Depression, suicidal ideation, and risky sexual behavior among U.S. adolescents

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Abstract

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Background

Depressive disorders affect 11% of the U.S. adolescent population, and suicide is the second leading cause of death among adolescents. The prevalence of sexually transmitted infections (STI) among U.S. adolescents ranges from 14-43.9%, and while rates of adolescent pregnancy have declined in the U.S. in the last decade, the U.S. rates are still high relative to other developed countries. There are currently no studies that examine the association between depression, suicidality, and risky sexual behavior (RSB) among adolescents. Using national data from the CDC's 2009 and 2011 Youth Risk Behavior Surveys (YRBS), our objectives were to: determine if adolescents who are depressed and suicidal are more likely to engage in risky sexual behavior than those without depression and those with depression without suicidal behaviors.

Methods

Participants in this cross-sectional study were adolescent YRBS respondents in grades 9-12 who were sexually active (N=12,311). Depression was measured through a single question, ("During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?"). Depression with suicidality was

measured as a positive response to the question regarding depression, plus a positive response to one or more of the three questions about suicidality ("During the past 12 months, did you ever seriously [consider/plan/attempt] suicide?"), and analyzed as a trichotomous variable. RSB was assessed using binary variables for each behavior: condom nonuse, birth control nonuse, drug/alcohol use at last sexual intercourse, or having had 4+ sexual partners. An additional dichotomous variable was created to examine the odds of engaging in any RSB. Logistic regression was conducted to determine the association between depression, suicidality, and RSB, and results were stratified by gender. Participants who were not sexually active (N=16,994) or missing information on depression/suicidality status or RSB (N=2,409) were excluded from analysis.

Results

Depressive symptoms were reported by 44.0% of sexually active girls and 25.5% of sexually active boys, and suicidal ideation was reported by 27.1% of girls and 18.0% of boys. Sixty-two percent of sexually active boys and girls engaged in at least one risky sexual behavior. Boys who were depressed and suicidal were 1.63 (95% CI: 1.22-2.18) times more likely to engage in risky behavior as those who were depressed only. They were 2.35 (95% CI: 1.81-3.05) times more likely to have not used a condom the last time they had sex, 2.39 (95% CI: 1.81-3.16) times more likely not to have used birth control, and 2.02 (95% CI: 1.36-2.49) times more likely to have used alcohol or drugs the last time they had sex, compared to boys who were depressed only. Girls who were depressed and suicidal were 1.49 (95% CI: 1.20-1.84) times more likely to engage in risky behavior as those who were depressed only. They were 1.39 (95% CI: 1.15-1.70) times more likely to have not used a condom the last time they had sex, 1.44 (95% CI: 1.17-1.76)

times more likely not to have used birth control, and 1.42 (95% CI: 1.13-1.75) times more likely to have had 4+ sexual partners, compared to girls who were depressed only. Eighty-one percent of boys who reported binge-drinking reported engaging in at least one RSB, compared to 56.6% of boys who were not binge-drinkers, and 76.8% of girls who reported binge-drinking reported engaging in at least one RSB, compared to 57.0% of girls who were not binge-drinkers.

Conclusion

Adolescents who are depressed and suicidal are at increased odds for engaging in RSB. Although causality cannot be established, involvement in any RSB is cause for concern and should be part of the clinical assessment of depression and suicidality among adolescent boys and girls.

To my mom and dad for their unwavering love and support, to my housemates for their patience, and to my friends and family for their encouragement

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INTRODUCTION

Risky sexual behaviors (RSBs) are any behavior, such as nonuse of condoms, that increase the probability of negative, unwanted, or adverse health consequences, such as unintentional pregnancy or contracting HIV or other sexually transmitted infections (STIs). It is estimated that nearly half of all newly-acquired STIs in the U.S. occur among young people aged 15-24 years.[1,2] Recent research on adolescents in a mental health treatment program reported higher rates of HIV risk behaviors than their peers[3] which suggests this population—adolescents with a mental health disorder—may be at higher risk for RSBs and STIs. National Institute of Mental Health (NIMH) data indicate that by the age of 18, 11% of adolescents have had a depressive disorder,[4] which can increase susceptibility to RSBs.[5] While prevalence estimatesdiffer among ethnic/racial sub-populations, urbanity, and gender, a significant correlate of depression is suicidal ideation.[6] According to the most recent CDC data, 15.8% of high school students reported seriously considering suicide during the last 12 months and 7.8% of students reported attempting suicide one or more times during the same time frame.[7]

This study sought to determine if there is an association between depression and RSBs among U.S. adolescents, to evaluate whether the association with RSB is stronger for depression with suicidal ideation than for depression alone, and to identify potential effect modifiers, such as gender, race, and binge-drinking, in the association between depression, suicidality and RSBs.

BACKGROUND

The growth in incidence of STIs such as chlamydia, genital warts, gonorrhea, syphilis, and trichomonas among adolescents in the U.S. is a serious public health problem.[8] The prevalence of STIs among sexually active adolescents ranges from 18.0-19.4% in white and Hispanic to 43.9% in African-

American adolescents; as many as 1 in 4 sexually active adolescent females have tested positive for an STI.[9] Given that some STIs such as human papillomavirus (HPV) and genital herpes are not reportable, these statistics may represent only a fraction of the true STI incidence in adolescents.

In addition to STIs, other unintended outcomes of adolescent RSBs include unwanted pregnancy. In 2012 there were 29.4 births for every 1,000 adolescent females ages 15-19.[10] This represents a drop of 6% from 2011 when the birth rate was 31.3 per 1,000.[10] While this represents the lowest annual rate in decades, teen birth rates differ by age, racial/ethnic group, and region of the country: birth rates are higher among Hispanic (46.3 births per 1,000 adolescent females) and African-American (43.9 births per 1,000 adolescent females) adolescents ages 15-19 than among whites (20.5 births per 1,000 adolescent females). Despite these recent decreases in teen birth rates, teens in the U.S. are more likely to give birth than teens in other developed countries.[11] This has been attributed to engagement in RSBs, especially lower condom and other contraceptive use and higher levels of multiple sexual partnerships among U.S. teens.[12] Teenage pregnancy is costly to adolescents, their infants, and society. An unintended pregnancy often diminishes future educational attainment and employment opportunities for adolescents,[13] which carries an estimated annual cost of $200 million.[14]

A mental health disorder such as depression can increase susceptibility to engaging in RSBs. Depression, a prominent health problem among adolescents, can impair cognitive function and memory, decrease impulse control, and contribute to psychosocial impairment, such as reduced emotional responses in relationships.[5] It is estimated that 11% of adolescents under the age of 18 have a depressive disorder.[4] Studies have found that depression among adolescents is correlated with lower self-esteem,[15] more suicidal thoughts,[16] more suicide attempts,[22] more academic problems,[17] and more personal

problems[22,18] compared with adolescents without a depressive disorder, as well as correlated with a greater likelihood of depression in adulthood.[19,20]

These depression-related effects may impair an adolescent's ability to act responsibly during intimate situations by reducing their ability to intervene or prevent RSBs as well as minimizing their perceptions of STI and pregnancy risk.[5] Youth with psychiatric disorders initiate intercourse at an earlier age, are less likely to use condoms, have higher rates of STIs, have more unintended pregnancies, and have more sexual partners than adolescents without a history of mental illness.[3] However, in prior research the relationship between adolescent depression and RSBs has been inconsistent. One study reported statistically significant results that substance abuse and RSBs can amplify the effects of depression.[21] In contrast, another study documented significant associations between substance abuse and RSBs, but reported no relationship between depressive symptoms and RSBs among adolescents.[22]

An additional concern with adolescent depression is its association with suicidal ideation. Suicide is the third leading cause of death among youth between the ages of 10 and 24 years in the U.S., with lifetime prevalence rates of suicide attempts ranging from 1% to 10% in adolescents.[23 ,24,25] After a decade of steady decline, the U.S. adolescent suicide rate increased 18% between the years 2003 and 2004, the largest single-year increase since 1990. The pediatric suicide rate—suicide in youth younger than 20 years—declined steadily until 2007 when it returned to 2004 levels. Since then, the pediatric suicide rate has continued to rise through 2012.[26] On average, 9.7% of adolescents report having attempted suicide, while 29.9% of these adolescents indicated having thought about suicide at some point in their life.[27]The actual number of suicide attempts may be underestimated because many adolescents do not seek treatment and suicidal behavior is stigmatizing.[29,28] Suicidal behavior does not occur in isolation; it most

frequently co-occurs with other health risk behaviors, such as binge eating, binge-drinking, tobacco use, weapon carrying, and having unprotected sex.[29,30] Common risk factors to all these difficulties are poor parent-child connection, low parental supervision, poor connection between child and school, and association with a deviant peer group.[31,32]

Adolescents with depression or suicidal symptoms may be at particularly high risk for STI exposure if they also engage in substance use.[33] While adolescents with psychiatric disorders generally experience multiple risk factors for STI exposure and significant deficits in protective competencies, adolescents with substance use disorders engage in significantly higher levels of RSBs.[34] Non-injection substance use has been found to indirectly increase the risk of STI exposure or unplanned pregnancy via lowered intentions to use condoms, increased numbers of sex partners, increased likelihood of selection of an STI-infected sex partner, or any combination of these behaviors.[35,36,37,38]

Associations among risky behaviors such as RSB, heavy alcohol use, and suicidal behaviors may differ by gender.Consistent gender differences have been found in the occurrence of depression and suicidal ideation, heavy alcohol use, and adolescent sexual activity. Lifetime estimates of suicide attempts among adolescents range from 1.3-3.8% in males and 1.5-10.1% in females, with higher rates in females than males in the older adolescent age range.[31,39,40] However, while girls are more likely to engage in suicidal behavior than boys, they are less likely to die as a result of a suicide attempt.[41, 42,43] A study by Kaess, et al. (2011) reported that gender alone only explains 2.3-2.7% of the information on non-fatal suicidal behavior. In contrast, they found that emotional and behavioral problems are responsible for 23.2-30.0% of the information. They supported the theory that explanations for gender differences in rates of suicidal behavior may be attributed to gender-related differences in psychopathology.[48,44] Boys

tend to act out their personal problems and are therefore more likely to show aggressive (externalizing) behavior, while girls more often show internalizing behavior.[50,45,46,47]

Adolescent engagement in RSBs is a serious public health problem. Developing effective policies and programs to address this problem depends on understanding its etiology. Understanding the association between depression and RSBs among adolescents could help inform and customize awareness, prevention, and/or treatment program objectives. The broad objective of this study was to determine if there is an association between depression and RSB among U.S. adolescents. The specific aims of this project were to: (1) determine if adolescents who are depressed are more likely to engage in RSBs compared to adolescents who are not depressed; (2) investigate whether the likelihood of engaging in RSBs differs between adolescents who are depressed only, and adolescents who are depressed and suicidal; and (3) evaluate the role of binge drinking in the association between depression and suicidal behavior and RSB..

METHODS

This study utilized the Youth Risk Behavior Survey (YRBS), part of a biennial national school-based survey conducted by the Centers for Disease Control and Prevention (CDC). The YRBS monitors health-risk behaviors of the nation's high school students, including alcohol and other drug use; diet, nutrition, and exercise; sexual behavior; mental health problems; suicidal thoughts and behaviors; tobacco use; traffic safety; weapons carrying, and violence.

Study Design

A cross-sectional analysis of de-identified YRBS data for the years 2009-2011 was conducted to examine the association between depression and RSB in adolescents. Study subjects were adolescents in U.S. high school grades 9-12 who participated in the YRBS in the years 2009 or 2011—approximately 31,835 potentially eligible subjects sampled nationally. Since this study used the publically available component of the YRBS dataset, ethical approval for this research was waived.

Setting

The first-stage sampling frame for each biennial national survey includes primary sampling units (PSUs) consisting of large-sized counties or groups of smaller, adjacent counties. In the second stage of sampling, schools are selected from PSUs. Schools are divided into two groups on the basis of enrollment. Schools that have an estimated enrollment of $\geq$25 students for each grade are considered large, and schools that have an estimated enrollment of <25 students for any grade are considered small. The third and final stage of sampling consists of randomly selecting, in each chosen school and in each of grades 9-12, one or two entire classes. All students in sampled classes are eligible to participate.

Local procedures for obtaining parental permission are followed before administering YRBS in any school. In 2011, 10% of schools used active permission, in which parents must send back to the school a signed form indicating their approval before their child can participate. Other schools (90%) used passive permission, in which parents send back a signed form only if they do not want their child to participate in the survey.[48] National survey participation rates range from 87-88% of students in participating schools.

For each cross-sectional survey, students complete an anonymous, self-administered questionnaire, which includes identically worded questions. In all surveys, students complete the self-administered questionnaire during one class period and record their responses directly in a computer-scannable booklet or on an answer sheet.[60] Not all participating students complete the questions about sexual behavior, as questions regarding these topics are considered sensitive in nature and are included on a separate page that schools may choose to remove before administering the survey.

Participants

YRBS records that were missing data for both the primary exposure (depression level) and indicators of RSB (defined below) were excluded from the analysis (N=2,409). Sexual activity was determined by the response to the question, "Have you ever had sexual intercourse?" Students who were not sexually active—i.e., either reported they had not had sexual intercourse, or had missing data about having sexual intercourse, were also excluded (N=16,994). After applying these criteria, 12,311 records were eligible for analysis (*Figure 1*).

Variables

Depression & Suicidal Ideation

Depression was measured by response to the YRBS question, "During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?" with a "no" answer defining "no depression" and a "yes" answer defining "depressed". The criteria for a major depressive episode, as defined by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V), are a depressed mood or loss of interest in activities plus 4 out of 7 additional symptoms (e.g., loss of appetite, sleep changes, fatigue, etc.) which include recurrent thoughts

of death or suicide, for at least 2 weeks.[49] The YRBS does not collect information on these other symptoms required for a DSM-V diagnosis of depression. And while there has not been any validation research on the depression items in the YRBS, YRBS items assessing suicidal thoughts and behaviors have demonstrated good convergent and discriminant validity.[50]

For the purposes of this study, "depressed and suicidal" was defined by a positive response to the depression question in conjunction with a positive response to any one of the following questions, "During the past 12 months, did you ever seriously consider suicide?"; "During the past 12 months, did you ever plan a suicide attempt?"; or "During the last 12 months, did you ever attempt suicide?" Those students who reported a positive response to the depression question and a negative response to all three suicide questions were classified as 'depressed only." For purposes of this study's focus on depression, students who were suicidal, but not depressed (N=791) were excluded. Thus in this study we examined RSB of three subgroups of students: depressed and suicidal, depressed only, and not depressed.

Risky Sexual Behavior (RSB)

A recent report on "Trends in the Prevalence of Sexual Behaviors and HIV Testing National YRBS: 1991–2011", indicated that the CDC considers condom nonuse, birth control (BC) nonuse, or alcohol/drug use the last time they had sex, and having four or more sexual partners, as "risky sexual behavior".[51]

Condom nonuse (the last time they had sex)

All subjects who gave a negative response to the question, "The last time you had sexual intercourse, did you or your partner use a condom?"

Birth control nonuse (the last time they had sex)

This dichotomous variable incorporates the responses to the question, "The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?", where birth control nonuse was defined as not answering "birth control," "condoms," or "Depo-Provera" to the question.

Alcohol/drug use (the last time they had sex)

All subjects who gave a positive response to the question, "Did you drink alcohol or use drugs before you had sexual intercourse the last time?"

4+ sexual partners

All subjects who answered 4+ people to the question, "During your life, with how many people have you had sexual intercourse?"

Any risky sexual behavior (RSB)

This was a dichotomous variable indicating the occurrence of $\geq$1 of the RSB listed above.

Potential Confounders

Age

Age was originally categorized as fifteen or younger, sixteen, seventeen, or eighteen and older. It was then recoded as a dichotomous variable, "Younger" ($\leq$16) and "Older" (17+).

Race

Seven categories were defined as: Hispanic/Latino, Black or African American, American Indian/Alaska Native (AIAN), White, Asian, or Native Hawaiian/Pacific Islander (NHPI).

Binge drinker

All subjects who answered 2+ days to the question, "During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?" were classified as binge drinkers.

Study Power

Using StatCalc from EpiInfo 7, with statistical power of 80% and a 95% confidence interval, this study needed a minimum sample size of 738 YRBS subjects.

Statistical Methods

All analyses were conducted using STATA version 12.1. Given the known association between gender and depression and gender differences in RSB, all analyses were stratified by gender. The exception is exploratory Tables 2 & 3, which show estimates without stratification by gender. Bivariate regression models were used to determine unadjusted estimates of the association between depression and the four RSBs, and depression with suicidality and the four RSBs.

The Pearson chi^2 test was used to examine the association between gender and other variables: race, age, binge-drinking, depression status, and RSBs, among the sexually active students who were included in study analyses (12,311). These test statistics can be found in Table 1.

Each of the variables for which we adjusted: age, race, and binge-drinking, were found to be independently associated with any RSB and depression/suicidal ideation. They were also found to be independently associated with condom nonuse and having had 4+ sexual partners. Race was found to be independently associated with birth control nonuse and depression/suicidal ideation, and race and binge-drinking were independently associated with alcohol/drug use during sex and depression/suicidal ideation. Therefore, fully-adjusted models were built controlling for age, race, and/or binge-drinking. Interaction terms between depression status and age, race, and binge-drinking were tested for effect modification in the association between depression, suicidality, and RSB (*Table 11*).

Unadjusted models were tested with "no depression" as the reference category and with "depression only" as the reference group to identify significant differences in RSB between those with no depression, those with depression only, and those with depression and suicidal ideation. Partially adjusted models controlled for age and/or race, while fully-adjusted models control for age, race, and binge-drinking, to evaluate the influence of binge-drinking on the depression group coefficients compared to partially-adjusted models. This approach enabled us to estimate the effects of depression on RSB net of and including possible associations between depression and risky drinking. Adjusted sample weights were used in analyses to produce generalizable estimates for sexually active U.S. adolescents enrolled in public and private high schools. P-values were 2-tailed, with significance tested at an alpha level of 0.05.

RESULTS

Participant Characteristics

Of the original 31,835 students, 46.6% (N=14,841) were sexually active. Descriptive statistics for the final, selected study sample of sexually active participants are presented in *Table 1*. The sample of sexually active adolescents was 49.7% female. The largest racial group was comprised of white participants (41.2%), with black participants (19.3%), Hispanic participants (16.5%), and those identified as multiple race (17.1%), the other groups with prominent representation in the sample. The remaining 4.6% of participants reported American Indian/Alaskan Native (AIAN), Asian, or Native Hawaiian/Pacific Islander (NHPI) ethnicity. Of sexually active students, 28.2% of boys and 22.4% of girls were binge drinkers.

Depression & Suicidality

Depressive symptoms were reported by 44.0% of sexually active girls and 25.5% of sexually active boys, and suicidal ideation was reported by 27.1% of girls and 18.0% of boys. Twenty-three percent of girls and 13.9% of boys were depressed only, and depression with suicidal ideation was reported by 20.6% of girls and 11.6% of boys.

Risky Sexual Behavior

Sixty-two percent of sexually active boys and girls engaged in at least one risky sexual behavior. Among sexually active students, 43.1% of girls and 30.6% of boys reported lack of condom use the last time they had sex. Birth control was not used by 31.9% of girls and 26.5% of boys, and 15.9% of girls and 22.4% of boys had used alcohol or drugs the last time they had sex. Twenty-five percent of girls and

36.6% of boys had 4 or more sexual partners. Risky sexual behaviors tend to co-occur; correlation coefficients can be found in *Table 10*.

Because we found a significant interaction between gender and depression status for three of the four risky sexual behaviors: condom nonuse ($p=0.033$), BC nonuse ($p=0.004$), and alcohol/drug use during sex ($p=0.043$) (*Table 11*), the remaining analyses are stratified by gender. Age was found to be an effect modifier only with the association between depression and having had 4+ sexual partners ($p=0.028$), and binge-drinking was an effect modifier in the association between depression and condom nonuse ($p=0.021$). There was no other significant effect modification by age, race, or binge-drinking.

Results for Boys[i]

Depression, Suicidality, & Risky Sexual Behavior: Partially-Adjusted Models for Boys

In age and/or race-adjusted models, sexually active boys who were depressed only were 1.54 (95% confidence interval [CI]: 1.32-1.80) times more likely to engage in risky sexual behavior, compared to those who were not depressed (*Table 6*); boys who were depressed and suicidal were 2.11 (95% CI: 1.68-2.65) times more likely to engage in risky sexual behavior compared to boys who were not depressed (*Table 8*). In the partially-adjusted model with depression only as the reference group, boys who were depressed and suicidal were 1.77 (95% CI: 1.34-2.34) times more likely to engage in risky behavior than those who were depressed only.

In the partially-adjusted models, sexually active boys with depression and suicidal ideation were 2.44 (95% CI: 1.97-3.00) times more likely to have not used a condom the last time they had sex, 2.55 (95%

[i] Unadjusted analyses for boys can be found in the appendix in Tables 4 & 5.

CI: 2.06-3.15) times more likely not to have used birth control, 2.25 (95% CI: 1.81-2.79) times more likely to have used alcohol or drugs the last time they had sex, and 1.42 (95% CI: 1.15-1.75) times more likely to have had 4+ sexual partners, compared to boys who were not depressed (*Table 8*). Compared to boys who were depressed only, boys who were depressed and suicidal were 2.39 (95% CI: 1.81-3.11) times more likely to have not used a condom the last time they had sex, 2.39 (95% CI: 1.81-3.16) times more likely not to have used birth control, and 2.02 (95% CI: 1.52-2.68) times more likely to have used alcohol or drugs the last time they had sex (*Table 8*).

Binge Drinking & Risky Sexual Behavior in Boys

In boys binge drinking was positively associated with risky sexual behavior. Eighty-one percent of sexually active boys who reported binge-drinking also reported engaging in at least one RSB, compared to 56.6% of boys who did not report binge-drinking. Thirty-six percent of male binge-drinkers also did not use a condom the last time they had sex, and 29.7% of male binge-drinkers did not use birth control, compared to 28.5% and 25.3% of male non-binge-drinkers, respectively. Of those boys who were binge-drinkers, 46.8% had been under the influence of drugs or alcohol the last time they had sex, compared to 12.8% of boys who were not binge-drinkers. Fifty-four percent of boys who reported binge-drinking also reported having had 4+ sexual partners, compared to the 29.8% of boys who were not binge-drinkers. Associations between binge-drinking and engaging in risky sexual behavior are all significant at the $p \leq 0.001$ level.

Depression, Suicidality, & Risky Sexual Behavior: Fully-Adjusted Models for Boys

In age, race, and/or binge-drinking-adjusted models, sexually active boys who were depressed only were 1.47 (95% CI: 1.25-1.72) times more likely to engage in risky sexual behavior, compared to those who

were not depressed (*Table 7*), whereas boys who were depressed and suicidal were 1.92 (95% CI: 1.52-2.42) times more likely to engage in risky sexual behavior compared to boys who were not depressed (*Table 9*). In the fully-adjusted model with depression only as the reference group, boys who were depressed and suicidal were 1.63 (95% CI: 1.22-2.18) times more likely to engage in RSB as those who were depressed only.

In fully adjusted models sexually active boys with depression and suicidal ideation were 2.36 (95% CI: 1.92-2.91) times more likely to have not used a condom the last time they had sex, 2.55 (95% CI: 2.06-3.15) times more likely not to have used birth control, 1.96 (95% CI: 1.57-2.45) times more likely to have used alcohol or drugs the last time they had sex, and 1.26 (95% CI: 1.03-1.55) times more likely to have had 4+ sexual partners, compared to boys who were not depressed (*Table 9*). Compared to boys who were depressed only, boys who were depressed and suicidal were 2.35 (95% CI: 1.81-3.05) times more likely to have not used a condom the last time they had sex, 2.39 (95% CI: 1.81-3.16) times more likely not to have used birth control, and 2.02 (95% CI: 1.36-2.49) times more likely to have used alcohol or drugs the last time they had sex (*Table 9*).

Binge-drinking among boys increased the odds of being depressed and suicidal by 1.57 (95% CI: 1.20-2.06). Controlling for binge-drinking, in addition to race and/or age, resulted in a modest reduction in the strength of the association between depression/suicide and RSB.. The odds of having sex under the influence of drugs or alcohol for boys with depression and suicidality decreased from 2.25 (95% CI: 1.81-2.79) to 1.96 (95% CI: 1.57-2.45), compared to boys who were not depressed, after controlling for binge-drinking.

Results for Girls[ii]

Depression, Suicidality, & Risky Sexual Behavior: Partially-Adjusted Models for Girls

In age and/or race-adjusted models, sexually active girls who were depressed only were 1.76 (95% CI: 1.54-2.02) times more likely to engage in risky sexual behavior, compared to those who were not depressed (*Table 6*); girls who were depressed and suicidal were 2.25 (95% CI: 1.87-2.69) times more likely to engage in risky sexual behavior compared to girls who were not depressed (*Table 8*). In the partially-adjusted model with depression only as the reference group, girls who were depressed and suicidal were 1.55 (95% CI: 1.26-1.91) times more likely to engage in RSB than those who were depressed only.

Controlling for age and/or race, sexually active girls with depression and suicidal ideation were 1.58 (95% CI: 1.34-1.87) times more likely to have not used a condom the last time they had sex, 1.69 (95% CI: 1.42-2.02) times more likely not to have used birth control, 2.03 (95% CI: 1.64-2.50) times more likely to have used alcohol or drugs the last time they had sex, and 1.86 (95% CI: 1.55-2.24) times more likely to have had 4+ sexual partners, compared to girls who were not depressed. (*Table 8*) Compared to girls who were depressed only, girls who were depressed and suicidal were 1.42 (95% CI: 1.17-1.72) times more likely to have not used a condom the last time they had sex, 1.44 (95% CI: 1.17-1.76) times more likely not to have used birth control, 1.37 (95% CI: 1.08-1.74) times more likely to have had sex under the influence of drugs or alcohol, and 1.49 (95% CI: 1.20-1.84) times more likely to have had 4+ sexual partners (*Table 8*).

[ii] Unadjusted analyses for girls can be found in the appendix in Tables 4 & 5.

Binge Drinking & Risky Sexual Behavior in Girls

In girls binge drinking was positively associated with risky sexual behaviors. Seventy-seven percent of sexually active girls who reported binge-drinking also reported engaging in at least one RSB, compared to 57.0% of girls who did not report binge-drinking. Forty-eight percent of female binge-drinkers also did not use a condom the last time they had sex, and 33.8% of female binge-drinkers did not use birth control, compared to 41.6% and 31.3% of female non-binge-drinkers, respectively. Of those girls who reported binge-drinking, 38.3% had been under the influence of drugs or alcohol the last time they had sex, compared to 9.4% of girls who were not binge-drinkers. Forty-one percent of girls who reported binge-drinking also reported having had 4+ sexual partners, compared to the 20.8% of girls who were not binge-drinkers. Associations between binge-drinking and engaging in risky sexual behavior were all significant at the $p \leq 0.001$ level.

Depression, Suicidality, & Risky Sexual Behavior: Fully-Adjusted Models for Girls

In age, race, and/or binge-drinking-adjusted models, sexually active girls who were depressed only were 1.70 (95% CI: 1.48-1.95) times more likely to engage in risky sexual behavior, compared to those who were not depressed (*Table 7*), whereas girls who were depressed and suicidal were 2.11 (95% CI: 1.75-2.55) times more likely to engage in risky sexual behavior compared to girls who were not depressed (*Table 9*). In the fully-adjusted model with depression only as the reference group, girls who were depressed and suicidal were 1.49 (95% CI: 1.20-1.84) times more likely to engage in risky behavior as those who were depressed only.

Sexually active girls with depression and suicidal ideation were 1.54 (95% CI: 1.30-1.84) times more likely to have not used a condom the last time they had sex, 1.69 (95% CI: 1.42-2.02) times more likely

not to have used birth control, 1.83 (95% CI: 1.46-2.30) times more likely to have used alcohol or drugs the last time they had sex, and 1.72 (95% CI: 1.42-2.08) times more likely to have had 4+ sexual partners, compared to girls who were not depressed (*Table 9*). Compared to girls who were depressed only, girls who were depressed and suicidal were 1.39 (95% CI: 1.15-1.70) times more likely to have not used a condom the last time they had sex, 1.44 (95% CI: 1.17-1.76) times more likely not to have used birth control, and 1.42 (95% CI: 1.13-1.75) times more likely to have had 4+ sexual partners (*Table 9*).

Binge-drinking among girls increased the odds of being depressed and suicidal by 1.38 (95% CI: 1.20-1.59). When adjusted for binge drinking the odds of having sex while under the influence of alcohol or drugs among girls with depression and suicide decreased from 2.03 (95% CI: 1.64-2.50) to 1.83 (95% CI: 1.46-2.30), compared to girls with no depression. (*Tables 8 & 9*) After controlling for binge-drinking, the association between depression/suicidality and having had 4+ sexual partners became slightly weaker, while still remaining statistically significant. After controlling for binge-drinking, the increased odds of girls with depression and suicidality having had sex under the influence of drugs or alcohol went from being significant (p=0.014), to non-significant (p=0.143).

DISCUSSION

The objective of this study was to examine the association between depression and risky sexual behavior among U.S. adolescents, to evaluate whether RSB was more likely to be exhibited by adolescents with both depression with suicidal ideation than by those with depression alone, and to explore the role of binge drinking in the association between depression, suicidal behavior and RSB. Although temporal sequence cannot be established, our overall findings showed that adolescents who are both depressed and suicidal are at increased odds for engaging in RSB. Within this broad finding we found the

association between depression/suicidality and RSB was stronger in boys than in girls and that the association was tempered somewhat when binge drinking was taken into account. We found that sexually active, adolescent boys who were both depressed and suicidal were almost twice as likely to engage in RSBs (OR range=1.63-2.39, for all RSBs) as boys who were depressed only; the association was similar, but not as strong among girls (OR range=1.39-1.49, for all RSBs). These findings can inform programs aimed at adolescent risk behaviors.

Given the potential consequences of pregnancy, HIV infection, and STIs, the increased risk of engaging in RSBs by adolescents with depression and suicidal behavior of 39-134% can have dramatic effects on the number of teenage pregnancies and prevalence of STIs. Nationwide, the percentage of sexually active students reporting condom use at most recent intercourse increased from 46.2% to 62.8% from 1991 to 2005, but then decreased to 61.5% in 2007.[52] We found suicidality among girls and boys increased the odds of having been under the influence of drugs or alcohol the last time they had sex by 24-84%, respectively, compared to their peers who were depressed only. This suggests that adolescents who are depressed and suicidal should be monitored not just for mental health reasons, but for RSB, as well. Knowing that students who are depressed and suicidal are at increased risk of condom nonuse, intervention efforts should focus on integrated programs that combine mental health treatment along with promotion of safe sexual practices.

Adolescents encounter many stressors, including heavy academic demands, difficult peer relationships, high parental expectations, family conflict, and confusing identity formation. Depression can occur when an adolescent's coping resources are not adequate to deal with such stresses. Although RSB and STIs are common among adolescents, depression can lower the likelihood that adolescents are able to

cope effectively in romantic relationships. Our findings show that adolescents who had seriously considered, planned, or attempted suicide within the past year had an significantly higher likelihood of engaging in RSB than adolescents who were depressed, but not suicidal. These behaviors, like engaging in risky sexual behaviors may be causally associated or may be part of a larger "adolescent risk behavior profile." Prior studies have shown that people who are depressed and suicidal are more prone to thrill-seeking, impulsivity, and not shy away from harmful experiences, compared to those who are depressed only.[53,54] The addition of suicidal ideation among adolescents who are depressed could therefore increase their willingness to participate in risky activities, such as spontaneous, impulsive sexual intercourse, without use of condoms or birth control. Even if they are aware of the potential consequences, such as STIs or unwanted pregnancy, depressed and suicidal adolescents may decide that the feelings of instant gratification outweigh the harmful costs. This inhibition to resist impulsive urges puts depressed and suicidal adolescents at greater odds of engaging in RSB, beyond the effects of depression only.

The idea of "adolescent risk behavior profile" is further strengthened by the strong association between binge drinking and RSB. Prior research has demonstrated that adolescent depression, suicidal behavior, risky sexual behavior and substance use are prevalent and linked. The National Survey on Drug Use and Health reported that 16% of adolescents aged 12 to 20 were binge-drinkers, and about 90% of the alcohol consumed by youth under the age of 21 in the United States is in the form of binge-drinking.[5] Many adolescents with depression self-medicate with alcohol, and the disinhibition from alcohol use can increase the likelihood of impulsively acting on suicidal thoughts.[55] Research with adolescents indicates that deficits in social problem-solving may be associated with increased risk for depression and suicidality.[56,57,58] Binge-drinking makes it harder for depressed and suicidal adolescents to make good

decisions with regards to safe sexual practices. Substance use can directly impair judgment, and adolescents who use alcohol may allow themselves to engage in RSBs they wouldn't normally engage in.[59] The association between binge-drinking and RSB may reflect situational behaviors, such as disinhibiting effects, cognitive impairment, social modeling or peer pressure, or the fact that substance use and sexual risk-taking often occur in the same social venues.[60,61] To reduce the likelihood that adolescents will engage in RSB, our findings suggest that depression, suicidal behavior and binge drinking should be taken into account. Inhibition

Limitations

This study has several limitations. A substantial proportion of students in the selected schools did not participate in the YRBS survey, schools self-selected to not administer items about risky sexual behavior, and there was a fair amount of missing data. For example, because parental permission protocols are administered locally in the school-based YRBS, procedures are not consistent across sites. There are conflicting results on how the type of parental permission affects participation.[62,63] To compensate for potential selection biases, analytical weights were calculated based on student gender, race/ethnicity, and school grade to adjust for student non-response and oversampling of black and Hispanic students.

Inability to generalize to the broader population of U.S. adolescents is another limitation. While our results should be representative of all students in grades 9-12 who attend public and private schools, adolescent who are home-schooled, in full-time special-education programs, or in juvenile detention facilities are not included in the YRBS sample. In addition, students who dropped out of high school, even though they may be at higher risk for RSB or suicidal ideation, are not included in the YRBS.

Nationwide dropout data indicate that, as of 2010, the average graduation rate for entering 9th graders[iii] was 78.2%.[64] The 1992 National Health Interview Survey and Youth Risk Behavior Supplement reported that out-of-school youth are more likely than youth attending school to engage in health-risk behaviors,[65] indicating that responses of the students who participated in the survey may under-represent the true prevalence of health risk behaviors in the population. In addition, state-level data are not available for all 50 states, because not every state participates in the YRBS from year to year, so the results could be biased by differing state prevalence rates of depression, suicidality, and RSB.

Analyses were conducted only with sexually active adolescents. The prevalence of depression among students who were not sexually active (18.61% for boys and 30.23% for girls) was considerably lower than the prevalence we found among sexually active youth (25.64% for boys and 44.23% for girls). Sexually inactive adolescent are not engaging in risky sexual behavior. Thus the odds ratios reported in this study reflecting associations between depression and RSB are lower in the sample that included sexually active adolescents, only, than the odds ratios would have been if sexually inactive adolescents had been included.

There may have been misclassification of sexual activity status. The variable used to determine if the student was sexually active was their response to the question, "Have you ever had sexual intercourse?" However, there are other sexual activities that adolescents engage in that increase risk for STIs, if not pregnancy.[66] Depending on their sexual education experience, many students today are taught to differentiate between the kinds of risks associated with different sexual acts, which could then influence their odds of engaging in RSB.[117]

[iii] Averaged Freshman Graduation Rate (AFGR) is an estimate of the percentage of an entering freshman class graduating in four years.

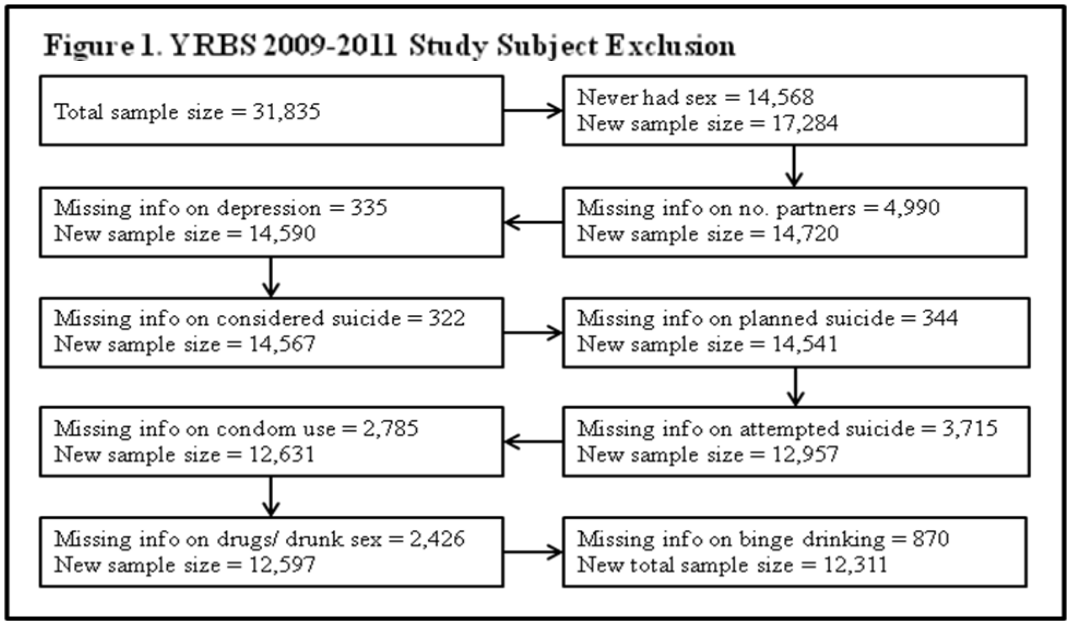
A final limitation is the study design. This is a cross-sectional study so we are unable to identify the temporal between depression, suicidal behavior, binge drinking, and risky sexual behavior. The cross-sectional survey design will only allow us to determine association, not cause and effect. Finally, although the factors of interest in this study, depression, suicidal behavior, and binge drinking, demonstrated statistically significant associations with risky sexual behaviors, they only explained an estimated 3.2%-10.8% of variability in risky sexual behavior.

Further study on other variables that affect adolescents' decisions to engage in RSB should consider sexual health education, religion, and social support. The YRBS does not collect information on sexual health education, except for the question, "Have you ever been taught about AIDS or HIV infection in school?" It does not ask *what* the student was taught about AIDS/HIV, and therefore leaves us uninformed as to whether they were given empirically supported information about sexual activity, birth control, or STIs risks. The YRBS does not ask about religious affiliation, which has been shown to strongly influence adolescent behavior. Religions have diverse views on what is considered a RSB. Religious participation can impact an adolescents' sexual behavior, and their risk of considering suicide.[67] Lastly, social support can reduce the risk of depression, suicide, and engaging in RSB among adolescents,[68] but the YRBS does not ask questions about whom adolescents can turn to when they are feeling depressed or suicidal. Including questions on the specific type of sexual health education (abstinence only or comprehensive), religion, and social support would also help us determine what protective factors could help decrease the risk of depression, suicidal ideation, and RSB.

CONCLUSION

Adolescent engagement in any RSBs is cause for concern and should be part of the clinical assessment of depression and suicidality among adolescent boys and girls. Similarly, health educators and public health practitioners whose target is RSB, teen pregnancy and STI prevention should take mental health and substance use into account. Prevention messages to address high risk behaviors in adolescents should stress links between depression, suicidality, binge-drinking, and RSB. Since this study was cross-sectional, next recommended research steps are to conduct prospective cohort studies to establish temporal relationships among depression, suicidality, binge drinking and RSB, and to conduct complementary qualitative research to establish a more in-depth and nuanced understanding of the contexts in which multiple adolescent risk behaviors occur

APPENDIX



***** No additional participants were missing data for the birth control indicator

TABLE 1 Unweighted Descriptive Statistics for Selected Sample & Complete Sample (%)

Characteristic	Selected Boys (n = 6,184)	Selected Girls (n = 6,081)	p-value	All Boys (n = 15,720)	All Girls (n = 15,988)	p-value
Race/Ethnicity			0.000			0.002
White	40.79	42.71		42.79	40.94	
American Indian/Alaska Native (AIAN)	1.84	1.66		1.49	1.27	
Asian	2.20	1.88		3.88	3.99	
Black/African-American	19.81	19.24		17.53	18.31	
Native Hawaiian/Pacific Islander (NHPI)	0.99	0.78		1.06	0.90	
Hispanic/Latino	17.28	16.15		16.81	16.91	
Multiple race	17.10	17.56		16.44	17.69	
Age			0.004			0.000
15 years or younger	21.88	21.76		31.56	34.26	
16 years old	25.07	25.95		25.93	26.01	
17 years old	31.18	32.96		25.65	25.79	
18 years or older	21.87	19.33		16.86	13.93	
Binge-drinking			0.000			0.000
Yes	28.19	22.40		16.83	12.84	
No	71.81	77.60		83.17	87.16	
Depression Level			0.000			0.000
No depression	74.50	55.99		78.71	63.92	
Depressed only	13.91	23.42		1.60	2.39	
Depressed and suicidal	11.59	20.59		19.69	33.69	
Risky Sexual Behavior (RSB)						
Any RSB	63.44	61.49	0.026	34.85	29.49	0.026
Condom nonuse	30.61	43.07	0.000	47.16	52.72	0.000
Birth control nonuse	26.50	31.88	0.000	16.04	20.41	0.000
Alcohol/drug use during sex	22.35	15.87	0.000	14.18	15.16	0.000
4+ partners	36.63	25.31	0.000	12.33	7.79	0.000

TABLE 2 Weighted Associations Between Depressive Symptoms and RSB

Depression Status	Unadjusted Odds Ratio (95% CI)				
	Any RSB	Condom Nonuse	Birth Control Nonuse	Alcohol/Drug Use During Sex	4+ Sexual Partners
No depression as reference category					
No depression	(Ref)	.	.	.	.
Depressed only	1.61 (1.46-1.78) [b]	1.53 (1.39-1.69) [b]	1.60 (1.44-1.77) [b]	1.50 (1.33-1.68) [b]	1.26 (1.14-1.39) [b]

[a] $p<0.05$ [b] $p\leq0.001$

TABLE 3 Weighted Associations Between Depressive & Suicidal Symptoms and RSB

Depression Status	Unadjusted Odds Ratio (95% CI)				
	Any RSB	Condom Nonuse	Birth Control Nonuse	Alcohol/Drug Use During Sex	4+ Sexual Partners
Depression only as reference category					
No depression	0.76 (0.68-0.86) [b]	0.83 (0.74-0.94) [a]	0.81 (0.71-0.93) [a]	0.85 (0.73-0.99) [a]	0.90 (0.79-1.03)
Depressed only	(Ref)	.	.	.	.
Depressed and suicidal	1.59 (1.35-1.88) [b]	1.66 (1.43-1.94) [b]	1.70 (1.45-2.00) [b]	2.02 (1.77-2.31) [b]	1.30 (1.10-1.52) [a]

[a] $p<0.05$ [b] $p\leq0.001$

TABLE 4 Weighted Associations Between Depressive Symptoms and RSB

Depression Status	Unadjusted Odds Ratio (95% CI)				
	Any RSB	Condom Nonuse	Birth Control Nonuse	Alcohol/Drug Use During Sex	4+ Sexual Partners
No depression as reference category					
Boys					
No depression	(Ref)	.	.	.	.
Depressed only	1.58 (1.36-1.85) [b]	1.59 (1.36-1.85) [b]	1.71 (1.45-2.00) [b]	1.58 (1.34-1.86) [b]	1.34 (1.15-1.55) [b]
Girls					
No depression	(Ref)	.	.	.	.
Depressed only	1.72 (1.50-1.97) [b]	1.27 (1.11-1.45) [b]	1.43 (1.25-1.65) [b]	1.77 (1.49-2.10) [b]	1.44 (1.01-1.45) [b]

[a] $p<0.05$ [b] $p\leq0.001$

TABLE 5 Weighted Associations Between Depressive & Suicidal Symptoms and RSB

Depression Status	Unadjusted Odds Ratio (95% CI)				
	Any RSB	Condom Nonuse	Birth Control Nonuse	Alcohol/Drug Use During Sex	4+ Sexual Partners
Depression only as reference category					
Boys					
No depression	0.81 (0.67-0.98) [a]	0.99 (0.80-1.21)	0.91 (0.74-1.13)	0.91 (0.72-1.14)	0.80 (0.66-0.97) [a]
Depressed only	(Ref)	.	.	.	.
Depressed and suicidal	1.73 (1.31-2.27) [b]	2.33 (1.79-3.04) [b]	2.34 (1.78-3.08) [b]	2.02 (1.52-2.68) [b]	1.14 (0.88-1.48)
Girls					
No depression	0.70 (0.60-0.83) [b]	0.90 (0.77-1.06)	0.83 (0.70-0.98) [a]	0.66 (0.54-0.81) [b]	0.83 (0.69-0.99) [a]
Depressed only	(Ref)	.	.	.	.
Depressed and suicidal	1.52 (1.23-1.86) [b]	1.41 (1.15-1.71) [b]	1.42 (1.16-1.74) [b]	1.37 (1.08-1.74) [a]	1.42 (1.15-1.75) [b]

[a] $p<0.05$ [b] $p\leq0.001$

TABLE 6 Weighted Associations Between Depressive Symptoms and RSB

Depression Status	Partially Adjusted Odds Ratio (95% CI)				
	Any RSB [1]	Condom Nonuse [1]	Birth Control Nonuse [2]	Alcohol/Drug Use During Sex [2]	4+ Sexual Partners [1]
No depression as reference category					
Boys					
No depression	(Ref)	.	.	.	.
Depressed only	1.54 (1.32-1.80) [b]	1.58 (1.35-1.84) [b]	1.67 (1.42-1.97) [b]	1.59 (1.34-1.87) [b]	1.30 (1.11-1.51) [b]
Girls					
No depression	(Ref)	.	.	.	.
Depressed only	1.76 (1.54-2.02) [b]	1.31 (1.15-1.50) [b]	1.40 (1.22-1.61) [b]	1.77 (1.49-2.10) [b]	1.52 (1.31-1.76) [b]

[a] $p<0.05$ [b] $p\leq0.001$ [1] Adjusted for age and race [2] Adjusted for race

TABLE 7 Weighted Associations Between Depressive Symptoms and RSB

Depression Status	Fully Adjusted Odds Ratio (95% CI)				
	Any RSB [1]	Condom Nonuse [1]	Birth Control Nonuse [2]	Alcohol/Drug Use During Sex [3]	4+ Sexual Partners [1]
No depression as reference category					
Boys					
No depression	(Ref)	.	.	.	.
Depressed only	1.46 (1.24-1.71) [b]	1.54 (1.32-1.80) [b]	1.67 (1.42-1.97) [b]	1.46 (1.22-1.74) [b]	1.21 (1.03-1.41) [a]
Girls					
No depression	(Ref)	.	.	.	.
Depressed only	1.70 (1.48-1.95) [b]	1.29 (1.13-1.47) [b]	1.40 (1.22-1.61) [b]	1.64 (1.37-1.98) [b]	1.44 (1.24-1.68) [b]

[a] $p<0.05$ [b] $p\leq0.001$ [1] Adjusted for age, race, and binge-drinking [2] Adjusted for race [3] Adjusted for race and binge-drinking

TABLE 8 Weighted Associations Between Depressive & Suicidal Symptoms and RSB

Depression Status	Partially Adjusted Odds Ratio (95% CI)				
	Any RSB [1]	Condom Nonuse [1]	Birth Control Nonuse [2]	Alcohol/Drug Use During Sex [2]	4+ Sexual Partners [1]
Depression only as reference category					
Boys					
No depression	0.84 (0.69-1.02)	0.98 (0.80-1.20)	0.94 (0.75-1.17)	0.90 (0.72-1.13)	0.84 (0.69-1.02)
Depressed only	(Ref)	.	.	.	.
Depressed and suicidal	1.77 (1.34-2.34) [b]	2.39 (1.83-3.11) [b]	2.39 (1.81-3.16) [b]	2.02 (1.52-2.68) [b]	1.19 (0.92-1.55)
Girls					
No depression	0.69 (0.59-0.82) [b]	0.90 (0.77-1.05)	0.85 (0.72-1.01)	0.66 (0.53-0.81) [b]	0.80 (0.66-0.95) [a]
Depressed only	(Ref)	.	.	.	.
Depressed and suicidal	1.55 (1.26-1.91) [b]	1.42 (1.17-1.72) [b]	1.44 (1.17-1.76) [b]	1.37 (1.08-1.74) [a]	1.49 (1.20-1.84) [b]

[a] $p<0.05$ [b] $p\leq0.001$ [1] Adjusted for age and race [2] Adjusted for race

TABLE 9 Weighted Associations Between Depressive & Suicidal Symptoms and RSB

Depression Status	Fully Adjusted Odds Ratio (95% CI)				
	Any RSB [1]	Condom Nonuse [1]	Birth Control Nonuse [2]	Alcohol/Drug Use During Sex [3]	4+ Sexual Partners [1]
Depression only as reference category					
Boys					
No depression	0.85 (0.69-1.04)	0.99 (0.81-1.18)	0.94 (0.75-1.17)	0.94 (0.73-1.20)	0.85 (0.70-1.05)
Depressed only	(Ref)	.	.	.	.
Depressed and suicidal	1.63 (1.22-2.18) [b]	2.34 (1.78-3.03) [b]	2.39 (1.81-3.16) [b]	1.84 (1.36-2.49) [b]	1.07 (0.82-1.39)
Girls					
No depression	0.70 (0.59-0.83) [b]	0.91 (0.77-1.06)	0.85 (0.72-1.01)	0.68 (0.54-0.85) [b]	0.83 (0.68-0.99) [a]
Depressed only	(Ref)	.	.	.	.
Depressed and suicidal	1.49 (1.20-1.84) [b]	1.39 (1.15-1.70) [b]	1.44 (1.17-1.76) [b]	1.24 (0.95-1.61)	1.42 (1.13-1.75) [b]

[a] $p<0.05$ [b] $p\leq0.001$ [1] Adjusted for age, race, and binge-drinking [2] Adjusted for race [3] Adjusted for race and binge-drinking

ABLE 10 Correlation Between Risky Sexual Behaviors, by Gender & Binge-drinking

All	**Any RSB**	**Condom Nonuse**	**Birth Control Nonuse**	**Alcohol/Drug Use During Sex**	**4+ Partners**
Any RSB	1.00				
Condom Nonuse	0.596 [b]	1.00			
Birth Control Nonuse	0.502 [b]	0.710 [b]	1.00		
Alcohol/Drug Use During Sex	0.379 [b]	0.047 [b]	0.070 [b]	1.00	
4+ Partners	0.523 [b]	0.081 [b]	0.071 [b]	0.212 [b]	1.00
Boys	**Any RSB**	**Condom Nonuse**	**Birth Control Nonuse**	**Alcohol/Drug Use During Sex**	**4+ Partners**
Any RSB	1.00				
Condom Nonuse	0.518 [b]	1.00			
Birth Control Nonuse	0.456 [b]	0.706 [b]	1.00		
Alcohol/Drug Use During Sex	0.430 [b]	0.071 [b]	0.074 [b]	1.00	
4+ Partners	0.573 [b]	0.066 [b]	0.084 [b]	0.233 [b]	1.00
Girls	**Any RSB**	**Condom Nonuse**	**Birth Control Nonuse**	**Alcohol/Drug Use During Sex**	**4+ Partners**
Any RSB	1.00				
Condom Nonuse	0.695 [b]	1.00			
Birth Control Nonuse	0.525 [b]	0.683 [b]	1.00		
Alcohol/Drug Use During Sex	0.360 [b]	0.049 [b]	0.089 [b]	1.00	
4+ Partners	0.479 [b]	0.180 [b]	0.085 [b]	0.157 [b]	1.00
Non-binge-drinkers	**Any RSB**	**Condom Nonuse**	**Birth Control Nonuse**	**Alcohol/Drug Use During Sex**	**4+ Partners**
Any RSB	1.00				
Condom Nonuse	0.654 [b]	1.00			
Birth Control Nonuse	0.554 [b]	0.723 [b]	1.00		
Alcohol/Drug Use During Sex	0.309 [b]	0.021	0.037 [a]	1.00	
4+ Partners	0.511 [b]	0.056 [b]	0.048 [b]	0.128 [b]	1.00
Binge-drinkers	**Any RSB**	**Condom Nonuse**	**Birth Control Nonuse**	**Alcohol/Drug Use During Sex**	**4+ Partners**
Any RSB	1.00				
Condom Nonuse	0.441 [b]	1.00			
Birth Control Nonuse	0.353 [b]	0.674 [b]	1.00		
Alcohol/Drug Use During Sex	0.452 [b]	0.053 [b]	0.115 [b]	1.00	
4+ Partners	0.500 [b]	0.124 [b]	0.111 [b]	0.187 [b]	1.00

[a] $p<0.05$

[b] $p\leq0.001$

TABLE 11 Interaction Term p-values

All	**Any RSB**	**Condom Nonuse**	**Birth Control Nonuse**	**Alcohol/Drug Use During Sex**	**4+ Partners**
Depression & Sex	0.820	**0.002**[a]	**0.004**[b]	**0.043**[b]	0.188
Depression & Age	0.994	0.217	0.960	0.116	**0.028**[b]
Depression & Race	0.505	0.052	0.738	0.456	0.061
Depression & Binge-drinking	0.329	**0.021**[b]	0.080	0.624	0.738
Boys	**Any RSB**	**Condom Nonuse**	**Birth Control Nonuse**	**Alcohol/Drug Use During Sex**	**4+ Partners**
Depression & Age	0.731	0.848	0.821	0.098	0.992
Depression & Race	0.471	0.130	0.158	0.294	0.154
Depression & Binge-drinking	0.949	0.759	0.176	0.157	**0.000**[a]
Girls	**Any RSB**	**Condom Nonuse**	**Birth Control Nonuse**	**Alcohol/Drug Use During Sex**	**4+ Partners**
Depression & Age	0.887	0.113	0.660	0.908	0.062
Depression & Race	0.742	0.116	0.558	0.346	0.589
Depression & Binge-drinking	0.116	**0.003**[b]	0.198	0.063	0.289

[a] $p<0.05$

[b] $p\leq0.001$

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