease (DiClemente, Durbin, Siegel, Krasnovsky, Lazarus, & Comacho, 1992; Gillmore, Butler, Lohr, & Gilchrwast, 1992). DiClemente et al (1992) further reported that condoms reduce the risk of human immunodeficiency virus (HIV) transmission. However, their use among adolescents had been inconsistent.

Literature linking high-risk behaviors such as drinking, using drugs, and mental health indicators with sexual behaviors that have high risk of STDs and HIV infection facilitates the present study that can determine whether the association among the outcome and predictor variables is strong and to find out the direction and magnitude of the risky sexual behaviors across gender, race, and metro status.

CHAPTER III

METHODOLGY

Study Design and Data Collection

This study used Adolescents Risk Behavior Survey (YRBS) data collected during 2003 by the Centers for Disease Control and Prevention (CDC). The YRBS was a component of a larger national effort—Adolescents Risk Behavior Surveillance System (YRBSS). The CDC's National Adolescents Risk Behavior Survey uses a representative sample of high school students in ninth through twelfth grades. The YRBS used the sampling frame developed from the Quality Education Data (QED), Inc., and database (Quality Education Data. 2004).

The 2003 national school-based survey employed a three-stage cluster sample design to produce a nationally representative sample of students in grades 9-12 who attend public schools. The first-stage sampling frame contained 1,262 primary sampling units (PSUs). The primary sampling units consist of counties, sub areas of large counties, or groups of smaller, adjacent counties. They were organized into 16 strata based on the degree of urbanization and the percentage of African American and Hispanic students in the PSU. From these PSUs, 57 were selected with probability proportional to overall school enrollment size (YRBS, 2003).

At the second sampling stage, 195 schools with any of grades 9–12 were selected with probability proportional to school enrollment size. To enable separate analysis of

data for African American and Hispanic students, schools with considerable numbers of African American and Hispanic students were sampled at higher rates than all other schools. At the third sampling stage one or two intact classes from each grade 9–12 were randomly selected from either a required subject (e.g., English or social studies) or a required period (e.g., second period) at each chosen school. All students in the selected classes were eligible to participate in the survey (YRBS, 2003).

Survey procedures were designed to protect students' privacy by allowing for anonymous and voluntary participation. The core questionnaire contained 87 multiple-choice questions. Local parental permission procedures were followed before survey administration (CDC, 2004). Students completed the self-administered questionnaire during one class period and recorded their responses directly on a computer-scannable questionnaire booklet or answer sheet (CDC, 2004).

Questionnaire Content

The YRBS questionnaire covers six categories of priority health-risk behaviors among high school students-behaviors that contribute to unintentional injuries and violence, tobacco use, alcohol and other drug use, sexual behaviors that contribute to unintended pregnancy and sexually transmitted Diseases (STDs), including human immunodeficiency virus (HIV) infection, unhealthy dietary behaviors, physical inactivity, and overweight. YRBSS includes national, state, and local school-based surveys of students in grades 9–12. National surveys were conducted biannually since 1991. Comparable state and local surveys were also conducted (CDC, 2004).

Study Variables

A. Outcome Variable: Sexual Behaviors

1. Lifetime Variables

a) Ever had sex: Having had sex during one's lifetime.

b) Lifetime multiples sexual partners: With how many people have had sex during one's lifetime.

2. *Past Three Month Variables* – includes those who have had sex in the past three months and were considered currently sexually active.

a) Alcohol/drug use before sex: Used alcohol or drugs before sex the last time.

b) Condom nonuse: student or his/her sexual partner used a condom during the last sex.

3. *Age of Initiation*: age when one had sex for the first time. This variable was used as a predictor in the analysis not as an outcome variable.

B. Predictor Variables

1. Alcohol Use Variables

a) Lifetime use of alcohol: having had at least one drink of alcohol during one's lifetime

b) Drinking type: created by combining current drinking (At least one drink of alcohol on one or more occasions during the past 30 days) and Binge drinking (five or more drinks of alcohol in a row within a couple of hours)

c) Age of initiation: age when student first drank of alcoholic beverages more than other than few sips

2. *Drug Use Variables*

a) Any drug use: created by combining (Lifetime use of marijuana, cocaine and injecting illegal drug into the body)

3. *Mental Health Indicators*

a) Felt sad or hopeless: ever felt sad or hopeless almost every day for two weeks or more in a row that one stopped doing some usual activities in the past 12 months

b) Suicidality included 4 items: a) during the past twelve months did you ever seriously consider attempting suicide, b) during the past twelve months did you make a suicidal plan, c) during the past twelve months did you actually attempt suicide, Suicidal tempt required medical attention, d) during the past twelve months did suicide attempts resulted in an injury, poisoning or overdose that had to be treated by a doctor or nurse

C. *Sociodemographic Variables*

1. Age: Completed years of age as reported by the students

2. Gender: Gender of the students as reported by the students

3. Race/ethnicity: Race/ethnicity as reported by the students. This included Caucasian, African American, Hispanic, multiple and other race includes—Native Asian, Native Hawaiian, and Pacific Islander

4. Metropolitan Status: In the National YRBS data (2003), students were classified as Urban, Suburban, or Rural based on the location of the school attended by that student. The definitions used by YRBS (2003) were as follows:

    a) Urban: School was located inside a Metropolitan Statistical area (MSA) and inside the "central city."

    b) Suburban: School was located inside an MSA, but outside the "central city."

    c) Rural: School was located outside an MSA. The coding for a particular school was determined from census data linked to the school's location during processing.

Study Population

For this study, there were a total of 15,214 students (48.6% female and 51.4% male) who completed the 2003 national YRBS survey.

Computation of the Study Variables

Coding of study variables was done in SPSS (SPSS Inc, 2006, version 14.0).

A. Outcome Variables: Sexual behaviors were coded as follows:

1. *Lifetime Variables*

    a) Ever had sex: No=0, yes =1.

    b) Multiple sexual partners: Never had sex=0; single partner=1, multiple partner=2.

2. *Past Three Month Variables*

a) Alcohol/drug use before sex: No=0, Yes=1.

b) Condom nonuse: No=1, Yes=0 .

3. Age of initiation: 13 or younger=4, 14 yrs=3 15yrs=2, 16 yrs and older=1.

B. Predictor Variables

1. *Alcohol Variables*

a) Lifetime use of alcohol: Yes=1, No=2.

b) Drinking type: Combined two items based on their alcohol use pattern in the past 30 day—a) On how many days did you have at least one drink. Response categories included number of days: 0, 1 or 2, 3-5, 6-9, 10-19, 20-29, and all 30 days; b) On how many days did you have five or more alcoholic drinks? Response categories included number of days: current and episodic drinking. Responses were 0, 1 or 2, 3-5, 6-9, 10-19, 20-or more days. These two items were cross-tabulated to determine students drinking pattern then placed in one three categories: never drank, drank 3+ days but not 5 or more drinks at any time within two hour period (non episodic), and episodic (drank one or more times, five or more drinks at any time within a two-hour period); drinking plus episodic drinking=1, drinking but not episodic drinking=2, never drank=3.

c) Age of initiation: (Categorical: 15 years and older=1, 13-14 years=2, 11-12 years=3, less than 10 years=4).

2. Drug Use

a) Any drug use: Combined lifetime use of marijuana, cocaine, and injecting any illegal drugs into body: A positive response to any of these items was coded yes=1 and no=2.

3. Mental Health Indicators (past twelve *months)*

a) Felt sad and hopeless: Yes=1, No=2.

b) Suicidality: Combined 4 items on suicide that have happened in the past 12 months: a) Did you ever consider attempting suicide? Responses were yes or no; b) Did you make a plan about how you would attempt suicide? Responses were yes or no; c) How many times did you actually attempt suicide? Responses were 0, 1, 2-3, 4-5, and 6 or more times; d) Did any attempt result in an injury, poisoning, or overdose that had to be treated by a doctor or nurse? Responses included: did not attempt suicide in the past 12 months, yes, and no. A positive response to any of these was coded yes=1, no=2.

C. Sociodemographic Variables

1. Age: (Categorical: 15 years and older=1, 13-14 years=2, 11-12 years=3, less than 10 years=4).
2. Gender: (Dichotomous: Female=1, Male=2).
3. Metro status: (Categorical: Urban=1, suburban=2, rural =3).

4. Race/ethnicity: (Categorical: mixed & other race (Ame. Indian, Native Asian, Native Hawaiian, Pacific Islander, Multiple Hispanic, Multiple Non-Hispanics=1, African American=2, Hispanic =3, Caucasian=4).

Data Analysis

For coding and manipulating data, SPSS (2006) version 14.0 was used. Due to the multiclustered sampling design of the YRBS data, SUDAAN software (Research Triangle Institute [RTI], 2006) was used to adjust the standard errors (Naimi et al., 2003). A weighting factor was applied to each student record to adjust for nonresponse and varying probabilities of sampling selection, including those resulting from oversampling of African American and Hispanic students.

The first level of data analyses: To describe and summarize sample population, descriptive Statistics (frequencies, percentages, means) and univariate analyses were computed for risky sexual behaviors, alcohol, drug use, mental health indicators, and demographic variables (age, gender, race, and metro status).

Bivariate Association

Cross-tabulations were conducted on items covering outcome and predictor variables by gender, ethnicity, and metro status. To determine if the variables were associated, chi-square was used for three constructs (alcohol, drug use, and mental health indicators) and five risky sexual behaviors (ever had sex, having sex with multiple partners in one's life time, using alcohol and/or drugs before sex, condom nonuse, and age of initiation) since all of them were categorical. The statistical significance of these

bivariate associations was tested with α set at the .05 level to compare relative proportions of rural, suburban, and urban students engaging in specific risk behavior.

The second level analyses: To determine which of these three sets of predictor factors a) alcohol use, b) drug use, c) mental health indicators (felt sad and hopeless, and suicidality) predicted each of risky sexual behaviors, logistic regression for dichotomous (ever had sex, alcohol/drug use before sex, and condom nonuse) and multinomial regression (multiple sexual partners) were utilized. The four logistic regression models were as follows:

1. Ever had sex = alcohol use, drug use, and mental health indicators.

2 Having multiple sexual partners in one's life = alcohol use, drug use, mental health indicators, and age of initiation.

2. Using alcohol and/drug use before sex = alcohol use, drug use, and mental health indicators.
3. Condom Nonuse = alcohol use, drug use, and mental health indicators.

The outcome variables were risky sexual behaviors and predictor variables included alcohol use, drug use, and mental health indicators. Demographic background variables included gender, race, and ethnicity. Odds ratios and 95% confidence intervals (CIs) were examined to arrive at the magnitude of effects and the significance ($p< 0.05$ level) of the above variables. Count and proportion (in percent) were presented in tables by study variable (gender, race/ethnicity, and metro status) where applicable.

For logistic regression, both outcome and predictor variables were categorical except age and age of alcohol initiation. Groups that were less likely to be at risk were chosen as reference groups. For the outcome variables (risky sexual behavior) ever had sex, having multiple sexual partners in one' life, using alcohol and /drug before sex, condom nonuse- the reference groups were never had sex, not having multiple sexual partners in ones' life, not using alcohol and /drug before sex, and not using condoms. For the predictor variables: alcohol use, drug use, felt sad and hopeless, and suicidality - the reference groups were never drank alcohol, never used drug, not feeling sad or hopeless, and no suicidality. For age of initiation variables- reference group was the youngest age group.

CHAPTER IV

RESULTS

Understanding risky sexual behaviors and factors affecting these behaviors was crucial in reducing the risk of contracting HIV infection. This study sought to explore prevalence of sexual activity among high school students, drinking and drug use behaviors, perceived depressed mood, and suicidality among adolescents across gender, race/ethnicity, and metro status and how these variables may be interrelated as well as associated with risky sexual behaviors. The sample included 15, 214 high school students in the United States in 2003. The findings presented in the tables are weighted percentages and the Ns provided were unweighted sample size.

A. Demographic Variables

The sociodemographic characteristics of all adolescents are shown in Table 1. The mean age of adolescents was 16.16 (SE=1.23) and ranged between 12-to-18 years and older. The sample consisted of 51.4% of male and 48.6% female adolescents. The majority were Caucasian (61.4%) followed by Hispanic (14.2%), African American (13.9%), and Mixed & other races (10.6%).

The sociodemographic characteristics of adolescents across three metro areas illustrated that the distribution of male and female adolescents was similar. Overall, the

Table 1

Sociodemographic Characteristics of Adolescents by Metro Status, YRBS, 2003

Lifetime alcohol	Total population	Urban	Suburban	Rural	$\chi^2_{(df)}$
	100.00 % (N=15,214)	27.0% (N= 5793)	50.6% (N=7027)	21.7% (N=2394)	
Gender					
Female	48.59 (7544)	48.13 (2789)	48.26 (3479)	49.95 (1276)	
Male	51.41 (7598)	51.87 (2968)	51.74 (3521)	50.05 (1109)	$2.36_{(2)}$NS
Age					
14 years old	12.52 (1478)	13.05 (569)	13.65 (705)	9.21 (204)	
15 years old	25.45 (3410)	26.82 (1335)	25.23 (1535)	24.22 (540)	
16 years old	26.21 (3892)	26.28 (1459)	26.38 (1819)	21.28 (614)	$21.88_{(8)}$*
17 years old	23.31 (3974)	21.66 (1464)	22.93 (1875)	26.30 (635)	
18 years old and older	12.52 (2410)	12.20 (940)	11.81 (1074)	14.58 (396)	
Race/ethnicity					
Caucasian	61.37 (6585)	35.09 (1476)	66.80 (3558)	82.11 (1551)	
African American	13.87 (3590)	26.17 (1821)	10.06 (1288)	7.13 (481)	
Hispanic	14.16 (3547)	24.58 (1778)	12.80 (1547)	4.11 (222)	$46.60_{(6)}$***
Mixed & other race	10.60 (1374)	14.17 (656)	10.35 (590)	6.65 (128)	
Grade level					
9th	29.44 (3674)	32.74 (1448)	29.53 (1644)	25.03 (582)	
10th	26.13 (3770)	25.94 (1408)	25.90 (1740)	26.90 (622)	$25.6_{(6)}$**
11th	23.38 (3810)	22.39 (1475)	23.53 (1759)	24.30 (576)	
12th	21.05 (3864)	18.94 (1419)	21.05 (1840)	23.77 (605)	

* p<0.05; ** p<0.01; *** p<.001; NS-Not Significant

percentage distribution of male adolescents (51.4%) was slightly higher than female adolescents (48.6%) in all the areas but similar across gender and metro status. A large majority of adolescents were in the age range of 15 to 17 years in urban and suburban areas compared to rural area and there was a significant association between age of the adolescents and metro status. Approximately 82% and 63% of rural and suburban adolescents respectively were Caucasian. In urban area, there were 26% African American, 25% Hispanic and 14% mixed & other race adolescents. Mixed & other race adolescents were found mainly in urban and suburban areas. The association between racial/ethnic composition of adolescents and metro areas was found statistically significant (χ^2 = 46.60, P < 0.001). The percentage of adolescents decreases as the grade level increases across three levels of the metro areas. A significant association between the grade level (9^{th}-12^{th}) of students and metro status (χ^2 = 25.61, P < 0.01) was the results.

B. Research Hypotheses

The present study examined the differences in the prevalence of HIV-related sexual risk behaviors across gender, race/ethnicity, and metro status and within three metro areas across gender and race/ethnicity. The study included four primary and 4four secondary hypotheses.

1. Primary Hypotheses

The prevalence of sexual behaviors among the study population across gender, and race/ethnicity, metro status are presented in Table 2-4. These tables presented the proportion along with the chi-square and associated p values for both and outcome

predictor variables across metro areas. The first primary hypotheses were that sexual behaviors would be more common in rural adolescents.

PH_1: Rural adolescents were more likely to engage in sexual behaviors (initiating sex at younger age, having multiple partners, use alcohol use before sex, and not using condoms) than suburban and urban adolescents.

With regard to having multiple sexual partners in one's lifetime, the results (Table 2) showed its statistically significant association with metro status. A higher percentage of urban adolescents (34.9%) had multiple sexual partners than rural (27.6%) and suburban (26.5%). Little less than one-fifth of suburban adolescents had single sexual partners compared to 16% of urban adolescents who had single sexual partners. The association between metro status and number of sexual partners was significant ($X^2_{(4)}=17.12, P<0.01$) but the direction of association was opposite to the research hypotheses.

The suburban adolescents (25.3%) were more likely to use alcohol/drug before the last sexual activity than urban adolescents (20.6%). A significant association was found between alcohol/drug use before sex and metro status ($X^2_{(2)}=8.26, P=0.02$).

The results of this study found a significant association between age of sexual initiation of adolescents and metro status. Of urban adolescents, 35.9% initiated sex at age 13 or younger compared to23.9% of urban adolescents whereas of the rural 34.5% initiated sex at the age of 16 years or older compared to 26% of urban adolescents. The association was highly significant ($X^2_{(6)}= 43.27, P<0.001$), but the direction of the association was opposite to the research hypothesis. Adolescents who did not use

condoms during their last time sexual activity were similar across metro status (rural (37.2%), suburban (34.1%), and urban (31.8%), ($X^2_{(2)}$=3.63, P=0.14)). The percentage of adolescents ever having had sex was not similar across three levels of metro areas. In age category 16 years and older, more rural adolescents (34.5%) compared to urban adolescents (25.7%) initiated sexual activity.

The second primary hypothesis was that alcohol use was more common in rural adolescents. Except for ever had alcohol indicator of alcohol use, there was significant difference among three metro areas.

PH_2: Rural adolescents were more likely to engage in alcohol (ever had a drink, age of alcohol initiation, drinking types (drinker only, drinker plus episodic drinker)) than suburban and urban adolescents.

Overall, 28% of adolescents identified themselves as both drinkers and episodic drinkers. A higher percentage of suburban adolescents (30.6%) were drinkers plus episodic drinkers than urban (23.4%) and rural (22.5%) adolescents (Table 3). Nearly 18% of urban adolescents reported as drinkers only compared to 13.6% rural adolescents ($X^2_{(4)}$=23.40, P<0.001). The alcohol initiation, in age 13-34 years varied significantly between rural (37.1%), and urban areas (23.8%) ($X^2_{(6)}$=27.74, P<0.001). Around 30% of urban adolescents reported imitating alcohol at age 15 years and older. The association between drinking types, age of alcohol initiation and metro status was highly significant but the direction of association was opposite to the research hypothesis.

In addition to alcohol use, the survey allowed an examination of relationship of drug use and metro status in general. Respondents were asked about their use of marijuana, cocaine and IDU over lifetime.

PH_3: Rural adolescents were more likely to engage in drugs use (marijuana, Cocaine, and IDU) than suburban and urban adolescents.

Overall, 43% adolescents reported having used any drug in their lifetime ((Table 4). The prevalence of any drug use was similar across the three metro areas (rural (42.3%), suburban (41.7%), and urban (45.7%))($X^2_{(2)}=1.33, P=0.519$). Therefore, the results failed to support the study hypothesis regarding drug use by rural adolescents.

PH_4: Rural adolescents were more likely to report having mental health aspects such as depression and suicidality compared to suburban and urban adolescents.

Overall, 28% adolescents reported feeling sad or hopeless during the past twelve months. The percentage of rural (27.7%), suburban (29.4%), and urban (28.1%) adolescents who felt sad and depressed during the past twelve months was similar across three metro areas ($X^2_{(2)}=0.42, P=0.811$). There was no significant difference in the percentage of rural (28.8%), urban (28.9%), and suburban (22.8%) adolescents who thought of or attempted suicide during the past twelve months ($X^2_{(2)}=2.17, P=0.346$). Therefore, there was no association between mental health indicators and metro status.

2. Secondry Hypotheses

In addition to primary hypotheses, the study also tested four secondary hypotheses in order understand prevalence of risk behaviors across specific race/ethnicity and gender.

SH_1: Rural African American male and female adolescents were more likely to engage in sexual behaviors (initiating sex at younger age, having multiple partners, use alcohol/drug before sex, and not using condoms) than suburban and urban African American male and female adolescents.

Urban African American male (47.9%) and female (42.9%) adolescents were more likely to initiate having sex at 13 or younger than suburban African American male (23.0%) and female (18.5%) students and rural African American male (22.7%) and female (14.7%) students (Table 5). The association between age of sexual activity initiation among males and female and metro status was highly significant (male: $X^2_{(9)}=109$, $P<0.001$; female: $X^2_{(9)}=73.47$, $p<0.001$)., In fact, 23.9% and 24.4% more urban African American male and female adolescents respectively than urban African American male and female adolescents had at least one drink in lifetime. The results of the study failed to support the hypothesis.

Rural African American male (11.9%) and female (5.8%) were less likely to use alcohol/drug before the last sexual activity than suburban American male (8.3%) and female (8.3%) and urban African American male (20.1%) and female (29.3 %) students (Table5). The association between using alcohol/drug before the last sex among males and females across metro status, and race/ethnicity was highly significant

Table 2

Sexual Behaviors of Adolescents by Metro Status, YRBS, 2003

	Total Population % (n)	Urban % (n)	Suburban % (n)	Rural % (n)	χ^2 Value (df)
Sexual behaviors					
Ever had sex					
Total	N=(13224)	N=(5315)	N=(5994)	N=(1915)	
Yes	46.68(7019)	50.49 (2946)	45.02 (3085)	45.51 (988)	$2.80_{(2)}$ NS
No	53.32 (6205)	49.51 (2369)	54.98 (2909)	54.49 (927)	
Number of partners					
Total	N=(13188)	N=(5299)	N=(5975)	N=(1914)	
Multiple partner	29.08 (4654)	34.86 (2022)	26.47 (1978)	27.58 (654)	$17.12_{(4)}$*
Single partner	17.48 (2326)	15.63 (907)	18.32 (1086)	17.95 (333)	
Never had sex	53.44 (6208)	49.51 (2370)	55.22 (2911)	54.47 (927)	
Alcohol/drug use before last sex					
Total	N=(7009)	N=(2947)	N=(3074)	N=(988)	
Yes	23.70 (1610)	20.60 (592)	25.29 (777)	24.62 (241)	$8.25_{(2)}$*
No	76.30 (5399)	79.40 (2355)	74.71 (2297)	75.38 (747)	
Condom Nonuse					
Total	N=(6875)	N=(2877)	N=(3025)	N=(973)	
Used	66.01 (1933)	68.18 (1933)	65.88 (1989)	62.82 (620)	$3.63_{(2)}$NS
Did not use	33.99 (2333)	31.82 (944)	34.12 (1036)	37.18 (353)	
Age of sexual initiation					
Total	N=(7003)	N=(2940)	N=3075	N=(988)	
≤13 yrs	28.64 (2103)	35.91 (957)	25.91 (868)	23.91 (278)	
14 yrs	20.44 (1385)	20.89 (615)	20.90 (587)	16.83 (183)	$43.27_{(6)}$***
15 yrs	23.80 (1622)	20.68 (633)	25.95 (752)	18.13 (237)	
16 yrs & older	27.12 (1893)	22.52 (735)	27.23 (868)	34.50 (290)	

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.0$; NS- Non Significant

Table 3

Alcohol Use by Metro Status, YRBS, 2003

	Total Population n (%)	Urban n (%)	Suburban n (%)	Rural n (%)	$\chi^2_{(df)}$
Alcohol use					
Ever had alcohol					
Total	N=(13587)	N=(5098)	N=(6406)	N=(2089)	
Yes	74.94 (10496)	71.90 (3859)	76.98 (5074)	73.79 (1563)	$1.96_{(2)}$ NS
No	25.06 (3091)	28.10(1233)	23.02 (1332)	26.21 (526)	
Drinking type					
Total	N=(14114)	N=(5347)	N=(6676)	N=(2091)	
Drinker plus an episodic drinker	28.83 (4054)	23.44 (1308)	30.56 (2096)	22.47 (650)	$23.40_{(4)}$ **
Drinker only	16.04 (2489)	18.06 (1046)	15.96 (1130)	13.58 (313)	
Never had alcohol	55.12 (7571)	58.50 (2993)	53.54 (3450)	53.54 (1128)	
Age of alcohol initiation					
Total	N=(10615)	N=(3905)	N=(5133)	N=(1577)	
≤12 yrs	19.83 (2138)	21.82 (842)	19.27 (1006)	18.80 (290)	
12-11 yrs	17.00 (1697)	15.64 (586)	17.90 (869)	16.36 (242)	$27.74_{(6)}$ ***
13-14 yrs	34.78 (3471)	32.25 (1213)	35.09 (1687)	37.10 (571)	
15 yrs & older	28.39 (3309)	30.30 (1264)	27.73 (1571)	27.74 (474)	

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; NS- Non Significant

Table 4

Drug Use and Mental Health Indicators by Metro Status, YRBS, 2003

	Total Population n (%)	Urban n (%)	Suburban n (%)	Rural n (%)	$\chi^2_{(df)}$
Drug use					
Any drug use					
Total	N=(14694)	N=(5589)	N=(6898)	N=(2207)	
Yes	42.92 (6579)	45.70 (2602)	41.70 (3052)	42.31 (925)	$1.33_{(2)}$NS
No	57.08 (8115)	54.30 (2987)	58.30 (3846)	57.69 (1282)	
Mental Health Indicator					
Feel sad or depressed					
Total	N=(14918)	N=(5748)	N=(6990)	N=(2180)	
Yes	28.60 (4405)	28.08 (1689)	29.24 (2088)	27.68 (620)	$.42_{(2)}$NS
No	71.40 (10513)	71.92 (4059)	70.76 (4902)	72.32 (1552)	
Suicidality					
Total	N=13451)	N=(4981)	N=(6301)	N=(2169)	
At suicidal risk	25.78 (3240)	28.97 (1247)	22.80 (1400)	28.80 (593)	$2.18_{(2)}$NS
Not at suicidal risk	74.22 (10211)	71.03 (3734)	77.20 (4901)	71.20 (1576)	

*$p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; NS- Non Significant

(male: $X^2_{(3)}$ =11.97, P<0.01; female: $X^2_{(3)}$ =26.19, p<0.001). In fact, 8.2% and 23.5% more urban African American male and female adolescents respectively than rural African American male and female adolescents used alcohol/drug before the last sex. The results of the study were in the opposite direction of the research hypothesis.

Rural African American male (16.2%) and female (15.5%) adolescents were less likely to have had multiple sexual partners than suburban American male (14.8%) and female (12.9%) and urban African American male (40.7%) and female (37.1%) students. The association between having multiple sexual partners and metro status across gender and race/ethnicity was highly significant (male: $X^2_{(6)}$ =96.8, P<0.001; female: $X^2_{(6)}$ =64.03, p<0.001) but the direction of association was opposite to the research hypothesis. In fact, 24.5% and 21.4% of more urban African American male and female adolescents respectively than rural African American male and female adolescents have had multiple sexual partners.

Rural African American male (7.6%) and female (8.8%) adolescents were less likely to report condom use during the last sex than suburban African American male (7.5%) and female (9.2%) and urban African American male (16.7%) and female (28.1%). The association between condom nonuse and metro status across gender and race/ethnicity was highly significant (male: X2 (3) =30.7, P<0.001; female: X2 (3) =16.8, p<0.01) but the results of the study indicated an opposite direction of the association. In fact, 9.1% and 19.3% more urban African American male and female adolescents respectively than rural African American male and female adolescents did not use condoms during their last sex.

SH_2: Rural Caucasian male and female adolescents were more likely to engage in alcohol use (ever had a drink, age of alcohol initiation at younger age, and drink type) than suburban and urban Caucasian ethnic male and female adolescents.

Rural Caucasian male (79.4%) and female (83.8%) adolescents were more likely to drink at least one drink in their lifetime than suburban Caucasian male (69.6%) and female (67.0%), urban Caucasian male (38.8%) and female (33.8%) students (Table 6). The association between ever had a drink and metro status across gender and race/ethnicity was highly significant (male: $X^2_{(3)}=17.94$, P=0.002; female: $X^2_{(3)}=8.58$, p=0.049) but the direction of the association was opposite to the research hypothesis. In fact, 40.6% and 50.0% more rural Caucasian male and female adolescents respectively than urban Caucasian male and female adolescents have had at least one drink in lifetime.

The results of the study indicated that there was an association between age of alcohol initiation and metro status. Rural Caucasian male (73.1%) and female (72.8%) adolescents were more likely to initiate drinking at age10 or younger than suburban Caucasian male (61.3%) and female (60.0%), and urban Caucasian male (26.2%) and female (26.5%). The association between age of alcohol initiation and metro status across gender and race/ethnicity was highly significant (male: $X^2_{(9)}=44.88$, P<0.001; female: $X^2_{(9)}=66.18$, p<0.001) The results of the study support the hypothesis. In fact, 46.9% and 46.3% of rural Caucasian male and female adolescents respectively than urban Caucasian male and female adolescents had at least one drink in lifetime.

Rural Caucasian male (82.2%) and female (83.9%) adolescents were more likely to be drinkers plus episodic drinkers in lifetime than suburban Caucasian male (72.9%) and female (74.4%), urban Caucasian male (48.8%) and female (43.9%). The association between drinking type and metro status across gender and race/ethnicity was highly significant (male: $X^2_{(3)}=52.25, P<0.001$; female: $X^2_{(3)}=50.27, p<0.001$) and the results of the study support the research hypothesis. In fact, 33.4% and 40.0% rural Caucasian male and female adolescents respectively than urban Caucasian male and female adolescents reported to be drinkers plus episodic drinker

SH_3: Rural Hispanic male and female adolescents were more likely to engage in drug use than suburban and urban Hispanic male and female adolescents.

There was a significant difference in the percentage of rural Hispanic male (6.6%), suburban Hispanic male (13.6%), and urban Hispanic male (26.6%) adolescents who used any drug in their lifetime (Table 7). And the association between drug use and metro status across gender and race/ethnicity was moderately significant (male: $X^2_{(3)}=10.32, P=0.025$; female: $X^2_{(3)}=6.73, P=0.09$) but the direction of association was opposite to the research hypothesis. In fact, 20% more urban Hispanic male adolescents than rural Hispanic adolescents used any type of drug in their lifetime.

SH_4: Rural Hispanic male and female adolescents were more likely to report having mental health indicators (felt sad and hopeless, and suicidality) than suburban and urban Hispanic male and female adolescents.

Urban Hispanic male (25.5%) and female (28.7%) adolescents were likely to report feeling sad and hopeless than rural Hispanic male (9.5%) and female (4.8%) and

suburban Hispanic male (15.1%) and female (18.3%) students (male: $X^2_{(3)}=26.67$, $p<0.001$; female: $X^2_{(3)}=19.30$, $p<0.001$). The association between felt sad and hopeless and metro status across gender and race/ethnicity was highly significant (male: $X^2_{(3)}=26.68$, $P<0.001$) but the results of the study indicated direction of association opposite to the research hypothesis. In fact, 15% and 23.9% more urban Hispanic male and female adolescents respectively than rural Hispanic male and female adolescents felt sad and hopeless (Table 7).

Urban Hispanic male (26.9%) and female (22.5%) adolescents were more likely to report having thought/attempted suicide than rural Hispanic male (8.4%) and female (3.2%) suburban Hispanic male (11.6%) and female (15.18%) students. The association between suicidality and metro status was highly significant (male: $X^2_{(3)}=9.95$, $P<0.029$; female: $X^2_{(3)}=23.55$, $p<0.001$) but the results failed to support the research hypothesis due to inverse association. In fact, 18.5% and 19.3% more urban Hispanic male and female adolescents respectively than rural Hispanic male and female adolescents felt sad and hopeless.

C. Outcome and Predictor variables by Gender and Race/ethnicity

1. Sexual Behaviors by Gender and Race/Ethnicity

Male adolescents (31.4%) (Table 8) were more likely to report having had multiple sexual partners compared to female adolescents (26.4%). Female adolescents were more likely to report having had single sexual partners compared to male adolescents ($\chi^2=29.0$, $p = 0.001$). A significant association was observed between use of alcohol/drug before last sex and gender ($\chi^2 = 10.8$, $p = 0.01$). Results showed a

significant difference across gender for condom nonuse during the last time the adolescents have had sex (χ^2 = 62.3, p = 0.001). More male adolescents (36.6%) initiated sexual activity before age 13 years while more female adolescents (29.1%) initiated sexual activity at age 16 years and older (χ^2=128.4, p <0.001). Gender difference was not obtained for ever having sex among adolescents across metro status.

The data presented in Table 9 illustrate that significant association existed between race/ethnicity and sexual behavior. Overall, more Caucasian adolescents were involved in sexual activities than other minority groups. African American adolescents were more likely to report ever having sex compared to Hispanic, mixed & other race, and Caucasian adolescents (χ^2=82.915, p<0.001). Similar results were found with having number of sexual partners among four racial/ethnic groups (χ^2=94.804, p<0.001). Caucasian and mixed & other race adolescents were more likely to report having used alcohol/drug before the last sex compared to Hispanic and African American adolescents (χ^2=2.5.586, p<0.001). Among all the racial/ethnic groups, Hispanic (40.38%) and mixed and mixed & other race (38.2%) adolescents were more likely to report condom nonuse compared to Caucasian (34.2%) adolescents (χ^2=34.875, p<0.001). Overall, the initiation of sexual activity in the study population was occurred before age of 13 years or younger. African American (46.4%), mixed & other race (38.5), and Hispanic (31.3%) were more likely to report having initiated sex before age 13 years than Hispanic (31.3%) and Caucasian (19.8%) (χ^2=146.2, p<0.001).

Table 5

Ever had sex by Metro status, Race/Ethnicity (African American), and Gender, YRBS 2003

	Total Population African American			Urban African American			Suburban African American			Rural African American			$X^2_{(df)}$
	Total N	Female % (n)	Male % (n)	Total N	Female % (n)	Male % (n)	Total N	Female % (n)	Male % (n)	Total N	Female % (n)	Male % (n)	
Ever had sex													
Total	N=(2910)	N=1585	N=1325	N=(1682)	N=(923)	N=(759)	N=(873)	N=451	N=422	N=(355)	N=211	N=144	
Yes	18.63 (2088)	60.87 1034)	73.83 (1054)	65.28 (1157)	57.74 (566)	73.54 (591)	69.39 (668)	63.52 (320)	74.99 (348)	71.60 (263)	71.11 (148)	72.10 (115)	$47.83_{(3)}$***
No	7.96(822)	39.13 (551)	26.17 (271)	34.72 (525)	42.26 (157)	26.46 (168)	30.61(205)	36.48 (131)	25.01 (74)	28.40(92)	28.89 (63)	27.90 (29)	$78.66_{(3)}$***
Number of partners													
Total	N=(2879)	N=1570	N=1309	N=(1669)	N=(917)	N=(752)	N=(858)	N=444	N=414	N=(352)	N=209	N=143	
Multiple partner	1.76(1601)	42.28(700)	61.77 (901)	50.72 (883)	39.22 (373)	63.41 (510)	51.19 (511)	44.09 (222)	58.51 (289)	58.29 (207)	54.53 (105)	62.15 (102)	$64.03_{(6)}$***
Single partner	14.99 (455)	18.22 (319)	11.59 (136)	14.33 (260)	18.25 (186)	10.01 (74)	17.03(142)	18.85 (92)	15.25 (50)	13.71 (53)	16.42 (41)	9.04 (12)	$96.76_{(6)}$***
Never had sex	33.24(823)	39.50 (551)	26.64 (272)	34.94 (526)	42.53 (58)	1168 (168)	31.58 (205)	37.06 (130)	26.24 (75)	28.54 (92)	29.05 (63)	28.01(29)	
Alcohol/drug use before last sex													
Total	N=(2080)	N=1033	N=(1047)	N=(1157)	N=(566)	N=(591)	N=(662)	N=119	N=343	N=(261)	N=148	N=113	
Yes	83.39 (1747)	87.48 (918)	79.86 (829)	84.98 (981)	88.99 (508)	81.53 (473)	81.40 (551)	83.89 (277)	79.36 (274)	80.79 (215)	88.98 (133)	72.43 (82)	$26.18_{(3)}$***
No	16.61(333)	12.52 (115)	20.14 (218)	15.02 (176)	11.01 (58)	18.47 (118)	18.60 (111)	16.11 (42)	20.64 (69)	19.21 (46)	11.02 (15)	27.57(31)	$11.97_{(3)}$*
Condom Nonuse													
Total	N=(2033)	N=(1023)	N=(1010)	N=(1157)	N=(566)	N=(591)	N=(654)	N=318	N=336	N=(1128)	N=557	N=137	$16.85_{(3)}$*
Used	74.41(1482)	67.74 (677)	80.31 (805)	84.98 (981)	88.99 (508)	81.53 (473)	74.26 (466)	66.04 (205)	81.18 (261)	74.80 (837)	68.35 (374)	61.15 (92)	$30.70_{(3)}$***
Did not use	25.59 (551)	32.26 (346)	19.49 (205)	15.02 (176)	11.01 (58)	18.47 (118)	25.74 (188)	33.96 (113)	18.82 (75)	25.20 (291)	31.65 (183)	38.85 (45)	
Age of initiation of sex													
Total	N=(2079)	N=(1033)	N=(1046)	N=(1153)	N=(566)	N=(587)	N=(665)	N=(320)	N=(345)	N=(261)	N=(147)	N=(114)	
≤13yrs	30.31(912)	24.27(262)	33.34(650)	46.56(491)	42.99(122)	47.92(369)	19.68(305)	14.72(96)	22.72(209)	21.28(116)	18.05(44)	23.00(72)	$73.47_{(9)}$***
14 yrs	19.63(399)	22.05(245)	16.64(154)	36.47(236)	39.10(145)	32.95(91)	11.82(117)	13.65(70)	9.72(47)	12.17(46)	14.37(30)	9.18(16)	$109.9_{(9)}$***
15 yrs	16.13(392)	13.53(256)	11.36(136)	26.11(215)	31.24(143)	19.99(72)	7.54(134)	7.06(82)	8.15(52)	7.75(43)	7.91(31)	7.52(12)	
16 yrs & older	15.77(376)	14.47(270)	6.78(106)	21.44(211)	26.84(156)	13.61(55)	6.84(109)	8.69(72)	11.32(37)	7.42(56)	10.52(42)	4.55(14)	

*$p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; NS- Non Significant

Table 6

Alcohol Use by Metro status, Race/Ethnicity (Caucasian), and Gender, YRBS 2003

	Total Population			Urban			Suburban			Rural			
		Caucasian			Caucasian			Caucasian			African American		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	
	N	% (n)	% (n)	N	% (n)	% (n)	N	% (n)	% (n)	N	% (n)	% (n)	$X^2_{(df)}$
Ever had alcohol													
Total	N=(5999)	N=(2940)	N=(3059)	N=(1330)	N=(573)	N=(1367)	N=(757)	N=(1639)	N=(1663)	N=(1367)	N=(728)	N=(639)	
	75.43	76.65	74.28	72.18	71.42	72.79	72.86	79.58	75.89	72.79	73.87	71.68	
Yes	(4663)	(2299)	(2364)	(1026)	(438)	(1002)	(588)	(1325)	(1310)	(1310)	(536)	(466)	
	24.57	23.35	25.72	27.82	28.58	27.21	27.14	20.42	24.11	27.21	26.13	28.32	$17.94_{(3)}$**
No	(1336)	(641)	(695)	(304)	(135)	(365)	(169)	(314)	(353)	(365)	(192)	(173)	
													$8.58_{(3)}$ *
Drinking type													
Total	N=(6175)	=(3026)	N=(3149)	N=(1390)	N=(596)	N=(794)	N=(3446)	N=(1709)	N=(1737)	N=(1339)	N=(721)	N=(618)	
Drinker plus an	72.79	32.06	32.80	30.10	28.68	31.39	33.23	34.17	32.37	32.13	29.75	34.65	
episodic drinker	(2107)	(992)	(1115)	(465)	(188)	(277)	(1198)	(583)	(615)	(444)	(221)	(223)	
Drinker only	27.21	16.32	13.03	16.78	17.77	15.87	14.81	16.55	13.25	13.01	15.10	10.79	$50.27_{(6)}$***
	(974)	(527)	(447)	(249)	(109)	(140)	541)	(306)	(235)	(184)	(112)	(72)	
Never had													$52.25_{(6)}$***
alcohol	52.93	51.62	54.17	53.12	53.55	52.74	51.96	49.27	54.38	54.86	55.15	54.56	
	(3094)	(1507)	(1587)	(676)	(299)	(377)	(1707)	(820)	(887)	(711)	(388)	(323)	
Age of initiation													
Of alcohol	N=(10527)	N=(2313)	N=(2373)	N=(1030)	N=(438)	N=(592)	N=(2650)	N=(1333)	N=(1317)	N=(1006)	N=(542)	N=(464)	
Total	53.61	51.52	54.86	26.30	26.46	26.18	60.86	60.00	61.12	72.99	72.79	73.10	
≤10 yrs	(799)	(304)	(495)	(180)	(70)	(110)	(455)	(172)	(283)	(164)	(62)	(102)	
	62.61	60.55	64.32	35.46	28.74	41.12	67.60	66.43	68.58	80.39	82,21	78.97	$66.18_{(9)}$***
12-11 yrs	(782)	(353)	(429)	(161)	(58)	(103)	(465)	(226)	(239)	(156)	(69)	(87)	
	67.25	66.56	68.11	38.31	34.64	42.40	71.71	70.39	73.43	86.95	88.29	85.14	$44.88_{(9)}$***
13-14 yrs	(1702)	(917)	(785)	(352)	(156)	(196)	(953)	(523)	(430)	(397)	(238)	(159)	
	63.57	61.98	65.42	40.96	38.65	43.76	68.73	65.88	71.89	80.47	83.27	77.01	
15 yrs & older	(1403)	(739)	(664)	(337)	(154)	(183)	(777)	(412)	(365)	(289)	(173)	(116)	

*$p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; NS- Non Significant

Table 7

Drug Use and Mental Health Indicators by Metro status, Race/Ethnicity (Hispanics), and Gender, YRBS 2003

	Total Population Hispanics			Urban Hispanics			Suburban Hispanics			Rural Hispanics			
	Total N	Female % (n)	Male % (n)	Total N	Female % (n)	Male % (n)	Total N	Female % (n)	Male % (n)	Total N	Female % (n)	Male % (n)	X^2 (df)
Drug use													
Any drug use													
Total	N=(3460)	N=(1698)	N=(1768)	N=(1731)	N=(823)	N=(908)	N=(1518)	N=(763)	N=(755)	N=(211)	N=(106)	N=(105)	
	45.37	41.13	49.62	48.51	47.97	48.96	41.86	36.35	48.65	48.02	32.63	59.94	$6.73_{(3)}$NS
Yes	(1662)	(716)	(946)	(838)	(372)	(466)	(726)	(301)	(425)	(98)	(43)	(55)	$10.32_{(3)}$*
	54.63	58.87	50.38	51.49	52.03	51.04	58.14	63.65	51.35	51.98	67.37	40.16	
No	(1798)	(976)	(822)	(893)	(451)	(442)	(792)	(462)	(815)	(113)	(63)	(50)	
Mental Health Indicator													
Feel sad or depressed													
Total	N=(3518)	N=(1711)	N=(1807)	N=(1762)	N=(833)	N=(929)	N=(1537)	N=(768)	N=(769)	N=(219)	N=(110)	N=(109)	
Yes	35.21	44.74	25.88	31.06	43.89	20.60	38.88	45.76	30.42	40.07	41.97	38.62	
	(1142)	(699)	(443)	(548)	(339)	(209)	(518)	(313)	(205)	(76)	(47)	(29)	$19.30_{(3)}$***
No	64.79	55.26	74.12	68.94	56.11	79.40	61.12	54.24	69.58	59.93	58.03	61.38	$26.67_{(3)}$***
	(2376)	(1012)	(1364)	(1214)	(494)	(720)	(1019)	(455)	(564)	(143)	(63)	(80)	
Suicidality													
Total	N=(3024)	N=(1529)	N=(1495)	N=(1504)	N=(743)	N=(761)	N=(1343)	N=(694)	N=(649)	N=(177)	N=(92)	N=(85)	
At suicidal risk	30.44	34.51	26.19	34.27	41.32	28.04	25.47	29.11	20.78	38.70	32.18	43.65	
	(747)	(473)	(274)	(402)	(250)	(152)	(305)	(197)	(108)	(40)	(26)	(14)	$23.57_{(3)}$***
Not at suicidal	69.56	65.49	73.81	65.73	58.68	71.96	74.53	70.89	79.22	61.30	67.82	56.35	$9.95_{(3)}$ *
risk	(2277)	(1056)	(1221)	(1102)	(493)	(609)	(1038)	(497)	(541)	(137)	(66)	(71)	

*$p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$; NS- Non Significant

2. Alcohol, Drug Use and Mental Health Indicators by Gender and Race/ethnicity

Alcohol use variables include alcohol drinking during one's lifetime, age of initiation of alcohol drinking, drinking type (combined drinking in the past 30 days, episodic drinking). Tables 10-13 indicated the frequency of occurrence of alcohol, drug use, and mental health indicators in the study population across three metro areas, gender, and race/ethnicity. Results from contingency tables of each of dichotomous or categorical variables are presented with chi-square values.

The results given in Table 10 showed significant differences between male and female adolescents (76.1% vs. 74%) who ever had at least one drink during their lifetime (χ^2=6.23, p<0.05). Female adolescents were more likely to report having drinks but not heavy episodic drinks while male adolescents were more likely to involve in heavy episodic heavy drinking (χ^2=42.972, p<0.001). More female adolescents (39%) initiated alcohol drinking between age 13-14 than male adolescents in the age category (30.6%) (χ^2=99.02, p<0.001).

The data shown in Table 11 indicated that a large majority of Hispanic adolescents (79%) reported ever having had a drink compared to Caucasian (75.4%) and African American adolescents (71.4%) (χ^2=15.83, p<0.01). In drinking type, drinking only occurred more frequently among African American adolescents (21.8%) compared to mixed & other race (16.4%)and Hispanic (16.2%) adolescents. Caucasian (32.5%) adolescents were more likely to report drinking plus episodic drinking compared to Hispanic (28.2%) and mixed &

Table 8

Sexual Behaviors of Adolescents by Gender, YRBS, 2003

	Total Population % (n)	Female % (n)	Male % (n)	$\chi^2_{(df)}$
Sexual ehaviors				
Ever had sex				
Total	N=(13171)	N=(6642)	N=(6529)	
Yes	46.64 (6989)	45.27 (3343)	47.97 (3646)	$3.53_{(1)}$NS
No	53.36 (6182)	54.73 (3299)	52.03 (2883)	
Number of partners				
Total	N=(13132)	N=(6629)	N=(6503)	
Multiple partner	28.98 (4627)	26.44 (2034)	31.46 (2593)	
Single partner	17.53 (2321)	18.73 (1293)	16.35 (1028)	29.0***
Never had sex	53.49 (6184)	54.83 (3302)	52.19 (2882)	
Alcohol/drug use before last sex				
Total	N=(6977)	N=(3345)	N=(3632)	
Yes	23.65 (1599)	20.35 (616)	26.71 (983)	10.8**
No	76.35 (5378)	79.65 (2729)	73.29 (2649)	
Condom Nonuse				
Total	N=(6846)	N=(3306)	N=(3549)	
Used	66.01 (4524)	60.63 (1956)	71.04 (2568)	62.3***
Did not use	33.99 (2322)	39.37 (1350)	28.96 (972)	
Age of initiation of sex				
Total	N=(6972)	N=(3343)	N=(3629)	
≤13yrs	28.50 (2087)	19.80 (662)	36.58 (1425)	$128.43_{(3)}$ ***
14 yrs	20.51 (1381)	23.46 (745)	17.77 (636)	
15 yrs	23.76 (1614)	27.67 (929)	20.13 (685)	
16 yrs & older	27.23 (1890)	29.07 (1007)	25.52 (883)	

** $p \leq 0.01$; *** $p \leq 0.001$

Table 9

Sexual Behaviors of Adolescents by Race/Ethnicity, YRBS, 2003

	Total Population % (n)	Afr. Ame. % (n)	Hispanic % (n)	Caucasian % (n)	Mixed & other race % (n)	$\chi^2_{(df)}$
Sexual behaviors						
Ever had sex						
Total	N= (13136)	N=(2917)	N=(3287)	N=(5711)	N=(1221)	
Yes	46.71 (6980)	67.28 (2093)	50.93 (1798)	41.75 (2504)	44.70(585)	$82.9_{(9)}$ ***
No	53.29(6156)	32.72 (824)	49.07 (1489)	58.25 (5711)	55.30 (636)	
Number of partners						
Total	N=13099	N=2886	N=3287	N=(5704)	N=(1222)	
Multiple partner	29.05 (4622)	51.84 (1605)	29.76 (1130)	23.82 (1473)	30.88 (414)	
Single partner	17.54 (2318)	14.98 (456)	21.13 (665)	17.88 (1025)	13.76 (172)	94.8***
Never had sex	53.41 (6159)	33.18 (825)	49.10 (1492)	58.30 (3206)	55.36 (636)	
Alcohol/drug use before last sex						
Total	N=(6969)	N=(2085)	N=(1797)	N=(2502)	N=(58)5	
Yes	23.68 (1596)	16.58 (334)	22.18 (431)	25.28 (672)	30.22 (159)	25.6***
No	76.32 (5373)	83.42 (1751)	77.82 (1366)	74.72 (1830)	69.78 (426)	
Condom Nonuse						
Total	N=(6839)	N=(2037)	N=(1753)	N=(2479)	N=(570)	
Used	65.98 (4519)	74.31 (1484)	59.62 (1050)	65.80 (1622)	61.76 (363)	34.9***
Did not use	34.02 (2320)	25.69 (553)	40.38 (703)	34.20 (857)	38.24 (207)	
Age of sexual initiation						
Total	N=(6962)	N=(2084)	N=(1794)	N=(2504)	N=(580)	
≤13 yrs	28.49 (2082)	46.44 (914)	31.27 (470)	19.77 (485)	38.54 (213)	
14 yrs	20.44 (1378)	21.56 (399)	20.92 (377)	20.67 (492)	16.43 (110)	$146.2_{(9)}$ ***
15 yrs	23.85 (1617)	16.30 (395)	23.76 (439)	26.53 (655)	23.20 (128)	
16 yrs & older	27.23 (1885)	15.71 (376)	24.05 (508)	33.03 (872)	21.83 (129)	

*** = $p \leq 0.00$

other race adolescents (26%). Overall, there were significant differences between race/ethnicity and drinking types (χ^2=77.48, p<0.001). Caucasian (54.4%) adolescents were more likely to initiate drinking alcohol between age 11-14 compared to Hispanic (53.0%) and African American adolescents (43.5%) (χ^2=82.3, p<0.001) in the study.

3. Drug Use by Gender and Race/ethnicity,

Overall, approximately 43% of adolescents (Table 12) used any drug in their lifetime. Among study population, more male adolescents (45.5%) used any drug compared to their female counterpart (40.1%) (χ^2=20.956, p<0.001). Drug use was not found significantly different among major racial/ethnic groups (χ^2=2.704, p<0.449) (Table 13).

4. Mental Health Indictors by Gender, and Race/ethnicity

A large majority of female adolescents (35.5%) reported that they felt sad or hopeless in the past year compared to their male counterpart (22%) (χ^2=112.17, p<0.001). The prevalence of suicidality was higher among female adolescents (30%) than male adolescents (22%) (χ^2=48.543, p<0.001) (Table 12).

With regard to mental health indicators, more Hispanic (35.3%) and mixed & other race adolescents (35.3%) reported the frequent occurrence of feelings of sadness and hopelessness than African American (26.3%) and Caucasian adolescents (26.2%) (χ^2 =30.944, p<0.001). Similar distribution was noted with suicidality occurrence across major racial/ethnic groups (χ^2=21.81, p<0.001) (Table 13).

Table 10

Alcohol Use by Gender, YRBS, 2003

	Total Population n (%)	Female n (%)	Male n (%)	$\chi^2_{(df)}$
Alcohol use				
Ever had alcohol				
Total	N=(13527)	N= 6782)	N=(6745)	
Yes	74.91 (10448)	76.14 (5280)	73.74 (5168)	$6.23_{(1)}$*
No	25.09 (3079)	23.86 (1502)	26.26 (1577)	
Drinking types				
Total	N=(14053)	N=(7086)	N=(6967)	
Both drinker and an episodic drinker	28.77 (4027)	27.98 (1861)	29.54 (2166)	$42.97_{(2)}$***
Drinker only	16.02 (2476)	17.83 (1369)	14.26 (1107)	
Never had alcohol	55.21 (7550)	54.19 (3856)	56.20 (3694)	
Age of initiation				
Total	N= (10566)	N= (5330)	N=(5236)	
≤10 yrs	19.75 (2120)	14.87 (834)	24.59 (1286)	
11-12yrs	17.05 (1693)	15.53 (801)	18.56 (892)	$99.02_{(3)}$ ***
13- 14 yrs	34.80 (3455)	39.04 (1894)	30.60 (1561)	
15 yrs & older	28.40 (3298)	30.56 (1801)	26.25 (1497)	

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Table 11

Alcohol Use by Race/Ethnicity, YRBS, 2003

	Total Population n (%)	Mixed/ Mixed & other race n (%)	Afro. Ame. n (%)	Hispanic n %)	Caucasian n (%)	$\chi^2_{(df)}$
Alcohol use						
Ever had alcohol						
Total	N=(13487)	N=(1199)	N=(3105)	N=(3175)	N=(6008)	
Yes	75.01 (10432)	72.19 (886)	71.43 (2250)	78.59 (2625)	75.44 (4671)	$15.82_{(3)}$**
No	24.99 (3055)	27.81 (313)	28.57 ((855)	21.41 (550)	24.56 (1337)	
Drinking type[a]						
Total	N=(14012)	N=(1271)	N=(3294)	N=(3263)	N=(6184)	
Both drinker and an episodic Drinker	28.85 (4026)	25.64 (329)	(15.50 521)	28.16 (1064)	32.47 (2112)	$77.48_{(6)}$***
Drinker only	16.01 (2469)	16.41 (221)	21.87 (708)	16.17 (564)	14.63 (976)	
Never had alcohol	55.14 (7517)	57.95 (721)	62.63 (2065)	55.67 (1635)	52.90 (2112)	
Age of initiation						
Total	N=(10551)	N=(906)	N=(2283)	N=(2667)	N=(4695)	
≤10 yrs	19.82 (2125)	28.76 (251)	29.00 (623)	18.18 (449)	16.91 (802)	
11-12 yrs	17.01 (1686)	18.19 (161)	14.29 (312)	18.61 (430)	17.00 (783)	$82.3_{(9)}$***
13-14 yrs	34.81 (3452)	26.63 (253)	29.24 (589)	34.34 (905)	37.36 (1705)	
15 yrs & older	28.36 (3288)	26.43 (241)	27.47 (759)	28.86 (883)	28.73 (1405)	

** $p \leq 0.01$; *** $p \leq 0.001$

The occurrence of feelings of sadness and hopelessness was similar across gender (χ^2 = 0.42, p = 0.811). Even the association between metro status and suicidality was not found statistically significant (χ^2 = 2.18, p = 0.346) (Table 8).

C. Associations of Outcome and Predictor Variables

1. Associations among Predictor Variables

The chi-square test of independence for association between each pair of alcohol drinking (ever had a drink, drink type—combination of current alcohol drinking plus episodic heavy drinking), drug use (a combination of lifetime use of marijuana, cocaine, and injecting illegal drugs), and psychological correlates (depressed mood and suicidality) were conducted and results of association were presented in Table 11.

The association between alcohol use variables and psychological correlates was well establwashed except the association between ever had a drink and suicidality. The association between ever had a drink and felt sad and depressed was found statwastically significant (χ^2=67.735, p<0.001). The chi-squwere test of independence showed an association between drink type and ever had a drink ($\chi^2$218.072, p<0.001) and between drinking type and depressed mood (χ^2=82.517, p<0.001). The data revealed that drug use was associated with drinking types (χ^2=212.990, p<0.001) and ever had a drink (χ^2 =177.092, p<0.001). Significant association existed between depressed mood and suicidality (χ^2=192.815, p<0.001) and drug use (χ^2= 91.384, p<0.001). The association of suicidality with drinking type (χ^2=29.510, p<0.001) and drug use (χ^2=110.524, p<0.001) was observed significant.

Table 12

Drug Use and Mental Health Indicator by Gender, YRBS, 2003

	Total Population n (%)	Female n (%)	Male n (%)	$\chi^2_{(df)}$
Drug use				
Any drug use[b]				
Total	N=(14626)	N=(7325)	N=(7301)	
Yes	42.83 (6537)	40.10 (2964)	45.45 (3573)	$20.95_{(1)}$***
No	57.17 (8089)	59.90 (4361)	54.55 (3728)	
Mental health indicator				
Feel sad or depressed				
Total	N=(14850)	N=(7403)	N=(7447)	
Yes	28.54 (4379)	35.49 (26.97)	21.95 (1692)	$112.17_{(1)}$
No	71.46 (10471)	64.51 (4716)	78.05 (5755)	***
Suicidality				
Total	N=(13396)	N=(6847)	N=(6549)	
At suicidal risk	25.76 (10173	29.81 (4893)	21.77 (5280)	$48.54_{(1)}$***
Not at suicidal risk	74.24 (3223)	70.19 (1954)	78.23 (1269)	

*** $p \leq 0.001$

Table 13

Drug Use and Mental Health Indicators by Race/Ethnicity, YRBS, 2003

	Total Population n (%)	Mixed/ Mixed & other race n (%)	Afro. Ame. n (%)	Hispanic n (%)	Caucasian n (%)	$\chi^2_{(df)}$
Drug use						
Any drug use[b]						
Total	N=(14587)	N=(1343)	N=(3446)	N=(3467)	N=(6331)	
Yes	42.89 (6526)	40.03 (570)	45.11 (1518)	45.44 (1666)	42.30 (2772)	$2.70_{(3)}$NS
No	57.11 (8061)	59.97 (773)	54.89 (1928)	54.56 (1801)	57.70 (3559)	
Mental health indicator						
Feel sad or depressed						
Total	N= (14806)	N=(1353)	N=(3559)	N=(3525)	N=(6369)	
Yes	28.51 (4362)	35.32 (494)	26.28 (985)	35.29 (1451) 64.71 (2380)	26.22 (1738)	$30.94_{(3)}$***
No	71.49 (10444)	64.68 (859)	73.72 (2574)		73.78 (4631)	
Suicidality						
Total	N= (13354)	N=(1250)	N=(2849)	N=(3028)	N=(6227)	
At suicidal risk	25.68 (3209)	33.69 (381)	21.06 (573)	30.44 (748)	24.21 (1507)	$21.82_{(3)}$***
Not at suicidal risk	74.32 (10145)	66.31 (869)	78.94 (2276)	69.56 (2280)	75.79 (4720)	

*** $p \leq 0.001$; NS- Non Significant

2. Associations between Predictor and Outcome Variables

The chi-square test of independence for association between risky sexual behaviors (ever had sex, having multiple sexual partners in one's life, using drug and/drug before sex, and condom nonuse) and predictor variables (ever had alcohol, drinking type, any drug use, depressed mood, suicidality) was associated. The results presented in Table 12 illustrate that most of the outcome and predictor variables were associated. The data also revealed that ever had a drink and condom nonuse was not associated (χ^2=3.008, p=0.091). Having multiple sexual partners and ever had a drink was associated (χ^2=108.497, p<0.001) and drinking type and having sexual partners was also associated (χ^2=95.468, p<0.001).

3. Predictors of Risky Sexual Behaviors

Logistic regression (ever had sex, alcohol/drug use before last sex, and condom nonuse. To determine which variables (alcohol, drug use, depressed mood and suicidality) predict risky sexual behaviors (behaviors such as ever had sex, alcohol/drug use before last sex, and condom nonuse, having multiple partners in one's life) logistic regression models were used. Having sex in the past three months and having multiple sexual partners in the past three months were excluded from the logistic regression analysis because it was hard to capture sufficient sample in this group and during such a short time as well. As mentioned earlier, all the outcome variables are associated with predictor variables. For sociodemographic variables, female adolescents, rural areas and Caucasians were used as reference groups; for alcohol and drug variables, never used

alcohol/drug were used as reference groups; never felt sad or depressed and never thought of/attempted suicide were used as reference groups for psychological correlates; never had sex was employed as the reference group for risky sexual variables. Multinomial regression was used to establish the predictor variables of having multiple sexual partners in one's lifetime.

Table 14

Association among Predictor Variables

Predictor variables	χ^2 *Value*
Alcohol Use	
Ever had a drink * felt sad and hopeless	67.7***
Ever had a drink *suicidality	0.479
Drink type * ever had a drink	218.1***
Drinking type * felt sad and hopeless	82.5***
Drug use	
Drug use * drinking types	212.9***
Drug use *ever had a drink	177.1***
Mental health Indicators	
Felt sad and hopeless * Suicidaity,	192.8***
Felt sad and hopeless * drug use	91.4***
Suicidality * drinking type	29.5***
Suicidality * drug use	110.5***

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Table 15

Association among Predictor Variables and Outcome Variables

Outcome variables and Predictor	χ^2 *Value*
Ever had sex * ever had a drink	102.7***
Number of sexual partners *ever had a drink	108.5***
Alcohol and/drug use before sex *ever had a drink	56.9***
Condom Nonuse *ever had a drink	3.1NS
Ever had sex * drink type	150.0***
Number of sexual partners *drink type,	157.8***
Alcohol and/drug use before sex * Drink type	95.5***
Condom Nonuse* Drink type	7.1*
Ever had sex * drug use	123.5***
Number of sexual partners * drug use	136.1***
Alcohol and / drug use before sex * drug use	75.9***
Condom nonuse *drug use	5.9*
Ever had sex * felt sad and depressed,	69.6***
Number of sexual partners * felt sad and depressed,	85.5***
Alcohol and/drug use before sex * felt sad and depressed,	10.2*
Condom Nonuse Feel sad * depressed,	19.8***
Ever had sex * suicidality *	81.7***
Number of sexual partners * suicidality,	97.6***
Alcohol and/drug use before sex * suicidality,	6.7***
Condom Nonuse * suicidality,	41.3***

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

a) Ever Had Sex in One's Lifetime

The final model of ever had sex in one's lifetime showed that among demographic variables (age, gender, race, and metro status), age and age of alcohol initiation were only the predictors that were statistically significant (Table 13). The younger the age of the adolescents the more likely they were to have had sex in their life (OR=1.19; p=0.000). Adolescents, who belong to other racial groups were almost two times more likely to have had sex (OR=1.59, p=0.006) compared to Caucasian adolescents. African American and Hispanic adolescents were about five times (OR=4.83; p=0.000) and two time (OR=1.62; p=0.000) respectively more likely to have had sex compared to Caucasian adolescents. The metro status of adolescents revealed that adolescents who were less suburban in status were more likely to have had sex (OR=0.80; p=0.04) compared to rural adolescents.

In the alcohol predictor variables, age of alcohol initiation, and both drinking and episodic drinking type were found statistically significant. Adolescents who initiated alcohol use at later years were more likely to have had sex in their lifetime (OR=1.19; p=0.000). Adolescents who were both drinkers and episodic drinkers were almost two times more likely to have had sex in their lifetime (OR=1.94; p=0.000) compared to those who never had a drink. Adolescents who used any drug use in their lifetime were

Table 16

Predictors of Ever had Sex in one's Lifetime

Predictors	β	SE	OR (95% CI)
Age (continuous)	-0.462	0.037	0.63*** (0.58 – 0.68)
Gender (ref: Female)	-0.0425	0.081	0.96 (0.813 – 1.13)
Race/Ethnicity (ref: Caucasian)			
Mixed & other race	0.466	0.162	1.59** (1.15 – 2.21)
African American	1.576	0.133	4.83*** (3.69 – 6.32)
Hispanic	0.483	0.123	1.62*** (1.26 – 2.08)
Metro status (ref: Rural)			
Suburban	0.224	0.103	0.80* (0.65 – 0.98)
Urban	0.209	0.147	0.81 (0.60 – 1.09)
Age of alcohol Initiation (continuous)	0.174	0.042	1.19*** (1.09 – 1.29)
Drinking type (ref: Never drank alcohol)			
Both drinker and an episodic drinker	0.664	0.084	1.94*** (1.64 – 2.30)
Drinker only	0.075	0.107	1.078 (0.64 – 0.87)
Any drug use (ref: Never used drug)	1.330	0.078	3.78*** (3.23 – 4.43)
Sad & depresses mood (ref: Never felt sad and depressed)	0.363	0.095	1.44*** (1.19 – 1.74)
Suicidality (ref: Never Thought of/attempted suicide)	0.253	0.079	1.29** (1.10 – 1.51)

*= $p \leq 0.05$; ** = $p \leq 0.01$; *** = $p \leq 0.001$

Table 17

Predictors of Alcohol and Drug Use before the Sex (Last Time)

Predictors	β	SE	OR (95% CI)
Age (continuous)	-0.129	0.040	0.88* (0.81 – 0.95)
Gender (ref: Female) Male	0.297	0.118	1.35** (1.06 – 1.71)
Race/Ethnicity (ref: Caucasian)			
Mixed & other race	0.429	0.237	1.53 (0.95 – 2.48)
African American	0.006	0.237	1.01(0.77 – 1.32)
Hispanic	-0.000	0.113	0.99 (0.80 – 1.25)
Metro status (ref: Rural)			
Suburban	0.072.	0.159	1.07 (0.78 – 1.48)
Urban	-0.052	0.161	0.95 (0.69 – 1.31)
Age of alcohol Initiation (continuous)	0.152	0.042	1.2*** (1.07 – 1.27)
Drinking type (ref: Never drank alcohol)			
Both drinker and an episodic drinker	1.658	0.136	5.25*** (3.98 – 6.91)
Drinker only	0.422	0.140	1.53** (1.15 – 2.03)
Any drug use (ref: Never used drug)	0.697	0.170	2.01*** (1.42 – 2.83)
Sad & depresses mood (ref: Never felt sad and depressed)	0.134	0.107	1.14 (0.92 – 1.42)
Suicidality (ref: Never thought/attempted suicide)	0.197	0.182	1.22 (0.84 – 1.76)

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

nearly two times more likely to have had sex (OR=3.78; p=0.000) compared to those who never used drugs in their lifetime.

Psychological correlates such as depressed mood and suicidality demonstrate statistically significant association with having had sex in their lifetime. Adolescents who felt sad or depressed were more likely to have had sex in one's lifetime (OR=1.44; p=0.000) compared to those who never felt sad and depressed. Adolescents who thought of /planned/attempted suicide in their lifetime were more likely to have had sex (OR=1.29; p=0.003) compared to those adolescents who never have had sex.

b) Alcohol/Drug Use Before Having Sex

In the sociodemographic variables, only age and gender were found to be statistically significantly associated with alcohol and drug use before the last time sex (Table 14). Adolescent male were more likely to use alcohol and drug before their last sex (OR=1.35; p=0.02) compared to adolescent females. Younger adolescents were more likely to use alcohol/drug use before the last time sex. Race and metro status did not establish a statistically significant association with alcohol/drug use before the last sex.

In the alcohol use variables, the older the age of alcohol initiation of adolescents the higher the likelihood of use of alcohol/drug use before the last time sex. In the drinking type of adolescents, drinkers and drinkers plus episodic drinkers were five times (OR=5.25; p=0.000) and roughly two times (OR=1.53; p=0.004) morem likely to use alcohol/drug before the last sex compared to those adolescents who never had a drink in their lifetime. Adolescents who used any drug in their lifetime were two times more

likely to use alcohol/drug before the last sex compared to those adolescents who never used any drug.

Mental health indicatores such as felt sad and hopeless and suicidality were not found having a statistically significant association with alcohol/drug use before the last sex in the model.

c) Condom Nonuse

The final model of condom nonuse showed that age, gender, Hispanic race, suicidality, and alcohol/dug use before the last sex were statically significant. The results indicated that adolescent males were less likely to report condom nonuse (OR=0.58; p=0.001). The younger adolescents were less likely to use condom before the last sex (OR=0.83; p=0.002). Hispanic adolescents were less likely to use condoms compared to Caucasian adolescents.

In the psychological correlates, only suicidality was statically significant. Adolescents who thought of/planned/attempted suicide were more likely to report nonuse of condoms (OR=1.34; p=0.0023) compared to those who did not attempt suicide.

Alcohol/drug use before the last time sex was a good indicator of risky sexual behavior. Adolescents who used alcohol/drug before the last sex were almost one and a half times more likely to report condom nonuse (OR=1.49; p=0.001)) compared to those who never used alcohol/drug before sex.

d) Having Multiple Sexual Partners in One's Lifetime (Multinomial Regression)

The regression model of having multiple sexual partners in one's life demonstrated that the younger the adolescents were the more likely they were to have

multiple sexual partners (OR =0.69; p=0.000) and single partners (OR=0.69; p=0.001). Age of alcohol initiation was found significant only with multiple partners (OR=0.58; p=0.001). Mixed & other race (OR=1.08; p=0.001), African American (OR=8.17; p=0.001), and Hispanic (OR=1.67; p=0.001) adolescents were more likely to have multiple sexual partners compared to Caucasian adolescents. Among these race/ethnic groups, African American were more than eight times more likely to have multiple sexual partners compared to Caucasian adolescents.

Adolescents who were drinkers plus episodic drinkers were more likely to have multiple sexual partners compared to those who never had a drink. Any drug use by adolescents was found statistically significant with both multiple (OR=6.05; p=0.001) and single (OR=2.27; p=0.001) sexual partners. Adolescents with depressed mood were one and a half times more likely to have multiple sexual partners (OR=1.54; p=0.001) and more likely to have single sexual partners (OR=1.31; p=0.03). Suicidality was statistically significantly associated with having multiple sexual partners by the adolescents.

Table 18

Predictors of Condom Nonuse during the Last Sexual Activity

Predictors	β	SE	OR (95% CI)
Age (continuous)	-0.537	0.069	0.58*** (0.51 – 0.67)
Gender (ref: Female) Male	-0.180	0.053	0.83 (0.74 – 0.93)
Race/Ethnicity (ref: Caucasian)			
Mixed & other race	0.253	0.158	1.29 (0.94 – 1.78)
African American	-0.138	0.133	0.87 (0.67 – 1.14)
Hispanic	0.361	0.124	1.44 (1.12 – 1.84)
Metro status (ref: Rural)			
Suburban	0.092	0.138	0.97 (0.69 – 1.21)
Urban	0.142	0.136	0.87 (0.66 – 1.14)
Age of alcohol Initiation (continuous)	0.052	0.054	1.05 (0.94 - 1.17)
Drinking type (ref: Never drank alcohol)			
Both drinker and an episodic drinker	-0.045	0.115	0.95 (0.76 – 1.20)
Drinker only	-0.110	0.116	0.89 (0.71 – 1.13)
Any drug use (ref: Never used drug)	0.087	0.089	1.09 (0.91 – 1.31)
Sad & depresses mood (ref: Never felt sad and depressed)	0.041	0.100	1.04 (0.85 – 1.27)
Suicidality (ref: Never thought/attempted suicide)	0.292	0.089	1.34 (.117 – 1.610

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Table 19

Predictors of Having Multiple Sexual Partners in One's Lifetime (ref: Never Had Sex)

Predictors	Multiple partner (β)	Multiple partner (SE)	OR (95% CI)	Single partner (β)	Single partner (SE)	OR (95% CI)
Age(continuous)	-0.543	0.049	0.58 (0.53 – 0.64)***	-0.369	0.042	0.69 (0.63 – 0.75)**
Gender (ref: Female) Male	0.021	0.093	1.02 (0.85 – 1.23)	-0.110	0.096	0.89 (0.73 – 1.08)
Race/Ethnicity (ref: Caucasian)						
Mixed & other race	0.731	0.192	2.08 (1.41 – 3.07)***	0.102	0.204	1.11 (0.73 – 1.67)
African American	2.100	0.152	8.17 (6.002 – 11.12)***	0.833	0.157	2.30 (1.67 – 3.16)***
Hispanic	0.515	0.438	1.67 (1.26 – 2.22)***	0.438	0.136	1.55 (1.17 – 2.04)**
Metro status (ref: Rural)						
Suburban	-0.244	0.110	0.78 (0.63 – 0.98)*	-0.189	0.117	0.83 (0.65 – 1.05)
Urban	-0.150	0.165	0.86 (0.61 – 1.20)	-0.266	0.143	0.77 (0.57 – 1.02)
Age of alcohol Initiation (continuous)	0.258	0.052	1.29 (1.16 – 1.44) ***	0.069	0.049	1.07 (0.97 – 1.18)
Drinking type (ref: Never drank alcohol)						
Both drinker and episodic drinker	0.926	0.359	2.52 (2.07 – 3.07)***	0.359	0.032	1.43 (1.13 – 1.80)))
Drinker but not episodic drinker	0.134	0.110	1.14 (0.91 – 1.43)	0.032	0.131	1.04 (0.79 – 1.35)
Any drug use (ref: Never used drug)	1.810	0.089	6.05 (5.05 – 7.25)***	0.821	0.098	2.27 (1.86 – 2.77)***
Sad & depresses mood (ref: Never felt sad and depressed)	0.435	0.091	1.54 (1.28 – 1.86)***	0.271	0.124	1.31 (1.01 – 1.68)*
Suicidality (ref: Never attempted suicide)	0.342	0.090	1.41 (1.17 – 1.69)***	0.137	0.101	1.15 (0.93 – 1.41)

*$p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

CHAPTER V

DISCUSSION, CONCLUSION, AND RECOMMENDATION

The current study was a comprehensive assessment of the behavioral, psychological, and sociodemographic factors that influence risky sexual behaviors among adolescents. The study also highlighted how these factors interplay between and among themselves across gender, race/ethnicity, and metro status. The present investigation was an explorative study. The data used for deriving the conclusions mainly consist of the self-reported responses of 9^{th} -12^{th} grade students. The results of this study can help public health and educational professionals, and community workers to better understand the magnitude and characteristics of HIV-related sexual risk behaviors and serve as basis for monitoring trends and develop educational programs to reduce health-compromising behaviors among high school students. The study can facilitate supplementary research on other factors because adolescents may be influenced by several factors such as family, friends, school, neighborhood, etc that promote or discourage certain behaviors.

The primary specific aim of the study was to determine the associated factors (alcohol/drug use, and mental health indicators) that were predictive of HIV-related sexual risk behaviors (ever had sex, lifetime multiple partners, alcohol/drug use before sex, condom nonuse, and age of initiation). There were several hypotheses associated with primary aim. These included assumptions that a) sexual behaviors (having had sex, having multiple partners, use alcohol/drug before the last sex, not using condoms, and

initiating sex at younger age) will be more common in rural adolescents; b) alcohol use (lifetime, past 30 days, binge drinking, age of initiation) will be more common among rural adolescents; c) drug use (lifetime marijuana, cocaine, and IDU) will be more common among rural male adolescents; and d) mental health issues (felt sad and hopeless, and suicide) will be higher among rural male adolescents

The bivariate analysis of the sociodemographic characteristics indicated significant differences in the age, race/ethnicity, and grade level of adolescents. The urban and suburban adolescents were slightly younger, rural residents were predominantly Caucasian, and Hispanics were less likely to reside in rural areas. More urban and suburban adolescents were in 9^{th} through 11^{th} grade while more rural adolescents were in 12^{th} grade.

Sexual behaviors

The sexual behavior hypotheses evaluated whether sexual behaviors were more common among rural adolescents. In terms of all the sexual behavior indicators used in the study (including 1) ever had sex, 2) lifetime multiple partners, 3) alcohol/drug use before sex, 4) condom nonuse, and 5) age of initiation), the results showed significant differences across gender, race/ethnicity, and metro status, but the direction of association was opposite to the research hypotheses. Having had multiple sexual partners was more prevalent among males, African Americans, and urban adolescents. Condom nonuse was higher among females, Hispanic and rural adolescents. These observations confirm prior research (Blum , 1987; Blum et al., 2000; Kaiser Foundation, 2003) in this field and offer

evidence supporting ever had sex by more males, African American, and urban adolescents.

In the present study, a higher percentage of African American and Hispanic male and female adolescents had multiple sexual partners than Caucasian male and female adolescents, while higher percentage of Caucasian male and female adolescents used alcohol/drug before last sexual activity than African American and Hispanic male and female adolescents. African American adolescents were least likely to have used alcohol/drugs before the last time they had sex, but were most likely to have used condom. These results were similar to the findings of Santelli et al., (1998), and Santelli et al., (2000), Kaiser Foundation study (2003).

In ages 13 years or younger, more females, African American, and urban adolescents initiated sex compared to female, Caucasian and rural adolescents. In the group of ages 16 years and older age group, more male, Caucasian, and rural adolescents initiated sex compared to their female, African American and urban counterparts. The present study results indicated the direction of association opposite to research hypotheses.

Alcohol Use

More female, Hispanic, and rural, adolescents reported ever having had alcohol. More male, African American, urban adolescents reported having initiated alcohol at age 10 years or younger and having episodic drinking. Episodic drinking was higher among both suburban male and female African American adolescents compared to Caucasian

adolescents. Similar results were reported by, O'Malley, and Bachman (2002), and SAMHSA (2002, 2004).

Drug Use, Felt sad & Hopeless and Suicidality

Nearly 45% of male, Hispanic and African American, and urban adolescents reported having used any drug in their lifetime. More female, Hispanic, and suburban adolescents reported having felt sad and hopeless in the past year. The findings of this study were similar to the studies of NSDUH, (2004), Garrison et al., (1989), and Sen, (2004), which stated that Hispanics were likely to have a depressed mood. More than twice as many young females as males reported depression. There were few studies that focus on rural adolescents and depression.

Suicidality was higher among female, Hispanic, mixed and other race, urban, and rural adolescents than among male, African American and suburban adolescents.

The Association between Predictor and Outcome Variables

A statistically significant association was found with regard to between outcome (sexual behavior) variables and predictor (alcohol, drug use, and mental health predictors) variables. All the predictor variables showed a close association with sexual behaviors, condom use, and ever had a drink. A similar pattern was observed with regard to association between predictor variables. These findings parallel the results of (Eisen, Pallitto, Bradner, & Bolshun (2000). Overall, univariate analyses revealed a significant associations showing that they were interrelated. This suggests that risky sexual behaviors were associated with various behaviors such as alcohol, drug use, and mental health indicators. These finings concurred with Grunbaum, Kann, Kinchen, et al., 2002;

Leigh& Stall, 1993. These studies reported that both casual and chronic substance users were more likely to engage in high-risk behaviors, such as unprotected sex, when they were under the influence of drugs or alcohol. The research findings showed overall association between alcohol and drug use, feelings of sadness and hopelessness, and suicidality individually among themselves and together as predictors of engaging in risky sexual behaviors.

Predictors of Sexual Behaviors

Race/ethnicity, metro status, age, age of initiation of alcohol, alcohol, drug use and mental health indicators predicted the risky sexual behavior among adolescents. Younger the age of adolescents the more likely they were to engage in sex in their lifetime. The results from univariate logistic regression analyses indicated that African American adolescents among all other racial/ethnic groups were at higher risk and are five times more likely to having had sex in their lifetime. Hispanic, mixed and other race adolescents were two times more likely to having had sex in their lifetime. Episodic drinkers and drug users were two times and three times more likely to having had sex in their lifetime. Younger adolescents and drug users (two times) were more likely to use alcohol/drug before they had sex. Episodic drinkers were five times more likely to use alcohol/drug before they had sex. Condom nonuse was higher among younger adolescents than older adolescents. the results of multinomial logistic regression indicated that younger age, race, episodic drinking, drug were also the strong predictors of having lifetime multiple sexual partners. Compared to Caucasian adolescents, African American adolescents were eight times, both mixed and other race, and Hispanic

adolescents were two times more likely to having had multiple sexual partners in their life. African America adolescents when compared to Caucasian adolescents were two times more likely to having had single sexual partners in their lifetime. Compared to non drug users, drug users were six times more likely to having had multiple sexual partners and two times were more likely to having had single sexual partners in their lifetime.

Conclusion

Although current progress in medical and scientific technology shows great promise, complete eradication of HIV was unattainable. However, slowing the spread of the Disease was possible through behavior changes. Though the HIV/AIDS cases were reported more among (given the incubation period) these adults may have been engaged in the risky behaviors during their adolescent years. In this study, approximately 46.7% had had sex and among those who had had sex, 29.1% had more than multiple partners and 34% did not use condoms.

Therefore, examining adolescents' health-compromising behavior may help to predict their future behavior and chance of contracting HIV/AIDS. Various studies reported that alcohol and drug usage were associated with risky sex behavior. Fromme et al. (1999) reported that having sex when intoxicated was related to risky sexual practices. The major finding of this study was that those students who are involved in alcohol and drug use tend to be involved in actual sexual behavior. Other findings were consistent with the present findings, where alcohol and drug use were predictors for engaging in risky sexual behaviors. However, in this study, depressed mood and suicidality were related to engaging in risky sexual behavior which was consistent with the findings of

Brooks et al. (2002) that showed that there was a association between felt sad and hopeless and suicidality and engaging in risky sexual behaviors

Recommendations

Future studies were needed since felt sad and hopeless, and suicidality were the strongest predictors of engaging in risky sexual behavior, but in the present study they failed to predict adolescents' engagement in risky sexual behaviors.

Future studies must examine influences of other factors such as parent's educational level, prenatal/normative peer group and neighborhood that impact risky sexual behaviors of adolescents.

Qualitative studies of high school students need to be conducted to further explore the reasons for engaging in risky sexual behaviors. It would be important to include students from private, and alternative schools students where home-schooled, and drop outs of high schools. Such study may help in finding out patterns of sexual behavior among adolescents and understand needs of all adolescents. In order to understand and bring about a change in adolescents' beliefs, attitudes, perceptions, and intentions that lead them to engage in risky sexual behaviors, the theory of reasoned behavior and theory of planned behavior could be used.

The mass media have been found to influence a wide range of adolescent health-related attitudes and behaviors including eating disorders, violence, tobacco, alcohol and drug use, and sexual behavior. One mainly unexplored factor that may contribute to adolescents' sexual activity was their exposure to mass media. Research needs to include very comprehensive research measures and methodologies to study the impact of mass

media on the health compromising behavior of adolescents. There was need for conducting an ongoing national surveillance of the sexual content of media and the exposure to that content.

Longitudinal studies of the effects of that exposure on the sexual decision-making, attitudes, and behaviors of those subgroups and various types of controls in limiting exposure were also essential. Family and friends need to take supportive and encouraging standpoints in the health-compromising behaviors, since they can greatly influence adolescents' behavior (CDC, 2005). The media on the other hand glamorize the risky sexual behaviors (alcohol/drug use before sex and having multiple sexual partners). School-based educational programs that address prevention of STD, HIV/AIDS related risky sexual behaviors should be strengthened and made mandatory.

Research data in the present study found that a higher proportion of both African American and Hispanic adolescents were engaged in risky sexual behaviors although condom use had been increased over the years among adolescents but its use was not consistent. CDC (2005) reported that school-based programs that highlight abstinence and condom use were the most successful. Hence, culturally sensitive programs need to be developed and implemented in order to address various health-compromising behaviors among minority groups.

Limitations

The major limitation of this study was that causality could not be determined. Since YRBS dataset used cross-sectional study design (Brooks, et al, (2002), Rector et al., (2003).

Another limitation of the study was that the YRBS survey included students who were attending school during the survey year and did not include students who were not attending school, dropped out, attended a private or alternative school or were home schooled. The behaviors exhibited by these students may be different from those who participated in the 2003 survey.

The variables used to measure ever felt sad and hopeless and suicidality were not true measurements of these concepts, but they depict how students felt about themselves and how they explain their actions and how they affect the students' behaviors. The 2003 national YRBS data was representative of adolescents in the nation but results cannot be generalized to the rest of the adolescent population because of these limitations.

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