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Abstract


By

Maithili Sridhar Bhat

January 5, 2017

Abstract:
INTRODUCTION: Suicidal behavior is a serious public health problem among adolescents in the United States (U.S). It is a complex phenomenon and process that may originate with suicidal thoughts and evolve over time into plans or attempts, or can more rarely be an impulsive act. A suicidal attempt may result in injury, disability or death. As adolescents are in a transitional period between childhood and adulthood, they are more vulnerable to adverse effects from health behaviors that put them at higher risk for suicidal behavior. The goal of this research was to examine high-risk health behaviors and assess their associations with suicidal risk.

METHODS: This research analyzed data from the Youth Risk Behavioral Surveillance System study data (YRBSS) from 2013 and 2015, to examine and quantify associations between health behaviors and suicide risk. Time trends were analyzed for changing relationships between health behaviors and suicide risk. They were examined with YRBSS data collected from 1991 to 2015. Suicide risk was defined as a categorical 3-level outcome. Statistical models were used to estimate associations with health behaviors and suicide risk. Analyses were stratified by sex. Odds ratios and 95% confidence intervals were reported.

RESULTS: Results of 2013 and 2015-year data showed that students who identified as feeling hopeless or sad, involved in abusing drugs such as cocaine or methamphetamine, involved in weight controlling behaviors such as vomiting or using laxatives, and/or involved in fights resulting in injury, were at increased risk for suicidal behavior. After controlling for race/ethnicity, age, and grade level, time trends from 1991 to 2015 showed students who identified as feeling hopeless or sad were at increased risk for suicidal behavior.

DISCUSSION: Adolescents were at higher risk for suicidal behavior when exposed to or involved in violence or other high-risk health behaviors. Teens exposed to or involved in violence at school or in their community should be screened to assess risk for suicidal behavior. Other factors to indicate potential for suicidal behavior include mental health issues, engaging in weight control measures, substance abuse, high-risk sexual behavior, or exhibiting aggressive or impulsive behavior. Additionally, screening may include flagging adolescents diagnosed with hopelessness or sadness. Interventions that may be effective with reducing the risk of suicidal behavior include pharmacotherapy, cognitive behavior therapy and social support. This research contributes to an improved understanding of health risk behaviors associated with suicidal behavior. This has implications for the development of preventive measures, including the design and testing of educational and public health interventions for promoting understanding of suicidal risk in adolescents.

by

Maithili S. Bhat

B.Sc., KARNATAKA UNIVERSITY, INDIA
M.Sc. MANGALORE UNIVERSITY, INDIA

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MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA
30303

by

Maithili S. Bhat

Approved:

Dr. Matthew J. Hayat_________________________
Committee Chair

Dr. Betty Lai_________________________
Committee Member

Dr. John Robert Lutzker _______________________
Committee Member

Date January 5, 2017
Acknowledgments

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Maithili S. Bhat
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Introduction

Suicide in the United States (U.S.) is the 10th leading cause of death (Suicide: Facts at a Glance, n.d.); is the second leading cause of death among adolescents aged 10-14 years and among young adults aged 15-24 years (National Suicide Statistics, 2016). The number of deaths due to suicide was substantially higher among males aged 15-19 years in comparison to females. In 2014, there were 425 victims of suicide among adolescents aged 10-14 years and 5,079 victims of suicide among young adults aged 15-24 years (National Suicide Statistics, 2016). The “Healthy People 2020” initiative by the Office of Disease Prevention and Health Promotion (ODPHDP) in the U.S., aims for a reduction of suicide attempts among adolescents at 10% by year 2020 (Healthy People, 2020, n.d.). Adolescents are a subset of the population that are at a higher risk for suicidal behavior.

Suicidal behavior among adolescents is a serious public health problem in the U.S. This behavior often begins with thoughts about killing oneself. It can evolve into making a plan, which may eventually lead to a suicide attempt. Attempts result in harm ranging from disability, injury or death (Nock et al., 2008). Suicide completion may be conceptualized as an action taken by an individual when unable to cope with a crisis situation (Sveticic & De Leo, 2012). Although this offers a partial understanding, suicidal behavior is a complex phenomenon. It is a process that develops over time across various environmental, social and individual risk factors (Mościcki, 2001). This work examines associations between high risk health behaviors and suicide risk.

Suicidal thoughts can onset in adolescents as early as 12 years of age (Kessler, Borges, & Walters, 1999). A study by Adrian et al., (2016) found, suicidal thoughts peaked around 12 years for boys and 14 years for girls (Adrian, Miller, McCauley, & Vander Stoep, 2016). Although early adolescence is a high-risk time for onset of suicidal behavior, it peaks around 16 and can remain high into the early 20s (Kessler et al., 1999). Thus, for the current research, high school students age 14 to 18 is the population of interest.

Adolescence is a transitional period from childhood to adulthood and a period of rapid physical growth and sexual development (Adolescent Development, n.d.). During this vulnerable period, any exposure to or involvement in violence at school or community, or engaging in certain health behaviors puts adolescents at a higher risk for suicidal behavior. Negative experiences or adverse life events can trigger suicidal thoughts (Arie, Haruvi-Catalan, & Apter, 2005). Suicidal thoughts may also occur when stress, immaturity and lack of emotional support combine to overwhelm a teen’s ability to cope and think logically (Portes, Sandhu, & Longwell-Grice, 2002). Teens with persistent suicidal thoughts are at increased risk of making suicidal plans (Mościcki, 2001). Adolescents experiencing suicidal thoughts and plans are at higher risk for a first suicidal attempt within the first year of onset. For teens who plan to commit suicide, the risk remains high till early 20s (Kessler et al., 1999). Nearly one-third of teens with suicidal thoughts developed plans of which, about 60% went on to attempt suicide. This transition from suicidal thoughts to plans and to attempts happened within one year of onset of suicidal thoughts (Nock et al., 2013). The risk of first suicide attempt is high only in the first year, and abates soon after, for teens experiencing suicidal thoughts without a plan (Kessler et al., 1999).

Although females are reported to have higher frequency of non-fatal suicidal attempts males are reported to have more frequent suicide completions. This gender paradox is well defined and described in the health literature (Mcloughlin, Gould, & Malone, 2015). The ratio of suicide completion for males to females has been estimated to be in the range of 3:1 to 7.5:1 (Nock et al., 2008). This gender paradox
may be explained by males using more lethal methods for suicide completion (particularly firearms), consuming more alcohol, displaying greater aggressive and impulsive behavior, and externalizing violent behaviors (McLoughlin et al., 2015). Therefore, this study analyzes YRBSS data by sex.

The Diagnostic and Statistical Manual of Mental Disorder (DSM-5) is the primary tool used by healthcare providers to diagnose Suicidal Behavior Disorder. It describes five criteria for Suicidal Behavior Disorder. Suicidal attempt is a sequence of behaviors that is started by an individual, with steps taken towards the intention of killing oneself. The criteria include: 1) a suicide attempt in the last 24 months; 2) an action that fails to meet the criterion for non-suicidal self-injury; 3) a diagnosis not applicable to suicidal ideation or plans; 4) action not taken while delirious or confused; and, 5) action not taken only for political or religious reasons (American Psychiatric Association, 2013). Suicidal Behavior Disorder is formally diagnosed only if all the named criteria in DSM-5 are met. Suicidal behavior has multiple stages from suicidal ideation to plans and attempts. However, DSM-5 criteria exclude both suicidal ideation and plans and considers only suicidal attempts to have occurred in past 24 months as a criterion. This reveals opportunities to identify suicidal behavior early. Therefore, it is the primary motivation in this research, to elaborate on risk factors.

Identifying specific risk factors that make teens more vulnerable to suicidal behavior will be valuable in screening and providing appropriate and timely interventions (Shain, 2007). Knowledge of related risk factors can be beneficial in explaining and predicting suicidal behavior (Miller & Eckert, 2009). This research seeks to enable a better understanding of suicidal risk factors in adolescents. It focuses on quantifying associations between suicidal behavior and risk factors among adolescents in the YRBSS data. This knowledge can contribute to reducing the overall morbidity associated with adolescent suicidal behavior.

The following research questions are addressed:

- What are the high-risk health behaviors associated with suicidal thoughts and attempts in 2013 and 2015?
- What are the time trends in high-risk health behaviors associated with suicidal thoughts and attempts in the years 1991 to 2015?

Associations between high-risk health behaviors and suicidal thoughts and attempts are examined for a national probability sample of adolescents. Lowry et al (2014) provided a framework for categorization of risk factors to be studied for associations with increased risk for suicidal thoughts and attempts. The YRBSS data provided an opportunity to examine relationships for a representative sample of adolescents. The aims of this research are to: (a) investigate associations between high risk health behaviors and suicidal thoughts and attempts among adolescents; (b) assess which high risk health behaviors affect suicide risk over time. Understanding of associations may help clinicians and healthcare workers involved in working with adolescents at risk, as well as those designing educational and public health prevention programs intended to promote greater understanding of suicidal phenomenon.

The risk of advancement of suicidal thoughts to plans and then to attempts may be reduced through appropriate intervention and treatment (Arie et al., 2005). Suicides are preventable (Bailey et al., 2011) (Mościcki, 2001). Intervention begins with recognizing high-risk groups for suicidal behavior, increasing public awareness though health campaigns, and educating school personnel, health care and mental
health providers about suicidal behavior (Bailey et al., 2011). The American Academy of Child and Adolescent Psychiatry (AACAP) recommends preventative actions, including implementing crisis hotlines for individuals experiencing suicidal behavior, as well as restricting means of suicidal attempt such as firearms or over-the-counter drugs. Gatekeeper training can be provided to those in close contact with adolescents (teachers, counselors, students, parents, and clergy), so that gatekeepers can identify youth experiencing suicidal behavior and provide appropriate referrals. Further, screening adolescents in ages 15-19, who are engaged in substance abuse, and those experiencing mental health disorders for suicidal behavior are helpful (Shaffer & Pfeffer, 2001).

A framework was constructed in this research for considering health behaviors based on work by Lowry et al. (2014). Grouping risk factors by domains and assessing them against suicidal behavior helps determine precise associations among them. Health behaviors are categorized into seven domains including exposure to violence in the community, exposure to violence at school, substance abuse, high risk sexual behaviors, weight controlling behaviors, physical/sedentary activities, and personal characteristics. This lays the groundwork for the YRBSS data analysis of such high-risk behaviors. This literature review explores risk factors cited in the health literature associated with suicidal behavior to support this research.

Literature Review

Overview

Suicidal behavior is defined in different ways in health literature. For example, in one study, suicidal behavior is defined as any action by an individual to hurt oneself (aggression towards self), regardless of the level of intended harm (Botega, Barros, Oliveira, Dalgalarrondo, & Marín-León, 2005). Another study categorized non-fatal suicidal behavior into three groups: suicidal ideation involving thoughts about how to end one’s life; suicidal plan pertaining to usage of a specific method to attain death; and suicide attempt engaging in self-injurious behavior with intention of dying (Nock et al., 2008). The Centers for Disease Control and Prevention (CDC) categorized suicidal behavior into two groups: suicidal ideation and suicidal attempts. Suicidal ideations were defined as thoughts and plans about death. Suicide attempts were defined as non-fatal, self-directed, injurious behavior with motivation to die that might not result in injury (CDC-Definitions: Self-directed Violence, n.d.).

There are various risk factors that increase the risk for suicidal behavior. For example, previous research has shown major risk factors for suicidal behavior include mental health issues such as depression; Attention Deficit Hyperactivity Disorder; Post Traumatic Stress Disorder; history of suicide attempt; family history of suicide; disruptive behavior disorder; drug or alcohol dependence or misuse; anxiety disorders; loss of a family member; access to lethal weapons; social isolation; hopelessness; experiencing stigma against mental illness; and experiencing physical illness (Bailey et al., 2011). Multiple risk factors may also be involved, leading to suicidal behavior (Mościcki, 2001). Untreated mental health issues are major risk factors for suicidal behavior. Individuals with two or more risk factors are at a higher risk for suicidal behavior (Bailey et al., 2011). Reducing risk factors helps in reduction for risk of suicidal behavior. Risk factors considered in this work are those individuals who were unable to focus at school, those who felt hopeless or sad, and those who abused alcohol or drugs.

Risk factors can be organized as proximal and distal and they influence suicidal behavior at different levels (Mościcki, 2001). Proximal risk factors are adverse events found to have occurred prior to a
suicidal attempt such as a crisis in an individual’s life. Distal risk factors are not specific to suicidal behavior; however, they function as risk thresholds beyond which the individual susceptibility increases for proximal risk factors. Either proximal or distal risk factors, by themselves are insufficient for attempted or completed suicide. The synergistic activities between proximal and distal risk factors, along with individual and environmental factors create an agreeable condition for complex suicidal behavior. While considering proximal and distal risk factors for this research, two proximal risk factors and a single distal risk factor were found in YRBSS data. Sense of hopelessness or sadness and dependency or addiction to alcohol were identified as the proximal risk factors. Substance abuse was identified as the distal risk factor. However, this research organizes risk factors in terms of seven different domains and not in terms of proximal and distal risk factors.

Protective factors may provide safeguards against developing suicidal thoughts and attempts among teens. For example, protective factors such as social support, religious support (Nock et al., 2008), being in good physical, mental health (Sveticic & De Leo, 2012), having higher academic achievement at school (Borowsky, Ireland, & Resnick, 2001), having positive attitude, developing coping skills and problem-solving skills can help reduce the risk for suicidal behavior (Lubell & Vetter, 2006). A protective factor considered in this research was, if higher academic performance of adolescents at school made them more or less prone to suicidal thoughts and attempts.

Most studies pertaining to suicidal behavior, consider risk factors in general. However, one study by Lowry et al., (2014) organized risk factors among of six domains. The current research expands on the Lowry et al., (2014) study, by adding a seventh domain, for personal characteristics, and analyzed YRBSS data for recent years. Also, there are few studies analyzing suicidal behavior trends over time utilizing YRBSS data in the U.S. One study that analyzed data from 1991 to 2001, reported an increase in risk for suicide attempt for male black students (Joe & Marcus, 2003). A more recent analysis looking at 1991 to 2011 found a decrease in suicidal behavior for male students (Lowry, Crosby, Brener, & Kann, 2014). This research differentiates from such studies by analyzing time trends in associations between suicidal behaviors and risk factors across the seven domains for 1991 to 2015. Review of the seven domains of risk factors considered for this research follow.

Community related Violence

Adolescents can be exposed to violence in their community, in various forms for example, usage of weapons such as guns; cyber bullying; physical violence at home or streets; and violence from an intimate partner. Such exposure to violence or involvement in violence leaves them at a higher risk for suicidal behavior. For example, a longitudinal study found some of the risk factors associated with suicide attempts among males included, being a victim of violent incidents, being a perpetrator of violence, or having been involved in past suicide attempts. Among females, those experiencing physical illness and exposure to suicide by a peer, were associated with an increase in risk for suicide attempts (Borowsky et al., 2001). A study among female Latino adolescents found, those involved in physical fights were at a higher risk for suicidal ideation and attempt (Eaton et al., 2011). Another study reported, teens experiencing direct violence were at a higher risk for suicidal behavior (Wolitzky-Taylor et al., 2009). A secondary analysis suggested, teens involved in carrying a weapon in the community or being involved in a physical fight were at increased risk for suicidal thoughts, plans, and attempts (Nickerson & Slater, 2009). Further, teen victims of cyberbullying were at an increased risk for suicidal thoughts and attempts as compared to non-victims (Hinduja & Patchin, 2010). Also, teens who were
victims of interpersonal violence by their intimate partner were at higher risk for suicidal thoughts and attempts in comparison to teens who were not victims. Victims of physical assault were at a higher risk for planning suicide. Females were more vulnerable for dating violence and this illustrates the gender paradox for suicidal behavior (Belshaw, Siddique, Tanner, & Osho, 2012). The suicide literature suggests a gender paradox; females report higher frequency of suicidal attempts, whereas males report more frequently committing suicides. The current research explores the associations between suicide risk and exposures to violence in communities such as carrying weapon, being involved in physical fights, being bullied electronically, being exposed to physical violence by an intimate partner and being forced to have sexual intercourse.

*School Related Violence*

Adolescents can be exposed to violence at school from a range of threats such as carrying guns or knives on school property, being bullied, being subject to intimidation or threats, or getting involved in physical fights. Such involvement or exposure to violence at school, makes adolescents more vulnerable to suicidal thoughts and attempts (Hinduja & Patchin, 2010). In addition, such unsafe school environments may discourage some adolescents from attending school. For example, a study showed, among teens who missed school because they felt unsafe and threatened at school were at a higher risk for suicidal ideation and attempts (Lowry et al., 2014). Another study found victims of school bullying were three times as likely to report suicidal ideation or attempts in comparison to non-victims (Sibold, Edwards, Murray-Close, & Hudziak, 2015). A meta-analysis examining the association between bullying and suicide found victims of bullying were at increased risk for suicidal thoughts and attempts. In addition, perpetrators of bullying were also at a higher risk for suicidal thoughts and attempts (Hinduja & Patchin, 2010) (Holt et al., 2015). A negative attitude towards school and lower grades was associated with increased risk for suicidal behavior (Lubell & Vetter, 2006). Finally, a study found among adolescents threatened or injured at school, those involved in physical fights and those injured in a physical fight at school were at a higher risk for suicidal thoughts, plans, and attempts (Nickerson & Slater, 2009). Therefore, the associations between risk for suicide risk and exposure to violence at school such as carrying weapon to school, being involved in physical fights in school, being bullied at school, missing school because of safety concerns, and being threatened at school were examined in this research.

*Substance Abuse*

Experimenting with different types of illicit drugs and alcohol are some of the risks that can onset during teen years. Curiosity in experiencing such substances can initiate abuse, and subsequently, owing to the addictive nature of such substances, it can result in recurring abuse by adolescents. Access to illicit substances in school or community and peer pressure can further increase risk for substance abuse. Clinical and community based studies show that teens involved in drug and alcohol abuse were at increased risk for suicidal behavior (Esposito-Smythers & Spirito, 2004). For example, among teens with substance abuse issues, the odds of suicidal attempt was three times higher than those who were not involved in substance abuse (Esposito-Smythers & Spirito, 2004). A secondary analysis reported, abusing alcohol or illicit drugs such as marijuana and cocaine were associated with an increased risk for suicidal thoughts and attempts (Gart & Kelly, 2015). Another secondary analysis with use of the YRBSS data found, teens engaged in abuse of substances such as alcohol, marijuana, methamphetamine, cocaine and injection drugs were at a higher risk for suicidal thoughts and attempts (Lowry et al., 2014). Further, a study reported, alcohol abuse was a proximal risk factor and substance abuse was a distal risk
factor for suicidal behavior (Esposito-Smythers & Spirito, 2004). Consumption of alcohol rendered teens more vulnerable to suicidal thoughts and attempts (Tomek et al., 2015). Another study indicated synergistic associations between substance abuse and suicidal behavior (Vijayakumar, Kumar, & Vijayakumar, 2011). In the current research, the associations between suicide risk and abuse of substances such as alcohol, marijuana, cocaine, methamphetamine, injection drug were investigated.

**High Risk Sexual Behaviors**

Adolescents undergo significant physical and sexual development during puberty and are more curious and conscious about sexuality. During this time, they may explore sexual relationships at an early age (13 or younger) or engage in unprotected sex or have sex with multiple partners resulting in increased risk for suicidal thoughts and attempts (Lowry et al., 2014). For example, a longitudinal study reported behaviors such as initiation of sexual intercourse at an early age or having multiple sexual partners were associated with increased risk for suicidal thoughts and attempts. In addition, those who used alcohol or drugs prior to a sexual intercourse were also at higher risk for suicidal thoughts and attempts (Hallfors et al., 2004). Another study reported incorrect or inconsistent usage of condoms was associated with increased risk for suicide attempts. Teens who had three or more sexual partners were at increased risk for suicide attempt (Houck et al., 2008). This research examined the associations between high risk sexual behavior such as engaging in sexual intercourse, initiation of sexual intercourse at 13 or younger, having multiple sexual partners, and refraining from condom use in the prior sexual intercourse and suicidal thoughts and attempts.

**Weight Related Behaviors**

Adolescence is a period of physical transformation, during which some teens engage in aggressive weight loss measures to gain social acceptance from their peers. Among them, some perceive themselves as overweight or obese while others are truly so. Their pursuit of any extreme weight loss measures such as prolonged fasting, using diet pills, vomiting or using laxatives have been identified as Unhealthy Weight Controlling Behaviors (UWCB) (Kim, Cho, Cho, & Lim, 2009). Such UWCBs in adolescents were associated with suicidal behavior. Teens who were obese were prone to suicidal behavior regardless of UWCB as well. For example, in a study by Kim et al., (2009), overweight teens were at a higher risk for suicidal thoughts than those in the normal weight range. Being overweight was also associated with increased risk for UWCB and suicidal thoughts. Another study found that teens with self-perception of being overweight were at a higher risk for suicidal thoughts regardless of their BMI. As teens grew older, the self-perception of being overweight was reduced for females, however, it was not for males (Lee & Seo, 2013). Further, teens with all three UWCBs (fasting, diet pills and vomiting/laxatives) were associated with increased risk for suicidal thoughts, plans and attempts (Johnson, Weiler, Barnett, & Pealer, 2016). The associations between adolescents who were obese, had self-perception of being overweight or experienced various UWCBs such as using diet pills, fasting, vomiting or using laxatives and suicide risk were explored in the current work.

**Physical/Sedentary Activities**

Physical activities benefit both physical and mental health by averting stress or anxiety, and improving overall energy levels. Many routinely engaged in sedentary activities such as watching television, playing video games or internet surfing can be associated with suicidal behavior. For example, a case control study reported, sedentary activity was associated with increased risk for suicidal thoughts. However,
teens engaged in team sports were resilient, felt socially connected and experienced a sense of belonging (Simon, Powell, & Swann, 2004). Another study reported, involvement with team sports had a protective effect against suicidal thoughts by enhancing endogenous endorphins, improved self-esteem, improved self-perception of body image, increased social support and altered substance abuse behavior (Babiss & Gangwisch, 2009). A secondary analysis reported, sedentary lifestyle such as spending four or more hours per day playing video games or internet surfing was associated with increased risk for suicidal thoughts and plans. Further, teens engaged in five or more hours of playing video games and internet surfing behaviors were also associated with an increased risk for suicidal thoughts, plans and attempts (Messias, Castro, Saini, Usman, & Peeples, 2011). Adolescence is a period of significant change in sleeping habits. A study reported, teens in the insomnia group were at a higher risk for suicidal thoughts and attempts compared to those in non-insomnia group (Bailly, Bailly-Lambin, Querleu, Beuscart, & Collinet, 2003). A prospective study on sleep related problems among adolescents aged 12-14 years predicted them to have suicidal thoughts and behaviors by the time they were 15-17, while controlling for depression (Wong, Brower, & Zucker, 2011). Another study reported that insomnia was a significant predictor for suicidal ideation among young people in aged 11-19 years (McGlinchey, Courtney-Seidler, German, & Miller, 2016). This research examined the associations between suicide risk and activities such as not being physically active, not participating in team sports, watching television or engaging in video games for more than 3 hours or sleeping for less than 8 hours per night.

**Personal Characteristics**

Adolescents with certain personal characteristics such as aggressive or impulsive behavior, experiencing feelings of hopelessness or sadness, or inability to concentrate leaves them at increased risk for suicidal behavior. For example, a study reported that characteristics such as aggression, anxiety, hopelessness, neuroticism, impulsivity, hostility, psychoticism and extroversion were closely associated with suicidal behavior (Brezо, Paris, & Turecki, 2006). Some of the major risk factors for suicidal behavior were untreated mental health problems such as depression or ADHD. Characteristics such as novelty seeking behavior, impulsiveness, and aggressiveness were associated with suicidal behavior (McGirr et al., 2008). Another study reported that presence of any psychiatric disorder was one of the major risk factors for suicidal thoughts and attempts (Nock et al., 2008). Teens diagnosed with major depression or major depression with dysthymic disorder were associated with increased risk for suicidal behavior (Shafii, Steltz-Lenarsky, Derrick, Beckner, & Whittinghill, 1988). Appropriate treatment for impulsivity in early years was crucial in managing and reducing risk for suicidal behavior (Vijayakumar et al., 2011). The current research investigated associations between being hopelessness and sadness, driving while intoxicated, involving in fights resulting in injury, driving without wearing seatbelts or abusing substances prior to sexual activity and suicide risk. Additionally, associations between academic performance at school, inability to focus and suicide risk were also explored.

**Introduction Summary**

Suicidal behavior among adolescents is a serious public health problem in the U.S. Public health organizations have set goals for reducing suicidal behavior among youth. Adolescents are a subset of the population that are at an increased risk for suicidal behavior. Teens who are involved with high risk health behaviors can begin to have suicidal thoughts and subsequently advance to suicidal planning and attempts, which may result injury, disability or death. Associations between suicidal behavior and risk factors elaborated in this research can help in early identification of adolescents at high risk for suicidal
behavior. Timely screening can result in referrals to appropriate services to reduce and prevent increased risk. This research analyzed over seven domains of risk factor associations with suicidal behavior among adolescents such as community related violence, school related violence, substance abuse, high risk sexual behaviors, weight controlling behaviors, physical/sedentary activities and personal characteristics. The results of this research might be used by those who work closely with adolescents such as school personnel, healthcare providers, and parents to raise overall awareness and empower them, with adequate knowledge in early identification and screening for suicidal behavior. Raising awareness and education at various levels of society, community, family and individual will further contribute to overall reduction of risk for suicidal behavior.

Methods

To better understand the factors that increased the risk for suicidal thoughts and attempts among adolescents, two sets of statistical analyses with the YRBSS data were conducted. The first was single year analysis for each of 2013 and 2015, examining risk factors associated with suicide risk. The second was a time trend analysis of risk factors associated with suicide risk for the years 1991 to 2015.

Study Design

The YRBSS study was developed and first implemented in 1991 and intended to monitor health risk behaviors that may lead to death, disability, and social problems among adolescents in the U.S. The YRBSS was a biannual cross-sectional survey conducted in odd years from 1991 to 2015 by the CDC. Independent sampling and operational procedures were used to collect data from national, state, territorial, tribal and large urban school districts. For the purpose of this research, the national YRBSS was used. The national YRBSS protocol has been approved by the Institutional Review Board at the CDC (Youth Risk Behavior Surveillance-United States, 2011, n.d.).

A probability sample was selected to obtain a nationally representative sample of student populations of those attending public and private high schools. Parental consent was obtained before administering the survey. The survey did not include name or any other personally identifiable information. The YRBSS was conducted from February to May of each survey year (Methodology of Youth Risk Behavior Surveillance System-2013, n.d.).

The target population for this survey was public and private school students in grades 9-12. The standard questionnaire consisted of 90-99 items. Each year, a small subset of 5 to 11 additional questions were added, while still limiting the total survey size to 99 questions. The survey was administered by experienced data collectors and excluded skip patterns, grid formats and fill-in-the blank formats (Methodology of Youth Risk Behavior Surveillance System-2013, n.d.). This approach ensured that each participant had the same amount of time to complete the questionnaire. Test-retest reliability for the questionnaire was first completed in 1992 and again in 2000. About two thirds of the questions indicated adequate reliability (Methodology of Youth Risk Behavior Surveillance System-2013, n.d.). Students answered questions in a paper booklet which was later scanned. The questionnaire included six categories of health-related behaviors:

(1) Unintentional injury and violence
(2) Tobacco use
(3) Alcohol and other drug use
(4) Sexual behaviors contributing to unintended pregnancy and sexually transmitted diseases
(5) Dietary behaviors  
(6) Physical activity

**YRBSS Methodology**

The probability sampling technique was a three-stage cluster sample design. The target population included students from all public and private schools in the 50 states of the U.S. and the District of Columbia. The U.S. territories were not included in the sampling frame (Methodology of Youth Risk Behavior Surveillance System-2013, n.d.). In the first stage, the sampling frame contained primary sampling units (PSUs) that included large counties, sub-areas of large counties, or groups of small adjacent counties. The PSUs were organized into different strata based on Metropolitan Statistical Area and percentage of black and Hispanic students in the PSUs. At the second stage, schools were chosen within previously selected PSUs with probability proportional to school enrollment size. At the third stage, sampling was completed in each school, by randomly selecting 1-2 classes for required subjects (English or Social Studies) from grades 9 through 12. A weighting factor was applied to each participant to account for probability of selection at each sampling stage, nonresponse, and oversampling of black and Hispanic students.

**Dependent Variable**

The suicide risk dependent variable used in this research originally appeared in Lowry et al (2014) and was constructed as a 3-level categorical variable based on four suicide related questions from the YRBSS data. The three levels of suicide risk were defined as: low, moderate and high. The four suicide related questions included in the YRBSS survey were with respect to suicidal thoughts, plans, attempts and injurious attempts in the past 12 months (Table 1). Table 2 provides the description of number of students that belonged to low, moderate and high risk groups in years 2013 and 2015.

Table 1 displays the construction of the suicide risk outcome and categories. Low risk category was defined as those who said ‘No’ to suicidal thoughts, plans, attempts and injurious attempts. The moderate risk category was defined as those who said ‘Yes’ to either suicidal thoughts, plans or both and said ‘No’ to suicidal attempts and injurious attempts. High risk category was defined as those who answered ‘Yes’ to suicidal thoughts and plans as well as those who answered ‘Yes’ to either attempts or injurious attempts or both. Suicide risk had three possible values:

- **Low risk**: those who had no suicidal thoughts, plans, attempts and injurious attempts in past 12 months
- **Moderate risk**: those who had suicidal thoughts or plans (‘Yes’ to either question on suicidal ideation but ‘No’ to suicide attempts/injurious attempts in the last 12 months)
- **High risk**: those with suicidal thoughts, plans and at least one suicide attempt/injurious attempt or both in the past 12 months

**Independent Variables**

The YRBSS dataset for any given year has between 90 and 99 variables. Only categorical variables were considered in this work. Independent variables consisted of demographic characteristics and health behavior data. Demographics included sex, race/ethnicity, grade and age. There were a host of risk factors that indicated associations with suicidal ideation and attempts from the past literature review.
framework was constructed in this research for considering health behaviors based on work by Lowry et al (2014). This include behaviors characterized into seven domains:

1. Community related violence
2. School related violence
3. Substance abuse
4. High risk sexual behavior
5. Weight related behavior
6. Physical/Sedentary activities
7. Personal characteristics

Table 4 displays details of survey questions for each domain and health behavior information collected for each. All of the health behavior variables within each domain were measured as dichotomous variable.

In the interest of being consistent with previous published studies of YRBSS data, the race/ethnicity variable was grouped into four categories: white, black, Hispanic and Other. Grade was categorized as 9th, 10th, 11th, and 12th grade students. Age was treated as a categorical variable, with age values of 14, 15, 16, 17 and 18 years or older. Table 5 for 2013 data and Table 9 for 2015 data displays the demographic characteristics of the participants. There were four high risk health behavior questions that were reverse coded. For these questions, participants that answered ‘No’ to the questions were considered.

Health behavior questions were not asked in all of the survey years between 1991 and 2015. Table 13 for females and Table 14 for males shows the survey years each question was asked, and the number of participants responding to each.

Data Analysis

The first analysis was to assess health behaviors associated with suicide risk for each of 2013 and 2015, and the second analysis was to assess time trends for the association with health behaviors and suicide risk from 1991 to 2015. For the single year analyses, there were 35 (2013) and 37 (2015) questions pertinent to high risk health behaviors that were considered as independent (predictor) variables for each survey year. There were 36 questions capturing health behaviors that were examined for an association with suicide risk for the combined data across years 1991 to 2015. Combined data was explored for linear trends. Line graphs were used to display associations between demographic characteristics and health behaviors significantly associated with suicide risk.

Missing data presented a challenge, as there was a considerable amount of missing responses for all study variables. The dependent variable was categorized for responses that were missing for suicide risk and responses that were not missing for suicide risk. Thus, an analysis was completed to compare participant characteristics for subjects with the observed risk outcome against those with missing risk outcome for 2013 and 2015 data. All study variables considered in this analysis were categorical. This resulted in a contingency table and a Pearson Chi-Square statistical test for comparing the distribution of missing and non-missing for each study variable. These results are displayed in Table 6 for 2013 data and Table 10 for 2015 data.
Statistical Analysis

The 3-level ordinal dependent variable was modeled with ordinal logistic regression. The study plan was to check the proportional odds assumption for this model. If the assumption was violated, the plan was to resort to the more general multinomial logistic regression model framework.

It was decided to structure this analysis in a format similar to a previous publication that examined the same outcome and also considered associations with risky health behaviors (Lowry et al, 2014). Lowry et al (2014) appeared in 2014 and analyzed YRBSS data collected up through 2011. This research includes original results for 2013 and 2015. In line with this previous published work, included here are bivariate statistical models with each health behavior as an independent variable also include race/ethnicity, age, and grade. Due to sex differences cited in Lowry et al (2014), all results are stratified by sex. Results of ordinal or multinomial logistic regression models were reported as odds ratios and 95% confidence intervals.

In analyzing time trends with data from 1991 to 2015, the focus was to examine how health behaviors changing over time affected suicide risk. Thus, a health behavior by time interaction term was included in each model. This allowed an approach for assessing which health behaviors contributed to changes in the suicide risk over the time period examined. This model also included race/ethnicity, age, and grade and all results are stratified by sex. Results of ordinal or multinomial logistic regression models were reported as odds ratios and 95% confidence intervals.

SAS version 9.4 (SAS Inc., Cary NC, 1989) was used for statistical analyses and Microsoft Excel was used for creating graphical displays. Due to the complex sampling methods used in YRBSS surveys, the SAS procedures PROC SURVEYFREQ and PROC SURVEYLOGISTIC were used. In order to avoid list wise deletion of the data and to improve variance estimates, NMACR option was used for each model. This option treated the data with non-missing values as one domain and compared it with the domain that included both missing and non-missing values to improve the variance estimation in the model and obtain more accurate standard error estimates. The level of significance in this work was set at $\alpha = 0.05$.

Results

Results for 2013 Data Analysis

Table 2 displays the description of students at low, moderate and high risk for 2013 data. There were 9,327 students in low risk, 1381 students in moderate risk and 939 students in the high-risk group. The details of the sampling plan, sample size and response rate for 2013 is given in Table 3. A description of health behaviors is provided in Table 4. In 2013, 193 schools were selected in the probability sample and invited to participate. Out of these, 148 schools participated, resulting in a school response rate of 77%. There were 15,480 students enrolled in the 148 schools, of which 13,633 students participated. If a response to a question matched with any of the available responses, it was considered valid, if not it was categorized as missing. There were 13,583 valid responses, resulting in a student response rate of 88%. The CDC reports overall response rate as a multiplication of school response rate and student response rate. Thus, the overall response rate for the survey was 68%. In 2013, the sample size for YRBSS data was 13,583. In this analysis, there were 46 students who reported suicide attempts without an indication of a suicidal ideation/plan, and hence were categorized as missing.
Descriptive Statistics for 2013 Data Analysis

Summary statistics by each of the suicide risks for demographic characteristics including sex, race/ethnicity, grade and age are described in Table 5. There were more female students than male students associated with moderate risk group (59.6% vs. 40.4%) and high risk group for suicide (68.9% vs. 31.1%). There were more white students than black, Hispanic or those belonging to Other race/ethnicity that were associated with moderate risk group (59.8% vs. 10.1%, 19.2%, 11.0%) and high risk group (47.0% vs. 13.6%, 28.0%, 11.4%). Students in grades 9th through 12th were associated with similar moderate risk for suicide. Students in 9th grade experienced higher risk for suicide (31.7%) than students in the 10th (28.4%), 11th (22.7%) and 12th grade (17.3%). Those students aged 18 or older had lower association with moderate or high risk for suicide than to students who were younger.

Missing data were present for all study variables. Table 6 displays summary statistics and statistical tests for comparing subject characteristics across missing and non-missing responses. Teens with missing risk were more likely to be involved in physical fights at school than those with non-missing risk for suicide ($\chi^2 (1) = 15.09, p < .001$. Students who carried weapon on school property were more prone to be in missing risk group than non-missing risk for suicide ($\chi^2 (1) = 5.11, p = 0.03$). Adolescents with missing risk were more likely to use marijuana than those in non-missing group for suicide ($\chi^2 (1) = 12.87, p<.001$). Teens who had four or more sexual partners were more prone to be in missing risk group than non-missing risk group for suicide ($\chi^2 (1) = 20.80, p<.001$). Students who were obese were inclined to be in missing risk group than non-missing risk group ($\chi^2 (1) = 13.82, p<.001$). Adolescents with missing risk were more likely to not play on a sports team than those with non-missing risk for suicide $\chi^2 (1) = 4.42, (p=0.04)$. Teens who felt hopeless of sad were less prone to be in non-missing risk group than missing risk group for suicide $\chi^2 (1) =0.0001, p = 0.99$.

Due to the ordinal nature of the dependent variable, the analytic plan was to build an ordinal logistic regression model. Once fit, proportional odds assumption was tested, and the assumption did not hold (Chi Square value of 110.10, $p < .001$). Hence, instead of ordinal logistic regression model, multinomial logistic regression model was constructed to measure the association between suicidal behavior and each high-risk health behavior. This model was controlled for race/ethnicity, grade and age for female students (N = 6,621) as well as male students (N = 6,950). Results of the multinomial logistic regression models were reported in Table 7 for female and Table 8 for male students.

Results for Female Students for 2013 Analysis

All of the models fit for 2013 data controlled for race/ethnicity, age and grade. Female students who experienced community related violence and were forced to have sexual intercourse were more likely to be at moderate than low risk group for suicide (OR = 2.92, 95% CI: 2.01, 4.23). This risk was substantially higher, with females who were forced to have sexual intercourse at 7.74 (95% CI: 5.86, 10.22) times the odds of being in the high versus low risk group. Females students who were exposed to school related violence and carried a weapon on school property were more inclined to be in the moderate than low risk group (OR = 3.42, 95% CI: 2.10, 5.56). This risk was considerably higher, with females who carried a weapon on school property at 7.45 (95% CI: 4.72, 11.75) times the odds of being in high versus low risk group. Female students who experienced school related violence and were threatened at school were prone to be at moderate than low risk group (OR = 2.52, 95% CI: 1.57, 4.05). The risk was considerably higher, with female students who were threatened at school at 6.39 (95% CI: 4.91, 8.30) times the odds of being in high versus low risk group. Female students involved in substance abuse and used cocaine...
were more likely to be at moderate than low risk group (OR = 1.88, 95% CI: 1.12, 3.16). This risk elevated substantially, with females who were cocaine users at 7.41 (95% CI: 4.86, 11.28) times the odds of being in high versus low risk group. Among female students who were substance abusers, and who used methamphetamine were more inclined to be at moderate than low risk group (OR = 3.26, 95% CI: 1.60, 6.64). This risk was considerably higher, with those who used methamphetamine at 7.26 (95% CI: 4.16, 12.67) times the odds of being in high than low risk group. Female students involved in weight controlling behavior and used vomiting or laxatives to control their weight were more likely to be at moderate than low risk group (OR = 2.49, 95% CI: 1.70, 3.64). This risk was considerably higher, with females who used vomiting or laxatives to control their weight at 7.25 (95% CI: 4.96, 10.58) times the odds of being in high than low risk group. Female students who felt hopeless or sad were more prone to be at moderate than low risk group (OR = 8.58, 95% CI: 7.11, 10.34). This risk heightened substantially, with females who felt hopeless or sad at 19.14 (95% CI: 14.13, 25.93) times the odds of being in high than low risk group for suicide.

Results for Male Students for 2013 Analysis

For 2013 data, male students who were exposed to community related violence and forced to have sexual intercourse were more inclined to be at moderate than low risk group for suicide (OR = 4.74, 95% CI: 2.62, 8.59). This risk expanded considerably for males who were forced to have sexual intercourse at 16.17 (95% CI: 11.14, 23.49) times the odds of being in high versus low risk group. For male students who were exposed to school related violence and threatened at school were more inclined to be at moderate than low risk group (OR = 1.86, 95% CI: 1.31, 2.64). This risk was substantially higher, with those who were threatened at school at 9.50 (95% CI: 6.51, 13.84) times the odds of being in the high than low risk group. Males involved in substance abuse and who used methamphetamine were more likely to be at moderate than low risk group (OR = 1.97, 95% CI: 1.16, 3.36). This risk expanded considerably, with males who used methamphetamine at 15.88 (95% CI: 10.25, 24.59) times the odds of being in high than low risk group for suicide. Male students involved in high risk sexual behavior and had sex before the age of 13 were more prone to be at moderate than low risk group (OR = 2.11, 95% CI: 1.46, 3.05). This risk expanded considerably for males who had sex before the age of 13 at 6.38 (95% CI: 3.94, 10.34) times the odds of being in high than low risk group for suicide. Male students involved in weight controlling behavior and who used vomiting or laxatives for controlling their weight were more inclined to be at moderate than low risk group (OR = 3.99, 95% CI: 2.21, 7.20). This risk was substantially higher with males who used vomiting or laxatives to control their weight at 12.02 (95% CI: 6.58, 21.98) times the odds of being in the high than low risk group. Male students who felt hopeless or sad were more prone to be at moderate than low risk group (OR = 12.42, 95% CI: 9.28, 16.61). This risk elevated substantially, with males who felt hopeless or sad at 19.30 (95% CI: 12.67, 29.42) times the odds of being in high than low risk group for suicide.

Results for 2015 Data Analysis

Table 2 displays the description of students at low, moderate and high risk for 2015 data. There were 9,346 students in low risk, 1541 students in moderate risk and 1063 students in the high-risk group. The details of the sampling plan, sample size and response rate for 2015 data is depicted in Table 3. In 2015, 180 schools were selected in the probability sample and invited to participate. Out of these, 125 schools participated, resulting in a school response rate of 69%. There were 18,165 students enrolled in 125 schools, of which 15,713 students participated. If a response to a question matched with any of the
available responses, it was considered valid, if not, it was categorized as missing. There were 15,624 valid responses resulting in a student response rate of 69%. The CDC reports the overall response rate as multiplication of school response rate and student response rate. Hence, the overall response rate was 60%. The sample size for 2015 data was 15,624. In this analysis, there were 74 students who reported suicide attempts without an indication of a suicidal ideation/plan and hence were categorized as missing.

**Descriptive Statistics for 2015 Analysis**

Summary statistics by each level of suicide for demographic characteristics including sex, race/ethnicity, grade and age are described in Table 9. There were more female than male students that were associated with moderate risk group (58.8% vs. 41.2%) and high risk group for suicide (70% vs. 30%). There were more white students than black, Hispanic or those belonging to Other race/ethnicity that were associated with moderate risk group (57.8% vs. 11.8%, 20.0%, 10.4%) and high risk group (44.6% vs. 11.5%, 30.4%, 13.4%). Students in grades 9 through 12 were associated with similar moderate risk for suicide. Students in 9th grade were more likely to be (32.6%) associated with an increase in risk for suicide than those in grades 10th (29.1%), 11th (21.6%) and 12th (16.7%). Students aged 18 or older had lower association with moderate or high risk for suicide than those younger.

Missing data were present for all the study variables. Table 10 displays summary statistics and statistical tests for comparing subject characteristics across missing and non-missing responses. Students with missing risk were more likely to be victims of electronic bullying than those in non-missing risk group for suicide ($\chi^2 (1) = 5.96, p = 0.02$). Teens involved in physical fights on school property were more prone to be in missing risk group than non-missing risk group for suicide ($\chi^2 (1) = 17.69, p < 0.001$). Participants who used cocaine were more inclined to be in missing risk group than non-missing risk group ($\chi^2 (1) = 29.35, p < 0.001$). Adolescents who achieved higher academic performance were more likely to be in missing risk group than non-missing risk group for suicide ($\chi^2 (1) = 16.14, p < 0.001$).

The analysis plan was to use ordinal logistic regression models to account for the ordinal nature of the dependent variable. When proportional odds assumption was tested, the assumption did not hold (Chi-square value of 80.43, $p = <.0001$). Hence, instead of ordinal logistic regression model, multinomial logistic regression models were constructed to measure the associations between suicide risk and high risk health behaviors. The models were controlled for race/ethnicity, grade and age. The results are reported in Table 11 for females and Table 12 for males.

**Results for Female Students for 2015 Analysis**

The statistical models described below for the 2015 data controlled for race/ethnicity, age and grade. Female students who experienced community related violence and forced to have sexual intercourse were more likely to be at moderate than low risk group for suicide (OR = 3.25, 95% CI: 2.49, 4.23). This risk expanded considerably, with females who were forced to have sexual intercourse at 7.10 (95% CI: 5.18, 9.74) times the odds of being in the high versus low risk group. Among female students who were exposed to school related violence, and carried a weapon on the school property were more likely to be at moderate than low risk group (OR = 3.30, 95% CI: 1.58, 6.89). This risk was substantially higher, with females who carried a weapon on school property at 7.93 (95% CI: 4.27, 14.71) times odds of being in
high versus low risk group. Among female students involved in substance abuse and used methamphetamine were more likely to be at moderate versus low risk group for suicide (OR = 3.21, 95% CI: 1.40, 7.37). This risk expanded considerably for those who used methamphetamine at 9.97 (95% CI: 4.94, 20.11) times the odds of being in the high versus low risk group. Female students involved in high risk sexual behavior, and had sexual intercourse before the age of 13 were more likely to be at moderate versus low risk group (OR = 3.24, 95% CI: 1.79, 5.85). This risk was substantially higher among those who had sex before the age of 13 at 5.74 (95% CI: 3.24, 10.17) times the odds of being in the high versus low risk group. Female students involved in weight controlling behavior and involved in weight loss efforts were prone to be at moderate versus low risk group (OR = 2.49, 95% CI: 1.70, 3.64). This risk expanded considerably for those involved in weight loss efforts at 7.25 (95% CI: 4.96, 10.58) times the odds of being in high versus low risk group. Female students who felt hopeless or sad were more inclined to be at moderate versus low risk group (OR = 8.17, 95% CI: 6.87, 9.71). This risk was considerably higher among those who felt hopeless or sad at 23.90 (95% CI: 15.35, 37.21) times the odds of being in high versus low risk group. Female students who were unable to concentrate were more prone to be in moderate versus low risk group (OR = 3.56, 95% CI: 2.43, 5.21). This risk expanded substantially, with male students who were unable to concentrate at 6.05 (95% CI: 4.15, 8.84) times the odds of being in high versus low risk group for suicide.

**Results for Male Students for 2015 Analysis**

Male students who experienced community related violence and who were victims of electronic bullying were more inclined to be at moderate than low risk group for suicide (OR = 2.71, 95% CI: 1.66, 4.43). This risk expanded considerably, with males who were victims of electronic bullying at 8.21 (95% CI: 5.44, 12.41) times the odds of being in high versus low risk group. Male students who were exposed to school related violence and threatened at school were more prone to be at moderate versus high risk group (OR = 2.77, 95% CI: 1.80, 4.27). This risk was substantially higher for male students who were threatened at school at 7.66 (95% CI: 4.97, 11.81) times the odds of being in high versus low risk group. Male students involved with substance abuse and used cocaine were more likely to be at moderate versus low risk group (OR = 2.37, 95% CI: 1.47, 3.81). This risk escalated considerably for males who used cocaine at 6.53 (95% CI: 4.40, 9.70) times the odds of being in the high versus low risk group. Male students who felt hopeless or sad were more inclined to be at moderate than low risk group (OR = 9.88, 95% CI: 6.77, 14.42). This risk was considerably higher, among those who felt hopeless or sad at 17.98 (95% CI: 11.40, 28.34) times the odds of being in high versus low risk group. Male students who were unable to concentrate were more prone to be in moderate versus low risk for suicide (OR = 3.56, 95% CI: 2.43, 5.21). This risk expanded substantially, with male students who were unable to concentrate at 6.05 (95% CI: 4.15, 8.84) times the odds of being in high versus low risk group.

**Results for Data Analysis from 1991 to 2015**

Table 3 displays details of the sampling plan, sample sizes, and response rates, across all study years. For data from 1991 to 2015, the school response rate ranged from 69% to 81% and the student response rate ranged from 83% to 90%. Hence, the overall response rate ranged from 60% to 71%. For data from 1991 to 2015, the sample size was 188,898 (ranged from 10,904 in 1995 to 16,410 in 2009). In this analysis, there were 722 students who reported suicide attempt without an indication of a suicidal ideation/plan and hence they were categorized as missing.
A linear trend was observed based on suicide risk among males and females across the years (Figure 1). A similar linear trend was also observed among white, black, Hispanic and Other race/ethnicity based on suicide risk scale (Figure 2). The independent variable questions were not consistently asked across the survey years from 1991 to 2015. For each question that was asked, not all students provided a response. Hence, the number of questions included in each survey year and number of students that answered the high-risk health behavior questions were reported for females (Table 13) and males (Table 14) by corresponding survey year.

The analysis plan was to build ordinal logistic regression model to account for the ordinal nature of the dependent variable. The proportional odds assumption was tested and this did not hold (Chi-Square value of 1194.21, p-value<.0001). Hence, instead of ordinal logistic regression model, a multinomial logistic regression model was constructed.

In order to understand how health behaviors changed over time affected the suicide risk, an interaction term between each health behavior by time was included for each model. The results of the multinomial logistic regression models for each high-risk health behavior was reported for female (Table 15) and male students (Table 16). Significant patterns detected from using interaction terms between each high-risk health behavior by year, follow.

**Results for Female Students from 1991 to 2015 Analysis**

All the models fit for 1991 to 2015 data were controlled for race/ethnicity, age and grade. For female students, there were six high risk health behaviors that were significantly associated with moderate and high risk group in comparison to low risk group for suicide. Female students who experienced community related violence and carried a weapon in the community were more likely to be at moderate than low risk group (OR = 1.01, 95% CI: 1.00, 1.03). Female students who carried a weapon in the community were at 1.01 (95% CI: 1.00, 1.03) times the odds of being in high versus low risk group. Female students who experienced school related violence and missed school due to safety concerns were more prone to be at moderate than low risk group (OR = 1.02, 95% CI: 1.00, 1.04). Female students who missed school due to safety concerns were at 1.03 (95% CI: 1.01, 1.04) times the odds of being in high versus low risk group. Female students who were involved with high risk sexual behavior and refrained from condom use during the prior sexual intercourse were more inclined to be at moderate than low risk group (OR = 1.02, 95% CI: 1.00, 1.03). Female students who abstained from condom use during the last sexual intercourse were at 1.02 (95% CI: 1.00, 1.03) times the odds of being in high risk versus low risk group. Female students involved in weight controlling behavior and had a perception of being overweight were more likely to be at moderate than low risk group (OR = 1.00, 95% CI: 1.00, 1.01). Female students with self-perception of being overweight were at 1.02 (95% CI: 1.01, 1.02) times the odds of being in high versus low risk group. Female students who felt hopeless or sad were more prone to be at moderate than low risk group (OR = 1.04, 95% CI: 1.02, 1.05). Female students who felt hopeless or sad were at 1.05 (95% CI: 1.02, 1.07) times the odds of being in high versus low risk group. Female students involved in fights resulting in injury were more prone to be at moderate than low risk group (OR = 1.02, 95% CI: 1.00, 1.04). Female students involved in fights resulting in injury had 1.02 (95% CI: 1.00, 1.04) times the odds of being in high versus low risk group for suicide.

Line graphs were used to display association between the above six health behaviors significantly associated with suicide risk for data from 1991 to 2015 (Figure 3). A multivariable model was
constructed with six risk factors, and their corresponding interaction terms. The interaction terms between each risk factor and year was estimated and reported (Table 17 for females). Female students who felt hopeless or sad were at 1.03 (95% CI: 1.00, 1.06) times the odds of being in the high versus low risk group for suicide.

Results for Male Students from 1991 to 2015 Analysis

There were three high risk health behaviors that were significantly associated with both moderate and high risk than low risk for suicide among male students. Male students who experienced school related violence and were involved in a physical fight at school were more prone to be at moderate than low risk for suicide (1.01, 95% CI: 1.00, 1.03). Male students who were involved with physical fights at school were at 1.02 (95% CI: 1.00, 1.03) times the odds of being in high versus low risk group. Male students who were involved with high risk sexual behavior and had sex before the age of 13 or younger were more inclined to be at moderate than low risk group (OR = 1.02, 95% CI: 1.00, 1.03). Male students who had sex before the age of 13 or younger were at 1.00 (95% CI: 1.00, 1.03) times the odds of being in high versus low risk group. Male students who felt hopeless or sad were more likely to be at moderate than low risk group for suicide (OR = 1.02, 95% CI: 1.00, 1.04).

Line graphs were used to display the associations for the above three risk factors significantly associated with suicide risk (Figure 4). These three significant risk factors were entered into a multivariable model which included the risk factors and the interaction terms between the risk factor and year (time). The estimation of the interaction terms and a 95% confidence interval were reported (Table 18). Male students who felt hopeless or sad were more likely to be at moderate than low risk for suicide (OR = 1.02, 95% CI: 1.00, 1.04). Male students who felt hopeless or sad were at 1.04 (95% CI: 1.00, 1.08) times the odds of being in high versus low risk group for suicide.

Discussion

Suicidal behavior is a major public health problem in the U.S., and an alarming number of adolescents are at a significant risk for engaging in suicidal behaviors. Public health organizations have set goals to reduce morbidity due to suicidal attempts by as much as 10% by the year 2020 (Healthy People, 2020). It is important to understand the associations between various risk factors and suicidal thoughts, attempts to enable timely detection and early intervention.

This research makes two key contributions to enable a better understanding of risk factors pertaining to suicidal thoughts and attempts. The first contribution is an analysis of health behaviors associated with suicide risk among adolescents in recent survey years (YRBSS, 2013 and 2015). The second contribution is an assessment of risk factors affecting suicide risk over time (YRBSS, 1991 to 2015). Knowledge of such associations between suicidal thoughts, attempts and various risk factors will help timely screening for suicidal behavior, and thus enable early treatment to reduce suicidal risk.

Results from surveys in 2013 and 2015 indicate a host of health behaviors were associated with moderate and high risk in comparison to low risk for suicide in adolescents. Seven domains related to health behaviors studied here included exposure to community related violence, exposure to school related violence, substance abuse, high risk sexual behavior, weight related issues, physical/sedentary activities and personal characteristics. Among these, physical/sedentary activities was the only risk domain that indicated weak associations with moderate and high-risk suicidal behavior. The rest
indicated strong associations with moderate and high risk suicidal behavior. The results here are aligned with results reported in previous years by Lowry et al., (2014). However, these results differ from the results observed in the studies by Simon et al., (2004), and Messias et al., (2011). Among female students, behaviors such as feelings of hopelessness or sadness, abuse of methamphetamine or cocaine and weight controlling methods such as vomiting or laxative usage, indicated a strong association with moderate or high risk than low risk for suicidal behavior. Among male students, behaviors such as feelings of hopelessness or sadness, involvement in fights resulting in injury and abuse of methamphetamine or cocaine indicate a strong association with moderate or high risk than low risk for suicidal behavior. These results were similar to those reported in Lowry et al., (2014) and Esposito-Smythers et al., (2004). Earning higher grades at school was found to be protective against suicidal behavior. This result is similar to the study results from Borowsky et al., (2001) and Lubell et al., (2006).

Results pertaining to survey years from 1991 to 2015 indicate linear associations between males and females and among white, black, Hispanic and Other race/ethnicity groups. A small set of risk factors indicate associations with suicidal behavior over the years. Among these, feelings of hopelessness or sadness is the only risk factor that emerges indicating an association with moderate or high risk than low risk for suicidal behavior. This is in line with results reported in studies by Baily et al., (2011), Brezo et al., (2008) and Eaton et al., (2011).

The YRBSS dataset is a national representative sample and the sampling frame consists of 50 states in U.S. and District of Columbia. Because this research is based on YRBSS data, one of its strengths is in the ability to generalize to students attending high schools in U.S. The YRBSS collects data on various high-risk health behaviors among adolescents in U.S. These facilities exploring multiple domains of risk factors associated with suicidal behavior. Unlike other studies that consider a single domain of risk factors, this study considers seven domains of risk factors to determine their associations with suicidal behavior. For example, associations between personal characteristics and suicidal risk were examined, but were not explored in the study by Lowry et al., (2014).

There are some study limitations to note. The YRBSS is a cross-sectional survey that collects data at a specific period and participants without any follow-up. Thus, causal inferences are not possible here. This work is limited to measurements at one point in time, does not provide information on potential progression of suicidal behavior. The participants’ responses are self-reports which are subject to recall and response bias. The YRBSS survey does not include questions about parental socio economic status, education, or marital status. Nor, does it collect information on exposure to suicide in the family or community or protective factors for suicidal behavior. Some proximal risk factors such as personal crisis situations and means available for suicide attempts were also not collected.

Prevention strategies for suicidal behavior are implemented in schools, communities and health-care systems (Gould & Kramer, 2001). These strategies typically have two goals: identifying and providing appropriate referrals or treatments to individuals who experience suicidal behavior and reducing risk factors. At the school level, some strategies implemented are suicide awareness curricula, skills training, screening, and gatekeeper training. At the community level, having crisis centers or hotlines, restricting means for suicide attempts and careful media communication regarding suicide are some strategies implemented. At the healthcare system level, training primary care physician and pediatricians was found effective in identification and treatment (Gould & Kramer, 2001).
School based intervention programs were beneficial in reducing suicidal behavior among youth, given that adolescents spend a large portion of their time at school (Miller & Eckert, 2009). A longitudinal study by Zenere et al., (2009) implemented the ‘Youth Suicide Prevention and Intervention Program’ - a 3-tier program to reduce suicidal behavior between 1989 and 2006 among students in ages 5-19. It combined universal, selected and indicated strategies of suicidal intervention/prevention and was implemented for an entire school district. They reported a decrease in suicide rate from 5.5 per 100,000 to 1.4 per 100,000 during the study period. Suicide attempts also declined at the same time period (Zenere & Lazarus, 2009).

A systematic review by Katz et al (2014) found, certain school based prevention programs effective in reducing suicide attempts: Signs of Suicide (SOS), Good Behavior Game (GBG) and Sources of Strength (Katz et al., 2013). SOS is a suicide awareness curricula. The main goal of the SOS program was to make teens aware of signs of suicide, so they will be able to identify this behavior among their peers (Katz et al., 2013). A randomized controlled trial (RCT) for SOS suicide prevention program reported, the intervention group had lower rates of suicide attempts, greater knowledge and adaptive attitudes about depression and suicides in comparison to the control group (Aseltine Jr, 2003). However, the SOS program was not effective in reduction of suicidal thoughts.

GBG is a skills training program. GBG is the most recommend suicide prevention program in the U.S., as it indicated a significant reduction in suicidal thoughts and attempts among adolescents and it is backed by SAMHSA (Substance Abuse and Mental Health Services Administration) (Katz et al., 2013). GBG was found effective in an RCT that was implemented among children in elementary grades and participants were followed up to teen years. It reported a reduction in suicidal thoughts and advancement to attempts in the intervention group in comparison to the control group in teen years. The strategy used by GBG for reduction of onset of suicidal thoughts and attempts was by reducing aggressive and disruptive behaviors in classrooms (Wilcox et al., 2008).

Sources of Strength was a peer leadership program that trained students to be gatekeepers and reach out to their peers who were at risk for suicidal behavior (Katz et al., 2013). When this program was evaluated in an RCT, the trained students were more inclined to connect an adult with a suicidal friend, seek adult support and accept help from adults (Wyman et al., 2010).

Reduction in suicidal behavior can also be achieved by enhancing protective factors such as clinical management of impulsivity and hostility, improving interpersonal relationships with family and peers (Vijayakumar et al., 2011), and teaching successful problem solving and coping skills to persevere under stressful situations (Lubell & Vetter, 2006). Affiliation to a religious group and having positive attitude also had a protective effect against suicidal behavior (Bailey et al., 2011) (Nock et al., 2008). This research found, students who earned higher grades at school were less likely to be associated with suicide risk than students who earned lower grades.

It is important to note that suicidal behavior is formally diagnosed as Suicidal Behavior Disorder by DSM-5 which is the primary tool used by healthcare providers. One of the key criteria in DSM-5 is that a suicidal attempt was made within past 24 months. As suicidal behavior develops across various stages starting from suicidal thoughts on to plans, and attempts, this indicates adolescents who are in early stage of suicidal behavior (thoughts and plans) may benefit from early identification. This study includes risk-factor associations with suicidal thoughts and attempts, which can help with early screening and intervention.
Results here suggest adolescents diagnosed with mental health issues, substance abuse issues and weight controlling issues should be screened for suicidal behavior. Further, adolescents with exposure to violence in the community or school should also be screened for suicidal behavior. Associations were also found between feelings of hopelessness or sadness and suicidal behavior. Those diagnosed with hopelessness or sadness should be routinely screened for suicidal behavior. Screening for suicidal ideations should be conducted at an early adolescence stage (Adrian et al., 2016). Further clinical referrals for mental health services such as prescription for Selective Serotonin Reuptake Inhibitor (SSRI), cognitive behavior therapy (CBT) and social support should be provided to these adolescents to reduce suicidal behaviors (Pelkonen & Marttunen, 2003). Using SSRIs was effective in reduction of aggressive and impulsive behavior among adolescents which in turn resulted in reduction of suicidal behavior (Gould, Greenberg, Velting, & Shaffer, 2003).

In order to assess the progressive nature of suicidal behavior, a longitudinal study needs to be designed to segment the various stages of suicidal behavior such as onset of suicidal thoughts, plans and attempts over time. Such a study could identify a set of risk factors for each stage of suicidal behavior. Detailing combination of risk factors corresponding to each stage of suicidal behavior as well as catalyzing transition from one stage to the next would be invaluable. Strategies for averting progression across various suicidal stages can be developed with further understanding of this mechanism. More research to determine additional protective factors needs to be conducted to further the mission of overall reduction in suicidal behavior.

In summary, the research described here examined and found associations between some health risk behaviors and suicide ideation and attempts which indicate suicidal risk among adolescents. The primary contributions of this research are in enabling a better understanding of health risk behaviors associated with suicide risk in recent years. The secondary contribution includes assessment of health risk behaviors affecting suicide risk over time. Understanding such associations, are helpful in screening youth at risk for suicidal behavior and enabling appropriate referral services early, to reduce the risk of this behavior. This knowledge, can also be beneficial to those designing educational and public health prevention programs, intended to promote a greater understanding of suicidal risk in adolescents.
References


Table 1. Construction of the Suicide Risk Dependent Variable with 4 Suicide Related Questions.

<table>
<thead>
<tr>
<th>Suicidal Behavior</th>
<th>Response</th>
<th>Low-Risk</th>
<th>Moderate-Risk</th>
<th>High-Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1: During the past 12 months, did you ever seriously consider attempting suicide?</td>
<td>Yes</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2: During the past 12 months, did you make a plan about how you would attempt suicide?</td>
<td>Yes</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3: During the past 12 months, how many times did you attempt suicide?</td>
<td>1+</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Q4: If you attempted suicide during the past 12 months, did any attempt result in an injury, poisoning, or overdose that had to be treated by a doctor or nurse?</td>
<td>Yes</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Description of Suicide Risk Outcome with 4 Suicide Related Questions for 2013 YRBSS Data (N = 13,583)\(^a\) and for 2015 YRBSS Data (N = 15,624)\(^b\).

<table>
<thead>
<tr>
<th>Suicide Behavior Questions</th>
<th>Response</th>
<th>2013 Data</th>
<th></th>
<th>2015 Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>Total</td>
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<tr>
<td>Q1: During the past 12 months, did you ever seriously consider attempting suicide?</td>
<td>Yes</td>
<td>0</td>
<td>1050</td>
<td>895</td>
<td>1945</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>9327</td>
<td>331</td>
<td>44</td>
<td>9702</td>
</tr>
<tr>
<td>Q2: During the past 12 months, did you make a plan about how you would attempt suicide?</td>
<td>Yes</td>
<td>0</td>
<td>869</td>
<td>782</td>
<td>1651</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>9327</td>
<td>512</td>
<td>157</td>
<td>9996</td>
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<tr>
<td>Q3: During the past 12 months, how many times did you attempt suicide?</td>
<td>1+</td>
<td>0</td>
<td>0</td>
<td>939</td>
<td>939</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>9327</td>
<td>1381</td>
<td>0</td>
<td>10708</td>
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<tr>
<td>Q4: If you attempted suicide during the past 12 months, did any attempt result in an injury, poisoning, or overdose that had to be treated by a doctor or nurse?</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
<td>304</td>
<td>304</td>
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<tr>
<td></td>
<td>No</td>
<td>9327</td>
<td>1381</td>
<td>635</td>
<td>11343</td>
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<tr>
<td>Total</td>
<td></td>
<td>9327</td>
<td>1381</td>
<td>939</td>
<td>9346</td>
</tr>
</tbody>
</table>

\(^a\) Missing data for individual questions: Q1 92, Q2 98, Q3 1601, Q4 1833. Total missing overall suicide risk outcome variable: 1936.

\(^b\) Missing data for Q1 190, Q2 483, Q3 3057, Q4 3293. Total missing overall suicide risk outcome variable: 3674.
Table 3. Details of Sampling Plan, Sample Sizes and Response Rates for YRBSS Data from 1991 to 2015 (N = 188,898).*

<table>
<thead>
<tr>
<th>Year of Survey</th>
<th>Schools Sampled</th>
<th>Schools Participated</th>
<th>Total # of Questions Administered</th>
<th>Total # of Completed Questions</th>
<th>Sample Size</th>
<th>Response Rate</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>School (%)</td>
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<td>Student (%)</td>
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<td>Overall (%)</td>
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<tr>
<td>2005</td>
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<td>68</td>
</tr>
<tr>
<td>2015</td>
<td>180</td>
<td>125</td>
<td>18,165</td>
<td>15,624</td>
<td>15,624</td>
<td>69</td>
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<td>60</td>
</tr>
</tbody>
</table>

*Hyphen indicated that the number of schools sampled and total number of questions administered were not available for those years.
Table 4. Description of Independent Variables.

<table>
<thead>
<tr>
<th>High-Risk Health Behaviors</th>
<th>Questionnaire Item</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community Related Violence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon</td>
<td>During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club?</td>
<td>&gt;=1 vs. 0 days</td>
</tr>
<tr>
<td>In a physical fight</td>
<td>During the past 12 months, how many times were you in a physical fight?</td>
<td>&gt;=1 vs. 0 times</td>
</tr>
<tr>
<td>Bullied electronically</td>
<td>During the past 12 months, have you ever been electronically bullied? (Include being bullied through email, chat rooms, instant messaging, Web sites, or texting.)</td>
<td>Yes vs. No</td>
</tr>
<tr>
<td>Hit by boyfriend/girlfriend</td>
<td>During the past 12 months, how many times did someone you were dating or going out with physically hurt you on purpose? (Count such things as being hit, slammed into something, or injured with an object or weapon.)</td>
<td>Yes vs. No</td>
</tr>
<tr>
<td>Forced to have sex</td>
<td>Have you ever been physically forced to have sexual intercourse when you did not want to?</td>
<td>Yes vs. No</td>
</tr>
<tr>
<td><strong>School Related Violence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon on school property</td>
<td>During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club on school property?</td>
<td>&gt;=1 vs. 0 days</td>
</tr>
<tr>
<td>In a physical fight on school property</td>
<td>During the past 12 months, how many times were you in a physical fight on school property?</td>
<td>&gt;=1 vs. 0 times</td>
</tr>
<tr>
<td>Bullied at school</td>
<td>During the past 12 months, have you ever been bullied on school property?</td>
<td>Yes vs. No</td>
</tr>
<tr>
<td>Missed school because they felt unsafe</td>
<td>During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?</td>
<td>&gt;=1 vs. 0 days</td>
</tr>
<tr>
<td>Threatened at school</td>
<td>During the past 12 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?</td>
<td>&gt;=1 vs. 0 times</td>
</tr>
<tr>
<td><strong>Substance Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current alcohol use</td>
<td>During the past 30 days, on how many days did you have at least one drink of alcohol?</td>
<td>&gt;=1 vs. 0 days</td>
</tr>
<tr>
<td>Current marijuana use</td>
<td>During the past 30 days, how many times did you use marijuana?</td>
<td>&gt;=1 vs. 0 times</td>
</tr>
<tr>
<td>Ever used cocaine</td>
<td>During your life, how many times have you used any form of cocaine, including powder, crack, or freebase?</td>
<td>&gt;=1 vs. 0 times</td>
</tr>
<tr>
<td>Ever used methamphetamine</td>
<td>During your life, how many times have you used methamphetamines (also called speed, crystal, crank, or ice)?</td>
<td>&gt;=1 vs. 0 times</td>
</tr>
<tr>
<td>Ever injected drugs</td>
<td>During your life, how many times have you used a needle to inject any illegal drug into your body?</td>
<td>&gt;=1 vs. 0 times</td>
</tr>
<tr>
<td><strong>Sexual Health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse</td>
<td>Have you ever had sexual intercourse?</td>
<td>Yes vs. No</td>
</tr>
<tr>
<td>Had sex before the age of 13</td>
<td>How old were you when you had sexual intercourse for the first time?</td>
<td>&lt;13 vs. &gt;=13 years</td>
</tr>
<tr>
<td>Four or more sex partners</td>
<td>During your life, with how many people have you had sexual intercourse?</td>
<td>&gt;=4 vs. &lt;4 persons</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Currently sexually active</td>
<td>During the past 3 months, with how many people did you have sexual intercourse?</td>
<td>&gt;=1 vs. 0 persons</td>
</tr>
<tr>
<td>No condom use at last sex¹</td>
<td>The last time you had sexual intercourse, did you or your partner use a condom?</td>
<td>No vs. Yes</td>
</tr>
</tbody>
</table>

### Weight Related Issues

<table>
<thead>
<tr>
<th>Obese (BMI &gt;=95th percentile)</th>
<th>Percentage of students who were obese (i.e., at or above the 95th percentile for body mass index, by age and sex)</th>
<th>BMI&gt;= 95th percentile vs. &lt;95th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-perception of being overweight</td>
<td>How do you describe your weight?</td>
<td>Very or slightly overweight vs. all other options</td>
</tr>
<tr>
<td>Fasted &gt;=24 hours for weight control</td>
<td>During the past 30 days, did you go without eating for 24 hours or more (also called fasting) to lose weight or to keep from gaining weight?</td>
<td>Yes vs. No</td>
</tr>
<tr>
<td>Took diet pills for weight control</td>
<td>During the past 30 days, did you take any diet pills, powders, or liquids without a doctor's advice to lose weight or to keep from gaining weight? (Do not include meal replacement products such as Slim Fast.)</td>
<td>Yes vs. No</td>
</tr>
<tr>
<td>Vomit/laxatives for weight control</td>
<td>During the past 30 days, did you vomit or take laxatives to lose weight or to keep from gaining weight?</td>
<td>Yes vs. No</td>
</tr>
</tbody>
</table>

### Physical/Sedentary Activities

| Not physically active for more than 60 minutes daily¹ | Percentage of students who were physically active for a total of at least 60 minutes per day on all seven of the past seven days | <7 vs. 7 days |
| Did not play on a sports team¹ | During the past 12 months, on how many sports teams did you play? (Count any teams run by your school or community groups.) | 0 vs. >=1 team |
| Watched TV for >= 3 hours a day | On an average school day, how many hours do you watch TV? | >=3 vs. <3 hours |
| Computer/video games for >=3 hours a day | On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Count time spent on things such as Xbox, PlayStation, an iPod, an iPad or other tablet, a smartphone, YouTube, Facebook or other social networking tools, and the Internet.) | >=3 vs. <3 hours |
| Slept<8 hours per night¹ | On an average school night, how many hours of sleep do you get? | <8 vs. >=8 hours |

### Personal Characteristics

<p>| Feelings of sadness or hopelessness in past two weeks or more | 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? | Yes vs. No |
| Driving while intoxicated | During the past 30 days, how many times did you drive a car or other vehicle when you had been drinking alcohol? | 0 vs. &gt;=1 times |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fights resulting in injury</td>
<td>During the past 12 months, how many times were you in a physical fight in which you were injured and had to be treated by a doctor or nurse?</td>
<td>0 vs. &gt;=1 times</td>
</tr>
<tr>
<td>Lack of seatbelt use</td>
<td>How often do you wear a seat belt when riding in a car driven by someone else?</td>
<td>never/rarely vs. sometimes/always</td>
</tr>
<tr>
<td>Substance use before the last sexual activity</td>
<td>Did you drink alcohol or use drugs before you had sexual intercourse the last time?</td>
<td>Yes vs. No</td>
</tr>
<tr>
<td>Academic Performance in school</td>
<td>During the past 12 months, how would you describe your grades in school?</td>
<td>Mostly As/Bs vs. lower grades</td>
</tr>
<tr>
<td>Difficulty in concentration</td>
<td>Because of physical, mental or emotional problems, do you have serious difficulty concentrating, remembering, or making decisions?</td>
<td>Yes vs. No</td>
</tr>
</tbody>
</table>

*a* reverse coded.  
*b* Question asked only in 2015 and 1991 to 2015 data.  
*c* Question asked only in 2015 data.
Table 5. Demographic Characteristics by Suicide Risk Scale, 2013 (N = 13,583)\(^a\).

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4277</td>
<td>47.3</td>
<td>810</td>
</tr>
<tr>
<td>Male</td>
<td>5045</td>
<td>52.7</td>
<td>571</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>4069</td>
<td>59.8</td>
<td>628</td>
</tr>
<tr>
<td>Black</td>
<td>1876</td>
<td>12.5</td>
<td>198</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2234</td>
<td>19.4</td>
<td>343</td>
</tr>
<tr>
<td>Other</td>
<td>962</td>
<td>8.3</td>
<td>178</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9(^{th})</td>
<td>2393</td>
<td>27.3</td>
<td>324</td>
</tr>
<tr>
<td>10(^{th})</td>
<td>2166</td>
<td>25.7</td>
<td>330</td>
</tr>
<tr>
<td>11(^{th})</td>
<td>2201</td>
<td>23.5</td>
<td>348</td>
</tr>
<tr>
<td>12(^{th})</td>
<td>2508</td>
<td>23.5</td>
<td>369</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Years Old</td>
<td>943</td>
<td>10.6</td>
<td>122</td>
</tr>
<tr>
<td>15 Years Old</td>
<td>2142</td>
<td>24.4</td>
<td>316</td>
</tr>
<tr>
<td>16 Years Old</td>
<td>2172</td>
<td>25.0</td>
<td>340</td>
</tr>
<tr>
<td>17 years Old</td>
<td>2429</td>
<td>24.6</td>
<td>379</td>
</tr>
<tr>
<td>18 Years or Older</td>
<td>1577</td>
<td>15.4</td>
<td>212</td>
</tr>
</tbody>
</table>

\(^a\) Un-weighted count and weighted percentage.
Table 6. Comparisons of Missing versus Non-Missing Suicide Risk Observations for All 2013 Study Variables (N = 13,583).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Levels of Variables</th>
<th>Count of Missing Values for Independent Variables</th>
<th>Missing Risk N (%)</th>
<th>Not Missing Risk N (%)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Female</td>
<td>12</td>
<td>887 (46.8)</td>
<td>5734 (50.4)</td>
<td>0.0755</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>1042</td>
<td>5908 (49.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td>318</td>
<td>426 (32.9)</td>
<td>5023 (58.8)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td>734</td>
<td>2867 (20.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>528</td>
<td>174 (9.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td>9th</td>
<td>102</td>
<td>565 (28.4)</td>
<td>3023 (27.2)</td>
<td>0.8938</td>
</tr>
<tr>
<td></td>
<td>10th</td>
<td>423</td>
<td>2729 (25.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11th</td>
<td>436</td>
<td>2748 (23.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12th</td>
<td>490</td>
<td>3067 (23.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>14 Years old</td>
<td>121</td>
<td>181 (8.6)</td>
<td>1187 (10.3)</td>
<td>0.2912</td>
</tr>
<tr>
<td></td>
<td>15 Years Old</td>
<td>414</td>
<td>2684 (24.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16 Years Old</td>
<td>430</td>
<td>2773 (25.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 Years Old</td>
<td>468</td>
<td>3005 (24.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 Years or Older</td>
<td>411</td>
<td>1909 (15.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Violence (Community-Related)</td>
<td>Carried a weapon</td>
<td>331</td>
<td>336 (20.1)</td>
<td>1924 (17.6)</td>
<td>0.1172</td>
</tr>
<tr>
<td></td>
<td>In a physical fight</td>
<td>251</td>
<td>631 (31.5)</td>
<td>2989 (23.7)</td>
<td>0.0004</td>
</tr>
<tr>
<td></td>
<td>Bullied electronically</td>
<td>82</td>
<td>224 (13.1)</td>
<td>1654 (15.0)</td>
<td>0.0997</td>
</tr>
<tr>
<td></td>
<td>Hit by boyfriend/girlfriend</td>
<td>3653</td>
<td>195 (12.9)</td>
<td>868 (9.8)</td>
<td>0.0106</td>
</tr>
<tr>
<td></td>
<td>Forced to have sex</td>
<td>76</td>
<td>187 (10.2)</td>
<td>841 (6.9)</td>
<td>0.0025</td>
</tr>
<tr>
<td>Violence (School-Related)</td>
<td>Carried a weapon on school property</td>
<td>229</td>
<td>105 (7.3)</td>
<td>522 (5.0)</td>
<td>0.0292</td>
</tr>
<tr>
<td></td>
<td>In a physical fight on school property</td>
<td>231</td>
<td>272 (13.9)</td>
<td>978 (7.4)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>Bullied at school</td>
<td>68</td>
<td>286 (15.9)</td>
<td>2222 (20.2)</td>
<td>0.0004</td>
</tr>
<tr>
<td></td>
<td>Missed school because unsafe</td>
<td>29</td>
<td>268 (13.8)</td>
<td>786 (6.1)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>Threatened at school</td>
<td>28</td>
<td>216 (11.5)</td>
<td>782 (6.3)</td>
<td>0.0005</td>
</tr>
<tr>
<td>Substance Use</td>
<td>Current alcohol use</td>
<td>1295</td>
<td>566 (37.0)</td>
<td>3807 (34.7)</td>
<td>0.3295</td>
</tr>
<tr>
<td></td>
<td>Current marijuana use</td>
<td>269</td>
<td>547 (29.0)</td>
<td>2820 (22.7)</td>
<td>0.0009</td>
</tr>
<tr>
<td>Category</td>
<td>Count</td>
<td>Value (N)</td>
<td>Reference Value (N)</td>
<td>P Value</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------</td>
<td>-----------</td>
<td>---------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td><strong>Ever used cocaine</strong></td>
<td>126</td>
<td>149 (9.2)</td>
<td>600 (5.0)</td>
<td>0.0009</td>
<td></td>
</tr>
<tr>
<td><strong>Ever used methamphetamine</strong></td>
<td>226</td>
<td>84 (5.4)</td>
<td>331 (2.9)</td>
<td>0.0069</td>
<td></td>
</tr>
<tr>
<td><strong>Ever injected drugs</strong></td>
<td>226</td>
<td>63 (3.4)</td>
<td>182 (1.5)</td>
<td>0.0044</td>
<td></td>
</tr>
<tr>
<td><strong>Sexual Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ever had sexual intercourse</strong></td>
<td>669</td>
<td>1023 (58.8)</td>
<td>5397 (45.2)</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td><strong>Had sex before age 13 years</strong></td>
<td>686</td>
<td>192 (10.8)</td>
<td>692 (5.0)</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td><strong>Four or more sex partners</strong></td>
<td>725</td>
<td>401 (22.7)</td>
<td>1758 (14.0)</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td><strong>Currently sexually active</strong></td>
<td>707</td>
<td>777 (45.0)</td>
<td>3890 (32.6)</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td><strong>No condom use at last sex</strong></td>
<td>9018</td>
<td>280 (37.3)</td>
<td>1580 (41.5)</td>
<td>0.1485</td>
<td></td>
</tr>
<tr>
<td><strong>Weight Related Issues</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Obese (BMI&gt;=95th percentile)</strong></td>
<td>1004</td>
<td>287 (18.1)</td>
<td>1499 (13.1)</td>
<td>0.0006</td>
<td></td>
</tr>
<tr>
<td><strong>Perceive self to be overweight</strong></td>
<td>242</td>
<td>503 (30.7)</td>
<td>3554 (31.2)</td>
<td>0.7702</td>
<td></td>
</tr>
<tr>
<td><strong>Fasted &gt;=24 hours for weight control</strong></td>
<td>226</td>
<td>299 (16.6)</td>
<td>1482 (12.6)</td>
<td>0.0111</td>
<td></td>
</tr>
<tr>
<td><strong>Took diet pills for weight control</strong></td>
<td>247</td>
<td>116 (6.4)</td>
<td>569 (4.9)</td>
<td>0.0393</td>
<td></td>
</tr>
<tr>
<td><strong>Vomit/laxative for weight control</strong></td>
<td>299</td>
<td>94 (5.0)</td>
<td>466 (4.3)</td>
<td>0.3986</td>
<td></td>
</tr>
<tr>
<td><strong>Physical/Sedentary Activities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Not physically active &gt;=60 minutes daily</strong></td>
<td>273</td>
<td>1356 (73.5)</td>
<td>8332 (72.8)</td>
<td>0.6509</td>
<td></td>
</tr>
<tr>
<td><strong>Did not play on a sports team</strong></td>
<td>388</td>
<td>862 (48.8)</td>
<td>5289 (45.6)</td>
<td>0.0417</td>
<td></td>
</tr>
<tr>
<td><strong>Watched TV&gt;=3 hours/day</strong></td>
<td>338</td>
<td>804 (40.7)</td>
<td>3978 (31.4)</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td><strong>Computer/video games&gt;=3 hours/day</strong></td>
<td>328</td>
<td>762 (40.8)</td>
<td>4907 (41.4)</td>
<td>0.6996</td>
<td></td>
</tr>
<tr>
<td><strong>Slept&lt;8 hours/night</strong></td>
<td>1248</td>
<td>1111 (67.7)</td>
<td>7453 (68.4)</td>
<td>0.6479</td>
<td></td>
</tr>
<tr>
<td><strong>Personal Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Feeling of hopelessness or sadness</strong></td>
<td>88</td>
<td>532 (30.0)</td>
<td>3554 (29.9)</td>
<td>0.9927</td>
<td></td>
</tr>
<tr>
<td><strong>Driving while intoxicated</strong></td>
<td>5725</td>
<td>135 (12.0)</td>
<td>626 (9.7)</td>
<td>0.2109</td>
<td></td>
</tr>
<tr>
<td><strong>Fights resulting in injury</strong></td>
<td>201</td>
<td>126 (6.6)</td>
<td>342 (2.6)</td>
<td>0.0002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Mean (SD)</td>
<td>Median (SD)</td>
<td>p-value</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------</td>
<td>-----------</td>
<td>-------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Lack of seat belt use</td>
<td>24</td>
<td>241 (13.9)</td>
<td>811 (6.7)</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td>Substance use before the last sexual activity</td>
<td>8948</td>
<td>180 (25.7)</td>
<td>860 (21.8)</td>
<td>0.1686</td>
<td></td>
</tr>
</tbody>
</table>

*Reverse coded.*
Table 7. Multinomial Logistic Modeling Results for High Risk Health Behaviors among Female Students by Suicide Risk Scale, 2013 (N = 6,621).

<table>
<thead>
<tr>
<th>High Risk Health Behaviors among Female Students</th>
<th>Suicide Risk Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Risk</td>
</tr>
<tr>
<td></td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Odds Ratio&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Violence (Community-Related)</td>
<td></td>
</tr>
<tr>
<td>Carried a weapon</td>
<td>5.2</td>
</tr>
<tr>
<td>In a physical fight</td>
<td>13.3</td>
</tr>
<tr>
<td>Bullied electronically</td>
<td>15.9</td>
</tr>
<tr>
<td>Hit by boyfriend/girlfriend</td>
<td>8.6</td>
</tr>
<tr>
<td>Forced to have sex</td>
<td>5.9</td>
</tr>
<tr>
<td>Violence (School-Related)</td>
<td></td>
</tr>
<tr>
<td>Carried a weapon on school property</td>
<td>1.6</td>
</tr>
<tr>
<td>In a physical fight on school property</td>
<td>3.1</td>
</tr>
<tr>
<td>Bullied at school</td>
<td>18.0</td>
</tr>
<tr>
<td>Missed school because unsafe</td>
<td>5.7</td>
</tr>
<tr>
<td>Threatened at school</td>
<td>3.3</td>
</tr>
<tr>
<td>Substance Use</td>
<td></td>
</tr>
<tr>
<td>Current alcohol use</td>
<td>30.7</td>
</tr>
<tr>
<td>Current marijuana use</td>
<td>16.9</td>
</tr>
<tr>
<td>Ever used cocaine</td>
<td>2.5</td>
</tr>
<tr>
<td>Ever used methamphetamine</td>
<td>1.5</td>
</tr>
<tr>
<td>Ever injected drugs</td>
<td>0.4</td>
</tr>
<tr>
<td>Sexual Health</td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse</td>
<td>41.2</td>
</tr>
<tr>
<td>Had sex before age 13 years</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Four or more sex</td>
<td>10.0</td>
</tr>
<tr>
<td>partners</td>
<td></td>
</tr>
<tr>
<td>Currently sexually</td>
<td>31.9</td>
</tr>
<tr>
<td>active</td>
<td></td>
</tr>
<tr>
<td>No condom use at last</td>
<td>44.3</td>
</tr>
<tr>
<td>sex b</td>
<td></td>
</tr>
<tr>
<td>Weight Related</td>
<td></td>
</tr>
<tr>
<td>Issues</td>
<td></td>
</tr>
<tr>
<td>Obese (BMI&gt;=95th percentile)</td>
<td>9.5</td>
</tr>
<tr>
<td>Perceive self to be</td>
<td>33.0</td>
</tr>
<tr>
<td>overweight</td>
<td></td>
</tr>
<tr>
<td>Fasted &gt;=24 hours for</td>
<td>12.0</td>
</tr>
<tr>
<td>weight control</td>
<td></td>
</tr>
<tr>
<td>Took diet pills for</td>
<td>4.6</td>
</tr>
<tr>
<td>weight control</td>
<td></td>
</tr>
<tr>
<td>Vomit/laxative for</td>
<td>4.0</td>
</tr>
<tr>
<td>weight control</td>
<td></td>
</tr>
<tr>
<td>Physical/Sedentary</td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td></td>
</tr>
<tr>
<td>Not physically active</td>
<td>81.8</td>
</tr>
<tr>
<td>&gt;=60 minutes daily b</td>
<td></td>
</tr>
<tr>
<td>Did not play on a</td>
<td>49.9</td>
</tr>
<tr>
<td>sports team b</td>
<td></td>
</tr>
<tr>
<td>Watched TV&gt;=3 hours/day</td>
<td>30.9</td>
</tr>
<tr>
<td>Computer/video games&gt;=3</td>
<td>37.3</td>
</tr>
<tr>
<td>hours/day</td>
<td></td>
</tr>
<tr>
<td>Slept&lt;8 hours/night b</td>
<td>68.9</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Characteristics</td>
<td></td>
</tr>
<tr>
<td>Feeling of hopelessness</td>
<td>25.1</td>
</tr>
<tr>
<td>or sadness</td>
<td></td>
</tr>
<tr>
<td>Driving while intoxicated</td>
<td>5.9</td>
</tr>
<tr>
<td>Fights resulting in</td>
<td>1.0</td>
</tr>
<tr>
<td>injury</td>
<td></td>
</tr>
<tr>
<td>Lack of seat belt use</td>
<td>4.8</td>
</tr>
<tr>
<td>Substance use before the</td>
<td>14.5</td>
</tr>
<tr>
<td>last sexual activity</td>
<td></td>
</tr>
</tbody>
</table>

BMI = body mass index; CI = Confidence Interval.

a Models adjusted for age, race/ethnicity and grade.

b Reverse coded.
Table 8. Multinomial Logistic Modeling Results for High Risk Health Behaviors among Male Students by Suicide Risk Scale for YRBSS, 2013 (N = 6,950).

<table>
<thead>
<tr>
<th>High Risk Health Behaviors among Male Students</th>
<th>Suicide Risk Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Risk</td>
</tr>
<tr>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Violence (Community-Related)</td>
<td></td>
</tr>
<tr>
<td>Carried a weapon</td>
<td>25.1</td>
</tr>
<tr>
<td>In a physical fight</td>
<td>26.2</td>
</tr>
<tr>
<td>Bullied electronically</td>
<td>5.7</td>
</tr>
<tr>
<td>Hit by boyfriend/girlfriend</td>
<td>4.5</td>
</tr>
<tr>
<td>Forced to have sex</td>
<td>1.9</td>
</tr>
<tr>
<td>Violence (School-Related)</td>
<td></td>
</tr>
<tr>
<td>Carried a weapon on school property</td>
<td>5.5</td>
</tr>
<tr>
<td>In a physical fight on school property</td>
<td>8.1</td>
</tr>
<tr>
<td>Bullied at school</td>
<td>12.2</td>
</tr>
<tr>
<td>Missed school because unsafe</td>
<td>3.1</td>
</tr>
<tr>
<td>Threatened at school</td>
<td>5.1</td>
</tr>
<tr>
<td>Substance Use</td>
<td></td>
</tr>
<tr>
<td>Current alcohol use</td>
<td>31.6</td>
</tr>
<tr>
<td>Current marijuana use</td>
<td>21.4</td>
</tr>
<tr>
<td>Ever used cocaine</td>
<td>4.4</td>
</tr>
<tr>
<td>Ever used methamphetamine</td>
<td>1.9</td>
</tr>
<tr>
<td>Ever injected drugs</td>
<td>0.9</td>
</tr>
<tr>
<td>Sexual Health</td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse</td>
<td>43.1</td>
</tr>
<tr>
<td>Had sex before age 13 years</td>
<td>5.8</td>
</tr>
<tr>
<td>Four or more sex partners</td>
<td>14.1</td>
</tr>
<tr>
<td>Currently sexually active</td>
<td>29.6</td>
</tr>
<tr>
<td>No condom use at last sex&lt;sup&gt;b&lt;/sup&gt;</td>
<td>32.4</td>
</tr>
<tr>
<td>Weight Related Issues</td>
<td></td>
</tr>
<tr>
<td>Obese (BMI&gt;95&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
<td>15.0</td>
</tr>
<tr>
<td>Perceive self to be overweight</td>
<td>24.7</td>
</tr>
<tr>
<td>Activity</td>
<td>R (%)</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Fasted &gt;=24 hours for weight control</td>
<td>4.5</td>
</tr>
<tr>
<td>Took diet pills for weight control</td>
<td>2.3</td>
</tr>
<tr>
<td>Vomit/laxative for weight control</td>
<td>1.0</td>
</tr>
<tr>
<td>Physical/Sedentary Activities</td>
<td></td>
</tr>
<tr>
<td>Not physically active &gt;=60 minutes dailyb</td>
<td>62.1</td>
</tr>
<tr>
<td>Did not play on a sports teamb</td>
<td>38.4</td>
</tr>
<tr>
<td>Watched TV&gt;=3 hours/day</td>
<td>30.3</td>
</tr>
<tr>
<td>Computer/video games&gt;=3 hours/day</td>
<td>40.2</td>
</tr>
<tr>
<td>Slept&lt;8 hours/nightb</td>
<td>63.2</td>
</tr>
<tr>
<td>Personal Characteristics</td>
<td></td>
</tr>
<tr>
<td>Feeling of hopelessness or sadness</td>
<td>13.0</td>
</tr>
<tr>
<td>Driving while intoxicated</td>
<td>10.6</td>
</tr>
<tr>
<td>Fights resulting in injury</td>
<td>2.2</td>
</tr>
<tr>
<td>Lack of seat belt use</td>
<td>7.3</td>
</tr>
<tr>
<td>Substance use before the last sexual activity</td>
<td>22.6</td>
</tr>
</tbody>
</table>

BMI = body mass index; CI = Confidence Interval.

*a* Models adjusted for age, race/ethnicity and grade.

*b* Reverse coded.
Table 9. Demographic Characteristics by Suicide Risk Scale for 2015, (N = 15,624) a.

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Sex</td>
<td>4357</td>
<td>45.5</td>
<td>938</td>
</tr>
<tr>
<td>Female</td>
<td>4935</td>
<td>54.5</td>
<td>590</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>4015</td>
<td>57.1</td>
<td>718</td>
</tr>
<tr>
<td>Black</td>
<td>983</td>
<td>12.4</td>
<td>133</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3241</td>
<td>21.5</td>
<td>498</td>
</tr>
<tr>
<td>Other</td>
<td>932</td>
<td>9.0</td>
<td>165</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9th</td>
<td>2331</td>
<td>27.2</td>
<td>380</td>
</tr>
<tr>
<td>10th</td>
<td>2374</td>
<td>25.5</td>
<td>361</td>
</tr>
<tr>
<td>11th</td>
<td>2324</td>
<td>23.8</td>
<td>401</td>
</tr>
<tr>
<td>12th</td>
<td>2254</td>
<td>23.4</td>
<td>388</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Years Old</td>
<td>856</td>
<td>10.0</td>
<td>152</td>
</tr>
<tr>
<td>15 Years Old</td>
<td>2325</td>
<td>26.7</td>
<td>340</td>
</tr>
<tr>
<td>16 Years Old</td>
<td>2391</td>
<td>24.5</td>
<td>398</td>
</tr>
<tr>
<td>17 years Old</td>
<td>2351</td>
<td>23.7</td>
<td>415</td>
</tr>
<tr>
<td>18 Years or Older</td>
<td>1378</td>
<td>15.1</td>
<td>226</td>
</tr>
</tbody>
</table>

a Un-weighted count and weighted percentage.
Table 10. Comparisons of Missing versus Non-Missing Suicide Risk Observations for All 2015 Study Variables (N = 15,624).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Levels of Variables</th>
<th>Missing Independent Variable N</th>
<th>Missing Risk N (%)</th>
<th>Not Missing Risk N (%)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Female</td>
<td>118</td>
<td>1694 (46.0)</td>
<td>6063 (49.2)</td>
<td>0.1171</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>1933</td>
<td>54.0</td>
<td>5816 (50.8)</td>
<td></td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td>White</td>
<td>358</td>
<td>1731 (45.3)</td>
<td>5118 (56.2)</td>
<td>0.0024</td>
</tr>
<tr>
<td></td>
<td>Black</td>
<td></td>
<td>438 (20.5)</td>
<td>1229 (12.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>967</td>
<td>24.0</td>
<td>4154 (22.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>404</td>
<td>10.2</td>
<td>1225 (9.6)</td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
<td>152</td>
<td>970 (26.5)</td>
<td>3033 (27.4)</td>
<td>0.8879</td>
</tr>
<tr>
<td></td>
<td>10&lt;sup&gt;th&lt;/sup&gt;</td>
<td></td>
<td>911 (26.4)</td>
<td>3027 (25.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11&lt;sup&gt;th&lt;/sup&gt;</td>
<td></td>
<td>949 (24.2)</td>
<td>2981 (23.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12&lt;sup&gt;th&lt;/sup&gt;</td>
<td></td>
<td>781 (22.9)</td>
<td>2820 (23.1)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>14 Years old</td>
<td>126</td>
<td>550 (10.1)</td>
<td>1134 (10.1)</td>
<td>0.241</td>
</tr>
<tr>
<td></td>
<td>15 Years Old</td>
<td></td>
<td>858 (24.0)</td>
<td>2959 (26.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16 Years Old</td>
<td></td>
<td>959 (27.4)</td>
<td>3074 (24.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 Years Old</td>
<td></td>
<td>821 (24.3)</td>
<td>3012 (23.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18 Years or Older</td>
<td></td>
<td>424 (14.2)</td>
<td>1707 (15.0)</td>
<td></td>
</tr>
<tr>
<td>Violence (Community-Related)</td>
<td>Carried a weapon</td>
<td>1201</td>
<td>725 (18.4)</td>
<td>1801 (15.8)</td>
<td>0.2681</td>
</tr>
<tr>
<td></td>
<td>In a physical fight</td>
<td>2500</td>
<td>496 (26.0)</td>
<td>2385 (22.1)</td>
<td>0.0474</td>
</tr>
<tr>
<td></td>
<td>Bullied electronically</td>
<td>159</td>
<td>511 (13.5)</td>
<td>1757 (15.9)</td>
<td>0.0191</td>
</tr>
<tr>
<td></td>
<td>Hit by boyfriend/girlfriend</td>
<td>5133</td>
<td>263 (10.2)</td>
<td>805 (9.5)</td>
<td>0.533</td>
</tr>
<tr>
<td></td>
<td>Forced to have sex</td>
<td>728</td>
<td>296 (9.0)</td>
<td>823 (6.3)</td>
<td>0.0066</td>
</tr>
<tr>
<td>Violence (School-Related)</td>
<td>Carried a weapon on school property</td>
<td>156</td>
<td>219 (5.6)</td>
<td>485 (3.8)</td>
<td>0.0249</td>
</tr>
<tr>
<td></td>
<td>In a physical fight on school property</td>
<td>292</td>
<td>405 (11.9)</td>
<td>848 (7.1)</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td>Bullied at school</td>
<td>176</td>
<td>678 (19.4)</td>
<td>2278 (20.3)</td>
<td>0.4167</td>
</tr>
<tr>
<td></td>
<td>Missed school because unsafe</td>
<td>61</td>
<td>321 (10.0)</td>
<td>666 (4.8)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td>Threatened at school</td>
<td>631</td>
<td>301 (9.7)</td>
<td>649 (5.3)</td>
<td>0.0005</td>
</tr>
<tr>
<td>Substance Use</td>
<td>Current alcohol use</td>
<td>1510</td>
<td>1081 (33.7)</td>
<td>3578 (32.6)</td>
<td>0.5832</td>
</tr>
<tr>
<td></td>
<td>Current marijuana use</td>
<td>374</td>
<td>773 (24.6)</td>
<td>2582 (21.1)</td>
<td>0.0379</td>
</tr>
<tr>
<td></td>
<td>Ever used cocaine</td>
<td>192</td>
<td>320 (9.9)</td>
<td>597 (4.3)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>N</td>
<td>Mean (SD)</td>
<td>Median (SD)</td>
<td>p-value</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------------------</td>
<td>----</td>
<td>------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Ever used methamphetamine</strong></td>
<td></td>
<td>735</td>
<td>204 (7.1)</td>
<td>296 (2.3)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td><strong>Ever injected drugs</strong></td>
<td></td>
<td>838</td>
<td>151 (5.0)</td>
<td>134 (1.2)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td><strong>Sexual Health</strong></td>
<td><strong>Ever had sexual intercourse</strong></td>
<td>1636</td>
<td>1320 (46.4)</td>
<td>4638 (40.4)</td>
<td>0.0098</td>
</tr>
<tr>
<td><strong>Had sex before age 13 years</strong></td>
<td></td>
<td>1692</td>
<td>198 (7.9)</td>
<td>454 (3.3)</td>
<td>0.0001</td>
</tr>
<tr>
<td><strong>Four or more sex partners</strong></td>
<td></td>
<td>1714</td>
<td>404 (16.9)</td>
<td>1203 (10.6)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td><strong>Currently sexually active</strong></td>
<td></td>
<td>1714</td>
<td>967 (34.6)</td>
<td>3337 (29.4)</td>
<td>0.0081</td>
</tr>
<tr>
<td><strong>No condom use at last sex</strong></td>
<td>Reverse coded.</td>
<td>11428</td>
<td>422 (46.9)</td>
<td>1439 (42.5)</td>
<td>0.0902</td>
</tr>
<tr>
<td><strong>Weight Related Issues</strong></td>
<td>Obese (BMI&gt;=95th percentile)</td>
<td>1266</td>
<td>506 (15.8)</td>
<td>1665 (13.6)</td>
<td>0.0277</td>
</tr>
<tr>
<td><strong>Perceive self to be overweight</strong></td>
<td></td>
<td>304</td>
<td>1017 (28.1)</td>
<td>3995 (32.2)</td>
<td>0.0099</td>
</tr>
<tr>
<td><strong>Weight loss</strong></td>
<td></td>
<td>1780</td>
<td>983 (44.3)</td>
<td>5693 (45.8)</td>
<td>0.3335</td>
</tr>
<tr>
<td><strong>Physical/Sedentary activities</strong></td>
<td>Not physically active &gt;=60 minutes daily</td>
<td>379</td>
<td>2654(75.4)</td>
<td>8698 (72.5)</td>
<td>0.0723</td>
</tr>
<tr>
<td><strong>Did not play on a sports team</strong></td>
<td>Reverse coded.</td>
<td>2502</td>
<td>863 (42.8)</td>
<td>5240 (42.3)</td>
<td>0.811</td>
</tr>
<tr>
<td><strong>Watched TV&gt;=3 hours/day</strong></td>
<td></td>
<td>500</td>
<td>958 (28.8)</td>
<td>3062 (24.0)</td>
<td>0.008</td>
</tr>
<tr>
<td><strong>Computer/video games&gt;=3 hours/day</strong></td>
<td></td>
<td>446</td>
<td>1364 (40.0)</td>
<td>5165 (42.0)</td>
<td>0.2791</td>
</tr>
<tr>
<td><strong>Slept&lt;8 hours/night</strong></td>
<td>Reverse coded.</td>
<td>1090</td>
<td>2336 (69.5)</td>
<td>8112 (73.3)</td>
<td>0.0412</td>
</tr>
<tr>
<td><strong>Personal Characteristics</strong></td>
<td>Feeling of hopelessness or sadness</td>
<td>169</td>
<td>991 (29.5)</td>
<td>3798 (29.9)</td>
<td>0.7879</td>
</tr>
<tr>
<td><strong>Driving while intoxicated</strong></td>
<td></td>
<td>7192</td>
<td>236 (11.0)</td>
<td>518 (7.2)</td>
<td>0.0132</td>
</tr>
<tr>
<td><strong>Fights resulting in injury</strong></td>
<td></td>
<td>2284</td>
<td>91 (5.0)</td>
<td>306 (2.6)</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Lack of seat belt use</strong></td>
<td></td>
<td>1554</td>
<td>230 (11.2)</td>
<td>646 (5.3)</td>
<td>0.0001</td>
</tr>
<tr>
<td><strong>Substance use before the last sexual activity</strong></td>
<td></td>
<td>11464</td>
<td>257 (26.7)</td>
<td>645 (19.6)</td>
<td>0.0067</td>
</tr>
<tr>
<td><strong>Academic Performance in School</strong></td>
<td></td>
<td>855</td>
<td>2323 (63.8)</td>
<td>7998 (73.8)</td>
<td>0.0002</td>
</tr>
<tr>
<td><strong>Difficulty in concentration</strong></td>
<td></td>
<td>4507</td>
<td>426 (31.2)</td>
<td>3081 (29.7)</td>
<td>0.5523</td>
</tr>
</tbody>
</table>

*a Reverse coded.*
Table 11. Multinomial Logistic Modeling Results for High Risk Health Behaviors among Female Students by Suicide Risk Scale for 2015 (N = 7,757).

<table>
<thead>
<tr>
<th>Health Risk Behaviors among Female Students</th>
<th>Suicide Risk among Female Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Risk</td>
</tr>
<tr>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Violence (Community-Related)</td>
<td></td>
</tr>
<tr>
<td>Carried a weapon</td>
<td>4.9</td>
</tr>
<tr>
<td>In a physical fight</td>
<td>11.5</td>
</tr>
<tr>
<td>Bullied electronically</td>
<td>16.0</td>
</tr>
<tr>
<td>Hit by boyfriend/girlfriend</td>
<td>7.8</td>
</tr>
<tr>
<td>Forced to have sex</td>
<td>5.9</td>
</tr>
<tr>
<td>Violence (School-Related)</td>
<td></td>
</tr>
<tr>
<td>Carried a weapon on school property</td>
<td>0.9</td>
</tr>
<tr>
<td>In a physical fight on school property</td>
<td>3.3</td>
</tr>
<tr>
<td>Bullied at school</td>
<td>17.9</td>
</tr>
<tr>
<td>Missed school because unsafe</td>
<td>2.8</td>
</tr>
<tr>
<td>Threatened at school</td>
<td>2.7</td>
</tr>
<tr>
<td>Substance Use</td>
<td></td>
</tr>
<tr>
<td>Current alcohol use</td>
<td>28.0</td>
</tr>
<tr>
<td>Current marijuana use</td>
<td>15.7</td>
</tr>
<tr>
<td>Ever used cocaine</td>
<td>2.0</td>
</tr>
<tr>
<td>Ever used methamphetamine</td>
<td>0.8</td>
</tr>
<tr>
<td>Ever injected drugs</td>
<td>0.3</td>
</tr>
<tr>
<td>Sexual Health</td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse</td>
<td>34.3</td>
</tr>
<tr>
<td>Had sex before age 13 years</td>
<td>1.2</td>
</tr>
<tr>
<td>Four or more sex partners</td>
<td>6.5</td>
</tr>
<tr>
<td>Currently sexually active</td>
<td>26.1</td>
</tr>
<tr>
<td>No condom use at last sex&lt;sup&gt;b&lt;/sup&gt;</td>
<td>45.4</td>
</tr>
<tr>
<td>Weight Related Issues</td>
<td></td>
</tr>
<tr>
<td>Obese (BMI&gt;=95&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
<td>9.5</td>
</tr>
<tr>
<td>Perceive self to be overweight</td>
<td>35.9</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Weight loss</td>
<td>58.4</td>
</tr>
<tr>
<td>Physical/Sedentary Activities</td>
<td></td>
</tr>
<tr>
<td>Not physically active &gt;=60 minutes daily</td>
<td>81.2</td>
</tr>
<tr>
<td>Did not play on a sports team</td>
<td>43.4</td>
</tr>
<tr>
<td>Watched TV&gt;=3 hours/day</td>
<td>22.6</td>
</tr>
<tr>
<td>Computer/video games&gt;=3 hours/day</td>
<td>39.7</td>
</tr>
<tr>
<td>Slept&lt;8 hours/night</td>
<td>74.3</td>
</tr>
<tr>
<td>Personal Characteristics</td>
<td></td>
</tr>
<tr>
<td>Feeling of hopelessness or sadness</td>
<td>25.5</td>
</tr>
<tr>
<td>Driving while intoxicated</td>
<td>4.2</td>
</tr>
<tr>
<td>Fights resulting in injury</td>
<td>0.7</td>
</tr>
<tr>
<td>Lack of seat belt use</td>
<td>3.1</td>
</tr>
<tr>
<td>Substance use before the last sexual activity</td>
<td>12.7</td>
</tr>
<tr>
<td>Academic Performance in school</td>
<td>83.3</td>
</tr>
<tr>
<td>Difficulty in concentration</td>
<td>24.9</td>
</tr>
</tbody>
</table>

BMI = body mass index; CI = Confidence Interval.

a Models adjusted for age, race/ethnicity and grade.

b Reverse coded.
Table 12. Multinomial Logistic Modeling Results for High Risk Health Behaviors among Male Students by Suicide Risk Scale for 2015 (N = 7,749).

<table>
<thead>
<tr>
<th>Health Risk Behaviors among Male Students</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>Odds Ratioa</td>
<td>95% CI</td>
</tr>
<tr>
<td>Violence (Community-Related)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon</td>
<td>21.8</td>
<td>33.5</td>
<td>1.82</td>
</tr>
<tr>
<td>In a physical fight</td>
<td>25.5</td>
<td>34.6</td>
<td>1.67</td>
</tr>
<tr>
<td>Bullied electronically</td>
<td>7.4</td>
<td>17.0</td>
<td>2.71</td>
</tr>
<tr>
<td>Hit by boyfriend/girlfriend</td>
<td>4.7</td>
<td>11.8</td>
<td>2.37</td>
</tr>
<tr>
<td>Forced to have sex</td>
<td>1.6</td>
<td>5.2</td>
<td>3.10</td>
</tr>
<tr>
<td>Violence (School-Related)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon on school property</td>
<td>4.2</td>
<td>10.8</td>
<td>2.80</td>
</tr>
<tr>
<td>In a physical fight on school property</td>
<td>8.2</td>
<td>13.4</td>
<td>1.91</td>
</tr>
<tr>
<td>Bullied at school</td>
<td>12.6</td>
<td>29.0</td>
<td>3.04</td>
</tr>
<tr>
<td>Missed school because unsafe</td>
<td>3.6</td>
<td>4.1</td>
<td>1.11</td>
</tr>
<tr>
<td>Threatened at school</td>
<td>4.4</td>
<td>11.2</td>
<td>2.77</td>
</tr>
<tr>
<td>Substance Use</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Current alcohol use</td>
<td>29.3</td>
<td>43.0</td>
<td>1.70</td>
</tr>
<tr>
<td>Current marijuana use</td>
<td>20.8</td>
<td>30.3</td>
<td>1.59</td>
</tr>
<tr>
<td>Ever used cocaine</td>
<td>3.8</td>
<td>9.5</td>
<td>2.37</td>
</tr>
<tr>
<td>Ever used methamphetamine</td>
<td>1.7</td>
<td>3.9</td>
<td>1.82</td>
</tr>
<tr>
<td>Ever injected drugs</td>
<td>0.6</td>
<td>2.5</td>
<td>2.95</td>
</tr>
<tr>
<td>Sexual Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse</td>
<td>39.3</td>
<td>51.9</td>
<td>1.51</td>
</tr>
<tr>
<td>Had sex before age 13 years</td>
<td>3.9</td>
<td>5.6</td>
<td>1.45</td>
</tr>
<tr>
<td>Four or more sex partners</td>
<td>11.7</td>
<td>15.1</td>
<td>1.24</td>
</tr>
<tr>
<td>Currently sexually active</td>
<td>27</td>
<td>36.5</td>
<td>1.44</td>
</tr>
<tr>
<td>No condom use at last sex</td>
<td>35.3</td>
<td>45.6</td>
<td>1.38</td>
</tr>
<tr>
<td>Weight Related Issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obese (BMI&gt;=95th percentile)</td>
<td>16.1</td>
<td>17.0</td>
<td>1.07</td>
</tr>
</tbody>
</table>
### Perceive self to be overweight

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24.4</td>
<td>29.2</td>
<td>1.30</td>
<td>(1.02, 1.67)</td>
<td>33.7</td>
</tr>
</tbody>
</table>

### Weight loss

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
<td>34.5</td>
<td>1.48</td>
<td>(1.27, 1.73)</td>
<td>37.1</td>
</tr>
</tbody>
</table>

### Physical/Sedentary Activities

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not physically active &gt;=60 minutes daily&lt;sup&gt;b&lt;/sup&gt;</td>
<td>62</td>
<td>70.2</td>
<td>1.48</td>
<td>(1.10, 2.01)</td>
<td>74.3</td>
</tr>
<tr>
<td>Did not play on a sports team&lt;sup&gt;b&lt;/sup&gt;</td>
<td>36.1</td>
<td>51.4</td>
<td>1.92</td>
<td>(1.55, 2.37)</td>
<td>46.1</td>
</tr>
<tr>
<td>Watched TV&gt;=3 hours/day</td>
<td>24.6</td>
<td>22.4</td>
<td>0.92</td>
<td>(0.69, 1.23)</td>
<td>24.2</td>
</tr>
<tr>
<td>Computer/video games&gt;=3 hours/day</td>
<td>39.4</td>
<td>49.5</td>
<td>1.60</td>
<td>(1.28, 2.02)</td>
<td>51.5</td>
</tr>
<tr>
<td>Slept&lt;8 hours/night&lt;sup&gt;b&lt;/sup&gt;</td>
<td>68.6</td>
<td>82.3</td>
<td>1.93</td>
<td>(1.44, 2.59)</td>
<td>82.9</td>
</tr>
</tbody>
</table>

### Personal Characteristics

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeling of hopelessness or sadness</td>
<td>12.7</td>
<td>58.5</td>
<td>9.88</td>
<td>(6.77, 14.42)</td>
<td>72.6</td>
</tr>
<tr>
<td>Driving while intoxicated</td>
<td>7.8</td>
<td>12.7</td>
<td>1.44</td>
<td>(1.02, 2.02)</td>
<td>21.5</td>
</tr>
<tr>
<td>Fights resulting in injury</td>
<td>2.4</td>
<td>5.0</td>
<td>2.07</td>
<td>(1.0, 4.37)</td>
<td>19.5</td>
</tr>
<tr>
<td>Lack of seat belt use</td>
<td>5.1</td>
<td>7.7</td>
<td>1.57</td>
<td>(1.03, 2.39)</td>
<td>15.3</td>
</tr>
<tr>
<td>Substance use before the last sexual activity</td>
<td>23.1</td>
<td>22.5</td>
<td>0.95</td>
<td>(0.61, 1.47)</td>
<td>30.1</td>
</tr>
<tr>
<td>Academic Performance in school</td>
<td>70.6</td>
<td>61.2</td>
<td>0.63</td>
<td>(0.52, 0.75)</td>
<td>56.1</td>
</tr>
<tr>
<td>Difficulty in concentration</td>
<td>19.4</td>
<td>46.0</td>
<td>3.56</td>
<td>(2.43, 5.21)</td>
<td>59.3</td>
</tr>
</tbody>
</table>

BMI = body mass index; CI = Confidence Interval.

<sup>a</sup> Models adjusted for age, race/ethnicity and grade.

<sup>b</sup> Reverse coded.
Table 13. High Risk Health Questions Included in each Survey Year and the Number of Participants Who Endorsed the High-Risk Health Question in each Survey Year among Female High School Students: 1991 to 2015 (N = 95,129) *

<table>
<thead>
<tr>
<th>High-Risk Health Behavior</th>
<th>1991</th>
<th>1993</th>
<th>1995</th>
<th>1997</th>
<th>1999</th>
<th>2001</th>
<th>2003</th>
<th>2005</th>
<th>2007</th>
<th>2009</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community Related Violence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon</td>
<td>6186</td>
<td>8155</td>
<td>5424</td>
<td>8116</td>
<td>7752</td>
<td>6783</td>
<td>7276</td>
<td>7119</td>
<td>6886</td>
<td>8203</td>
<td>7589</td>
<td>6524</td>
<td>7203</td>
<td>93216</td>
</tr>
<tr>
<td>In a physical fight</td>
<td>6236</td>
<td>8107</td>
<td>5415</td>
<td>8130</td>
<td>7737</td>
<td>6874</td>
<td>7282</td>
<td>7107</td>
<td>6909</td>
<td>8183</td>
<td>7565</td>
<td>6532</td>
<td>6561</td>
<td>92638</td>
</tr>
<tr>
<td>Bullied electronically</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6980</td>
<td>6591</td>
<td>7690</td>
</tr>
<tr>
<td>Hit by boyfriend/girlfriend</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>4876</td>
<td>5299</td>
<td>10175</td>
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<tr>
<td>Forced to have sex</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>7042</td>
<td>6751</td>
<td>6928</td>
<td>7926</td>
<td>7600</td>
<td>6582</td>
<td>7391</td>
<td>56819</td>
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<tr>
<td><strong>School Related Violence</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon on school property</td>
<td>8178</td>
<td>5438</td>
<td>8129</td>
<td>7767</td>
<td>6907</td>
<td>7488</td>
<td>7146</td>
<td>6904</td>
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<td>7485</td>
<td>6541</td>
<td>7717</td>
<td>87939</td>
<td></td>
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<tr>
<td>In a physical fight on school property</td>
<td>8133</td>
<td>5447</td>
<td>8142</td>
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<td>693</td>
<td>7299</td>
<td>7137</td>
<td>6926</td>
<td>8150</td>
<td>7602</td>
<td>6525</td>
<td>7637</td>
<td>87649</td>
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<tr>
<td>Bullied at school</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
<td>7838</td>
<td>7348r</td>
<td>6597</td>
<td>7686</td>
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<tr>
<td>Missed school because they felt unsafe</td>
<td>-</td>
<td>8229</td>
<td>5493</td>
<td>8186</td>
<td>7820</td>
<td>6943</td>
<td>7528</td>
<td>7185</td>
<td>6968</td>
<td>8268</td>
<td>7671</td>
<td>6611</td>
<td>7739</td>
<td>88641</td>
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<tr>
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<td>8228</td>
<td>5494</td>
<td>8190</td>
<td>7816</td>
<td>6946</td>
<td>7535</td>
<td>7189</td>
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<td>8264</td>
<td>7678</td>
<td>6608</td>
<td>7442</td>
<td>88358</td>
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<tr>
<td><strong>Substance Use</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Current alcohol use</td>
<td>6023</td>
<td>7902</td>
<td>5236</td>
<td>7849</td>
<td>7552</td>
<td>6680</td>
<td>7096</td>
<td>6916</td>
<td>6425</td>
<td>7531</td>
<td>7032</td>
<td>6012</td>
<td>7069</td>
<td>89323</td>
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<tr>
<td>Current marijuana use</td>
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<td>8151</td>
<td>5424</td>
<td>8101</td>
<td>7730</td>
<td>6882</td>
<td>7391</td>
<td>7106</td>
<td>6886</td>
<td>8166</td>
<td>7534</td>
<td>6526</td>
<td>7619</td>
<td>93784</td>
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<tr>
<td>Ever used cocaine</td>
<td>6232</td>
<td>8180</td>
<td>5458</td>
<td>8128</td>
<td>7802</td>
<td>6917</td>
<td>7386</td>
<td>7153</td>
<td>6946</td>
<td>8214</td>
<td>7606</td>
<td>6586</td>
<td>7680</td>
<td>94288</td>
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<tr>
<td>Ever used methamphetamine</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>7811</td>
<td>6933</td>
<td>7517</td>
<td>7160</td>
<td>6954</td>
<td>8244</td>
<td>7483</td>
<td>6542</td>
<td>7402</td>
<td>66046</td>
</tr>
<tr>
<td>Ever injected drugs</td>
<td>-</td>
<td>-</td>
<td>5477</td>
<td>8164</td>
<td>7809</td>
<td>6928</td>
<td>7468</td>
<td>7160</td>
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<td>8157</td>
<td>6994</td>
<td>6544</td>
<td>7362</td>
<td>79015</td>
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<tr>
<td><strong>Sexual Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse</td>
<td>6024</td>
<td>8119</td>
<td>5309</td>
<td>8028</td>
<td>7479</td>
<td>6706</td>
<td>6642</td>
<td>6458</td>
<td>6637</td>
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<td>7263</td>
<td>6394</td>
<td>7070</td>
<td>89822</td>
</tr>
<tr>
<td>Had sex before the age of 13</td>
<td>6017</td>
<td>8117</td>
<td>5307</td>
<td>8019</td>
<td>7461</td>
<td>6709</td>
<td>6645</td>
<td>6460</td>
<td>6628</td>
<td>7689</td>
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<td>6403</td>
<td>7040</td>
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*Hyphen indicates questions that were not asked in all those years.*
### Table 14. High Risk Health Questions Included in each Survey Year and the Number of Participants who Endorsed the High Risk Health Question in each Survey Year among Male High School Students: 1991 to 2015 (N = 93,138)*.

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<td>Slept&lt;8 hours per night</td>
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<td>Feelings of sadness or hopelessness in past two weeks or more</td>
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<td>5306</td>
<td>8010</td>
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<td>Fights resulting in injury</td>
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<tr>
<td>Lack of seatbelt use</td>
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<td>Academic Performance in school</td>
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</table>

*Hyphen indicates questions that were not asked in all those years.*

<table>
<thead>
<tr>
<th>Behavior by Time Interaction</th>
<th>Moderate Risk</th>
<th>High Risk</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio b</td>
<td>95% CI</td>
<td>Odds Ratio b</td>
</tr>
<tr>
<td>Community Related Violence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon</td>
<td>1.01</td>
<td>(1.00, 1.03)</td>
<td>1.01</td>
</tr>
<tr>
<td>In a physical fight</td>
<td>1.00</td>
<td>(0.99, 1.01)</td>
<td>1.02</td>
</tr>
<tr>
<td>Bullied electronically</td>
<td>0.94</td>
<td>(0.87, 1.02)</td>
<td>1.03</td>
</tr>
<tr>
<td>Hit by boyfriend/girlfriend</td>
<td>0.94</td>
<td>(0.74, 1.19)</td>
<td>1.00</td>
</tr>
<tr>
<td>Forced to have sex</td>
<td>1.00</td>
<td>(0.98, 1.03)</td>
<td>1.01</td>
</tr>
<tr>
<td>School Related Violence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon on school property</td>
<td>1.01</td>
<td>(0.99, 1.04)</td>
<td>1.02</td>
</tr>
<tr>
<td>In a physical fight on school property</td>
<td>1.01</td>
<td>(0.99, 1.02)</td>
<td>1.01</td>
</tr>
<tr>
<td>Bullied at school</td>
<td>1.03</td>
<td>(0.98, 1.08)</td>
<td>1.06</td>
</tr>
<tr>
<td>Missed school because they felt unsafe</td>
<td>1.02</td>
<td>(1.00, 1.04)</td>
<td>1.03</td>
</tr>
<tr>
<td>Threatened at school</td>
<td>1.00</td>
<td>(0.97, 1.02)</td>
<td>1.01</td>
</tr>
<tr>
<td>Substance Use</td>
<td></td>
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</tr>
<tr>
<td>Current alcohol use</td>
<td>0.99</td>
<td>(0.98, 1.00)</td>
<td>1.00</td>
</tr>
<tr>
<td>Current marijuana use</td>
<td>1.00</td>
<td>(0.99, 1.01)</td>
<td>1.01</td>
</tr>
<tr>
<td>Ever used cocaine</td>
<td>0.99</td>
<td>(0.97, 1.01)</td>
<td>0.99</td>
</tr>
<tr>
<td>Ever used methamphetamine</td>
<td>1.01</td>
<td>(0.97, 1.05)</td>
<td>1.01</td>
</tr>
<tr>
<td>Ever injected drugs</td>
<td>0.99</td>
<td>(0.93, 1.06)</td>
<td>0.99</td>
</tr>
<tr>
<td>Sexual Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse</td>
<td>1.00</td>
<td>(0.99, 1.01)</td>
<td>1.00</td>
</tr>
<tr>
<td>Had sex before the age of 13</td>
<td>1.01</td>
<td>(0.99, 1.03)</td>
<td>1.01</td>
</tr>
<tr>
<td>Four or more sex partners</td>
<td>1.01</td>
<td>(1.00, 1.02)</td>
<td>1.00</td>
</tr>
<tr>
<td>Currently sexually active</td>
<td>1.00</td>
<td>(0.99, 1.01)</td>
<td>1.00</td>
</tr>
<tr>
<td>No condom use at last sex</td>
<td>1.02</td>
<td>(1.00, 1.03)</td>
<td>1.02</td>
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<tr>
<td>Weight Related Issues</td>
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<tr>
<td>Obese (BMI &gt;=95th percentile)</td>
<td>1.01</td>
<td>(0.99, 1.04)</td>
<td>0.99</td>
</tr>
<tr>
<td>Self-perception of being overweight</td>
<td>1.00</td>
<td>(1.00, 1.01)</td>
<td>1.02</td>
</tr>
<tr>
<td>Weight loss</td>
<td>1.00</td>
<td>(0.99, 1.00)</td>
<td>1.01</td>
</tr>
<tr>
<td>Physical/Sedentary Activities</td>
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<td></td>
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<tr>
<td>Not physically active for more than 60 minutes daily</td>
<td>0.98</td>
<td>(0.90, 1.08)</td>
<td>1.02</td>
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<tr>
<td>Did not play on a sports team</td>
<td>1.01</td>
<td>(0.99, 1.02)</td>
<td>1.02</td>
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<tr>
<td>Watched TV for &gt;= 3 hours a day</td>
<td>0.99</td>
<td>(0.97, 1.01)</td>
<td>1.01</td>
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<tr>
<td>Personal Characteristics</td>
<td>1.01</td>
<td>(0.99, 1.04)</td>
<td>1.01</td>
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<tr>
<td>------------------------------------------------------------------------------------------</td>
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<tr>
<td>Slept&lt;8 hours per night^c</td>
<td>0.98</td>
<td>(0.95, 1.02)</td>
<td>0.96</td>
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<tr>
<td>Feelings of sadness or hopelessness in past two weeks or more</td>
<td><strong>1.04</strong></td>
<td>(1.02, 1.05)</td>
<td><strong>1.05</strong></td>
</tr>
<tr>
<td>Driving while intoxicated</td>
<td>1.20</td>
<td>(0.80, 1.50)</td>
<td>0.79</td>
</tr>
<tr>
<td>Fights resulting in injury</td>
<td><strong>1.02</strong></td>
<td>(1.00, 1.04)</td>
<td><strong>1.02</strong></td>
</tr>
<tr>
<td>Lack of seatbelt use</td>
<td>1.00</td>
<td>(0.99, 1.02)</td>
<td>1.02</td>
</tr>
<tr>
<td>Substance use before the last sexual activity</td>
<td>1.01</td>
<td>(0.99, 1.03)</td>
<td>1.01</td>
</tr>
<tr>
<td>Academic Performance in school</td>
<td>0.99</td>
<td>(0.97, 1.01)</td>
<td>0.96</td>
</tr>
</tbody>
</table>

BMI = body mass index; CI = Confidence Interval
^a Low Risk as reference category.
^b Models adjusted for age, grade and race/ethnicity.
^c Reverse coded.

<table>
<thead>
<tr>
<th>Behavior by Time Interaction</th>
<th>Moderate Risk&lt;sup&gt;a&lt;/sup&gt;</th>
<th>High Risk&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio&lt;sup&gt;b&lt;/sup&gt;</td>
<td>95% CI</td>
</tr>
<tr>
<td><strong>Community Related Violence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon</td>
<td>1.00 (0.98, 1.01)</td>
<td>0.99 (0.97, 1.00)</td>
</tr>
<tr>
<td>In a physical fight</td>
<td>1.01 (1.00, 1.02)</td>
<td>1.00 (0.98, 1.02)</td>
</tr>
<tr>
<td>Bullied electronically</td>
<td>0.99 (0.85, 1.15)</td>
<td>1.06 (0.95, 1.18)</td>
</tr>
<tr>
<td>Hit by boyfriend/girlfriend</td>
<td>1.00 (0.75, 1.34)</td>
<td>1.07 (0.75, 1.53)</td>
</tr>
<tr>
<td>Forced to have sex</td>
<td>1.01 (0.96, 1.05)</td>
<td>1.04 (1.00, 1.07)</td>
</tr>
<tr>
<td><strong>School Related Violence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carried a weapon on school property</td>
<td>0.99 (0.98, 1.01)</td>
<td>1.02 (1.00, 1.04)</td>
</tr>
<tr>
<td>In a physical fight on school property</td>
<td><strong>1.01 (1.00, 1.03)</strong></td>
<td><strong>1.02 (1.00, 1.03)</strong></td>
</tr>
<tr>
<td>Bullied at school</td>
<td>1.04 (0.98, 1.09)</td>
<td>1.02 (0.93, 1.12)</td>
</tr>
<tr>
<td>Missed school because they felt unsafe</td>
<td>0.99 (0.96, 1.01)</td>
<td>1.00 (0.97, 1.02)</td>
</tr>
<tr>
<td>Threatened at school</td>
<td>1.00 (0.98, 1.01)</td>
<td>1.01 (0.99, 1.03)</td>
</tr>
<tr>
<td><strong>Substance Use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current alcohol use</td>
<td>1.00 (0.99, 1.01)</td>
<td>1.02 (1.01, 1.04)</td>
</tr>
<tr>
<td>Current marijuana use</td>
<td>1.00 (0.99, 1.01)</td>
<td>1.00 (0.99, 1.02)</td>
</tr>
<tr>
<td>Ever used cocaine</td>
<td>0.99 (0.98, 1.01)</td>
<td>1.01 (0.99, 1.03)</td>
</tr>
<tr>
<td>Ever used methamphetamine</td>
<td>0.96 (0.93, 0.99)</td>
<td>1.04 (1.01, 1.07)</td>
</tr>
<tr>
<td>Ever injected drugs</td>
<td>0.99 (0.96, 1.02)</td>
<td>1.02 (0.99, 1.05)</td>
</tr>
<tr>
<td><strong>Sexual Health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever had sexual intercourse</td>
<td>0.99 (0.98, 1.00)</td>
<td>0.99 (0.98, 1.01)</td>
</tr>
<tr>
<td>Had sex before the age of 13</td>
<td><strong>1.02 (1.00, 1.03)</strong></td>
<td><strong>1.00 (1.00, 1.03)</strong></td>
</tr>
<tr>
<td>Four or more sex partners</td>
<td>0.99 (0.98, 1.00)</td>
<td>1.00 (0.99, 1.02)</td>
</tr>
<tr>
<td>Currently sexually active</td>
<td>0.99 (0.98, 1.00)</td>
<td>1.00 (0.99, 1.02)</td>
</tr>
<tr>
<td>No condom use at last sex</td>
<td>1.00 (0.99, 1.02)</td>
<td>1.03 (1.01, 1.05)</td>
</tr>
<tr>
<td><strong>Weight Related Issues</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obese (BMI &gt;=95&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
<td>1.01 (0.99, 1.04)</td>
<td>1.01 (0.98, 1.04)</td>
</tr>
<tr>
<td>Self-perception of being overweight</td>
<td>1.01 (1.00, 1.02)</td>
<td>1.00 (0.98, 1.01)</td>
</tr>
<tr>
<td>Weight loss</td>
<td>1.01 (1.00, 1.02)</td>
<td>1.00 (0.99, 1.02)</td>
</tr>
<tr>
<td><strong>Physical/Sedentary Activities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not physically active for more than 60 minutes daily</td>
<td>1.04 (0.93, 1.16)</td>
<td>1.15 (1.01, 1.31)</td>
</tr>
<tr>
<td>Did not play on a sports team</td>
<td>1.03 (1.01, 1.04)</td>
<td>0.98 (0.96, 1.01)</td>
</tr>
<tr>
<td>Watched TV for &gt;= 3 hours a day</td>
<td>0.99 (0.97, 1.01)</td>
<td>1.00 (0.98, 1.03)</td>
</tr>
<tr>
<td>Personal Characteristics</td>
<td>Odds Ratio</td>
<td>95% CI</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Computer/video games for &gt;=3 hours a day</td>
<td>1.01</td>
<td>(0.99, 1.04)</td>
</tr>
<tr>
<td>Slept&lt;8 hours per night</td>
<td>1.03</td>
<td>(0.98, 1.08)</td>
</tr>
<tr>
<td>Feelings of sadness or hopelessness in past two weeks or more</td>
<td>1.02</td>
<td>(1.00, 1.04)</td>
</tr>
<tr>
<td>Driving while intoxicated</td>
<td>1.26</td>
<td>(1.02, 1.57)</td>
</tr>
<tr>
<td>Fights resulting in injury</td>
<td>1.01</td>
<td>(0.99, 1.02)</td>
</tr>
<tr>
<td>Lack of seatbelt use</td>
<td>1.00</td>
<td>(0.98, 1.01)</td>
</tr>
<tr>
<td>Substance use before the last sexual activity</td>
<td>0.98</td>
<td>(0.96, 1.00)</td>
</tr>
<tr>
<td>Academic Performance at school</td>
<td>0.99</td>
<td>(0.97, 1.01)</td>
</tr>
</tbody>
</table>

BMI = body mass index; CI = Confidence Interval

a Low Risk as reference category.
b Models adjusted for age, grade and race/ethnicity.
c Reverse coded
Table 17. Multivariable Logistic Modeling with Interaction of Covariate by Time Results Displayed for Variables found to be Statistically Significant in Previous Modeling Steps, Females: 1991 to 2015 (N=95,129).

<table>
<thead>
<tr>
<th>Behavior by Time Interaction among Female Students</th>
<th>Moderate Risk$^a$</th>
<th>95% CI</th>
<th>High Risk$^a$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrying Weapon in the community</td>
<td>1.02</td>
<td>(0.98, 1.06)</td>
<td>0.98</td>
<td>(0.94, 1.01)</td>
</tr>
<tr>
<td>Missed school because they felt unsafe</td>
<td>1.00</td>
<td>(0.96, 1.05)</td>
<td>1.02</td>
<td>(0.98, 1.06)</td>
</tr>
<tr>
<td>No condom use at last sex$^c$</td>
<td>1.02</td>
<td>(0.99, 1.05)</td>
<td>1.02</td>
<td>(0.99, 1.05)</td>
</tr>
<tr>
<td>Self-perception of being overweight</td>
<td>1.01</td>
<td>(0.99, 1.03)</td>
<td>0.99</td>
<td>(0.97, 1.02)</td>
</tr>
<tr>
<td>Feeling of hopelessness or sadness</td>
<td>1.02</td>
<td>(0.99, 1.05)</td>
<td>1.03</td>
<td>(1.00, 1.06)</td>
</tr>
<tr>
<td>Fights resulting in injury</td>
<td>1.04</td>
<td>(0.98, 1.10)</td>
<td>1.01</td>
<td>(0.96, 1.06)</td>
</tr>
</tbody>
</table>

CI = Confidence Interval

$^a$ Low Risk as reference category.

$^b$ Models adjusted for age, grade and race/ethnicity.

$^c$ Reverse coded.
Table 18. Multivariable Logistic Modeling with Interaction of Covariate by Time Results Displayed for Variables found to be Statistically Significant in Previous Modeling Steps, Males: 1991 to 2015 (N=95,129).

<table>
<thead>
<tr>
<th>Behavior by Time Interaction among Male students</th>
<th>Moderate Risk(a)</th>
<th>High Risk(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio(b)</td>
<td>95% CI</td>
</tr>
<tr>
<td>Involved in physical fight on the school property</td>
<td>1.00 (0.97, 1.02)</td>
<td>0.99 (0.96, 1.03)</td>
</tr>
<tr>
<td>Had sex before the age of 13</td>
<td>1.00 (0.96, 1.03)</td>
<td>0.98 (0.94, 1.02)</td>
</tr>
<tr>
<td>Feelings of Hopelessness or sadness</td>
<td>1.02 (1.00, 1.04)</td>
<td>1.04 (1.00, 1.08)</td>
</tr>
</tbody>
</table>

CI = Confidence Interval.
\(a\) Low Risk as reference category.
\(b\) Models adjusted for age, grade and race/ethnicity.
Figure 1. Suicide Risk by Sex and Year: 1991 to 2015 (N = 188,898).

a.

Suicide Risk among Female High School Students by Year, 1991 to 2015

Suicide Risk in Percent

Survey Year

1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015

Low Risk Moderate Risk High Risk

b.

Suicide Risk among Male High School Students by Year, 1991 to 2015

Suicide Risk by Percent

Survey Year

1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015

Low Risk Moderate Risk High Risk
Figure 2. Suicide Risk by Race: 1991 to 2015 (N = 188,898).

a. Suicide Risk among White High School Students by Year, 1991 to 2015

b. Suicide Risk among Black High School Students by Year, 1991 to 2015
c. Suicide Risk among Hispanic/Latino High School Students by Year, 1991 to 2015

- Low Risk
- Moderate Risk
- High Risk

Suicide Risk in Percent

Survey Year

1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015

d. Suicide Risk among High School Students belonging to Other Race by Year, 1991 to 2015

- Low Risk
- Moderate Risk
- High Risk

Suicide Risk in Percent

Survey Year

1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015
Figure 3. Suicide Risk for Female Participants with Significantly Associated Risk Factors from Bivariate Analysis: 1991 to 2015 (N = 95,129)\textsuperscript{a}.

\textbf{a.}

Suicide Risk for Female Participants Endorsing 'Yes' for Carrying Weapon in the Community, 1991 to 2015

\textbf{b.}

Suicide Risk for Female Participants Endorsing 'No' for Carrying Weapon in the Community, 1991 to 2015

\textsuperscript{a} Weighted percentages
c. Suicide Risk for Female Participants Endorsing 'Yes' for Unable to Attend School due to Safety Concern, 1993 to 2015

Suicide Risk by Percent

Survey Year

1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015

Low Risk    Moderate Risk    High Risk

d. Suicide Risk for Female Participants Endorsing 'No' for Unable to Attend School due to Safety Concern, 1993 to 2015

Suicide Risk by Percent

Survey Year

1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015

Low Risk    Moderate Risk    High Risk
Suicide Risk for Female Participants Endorsing 'Yes' for Partner Using Condom in the Last Sexual Intercourse, 1991 to 2015

Suicide Risk for Female Participants Endorsing 'No' for the Partner Using Condom during Last Sexual Intercourse, 1991 to 2015
Suicide Risk for Female Participants Endorsing 'Yes' for Perception of Being Overweight, 1991 to 2015

Suicidal Risk for Female Participants Endorsing 'No' for Perception of Being Overweight, 1991 to 2015
Suicide Risk for Female Participants Endorsing 'Yes' for Hopelessness, 1999 to 2015

Suicide Risk for Female Participants Endorsing 'No' for Hopelessness, 1999 to 2015
k. Suicide Risk for Female Participants Endorsing 'Yes' for Fights Resulting in Injury, 1991 to 2015

l. Suicide Risk for Female Participants Endorsing 'No' for Fights Resulting in Injury, 1991 to 2015
Figure 4. Suicide Risk among Male Participants with on Significantly Associated Risk Factors from Bivariate Analysis: 1991 to 2015 (N = 93,138)\textsuperscript{a}.

\textbf{a.}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure4a.png}
\caption{Suicide Risk for Male Participants Endorsing 'Yes' for Involving in Physical Fights in School, 1993 to 2015}
\end{figure}

\textsuperscript{a} Weighted percentage.

\textbf{b.}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure4b.png}
\caption{Suicide Risk for Male Participants Endorsing 'No' for Involving in Physical Fights in School, 1993 to 2015}
\end{figure}
Suicide Risk for Male Participants Endorsing 'Yes' for Involving in Sexual Activity before the Age of 13, 1991 to 2015

Suicide Risk for Male Participants Endorsing 'No' for Involving in Sexual Activity before the Age of 13, 1991 to 2015
e. Suicide Risk for Male Participants Endorsing 'Yes' for Hopelessness, 1999 to 2015

f. Suicide Risk for Male Participants Endorsing 'No' for Hopelessness, 1999 to 2015