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Minority Adolescent Health: A Factor Analytic Approach towards Conceptualizing Health Behaviors and Resilience Constructs from the New Mexico Youth Risk Resiliency Survey

Jeremiah Simmons

Jeremiah D. Simmons
Candidate

Psychology
Department

This thesis is approved, and it is acceptable in quality and form for publication:

Approved by the Thesis Committee:

Jane Ellen Smith, PhD, Chairperson

Sarah Erickson, PhD

Teddy Warner, PhD

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By

Jeremiah D. Simmons

B.A., Human Biology, Stanford University, 2006

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JEREMIAH D. SIMMONS

B.A., Human Biology, Stanford University, 2006
M.S., Psychology, University of New Mexico, 2016

ABSTRACT

Current researchers in the adolescent health field are beginning to argue that the descriptive knowledge base of adolescent health lacks a strong conceptual base and may be inadequate to sufficiently inform a comprehensive assessment of adolescent health behaviors. This study aimed to build upon the conceptual base by integrating a descriptive epidemiologic study (2013 New Mexico Youth Risk Resilience Survey) with psychological theory and factor analytic methodologies to better understand the relationship between health behaviors and resilience factors. This study replicated a previously identified four-factor health behavior structure and an expanded six-factor health behavior structure across a racially/ethnically diverse sample. All substance use factors were highly correlated with sexual activity and physical activity risk being correlated with eating behavior risk. This study also confirmed a unidimensional resilience factor structure that positively correlated with all six behaviors, with resilience risk being mostly highly correlated with physical activity risk. Measurement invariance was achieved between males and females only on alcohol use, sexual activity, physical activity, and resilience. The results have significant

implications for targeting multiple behaviors through prevention and intervention initiatives. An important strength of this study is the inclusion of a large and ethnically diverse sample. The results of this study aim to influence the creation of interventions that move beyond targeting individual or isolated risk behaviors and towards interventions that target sets of behaviors that are specific to youth in New Mexico.

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Introduction

In the United States the transition into adulthood has changed in recent decades as many of the traditional milestones that mark adulthood, such as household establishment and marriage, have been altered or delayed (Arnett, 2000; McLanahan, Haskins, Paxson & Sawhill, 2010). According to the U.S. Census Bureau, there were 74.1 million children in the United States in 2010, which was 1.7 million more than in 2000. This number is projected to increase to 80.3 million in 2030. In 2012, there were approximately 25.1 million adolescents in the 12-17 year old age group, with an additional 24.5 million pre-adolescents about to enter into this later adolescent stage (Federal Interagency Forum on Child and Family Statistics, 2013). Understanding the changing demographic characteristics of today's young people is critical for shaping social programs and policies. In this regard, it is vital for professionals to recognize that today's youth are becoming increasingly racially and ethnically diverse. By 2050, 36% of U.S. children are projected to be Hispanic (up from 24% in 2012) and 36% are projected to be White, non-Hispanic (down from 53% in 2012) (Federal Interagency Forum on Child and Family Statistics, 2013). Importantly, the behavioral patterns established during these developmental periods help determine all young people's later health status and their risk for developing chronic diseases in adulthood (Lawrence, Gootman, & Sim, 2009).

As adolescents become increasingly independent, they assume more responsibility for health-related behaviors, such as diet and exercise. Many adolescents initiate adult behavior in areas such as driving, substance use, and sexuality. These behaviors have significant implications for health both in the short and long term. Furthermore, the leading causes of illness and death among adolescents and young adults are largely preventable (Mulye et al.,

2009). Thus, this developmental period for young people presents an opportunity to promote a lifetime of health. Influences at the individual, family, school, community, and policy levels interact to shape the health and well-being of adolescents.

A separate consideration is the financial burden of preventable health problems in adolescence, which includes the long-term costs of chronic diseases that result from behaviors begun during adolescence. One example is the annual adult health-related financial burden of cigarette smoking, which usually starts by age 18 (Schoenborn, Vickerie & Barnes, 2003; Substance Abuse and Mental Health Services Administration; SAMHSA, Office of Applied Studies, 2008), is $193 billion (Adhikari, Kahende, Malarcher, Pechacek, & Tong, 2009).

Cultural Variations of Adolescence

The vast majority of studies of adolescent development reported in the scientific literature have focused primarily on White middle-class youth (Lerner & Galambos, 1998; Ohye & Daniel, 1999). Consequently, research on most areas of normal adolescent development for minority youth is still lacking, and caution should be used in generalizing findings from the extant literature to all adolescents. Cross-cultural researchers Chen and Farruggia (2002) stated, "until the 1950s, less than 5% of research on adolescence included cultural or cross-cultural elements." The adolescent population is becoming more ethnically diverse, with rapid increases in the numbers of Hispanic and Asian American youth. The growing ethnic diversity will require cultural responsiveness to health care needs and sharpened attention to disparate health and academic outcomes. One noteworthy consideration is that many of these outcomes are correlated with poverty, especially among

adolescents from minority racial and ethnic groups (Brindis, Millstein, Knopf & Irwin, 1998).

Another important consideration when examining adolescent health across cultures is the varying degrees of *independence* allowed by adults and expected by adolescents (Schlegel & Barry, 1991). Due to cultural values placed on individualism by the majority cultures of the West, it is taken for granted by these adolescents and their parents (as well as by most Western social scientists) that children should become independent from their parents during the course of adolescence (Arnett, 2000). This belief is supported by the social and political construction of a prolonged educational period, in which the majority of adolescents' time is spent with peers in classrooms. In turn, this arrangement separates adolescents from their families and allows for the creation of peer groups and youth culture. In contrast, for some collectivist communities and societies that have had Western beliefs and practices imposed upon them, adolescents from these communities (i.e., Native American, Mexican) may find themselves experiencing a conflict between the demands of Western standards and those of their home communities (where more time spent on educational attainment means less time to assist the family with chores and contribute financially to the household). Historically, adolescents from collectivist cultures were socialized into society by adults and moved from childhood to adulthood without the prolonged adolescent period that is currently observed in Western societies.

In brief, culture can have a powerful influence on adolescent development. Moreover, the different components of culture often interact with one another. For example, cultural values and societal systems may impact an individual adolescent's development through the mediating effects of proximal social contexts, such as family and peers. These same values

and systems may also moderate the association between social and environmental factors and adolescent outcomes (Chen & Farruggia, 2002).

Why Study Adolescent Health Behavior

While the health and well-being of all age groups is important, the developmental nature of adolescence leads to special considerations and needs for this population (Kipke, 1999; Millstein, Petersen, & Nightingale, 1994). According to the National Center on Addiction and Substance Abuse (2011), nine out of 10 Americans who meet the medical criteria for addiction started at least one of these problem behaviors before age 18. All of the ways in which adolescents develop: cognitively, physically, socially, and emotionally, prepare them to experiment with new behaviors as they transition from childhood to adulthood (APA, 2002). Risk taking in adolescence is an important way for adolescents to shape their identities, test decision-making skills, and develop realistic assessments of themselves, other people, and the world (DiClemente, Hansen, & Ponton, 1996). However, when adolescents overestimate or underestimate their capacity to handle novel situations, their behaviors can have adverse short-term and long-term health consequences.

For the purpose of the current study, the following five health behaviors and resilience factors were examined, as they have been the focus of recent empirical investigation: alcohol and illicit substance use (i.e., marijuana, heroin, cocaine, and methamphetamines), tobacco use, sexual activity, eating behaviors, physical activity, and resilience factors (individual, peer, family, school, and community). Additionally, with the exception of resilience factors, the behaviors under study are also a priority focus of the Centers for Disease Control and Prevention (CDC). These priority adolescent health-risk behaviors contribute to the leading causes of death and disability among adults and youth.

Substance Use and Negative Consequences

Adolescent substance use (smoking, drinking, misusing prescription drugs, and using illegal drugs) is by any measure a public health problem of epidemic proportion. It presents a clear and present danger to millions of America's youth and severe and expensive long-range consequences for our entire population. The National Institute on Drug Abuse (NIDA) has continuously monitored trends of substance use among adolescents by providing funding to the Monitoring the Future (MTF) Project since 1975. The 2013 MTF survey encompassed about 41,700 8th-, 10th-, and 12th-grade students in 389 secondary schools nationwide. In reviewing the previous five years, the 2013 MTF data revealed several current predominant issues regarding adolescent substance use which are of significance to the current study (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2014):

- Alcohol: Alcoholic beverages remain the substance most widely used by today's adolescents, despite the 5-year trends which show significant decreases in alcohol use among all grades and across nearly all prevalence periods.
- Cigarettes: There were significant 5-year drops in lifetime, current (past-month), and daily cigarette use among all grades.
- Marijuana: Five-year trends show significant increases in past-year and past-month marijuana use across all three grades, as well as increases in lifetime and daily marijuana use among 10th graders. These increases continue to parallel softening attitudes about the perceived risk of harm and disapproval associated with marijuana use (Johnston et al., 2014).

- Illicit drugs: Between 2001 and 2007 all three grades showed declines in illicit drug use, but the annual use rates in all three grades were higher in 2013 (including a significant increase for 8th graders).

The above trends in substance use will be discussed in further detail below. Two apparent facts are worth highlighting: (1) There is a clear developmental gradient to substance use onset across adolescence, and (2) the large majority of current U.S. youth avoid substance use, and even by 12th grade, most have not tried cigarettes or an illicit drug other than marijuana (Johnston et al., 2014).

Part of the framework for this discussion is that adolescent substance use can occur in isolation or within a social context and that a substance use episode can include using more than one substance in one setting. Understanding patterns and onset of substance use among young people is of significant public health relevance. Clearer descriptions of prevalence patterns within particular contexts and populations are imperative for effective, targeted prevention and/or delayed substance use onset. When the above trends are framed within a health disparities perspective, it is necessary to examine substance use involvement across ethnicity, as various ethnic groups are disproportionately impacted.

Adolescent Alcohol Use and Risk Correlates

Patterns of use and prevalence. Multiple nationally representative surveys indicate that alcohol is the drug of choice among U.S. adolescents of all ages (Masten, Faden, Zucker, & Spear, 2008). Although some young people begin drinking in elementary school, the first use of alcohol (defined as drinking a whole drink) typically occurs in early adolescence at approximately 13-14 years of age (Faden, 2006). According to data from the 2012 National Survey on Drug Use and Health (NSDUH), the rate of current alcohol *use* among youths

aged 12-17 is 12.9%, the rate of youth *binge drinking* is 7.2%, and the rate of alcohol *dependence or abuse* is 3.4%. Alcohol abuse and dependence, as defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV-TR) (American Psychiatric Association, 2000), typically emerges during late adolescence or early adulthood (Grant et al., 2006)

When looking across gender in this 12-17 year age group, one sees that the percentage of males who were current drinkers (12.6%) was similar to the rate for females (13.2%); however, underage males were more likely than underage females to report binge drinking (16.5 vs. 14.0%). An examination by race/ethnicity in 2012 showed that Asian Americans had the lowest rates of current alcohol use (4.9%). The highest rates were for non-Hispanic Whites (14.6%), followed by Hispanics (12.8%), individuals reporting two or more races (11.7%), American Indians or Alaska Natives (10.0%), and African Americans (9.3%).

Alcohol use risk correlates. Adolescent alcohol use is associated with the increased risk of academic failure, illicit drug use, and tobacco use. It can cause a range of physical consequences, from hangovers to death from alcohol poisoning, suicide, homicide, and traffic crashes. Annually about 4,700 people under age 21 die from injuries involving underage drinking (Centers for Disease Control, 2013).

The landmark research of Jessor (1991) showed that adolescent alcohol use and abuse usually does not occur in isolation, but instead occurs with other adolescent problem behaviors, including tobacco and illicit drug use, early sexual activity, antisocial behavior, and poor academic achievement and progress. Additionally, adolescent alcohol use is associated with high-risk sexual behavior (e.g., having multiple sexual partners, failing to use condoms, or having unplanned sex). The negative consequences of high-risk sexual behavior

are common in this age group, particularly unwanted pregnancy and sexually transmitted diseases such as HIV/AIDS (NIAAA, 2013).

Adolescent Tobacco Use and Risk Correlates

Patterns of use and prevalence. Cigarette smoking among youths aged 12-17 in 2012 was reported by 6.8% of the males and 6.3% of the females (SAMHSA, 2013). The percentages were somewhat higher among non-Hispanic Whites than African Americans (SAMHSA, 2013). Among youths aged 12-17 who smoked cigarettes in the past month, more than half also used an illicit drug and drank alcohol. This association also was found for binge drinking (SAMHSA, 2013).

Tobacco products used by adolescents included cigarettes (both store-bought and hand-rolled), cigars, pipes, hookahs, smokeless tobacco, and newer oral products such as pouches, lozenges, strips, and sticks. All of these products deliver tobacco's toxic effects. Interestingly, hookah use has been increasing among adolescents, despite the fact that hookahs are no safer than other forms of tobacco smoking and may deliver even higher levels of toxic substances (Cobb, Ward, Maziak, Shihadeh, & Eissenberg, 2010).

Tobacco use risk correlates. Numerous factors influence adolescents' decisions to start smoking or to use other tobacco products. These factors include certain individual characteristics, such as poor coping ability and low self-esteem, but also social characteristics, such as smoking by parents (Gilman et al., 2009), siblings, and friends (O'Loughlin, Karp, Koulis, Paradis, & DiFranza, 2009). Exposure and susceptibility to tobacco advertising can also affect smoking initiation among adolescents (Hanewinkel, Isensee, Sargent, & Morgenstern, 2011).

In addition to the well-known health impacts from tobacco use, adolescent tobacco use typically precedes other substance abuse, including drinking alcohol, smoking marijuana, and using hard drugs (U.S. Department of Health and Human Services, 2012). Adolescent smokers tend to engage in other unhealthy behaviors, such as fighting and having multiple sexual partners (Escobedo, Reddy, & DuRant, 1997).

Adolescent Illicit Drug Use and Risk Correlates

Initiation and prevalence rates of illicit drug use. Data from the 2012 NSDUH revealed that about 2.9 million persons aged 12 or older used an illicit drug for the first time within the past 12 months; this averages to about 7,900 new users per day. Over half of initiates (55.1%) were younger than age 18 when they first used, and 53.7% of new users were female (SAMHSA, 2013). Of the first-time illicit drug users aged 12 or older, a majority reported that the drug was marijuana (65.6%). The remaining first-time illicit drugs used, from highest to lowest frequency, were nonmedical use of pain relievers, nonmedical use of tranquilizers, Ecstasy, stimulants, cocaine, and inhalants (SAMHSA, 2013).

Marijuana use. Among all youths aged 12-17 in 2012 an estimated 5.0% had used marijuana for the first time within the past year (SAMHSA, 2013). According to the Monitoring the Future (2013) report, 18.0% of 10th graders and 22.7% of 12th graders used marijuana in the past month. Daily use has increased, with 6.5% of 12th graders now using marijuana every day (Johnston et al., 2014). Interestingly, of the 12th graders who had used marijuana in the prior 12 months *and* who reside in states that passed medical marijuana laws by the end of the year prior to the survey, 34% said that one of their sources of marijuana was another person's medical marijuana prescription, and 6% said they got the marijuana through

their own prescription. It thus appears that state medical marijuana laws provide an additional avenue of accessibility to the drug for teens (Johnston et al., 2014).

Marijuana use risk correlates. Problematic behaviors associated with early marijuana use include higher frequencies of leaving the family home prematurely and immature sexual activity that can result in unplanned pregnancy (Bryan, Schmiege, & Magnan, 2012). Other problematic behaviors include an increased risk of driving while under the influence of marijuana, which doubles the risk of an accident (Asbridge, Hayden, & Cartwright, 2012), and higher levels of criminal behavior (e.g., motor vehicle theft and breaking-and-entering offenses). In later adulthood long-term heavy marijuana users generally report lower life satisfaction, poorer mental and physical health, more relationship problems, and less academic and career success compared to non-marijuana-using peers. Several studies also associate workers' marijuana smoking with increased absences, tardiness, accidents, workers' compensation claims, and job turnover (NIDA, 2014). A 2012 study of over 1,000 individuals followed from birth through midlife found that persistent cannabis use was associated with neuropsychological decline across numerous domains, including cognitive and memory problems and declining IQ. Further, cessation of marijuana use did *not* fully restore neuropsychological functioning among adolescent-onset cannabis users (Meier et al., 2012).

Non-Substance Use Related Health Behavior Domains and Risk Correlates

Peer relationships. Understanding adolescent risk behavior is more useful when framed within a peer relationship context. Although some adolescents use substances simultaneously with other negative health behaviors on an individual basis, more adolescents tend to engage in these multiple behaviors within a social context. The differences between

adolescents and adults in risk-taking behavior are maximized when individuals are in the presence of peers and minimized when they are alone (Gardner & Steinberg, 2005), which suggests that risk-taking may serve a social function in adolescence.

Deviant peer relationships are positively associated with adolescent substance use (Ary, Tildesley, Hops, & Andrews, 1993; Branstetter, Low, & Furman, 2011; Windle, 2000). Interestingly, some researchers found that adolescents who grew up in unstable community environments (defined as lower levels of employment and less access to resources) were actually *less* susceptible to deviant peer influences (Snedker, Herting, & Walton, 2009) if their parents had a nurturant/involved parenting style combined with a collective socialization mentality in their community (Brody et al., 2001).

Regarding alcohol use specifically, adolescent peer influences on risk for use and abuse can follow three paths: (1) Through modeling processes or the encouragement of alcohol use, peer influences can be direct or indirect, (2) Peer influences can be self-sustaining, as affiliation with like-minded friends can encourage behavioral continuity and resistance to change processes, and (3) Adolescents can significantly overestimate the prevalence of their peers' drinking, which indirectly encourages heavy drinking (Shulenberg & Maggs, 2002). Additionally, the process of peer influence can be amplified by the media and popular culture, which generally depict unhealthy and risky behaviors such as drinking, physical aggression, interpersonal conflict, and unprotected sex as glamorous and risk-free (Brown & Witherspoon, 2002).

Adolescent risk: Sexual activity. Initiating sexual activity and learning to navigate sexuality are developmental tasks of adolescence and early adulthood. In the U.S. and Europe, multiple studies have shown that the average age of first sexual intercourse occurs

between 17.5 and 18 years of age (Darroch, Singh, & Frost, 2001), although there are variations by region, ethnicity, and gender (Avery & Lazdane, 2008; Finer & Philbin, 2013). Recent research also suggests that youth who initiate sexual activity early (by age 14 and 11 months) may lack knowledge about or have difficulty obtaining, using, or negotiating contraception, and therefore put themselves at risk for unplanned pregnancy or sexually transmitted infections (STIs) (Finer & Philbin, 2013; Sneed, 2009). Young people (ages 13-29) in the U.S. account for 39% of new HIV infections (CDC, 2011a), and youth account for nearly half of the 18.9 million new cases of STIs each year (Weinstock, Berman, & Cates, 2004) and over 750,000 pregnancies (Kost & Henshaw, 2012). Consistent condom use could prevent many negative consequences, but only 60% of U.S. teens reported using a condom during their last sexual encounter (CDC, 2011b).

Viewing adolescent sexual risk behaviors from an ecological perspective allows for the study of additional non-cognitive factors and both individual and social factors as determinants of risk-taking. For example, when viewed under the Social Personal Framework for HIV-Risk Behavior (Donenberg, 2005), adolescent sexual risk is a function of the interplay of four components of their lives: personal attributes, peer and partner relationships, environmental conditions, and family context. Importantly, a growing body of literature has documented that early sexual initiation co-occurs with other adolescent risk-taking behaviors, such as early drug use and delinquent acts (Shafer & Boyer, 1991; Young, Rhee, Stallings, Corley, & Hewitt, 2006). More specifically, adolescents involved in substance use are more likely to engage in earlier and unsafe sexual behavior (Dunn, et al., 2008; Grossman, Kaestner, & Markowitz, 2004; Guo et al., 2002; Tapert, Aarons, Sedlar, & Brown, 2001) compared to non-using adolescents. The substances decrease behavioral inhibition and

rational decision-making (Bava & Tapert, 2010; Millstein & Moscicki, 1995), which may already be compromised given that the adolescent brain experiences heightened social awareness and immature self-regulation capabilities (Steinberg, 2008).

A survey of 26,023 students in grades 7-12 from a mid-western state showed that sexually active male adolescents reported a moderate-to-high level of alcohol use (Lammers, Ireland, Resnick, & Blum, 2000). Miller, Naimi, Brewer, and Jones (2007) investigated binge drinking and risky behaviors utilizing the Youth Risk and Behavior Survey (YRBS). Findings revealed a significant relationship between the frequency of binge-drinking days among current drinkers and the prevalence of being sexually active, *not* using a condom during the last sexual intercourse, substance use before the last sexual intercourse, and getting someone pregnant.

There is less research examining the relationship between marijuana use and risky sexual behavior. Some studies indicate that higher marijuana use is associated with more risky sexual behavior, nonuse of condoms with casual partners, and having a higher number of sexual partners (Anderson & Stein, 2011; Bellis et al., 2008). However, studies conducted with homeless adolescent populations suggest the lack of a relationship between marijuana use and condom use (MacKellar et al., 2000). Given the conflicting findings regarding marijuana use and risky sexual behavior, and the fact that adolescents are very likely to engage in both behaviors, further research is needed to clarify this relationship.

Physical activity. A recent longitudinal study conducted in the U.S. found that by age 15, 69% of adolescents did not meet the recommended guidelines for physical activity of 60 min/day on weekdays, and 83% did not meet the guidelines on weekends (Nader, Bradley, Houts, McRitchie, & O'Brien, 2008). As participation in physical activity may promote

various aspects of physical fitness and fitness is a stronger predictor of health than physical activity (Rizzo, Ruiz, Hurtig-Wennlöf, Ortega, & Sjöström, 2007; Williams, 2001), there is concern regarding declining youth fitness levels. Data collected between 1958 and 2003 for 6- to 19-year-olds from 27 countries found that aerobic performance had declined substantially since 1970 (Tomkinson & Olds, 2007). The benefits of regular physical activity for adolescents include enhanced physical, psychological, and social well-being (Biddle, Cavill, & Sallis, 1998; Penedo & Dahn, 2005). Social support from friends and family members is associated with higher levels of physical activity (Salvy et al., 2009), perhaps due to injunctive peer norms (Rimal & Real, 2005), support (De La Haye, Robins, Mohr, & Wilson, 2011), modeling (De La Haye et al., 2011), and peer selection and socialization processes (De La Haye et al., 2011; King, Tergerson, & Wilson, 2008).

Within the past ten years, researchers have been investigating how physical activity clusters and correlates with other behavioral factors – both risk and protective. For example, diet, physical activity, and sedentary behavior may combine in complex ways that have a cumulative effect on the development of overweight and obesity (Sanchez et al., 2007). An understanding of which behaviors need to be targeted simultaneously, and in whom obesogenic behaviors cluster together, can be helpful for the development of targeted obesity prevention initiatives.

Eating behaviors. National and population-based surveys have found that adolescents often fail to meet dietary recommendations for overall nutritional status and for specific nutrient intakes (Neumark-Sztainer, Story, Hannan, & Croll, 2002). According to recent estimates, adolescents are receiving a higher proportion of energy from fat and/or added sugar and have lower intakes of vitamin A, folic acid, fiber, iron, calcium, vitamin D,

and zinc than is recommended (Ambrosini et al., 2009; CDC, 2003; Stang, Story, Harnack, & Neumark-Sztainer, 2000). Data from six nationally representative surveys demonstrated that total energy intake among adolescents increased through 2004 then decreased through 2010 (Slining, Mathias, & Popkin, 2013). The seven major contributors across all time points were: sugar-sweetened drinks, pizza, high fat milk, grain-based desserts, breads, pasta dishes, and savory snacks (Slining, Mathias, & Popkin, 2013). Considering that obesity rates have more than quadrupled in adolescents in the past 30 years (Hyattsville, 2012), with more than one third of adolescents being overweight or obese (Ogden, Carroll, Kit, & Flegal, 2014), it is beneficial to understand how eating patterns and behaviors co-occur with other risky or health promoting behaviors.

Eating patterns and behaviors of adolescents are influenced by many factors, including peer relationships, parental modeling, food availability, food preferences, cost, convenience, personal and cultural beliefs, mass media, and body image (Story, Neumark-Sztainer, & French, 2002). A recent study indicated that being overweight or obese status was significantly associated with substance use among female adolescents. Smoking and alcohol consumption were associated with being a younger overweight or obese female, and the same substances were associated with being an older obese (but not overweight) female (Farhat, Iannotti, & Simons-Morton, 2010).

Adolescent Resilience

Resilience research has progressed from focusing on the individual to seeing the adolescent within his/her wider family and community context. In their well-cited longitudinal study of children in Kauai, Hawaii, Werner and Smith (1989) expanded the idea of "risk" to include factors such as chronic poverty, parental divorce or psychopathology, and

perinatal stress. They demonstrated that various child, family, and community factors were related to positive adult outcomes (Werner, 1995).

In the first wave of resilience work, researchers set out to identify the correlates and markers of good adaptation among young people expected to struggle because of their genetic or environmental risk. The initial work was largely descriptive with the following aim: to ascertain which factors make a difference in the lives of such children, thereby enabling future research to guide efforts to improve the life chances of these at-risk children. The variable-focused nature at the time produced a "short list" of potential assets or protective factors associated with resilience in children and youth which continues to be corroborated in diverse studies (Masten, 2004, 2006; Masten & Gewirtz, 2006). The second wave of resilience research was focused on uncovering the processes and regulatory systems that account for the aforementioned short list. The third wave, characterized by efforts to promote resilience through prevention, intervention, and policy, rose from a sense of urgency for the welfare of children growing up with adversities and vulnerabilities. During that period, resilience research joined prevention science to promote the competence gained from resilience as a strategy for preventing or ameliorating behavioral and emotional problems (Masten & Coatsworth, 1998; Masten, Burt & Coatsworth, 2006; Weissberg, Kumpfer & Seligman, 2003).

Resilience: Definition and Key Requirements

According to Masten (2006), *resilience* is a broad conceptual umbrella covering many concepts related to positive patterns of adaptation in the context of adversity. The conceptual family of resilience encompasses a class of phenomena where the adaptation of a system has been threatened by experiences capable of disrupting or destroying the successful operation,

viability, or development of the system. According to Masten (2014), this definition was intended to be scalable across systems and disciplines, from the level systems operating within the human organism to the systems of family, school, community, culture, economy, and society.

A key requirement of resilience is the presence of both risks and protective factors that either help bring about a positive outcome or reduce or avoid a negative outcome (Fergus & Zimmerman, 2005).

In order to identify an adolescent as being resilient, it must be determined that there was a significant threat to the adaptation of the individual, and the individual meets the expectations for positive adaptation (Masten & Obradović, 2006). For example, Garmezy conceptualized positive adaptation as competence criteria in age-salient developmental tasks (Masten & Powell, 2003). This competence framework grew to encompass adaptation over the course of development as well as across cultural and historical contexts. Today, resilience research in adolescent development reflects a broad transformation occurring in multiple sciences concerned with adaptation in complex developing systems. The concepts and empirical approaches are more dynamic, as investigators attempt to understand and promote adaptive change or the capacity for positive adaptation in a context of existing or potential threats.

Current Study

The current study systematically examined a network of potential explanatory variables associated with adolescent health behaviors and resilience factors by applying factor analytic models to data from the 2013 NM YRRS (Appendix B). The first step used confirmatory factor analysis (CFA) to examine the latent structure of **adolescent health**

behaviors (tobacco use, alcohol and other illicit drug use, sexual activity, eating behaviors, and physical activity) that were previously identified by Kulbok and Cox (2002). The second step used CFA to examine the latent structure of **resilience measures** from the NM YRRS, as represented by the "resilience factors" section within this main instrument (Questions 100-113). This factor structure was previously identified by Hanson and Kim (2007). The final step took the final factor solutions from steps 1 and 2 and utilized a multi-group CFA approach to test for measurement invariance across age, gender, ethnicity, and sexual orientation.

To date, only one study has factor analyzed the structure of CDC-related adolescent health behaviors using population-based behavioral health surveys of adolescents (Kulbok & Cox, 2002). A common limitation in the adolescent literature is the absence of racially, ethnically, and culturally diverse samples to inform the conceptual understanding of adolescent health behaviors. The focus on clustering or covariation of adolescent health behaviors derives from our knowledge that the influences on these behaviors are multivariate and interactive (Pronk et al., 2004). It is also important to determine if health behaviors and resilience can be meaningfully compared across demographically important groups. Given that certain demographic variables have been previously identified as influential in predicting the covariation of adolescent health behaviors, comparisons were determined across age (Brener & Collins, 1998; Lowry, Kann, Collins, & Kolbe, 1996; Lytle, Kelder, Perry, & Klepp, 1995; Pronk et al., 2004), gender (Lytle et al., 1995), self-identified ethnicity, and sexual orientation. In summary, this study expanded this literature by examining a diverse population-based sample to identify co-occurring health risk behavior factors, their socio-

demographic correlates, and the role of resiliency factors in determining responses to risk behaviors.

Hypotheses

Hypothesis 1. This study used confirmatory factor analysis (CFA) to examine the latent structure of: (1) adolescent health behaviors (tobacco use, alcohol and other illicit drug use, sexual activity, and physical activity) that were previously identified by Kulbok and Cox (2002); (2) and a six-factor expanded health behavior structure, including an additional health factor of eating behaviors and allowing alcohol use to become an independent factor. This was conducted using a similar epidemiological adolescent health behavior survey. The manifest variables were represented by sections in the 2013 NM YRRS (See Appendix B): (1) Tobacco use; (2) Alcohol use; (3) Other drug use; (4) Sexual activity; and (5) Physical activity. To be clear, in order to test hypothesis 1, the current study factor analyzed health risk behaviors separately from the factor analysis on resilience factors.

The random sub-sample used in this study was demographically similar to the Kulbok and Cox (2002) study in terms of gender (49% female) and Hispanic ethnicity (19%), but dissimilar in terms of the number of youth in each age group, the gender, and non-Hispanic White and American Indian ethnicities. Despite some demographic dissimilarity, it was predicted that a similar four-factor solution would be confirmed using an independent random sub-sample selected from the overall study sample for the constructs of tobacco use, alcohol and illicit drug use, physical activity, and sexual activity. We also predicted that a six-factor expanded health behavior factor solution would be confirmed using an independent random sub-sample selected from the overall study for the constructs of tobacco use, alcohol use, other drug use, sexual activity, eating behaviors, and physical activity.

Hypothesis 2. The 13 resilience items (Questions 100-113; see Appendix B) included in the NM YRRS survey were empirically derived (Hanson & Kim, 2007) in an adolescent population similar to that of the proposed study. The eight constructs that underlie the Hanson and Kim (2007) resilience structure (school support, school meaningful participation, community support, community meaningful participation, home support, home meaningful participation, peer caring relationships, and pro-social peers) were not predicted to emerge because Hanson and Kim (2007) replicated this structure in random samples during the development of these resilience factors, and the current NM YRRS used only 13 of the original 29 resilience items. Thus, it was predicted that a factor structure with less than four factors would emerge.

Hypothesis 3. Once a resilience factor solution emerged during EFA, the study planned to determine its covariation with the extracted six-factor expanded health behavior structure identified in Hypothesis 1. No previous studies have provided empirical and conceptual support to predict which resilience factors would be correlated with the health behavior factors. It was predicted that health behavior factors (tobacco use, alcohol use, other drug use, sexual activity, eating behaviors, and physical activity) would positively correlate with resilience factors (school, home, community, and peers).

Hypothesis 4. Once final factor structures (as determined by the six-factor health behavior and resilience factor structures derived in hypotheses 1 and 2) were determined, a multi-group CFA approach was used to examine measurement invariance across demographic groups of age, gender, race/ethnicity, and sexual orientation. Testing the equivalence of measurement models representing the relationships between indicators of risk and protective (resilience) factors across demographic groups would indicate how

consistently risk and protective factors can be meaningfully compared by the same indicators in different groups. It was predicted that measurement invariance would not be found, thereby revealing that all adolescent health behavior and environmental resilience asset factor structures are NOT consistent across demographic groups of students by age, gender, race/ethnicity, and sexual orientation.

Methods

Sample

The total 2013 NM YRRS study sample size was 19,093 students from New Mexico high schools. For the purpose of factor analysis, this study included ages 14-17 or older. The study used complete survey data only, and any cases with missing data on the variables of interest were removed from analysis. This reduced the sample size to 12,533. Age, gender, and self-reported race/ethnicity were used to define the subsamples for the CFAs. The study sample age profile was: 21.9% aged 14 years (*n*=2747), 27.2% aged 15 years (*n*=3408), 24.3% aged 16 years (*n*=3040), and 26.6% aged 17 years and older (*n*=3335). The study sample was 53.2% (*n*=6671) female. Race/ethnicity was self-reported using predefined categories: Hispanic (n=5827, 46.5%), non-Hispanic White (n=3783, 31.2%), American Indian or Alaska Native (n=2115, 16.9%); Black or African American (n=320, 2.6%), and Asian or Pacific Islander (n=289, 2.4%). Considering the adequate sample sizes for each racial/ethnic group, all racial/ethnic groups were included in most analyses. The one exception was for measurement invariance analyses, in which adequate sample sizes were only available for the American Indian, Hispanic, and Non-Hispanic White categories. See Table A-1 for final study sample characteristics.

Measure

Data for this study were taken from the 2013 New Mexico High School Youth Risk and Resiliency Survey (NM YRRS), which is part of the national CDC Youth Risk Behavior Surveillance System (YRBSS). The full YRBSS contains topic areas of risk behaviors related to alcohol and drug use, unintentional injury, violence, suicidal ideation and attempts, tobacco use, sexual activity, physical activity, and nutrition. It is used by federal agencies to

track drug use, sexual behavior, and other risk behaviors, and it informs the creation of prevention programs and influences the allocation of funding for at-risk populations. States are allowed to modify and include additional questions to track and monitor emerging health trends of interest.

The NM YRRS version contains 114 items, of which 13 are related directly to resiliency factors such as relationships in the family, school, community, and with peers. Additionally, the NM YRRS includes health status issues, such as body weight (Question 80) and asthma (Question 94) (Green, Peñaloza, & FitzGerald, 2012). The main differences between the YRBS and the YRRS occur in the substance abuse section. The NM YRRS has added a '30-day' reference anchor question for each of the substances. The NM YRRS dropped the lifetime question that the YRBS uses (e.g., inhalants, steroids).

Health behaviors, for the purposes of this study, were defined as any action or behavior taken by an individual that may enhance or compromise well-being. The specific behaviors of interest from the NM YRRS that were used in this study included: tobacco use (7 items; Questions 36-38, 40, 42-44), alcohol use (6 items; Question 46-49, 51, 53), marijuana use (4 items; Questions 54-57), other illicit drug use (12 items; Questions 59-68), sexual behavior (6 items; Questions 72-77), eating behaviors (8 items; Questions 81-88), physical activity (4 items; Questions 89-92), and resiliency factors (13 items; Questions 100-113).

The item format for each section of interest is not consistent, as the scale dimensions and content differ from one another. For example, the tobacco use behaviors include dichotomous scales ("Have you ever tried cigarette smoking?"; 1 = yes, 2 = no), ordinal scales ("How old were you when you smoked a whole cigarette for the first time?"; 1-7 range

where 1 = Never and 7 = 17 years or older), and categorical scales ("The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?"; 1-8 range where 1 = I have never had sexual intercourse; 2 = No method was used to prevent pregnancy; 3 = Birth control pills; to 8= Not sure). Additionally, the time-frame response scale is not consistent within each section. Some items ask about use during the past 12 months, whereas others ask about the past 30 or 7 days. Most time-frame response scales are consistent within each section (See the Data Analysis section for Hypothesis 4 for a description of how these item scale inconsistencies are handled). See Appendix B for a complete viewing of each behavior section's particular scale and content usage.

Procedure

The NM YRRS is offered to a selection of high schools and middle schools in each school district in the fall of odd-numbered years (i.e., 2009, 2011, 2013). All data are self-reported by students who voluntarily complete the survey during one class period. Unlike the YRBS, the NM YRRS version is conducted only for the state of New Mexico. The CDC approved the use of the NM YRRS as a substitute for the YRBS because both surveys contain the same core questions, and the YRRS simply has additional state-specific questions.

The NM YRRS survey was designed by a steering committee composed of representatives from the New Mexico Public Education Department (NM PED), the New Mexico Department of Health (NM DOH), the University of New Mexico Prevention Research Center (UNM PRC), the Albuquerque Area Southwest Tribal Epidemiology Center (AASTEC), the New Mexico Human Services Division (HSD), and the New Mexico Children, Youth, and Families Department (CYFD). The 2013 NM YRRS was coordinated

with: (1) the Navajo Nation, which conducted the YRRS in schools with high Navajo student enrollment, and (2) the Bureau of Indian Education (BIE), which conducted the survey in BIE schools throughout New Mexico.

The NM YRRS has two discreet sampling plans (CDC-YRBS plan and NM YRRS plan) that allow it to respond to various requirements concerning the geographic level at which results can be presented. The relevant plan for the current study was the single statewide sample (CDC-YRBS) plan, which was drawn according to sampling criteria developed by the Division of Adolescent and School Health and the Centers for Disease Control and Prevention (CDC-DASH). This sampling plan, which is followed by all states that participate in the Youth Risk and Behavior Survey (YRBS), provided a sample that was representative of the population of public high school students in New Mexico.

The school district stratification-sampling plan that was used to collect data for the estimation of rates at sub-state levels was a modified version of the single statewide sampling plan developed by the CDC. For this sampling design, public schools were divided into 90 different groups, or strata. Each of New Mexico's 89 school districts was represented by its own stratum, and the 90th stratum was made up of all independent, or state chartered, charter schools not affiliated with a school district. In large strata, schools were selected with probability of selection equal to school enrollment size, and in small school districts with only one or two schools all schools were selected. From the selected schools, classrooms and students were selected as they were for the single statewide sample. Of the 90 strata, 81 participated in the survey (80 school districts and the stratum made up of independent charter schools). From 130 participating schools, 19,226 students in grades 9-12 returned a survey questionnaire answer sheet.

Data Analysis

Factor analytic steps (CFA and Multi-group CFA for measurement invariance) were undertaken to characterize the underlying factor structure in the NM YRRS dataset and to test for measurement invariance across age, gender, ethnicity, and sexual orientation. The study sample and subsamples were more than adequate for factor analysis procedures. Analysis with 60 NM YRRS variables used a minimum subsample size of n=500, which was more than adequate to reduce the possibility that the factors were the effect of sampling error. The large subsample size was necessary for ordinal variables to reduce the likelihood of encountering 'zero cells' in bivariate comparisons between each variable, which would create model non-identification problems.

Before the CFA procedures were conducted, SPSS 22 was used to draw random samples of n=500 (~3% of the total sample) for each analytic step. Randomly drawn samples were compared to the study sample to determine if the subsample was representative of the study sample characteristics through a comparison of means, standard deviations, and standard error of the mean. CFAs were then conducted using Mplus Version 7.31 (Muthén & Muthén, 1998-2011). Preliminary analyses included inter-item correlations, normality, Bartlett's test of sphericity, and the Kaiser-Meyer-Olkin measure of sampling adequacy.

Measurement invariance, using Mplus Version 7.31, was used to verify that each health behavior and resilience factor was measuring the same underlying latent construct within each demographic group (age, gender, ethnicity, and sexual orientation).

Data analysis for hypothesis 1. Confirmatory factor analysis (CFA) models were conducted to determine whether or not the factor structure of adolescent health behaviors and environmental resilience assets within the NM YRRS, as previously identified by Kulbok

and Cox (2002) and Hanson and Kim (2007), could be replicated. After determining the number of latent factors, the patterns in which each item loaded onto a particular factor were specified. The next step involved executing the analysis to determine the fit of the overall model to the data, then the direction, magnitude, and statistical significance of parameter estimates (Kline, 2015).

This study utilized the following fit indices and evaluation criteria: (1) The Root Mean Square Error of Approximation (RMSEA) is a measure of discrepancy between the sample model and the population model per degree of freedom. Browne and Cudeck (1992) suggested values between .05 and .08 were reasonable, between .08 and 1.0 were marginal, and above 1.0 was an unacceptable fit. (2) The Tucker-Lewis Index (TLI) evaluates the degree to which the tested model accounts for the variance in the data vis-à-vis a baseline model, with a model fit adequacy value of .95 or higher. (3) The Comparative Fit Index (CFI) compares the model of interest with some alternative, such as the null or independence model. The CFI represents the extent to which the model of interest is better than the independence model. Values that approach 1 indicate acceptable fit. (4) The standardized root mean square residual (SRMR) indicates the average value of the standardized residuals between observed and predicted covariances, with an adequate value less than .10.

Data analysis for hypothesis 2. EFA and CFA were used to (1) extract a resilience factor structure, followed by (2) confirmation of the extracted factor structure using random independent samples. Four separate factor solutions were extracted to determine the best model structure to fit the data. Unidimensional, two-, three-, and four-factor model solutions were compared for best model fit.

Data analysis for hypothesis 3. Pairwise associations, using Pearson r correlations between variables, were used to yield a numerical response. Empirical associations are noted for those pairs that have statistically significant values with a p value <.05.

Data analysis for hypothesis 4. CFAs were conducted using Mplus Version 7.31; the categorical data option. This involved estimating polychoric correlation matrices between unobserved continuous, normally distributed latent variables measured by the observed ordinal items (Jöreskog & Sörbom, 1993; Olsson, 1979). The parameter estimates and fit of the structural models were then based on the polychoric correlations. These models provided optimal parameter estimates with ordinal and skewed data. Weighted Least Squares (WLS) and Weighted Least Squares Means-Variance Adjusted (WLSMV) (Muthén, Du Toit, & Spisic, 1997) estimators were used to obtain the appropriate fit indices. The WLSMV estimator was used to obtain the Tucker Lewis Index (TLI), the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). The WLSMV estimator provided optimal estimates of the TLI, CLI, RMSEA and the SRMR. However, the chi-square estimate produced using WLSMV is inappropriate for comparing across models because the chi-square and degrees of freedom for each model are adjusted to provide correct P-values to assess model fit (Muthén and Muthén, 2001). Therefore, unadjusted chi-square statistics for each model were obtained using the WLS estimator.

Due to scale inconsistencies between each health behavior and resilience factor, measurement invariance testing was conducted within each factor across each demographic group (race/ethnicity, gender, sexual orientation, and age). This resulted in conducting 28 tests of invariance of demographic indicators by seven total factors.

Models assessing measurement invariance across race/ethnicity, gender, sexual orientation, and age groups were carried out following the steps recommended by Vandenberg and Lance (2000). The first step (invariance of covariance matrices) tests a model in which the observed covariance matrices for the different groups are held to be equal, while no specific factor structure is imposed. Failure to reject such models constraining the covariance matrices to be equal across groups is viewed as a rigorous demonstration of overall measurement equivalence across groups (Vandenberg & Lance, 2000). When covariance matrices are not found to be equal across groups, a series of increasingly restrictive tests are used to identify the source of nonequivalence (Byrne, Shavelson & Muthen, 1989).

The least restrictive test (configural invariance) assesses only the factor pattern that is constrained to be equal across groups. This determines whether or not the pattern of items loading on the factor structure from hypothesis 2 is the same across age, gender, and ethnicity. The next, more restrictive test (loading invariance) constrains both the factor pattern and the factor loadings (each item's relationship to the factor) to be equal across groups. An even more restrictive test (structural invariance) tests the covariances between the factors also constrained to be equal across groups. And finally, the most restrictive test (mean invariance) determines the equality of factor means across groups, plus the addition of the previous constraints.

The parameterization of these models is explained in more detail elsewhere (Muthén, 1984; Muthén and Kaplan, 1992). For the tests of equivalence of covariance matrices, this study estimated models in which no latent variables were included and the errors of all observed variables were set equal across all groups. The study tested a simple model of

configural invariance in which only the factor pattern was held constant across groups, factor means were set to 0 in each group, the scaling parameters set to 1, and all other parameters were estimated freely for each group. The study tested metric invariance, where the factor loadings and thresholds were constrained to be equal across all groups. The factor means, variances, and covariances were fixed (at 0 and 1, respectively) in the first group and estimated independently in the other groups, and all other parameters were freed across groups. The study tested for structural invariance, where the factor variances and covariances were fixed to be equal in addition to the factor loading and thresholds. Finally, the study tested the mean invariance, fixing all factor means to 0, fixing thresholds, loadings, factor variances, and covariances to be equal, and fixing scaling parameters to 1 in the first group and allowing them to vary across all other groups.

When the study compared different models to establish measurement invariance across different groups, changes in fit indices and chi-square differences were examined. Cheung and Rensvold (2002) and Vandenberg and Lance (2000) suggested that comparing values of fit indices is useful because they are not sensitive to sample size. This method for comparing nested models provided an overall assessment of measurement equivalence across groups. However, it did not test for differences in specific parameters, so conclusions that scale means or any other parameters are statistically equal across groups should not be drawn from these analyses.

Results

Cross-sectional data were examined in this secondary analysis. Preliminary analyses included the examination of distributional characteristics of all variables in the study. Frequency distributions and measures of central tendency, measures of dispersion, and deviations from normality were assessed for all variables. In total, 60 items were included for analysis (Table A-1). The demographic profile of youth with complete data (N = 12,533) for the study variables was not meaningfully different from the profile of youth with missing data (N = 6,560), especially across demographic indicators of age, gender, and ethnicity. For a detailed comparison between students with complete and incomplete data, see Tables A-1 and A-2. Therefore, it was decided to conduct data analysis procedures only on respondents with complete data for all variables. That is, imputation for missing values was not attempted.

Reliability Analysis

Internal consistency estimates of reliability of each health behavior and resilience factor were calculated using Cronbach's alpha for the overall main sample (see Table 1). Nunnally and Bernstein's (1994) criterion of 0.70 was used as the cutoff for determining acceptable reliability in research contexts. The internal consistency of all seven factors ranged from 0.25 to 0.83, but the Eating Behavior and Physical Activity factors exhibited low reliability estimates of 0.25 and 0.41, respectively. Tobacco Use, Alcohol Use, Other Drugs, Sexual Activity, and Resilience factors exhibited acceptable reliability estimates ranging from 0.78 to 0.90.

Table 1. Cronbach's α Coefficient for Health Behaviors and Resilience Estimates

Factors	Cronbach α
Tobacco Use (7 indicators)	0.80
Alcohol Use (6 indicators)	0.78
Other Drugs (Marijuana, Cocaine, methamphetamines, heroin, & prescription drugs; 16 indicators)	0.82
Sexual Activity (6 indicators)	0.90
Eating Behaviors (8 indicators)	0.25
Physical Activity (4 indicators)	0.41
Resilience (13 indicators)	0.83

Confirmatory Factor Analysis: Overall Sample Health Behavior & Resilience Structure

A full review of the details for each hypothesis and additional analyses are explained below. The results will be discussed in the following order:

(1) confirmation of the Kulbok and Cox (2002) four-factor structure and expanded six-factor structure;

(2) health behavior CFA and resilience CFA for the overall sample;

(3) comparative fit of the health behavior and resilience CFA's by ethnicity, gender, sexual orientation, and age; and lastly,

(4) measurement invariance by ethnicity, gender, sexual orientation, and age.

Confirmed four-factor structure. Confirmatory factory analysis (CFA) was performed to test the construct validity of the 39 items comprising the Kulbox and Cox (2002) four-factor structure (tobacco use, alcohol and other drug use, sexual activity, and

physical activity). A four-factor CFA model was estimated, with the covariance between the factors to be freely estimated with each item restricted to load only on its hypothesized factor (Figure 1).

Results indicated acceptable fit (CFI=0.98, TLI=0.98, RMSEA=0.04, WRMR=1.75), with the anticipated exception of the large chi-square value due to the large sample size: X^2 (659) = 1817.28, $p<0.001$. Model parameter estimates were well within expectation, with statistically significant and moderate to large factor loadings, with the exception of one loading from the sexual activity factor (Question 72: "How old were you when you had sexual intercourse for the first time?" $\lambda = 0.245$).

The interfactor correlations resulting from this oblique CFA among the three health behaviors (tobacco use, alcohol and other drug use, and sexual activity) were positive and ranged from 0.63 to 0.82, whereas the interfactor correlations of physical activity with tobacco use, alcohol and other drug use, and sexual activity were lower and negative (-0.11 to -0.18). Table 2 shows the interfactor correlations resulting from the oblique CFA. These interfactor correlations were significant at the $p < 0.05$ level.

Table 2. Factor correlation matrix for confirmed Kulbok and Cox 4-factor model.

	TU	AOD	SA	PA
Tobacco Use				
Alcohol & Other Drug Use	0.82			
Sexual Activity	0.63	0.67		
Physical Activity	- 0.11	- 0.18	- 0.15	

Overall sample health behavior CFA. For the health behavior factors CFA was performed on the 47-items comprising 6 factors of cigarette use, alcohol use, other drug use, sexual activity, eating behaviors, and physical activity. A final CFA model with a hypothesized 6-factor structure was estimated using an oblique rotation, with the covariance between factors to be freely estimated and each item being restricted to load only on its hypothesized factor (see Figure 1).

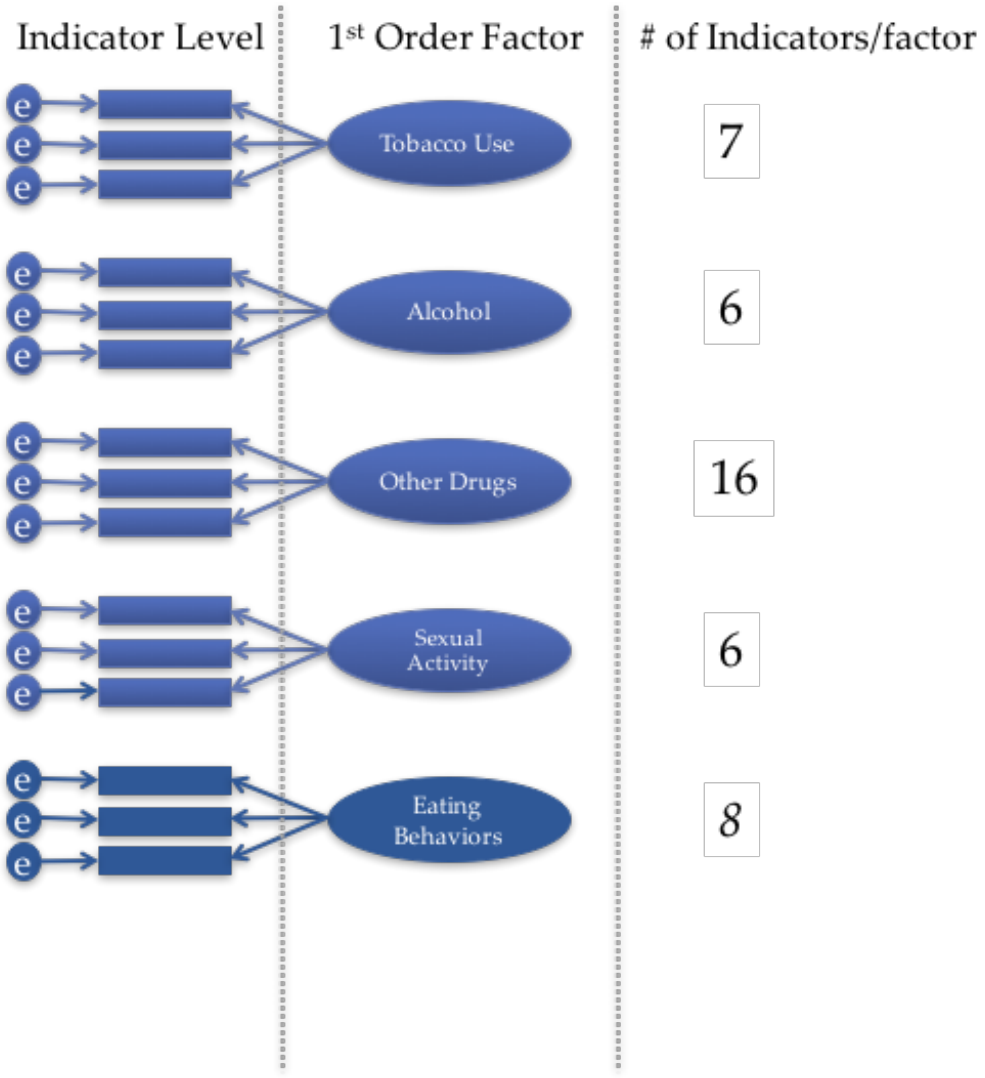


Figure 1. Final hypothesized 6-factor structure of health behaviors for CFA analysis.

Unidimensional, 6-factor, and higher-order factor structure models were compared for best model fit. This was necessary to determine dimensionality of the first-order-factor solution. To begin with, we fit all 47-health behavior indicators to a single first-order factor (i.e., one dimension) that represented all health behaviors. Next, we fit a 6-factor structure:

(1) 7 indicators only representing the factor of tobacco use;

(2) 6 indicators only representing the factor of alcohol use;

(3) 16 indicators only representing the factor of other drug use;

(4) 6 indicators only representing the factor of sexual activity;

(5) 8 indicators only representing the factor of eating behaviors; and

(6) 4 indicators only representing the factor of physical activity.

Lastly, we fit the higher-order structure where we replicated the 6-factor first order structure as described previously above, followed by allowing the factors of tobacco use, alcohol use, other drug use, and sexual activity to fit a higher-order latent factor representing the "Problem Behavior Syndrome" (Donovan & Jessor, 1985) while allowing the eating behavior factor and physical activity factor to remain as first-order factors (See Figure 2 for an illustration of the unidimensional, six-factor, and higher order factor structures).

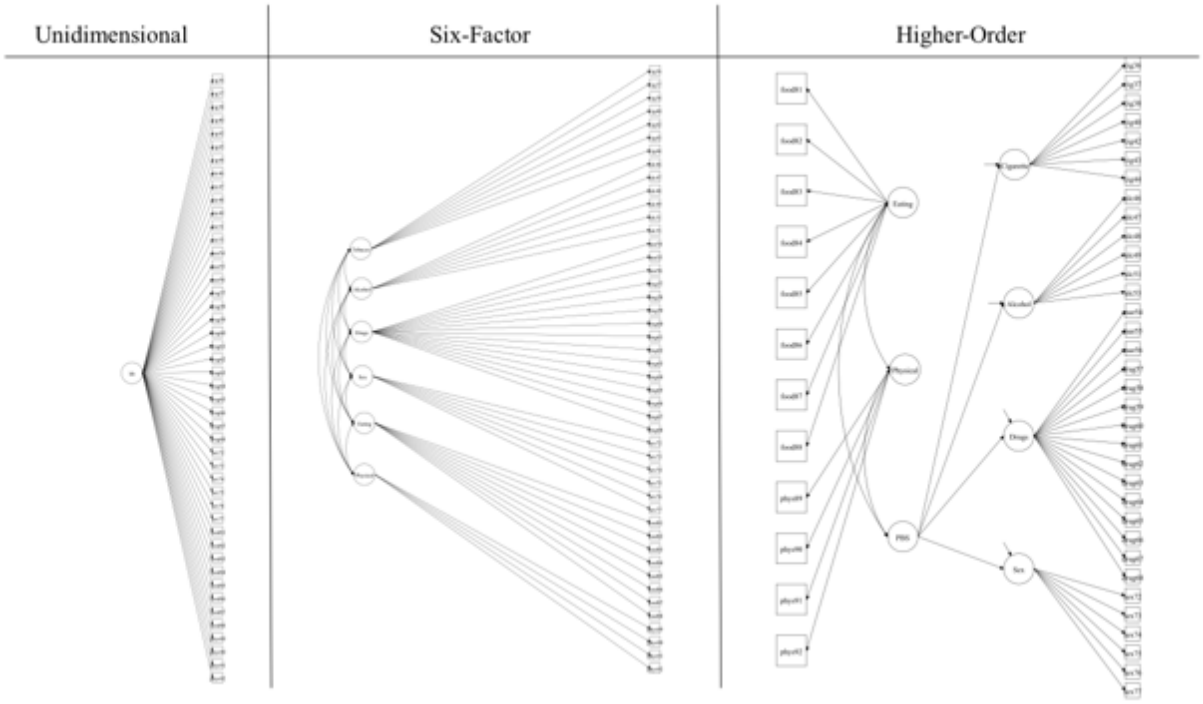


Figure 2. Model illustration of the unidimensional, six-factor, and higher-order structures.

The higher-order factors explain the relationships among factors at the next lower level in the same way that the first-order factors explain the relationships among the indicator items. For example, factors that are highly correlated – like the substance use factors and the sexual activity factor – can be hypothesized to represent an overarching latent construct. This construct can be entered into the model as a higher-order factor. Table 3 compares model fit statistics between the unidimensional, six-factor, and higher-order structures.

Table 3. Model fit indices of the unidimensional, six-factor, and higher-order structures.

Model Structure	N	CHI SQ (df)	RMSEA	CFI	TLI	WRMR
Unidimensional	500	6136.26 (989)***	0.07	0.93	0.92	3.13
Six-Factor	500	2213.14 (974)***	0.04	0.98	0.98	1.60
Higher-Order	500	2175.48 (982)	0.04	0.98	0.98	1.63

*** p < 0.05 ** p < 0.01 *** p < 0.001**

The 6-factor model proved to have a slightly better model fit and was selected as the model that best represents the data for the main overall sample of health behaviors. Results indicated a good descriptive fit (CFI=0.98, TLI=0.98, RMSEA=0.04, WRMR=1.60), with the anticipated exception of the chi-square, which indicated a poor statistical fit as is typical with large sample sizes: X^2 (974) = 2213, p<0.001. Model parameter estimates generally were well within expectations, with statistically significant and moderate to large factor loadings (Table 4). The exceptions were 5 low loadings from the eating behavior and physical activity factors:

Question 81 – Amount of fruit juice consumed in past 7 days: loading = -0.04;

Question 88 – Number of days ate breakfast in past week: loading = -0.13;

Question 91 – Number of hours spent on computer or other digital device: loading = 0.25;

Question 92 – Number of days attended PE class during past week: loading = 0.22;

Question 81 – Amount of fruit juice consumed in past 7 days: loading = -0.04, p=0.64

Table 4. Six-factor Health Behavior Structure – CFA standardized loading estimates.

	LOADING ESTIMATE
CIGARETTE USE by	
Q36-How old when first smoked	0.72***
Q37-How many days smoked past 30 days	0.98***
Q38-How many cigarettes/day past 30 days	0.99***
Q40-How many days smoked at school in past 30 days	0.93***
Q42-How many days use chewing tobacco, snuff, or dip in past 30 days	0.66***
Q43-How many days smoke cigars in past 30 days	0.88***
Q44-Days smoked hookah in the past 30 days	0.84***
ALCOHOL USE by	
Q46-How old when first drank alcohol	0.56***
Q47-How many days drink alcohol in past 30 days	0.97***
Q48-How many days had 5+ drinks in past 30 days	0.98***
Q49-Max # drinks in a row in the past 30 days	0.96***
Q51-Where did you usually drink alcohol in past 30 days	0.86***
Q53-How many days drank at school in the past 30 days	0.93***
OTHER DRUG USE by	
Q54-How old when first tried marijuana	0.62***
Q55-How many times used marijuana in past 30 days	0.82***
Q56-How many times used synthetic marijuana in past 30 days	0.78***
Q57-How many times have you used cocaine	0.93***
Q58-How many times used cocaine in past 30 days	0.97***
Q59-How many times used inhalants in past 30 days	0.83***
Q60-How many times used heroin in lifetime	0.98***
Q61-Times used heroin in past 30 days	0.99***
Q62-How many times used methamphetamines	0.96***
Q63-How many times used methamphetamines in past 30 days	0.98***
Q64-How many times used ecstasy in lifetime	0.89***
Q65-How many times used ecstasy in past 30 days	0.94***
Q66-Times used Rx drugs w/o a Rx in lifetime	0.83***
Q67-Times used pain killer to get high in past 30 days	0.87***
Q68-How many times injected drugs in lifetime	0.95***
SEXUAL ACTIVITY by	
Q72-How old at first sex	0.85***
Q73-How many sex partners	0.95***
Q74-How many sex partners in the past 3 months	0.95***
Q75-Did you use alcohol/drugs at last sexual intercourse	0.97***
Q76-Did you use a condom at last sexual intercourse	0.96***
Q77-What birth control method did you use at last sexual intercourse	0.92***

	LOADING ESTIMATE
EATING BEHAVIORS by	
Q81-How many times drank fruit juice in the past 7 days	-0.04 (ns)
Q82-How many times ate fruit in the past 7 days	-0.57***
Q83-How many times ate green salad in the past 7 days	0.68***
Q84-How many times ate potatoes in the past 7 days	0.68***
Q85-How many times ate carrots in the past 7 days	-0.53***
Q86-How many times ate other vegetables in the past 7 days	0.65***
Q87-How many times drank soda in the past 7 days	0.73***
Q88-How often ate breakfast in the past 7 days	-0.13***
PHYSICAL ACTIVITY by	
Q89-Days active for min of 60 minutes for the past 7 days	0.58***
Q90-How many hours watched TV	0.44***
Q91-How many hours/day played video games	0.25***
Q92-How many days attended PE in avg week	0.22***

*** p < 0.05 ** p < 0.01 *** p < 0.001**

All but one of the 15 factor inter-correlations were statistically significant, but with the large sample size of N = 500, p-values are not very useful in helping to understand the data. Interfactor correlations in Table 5 show a clear pattern:

(1) Tobacco use, alcohol use, other drug use, and sexual activity factors inter-correlated strongly (all $r > 0.62$).

(2) Eating behaviors correlated negatively and at a low level negatively (all $r < -0.21$) with the 4 factors listed previously.

(3) The physical activity factor correlated moderately (all r's > 0.27) with tobacco use, alcohol use, and other drug use but not with sexual activity ($r = 0.08$, $p > 0.05$).

(4) Eating behavior and physical activity correlated strongly ($r = 0.53$).

Table 5. Factor inter-correlation matrix for six-factor health behavior model.

	TU	AU	ODU	SA	EB
Tobacco Use					
Alcohol Use	0.80				
Other Drug Use	0.80	0.80			
Sexual Activity	0.63	0.63	0.67		
Eating Behaviors	- 0.14	- 0.12	- 0.20	- 0.16	
Physical Activity	0.37	0.28	0.33	0.08	0.53

Overall sample resilience EFA and CFA. Prior to conducting the CFA on the resilience factor, an EFA was conducted on the 13 resilience items to determine if the available 13 items could reproduce the previous confirmed 30-item, four-factor resilience structure. The resilience items for the 2013 High School survey were reduced from 30 items in 2011 to 13 items in 2013. The remaining 13 items represented partial resilience factors from the original California Healthy Kids Survey (CHKS) (Hanson & Kim, 2007); therefore, a re-evaluation of the presence of a resilience factor structure for our sample was conducted using an EFA.

The number and nature of the dimensions underlying the 13 resilience items were investigated through WLSMV exploratory factor analysis with Geomin rotations. Examination of one- to four-factor solutions most clearly revealed the presence of a single factor with all pattern loadings greater than 0.50 (see Table 6) with marginal fit indices (CFI=0.98, TLI=0.98, RMSEA=0.11, SRMR=0.11). Although a 3 factor solution was most conceptually similar to factors identified by the CHKS and had acceptable model fit indices

(CFI=0.999, TLI=0.999, RMSEA=0.028, SRMR=0.023), the 4-, 5-, and 6-factor solutions either: (1) produced negative residual variances (4-factor solution; may indicate over extraction of factors); (2) failed to identify a solution (5-factor solution); or (3) had standardized factor loadings greater than 1 (4-, 3-, and 2-factor solutions: loadings greater than 1 may indicate Heywood cases). All 3 conditions were considered unacceptable for the selection of an appropriate factor solution, which revealed a single-factor solution as the most appropriate fit for the data. Internal consistency for this 13-item factor was 0.83 as estimated by Cronbach's alpha.

Table 6. EFA – Unidimensional structure of resilience – Factor loadings

Resilience Items	Factor Loadings
RES100 – In my home, there is a parent or some other adult who is interested in my school work.	0.71*
RES101 – In my home, there is a parent or some other adult who believes that I will be a success.	0.88*
RES102 – At my school, there is a teacher or some other adult who listens to me when I have something to say.	0.86*
RES103 – At my school, there is a teacher or some other adult who believes that I will be a success.	0.96*
RES104 – Outside of my home and school, there is an adult who really cares about me.	0.57*
RES105 – Outside of my home and school, there is an adult who tells me when I do a good job.	0.85*
RES106 – I have a friend about my own age who really cares about me.	0.77*
RES107 – When I am not at home, one of my parents or guardians knows where I am and who I am with.	0.54*
RES108 – In my school, there are clear rules about what students can and cannot do.	0.97*
RES109 – I plan to go to college or some other school after high school.	0.95*
RES110 – At school I am involved in sports, clubs, or other extra-curricular activities (such as band, cheerleading, or student council).	0.95*
RES111 – Outside of my home and school, I am a part of clubs, sports teams, church, temple, or other group activities.	0.88*
RES112 – Outside of my home and school, I am involved in music, art, literature, sports, or a hobby.	0.83*
RES113 – My friends get into a lot of trouble.	0.54*

*** p < 0.05 ** p < 0.01 *** p < 0.001**

A CFA replicated the single-factor solution resulting from the EFA using a second independent random 500 student sample. Results indicated marginal model fit (CFI=0.98, TLI=0.98, RMSEA=0.11, WRMR=2.33) with the usual expected exception of the chi-square: X^2 (91) = 48,482.4, p<0.001. Model parameter estimates were well within expectation, with statistically significant and moderate to large factor loadings (see Table 7).

Table 7. CFA - Unidimensional structure of resilience – Factor loadings

Resilience Items	Factor Loadings
RES100 – In my home, there is a parent or some other adult who is interested in my school work.	0.66*
RES101 – In my home, there is a parent or some other adult who believes that I will be a success.	0.98*
RES102 – At my school, there is a teacher or some other adult who listens to me when I have something to say.	0.97*
RES103 – At my school, there is a teacher or some other adult who believes that I will be a success.	0.87*
RES104 – Outside of my home and school, there is an adult who really cares about me.	0.63*
RES105 – Outside of my home and school, there is an adult who tells me when I do a good job.	0.82*
RES106 – I have a friend about my own age who really cares about me.	0.76*
RES107 – When I am not at home, one of my parents or guardians knows where I am and who I am with.	0.50*
RES108 – In my school, there are clear rules about what students can and cannot do.	0.97*
RES109 – I plan to go to college or some other school after high school.	0.97*
RES110 – At school I am involved in sports, clubs, or other extra-curricular activities (such as band, cheerleading, or student council).	0.95*

Resilience Items	Factor Loadings
RES111 – Outside of my home and school, I am a part of clubs, sports teams, church, temple, or other group activities.	0.84*
RES112 – Outside of my home and school, I am involved in music, art, literature, sports, or a hobby.	0.78*
RES113 – My friends get into a lot of trouble.	0.51*

*** p < 0.05 ** p < 0.01 *** p < 0.001**

Factor correlations between health behaviors and resilience. The CFA procedures used to confirm the health behavior and resilience factor structures also produced unstandardized factor scores for each latent variable that were saved separately for this analysis. Mplus used a regression method (expected posterior distribution approach) for the categorical and ordinal variables to determine the factors scores for each of the six health behavior factors and the single resilience factor.

Bivariate correlations were conducted to determine the relationship between the 6 health behavior factors with the single resilience factor. All correlations were statistically significant as would be expected with a sample size of 500, ranging from 0.09 through 0.65. Table 8 shows interfactor correlations between the 6 health behaviors and resilience. Only physical activity correlated strongly with resilience ($r = 0.65$). Tobacco use, other drug use, and eating behaviors correlated moderately (r's ≥ 0.30), with resilience with alcohol correlating somewhat less ($r = 0.21$). Resilience did not meaningfully correlate with sexual activity ($r = 0.09$).

Table 8. Interfactor correlations between health behaviors and resilience.

	Tobacco Use	Alcohol Use	Other Drug Use	Sexual Activity	Eating Behaviors	Physical Activity
Resilience	.34	.21	.37	.09	.30	.65

Measurement Invariance across Demographic Groups

Measurement invariance (MI) indicates that the data produced by self-report instruments (e.g., NM YRRS) in quantitative comparative research requires not only that the measured constructs have the same meaning across groups but that group comparisons of sample estimates (e.g., means and variances) reflect true group differences and are not contaminated by group-specific attributes that are unrelated to the construct of interest (Gregorich, 2006).

When measurement invariance holds (for a specific instrument at one point in time) respondents from 2 groups with the same value on the underlying construct generate the same observed scores (Meredith & Millsap, 1992; Williams et al., 2010). Alternatively, 2 respondents from different groups (on one instrument) may be equal on the underlying construct of interest but may produce different observed values, indicating measurement variance (Williams et al., 2010). While respondents from one sample may be invariant on one measurement, another sample could be variant on the same measure.

Measurement invariance is a statistical property of measures that can be tested with multiple-group confirmatory factor analyses (MG-CFA). Several typologies, or degrees, of measurement invariance exist, including configural invariance, metric invariance, scalar invariance, and strict invariance (the latter not tested in this study). Sample respondent data

on measure(s) are typically deemed invariant and useful across groups if scalar (and hence, metric and configural) invariance is achieved. Lack of strict invariance does not preclude meaningful group comparisons on a particular measure. The importance of invariant respondent data on measurement instruments is to evaluate the validity and fairness of test scores when the respondent population contains distinct groups of respondent, such as respondents from different gender, racial/ethnic, sexual orientation, or age groups. This means that when factor loadings, intercepts, and residual variances are equivalent in a factor model (e.g., adolescent heath behaviors) that measures a latent concept (e.g., resilience), we can be assured that comparisons that are made on the latent variable are valid indicators or differences on the *constructs* being measured across groups rather than partially indicating differences in interpretation of indicator variables. Thus, groups that show measurement variance on a measure show evidence that their responses on that measure are not only indicative of differences on the construct but to some degree also reflect differences inherent in group perceptions of indicators.

The six-factor, 47-item model representing "Health Behaviors" and the unidimensional, 13-item model representing the "Resilience" factor were specified for all subsequent tests of invariance across gender, age, race/ethnic, and sexual orientation groups. Considering that the unstandardized and standardized estimates were very similar, and without any notable exceptions, all reported estimates are standardized values. Measurement invariance was tested within each health behavior factor (6 factors – cigarette use, alcohol use, other drug use, sexual activity, eating behaviors, and physical activity) due to model non-identification for the entire 6 factor structure.

For measurement invariance testing across each demographic group, the reference groups are: (1) Gender – male; (2) Ethnicity – Non-Hispanic White; (3) Sexual Orientation – straight; and (4) Age – 14 & 15 year old combined ages. A summary of measurement invariance tests for each demographic group by behavior can be found in Table 13.

MI by Gender on Six Health Behavior Factors and the Single Resilience Factor

Summary of MI by gender. Full measurement invariance (across all 3 successive levels – configural, metric, and scalar) was achieved for 4 of the 7 factors: (1) Alcohol Use; (2) Sexual Activity; (3) Physical Activity; and (4) Resilience. Thus, respondent data perform consistently across these factors for females and males in that they interpret the individual questions, as well as the underlying latent factors in the same way. See Table 9.

Table 9. CFA Model Fit Statistics by Participant Characteristic by Model Type (N=500)

	χ^2 (df)	χ^2 Differences (df)	RMSEA	CFI : TLI	SRMR	Invariance by Level
Cigarette Use Factor						
Configural	156.65 (28)*		0.15	0.93 - 0.90	0.04	Yes
Configural/Metric		188.90 (6)***				No
Metric/Scalar		15.59 (6)***				No
Summary	Measurement invariance was **NOT** achieved for Cigarette Use					
Alcohol Use						
Configural	51.12 (18)*		0.09	0.96 : 0.94	0.04	Yes
Configural/Metric		4.89 (5), p=0.43				Yes
Metric/Scalar		9.64 (5), p=0.09				Yes
Summary	Measurement invariance **WAS** achieved for Alcohol Use					
Other Drug Use						
Configural	612.35 (180)*		0.18	0.58 : 0.52	0.13	No

	χ^2 (df)	χ^2 Differences (df)	RMSEA	CFI : TLI	SRMR	Invariance by Level
Configural/Metric		49.65 (14)***				No
Metric/Scalar		17.14 (14), p= 0.25				Yes
Summary	Measurement invariance was **NOT** achieved for Other Drug Use					
Sexual Activity						
Configural	51.12 (18)*		0.09	0.96 : 0.94	0.04	Yes
Configural/Metric		4.89 (5), p= 0.43				Yes
Metric/Scalar		9.638 (5), p= 0.09				Yes
Summary	Measurement invariance **WAS** achieved for Sexual Activity					
Eating Behaviors						
Configural	122.81 (40)*		0.07	0.95 : 0.93	0.04	Yes
Configural/Metric		37.558 (7)***				No
Metric/Scalar		37.053 (7)***				No
Summary	Measurement invariance was **NOT** achieved for Eating Behaviors					
Physical Activity						
Configural	13.31 (4)*		0.19	0.97 : 0.90	0.05	Yes
Configural/Metric		2.37 (3), p= 0.50				Yes
Metric/Scalar		5.43 (3), p= 0.14				Yes
Summary	Measurement invariance **WAS** achieved for Physical Activity					
Resilience						
Configural	1225.44 (154)*		0.17	0.58 : 0.50	0.12	Yes
Configural/Metric		21.86 (13), p= 0.06				Yes
Metric/Scalar		19.57 (13), p= 0.11				Yes
Summary	Measurement invariance **WAS** achieved for Resilience					

*** p < 0.05 ** p < 0.01 *** p < 0.001**

MI by Ethnicity on Six Health Behavior Factors and the Single Resilience Factor

Summary of MI by ethnicity. Full measurement invariance (across all three successive levels – configural, metric, and scalar) was not achieved across any of the 7 factors. This indicates that the respondent data does not perform consistently across these factors, with systematic differences between group means on latent factor scores due to differences on the common factors. This implies that respondents who identify as American Indian, Hispanic, or Non-Hispanic White interpret the individual questions, as well as that the underlying latent factors are different from members of the other groups. This study aimed to determine measurement invariance across three ethnic groups, and additional analyses are not reported in this document to determine measurement invariance between two-group combinations of the three ethnic groups. See Table 10.

Table 10. CFA Model Fit Statistics by Participant Characteristic by Model Type (N=500)

	χ^2 (df)	χ^2 Differences (df)	RMSEA	CFI : TLI	SRMR	Invariance by Level
Cigarette Use Factor						
Configural	1074.40 (42)		0.93	0.93 : 0.89	0.04	Yes
Configural/Metric		1050.95 (12)***				No
Metric/Scalar		316.44 (12)***				No
Summary	Measurement invariance was **NOT** achieved for Cigarette Use					
Alcohol Use						
Configural	445.91 (27)		0.07	0.98 : 0.96	0.03	Yes
Configural/Metric		159.27 (10)***				No
Metric/Scalar		200.16 (10)***				No
Summary	Measurement invariance was **NOT** achieved for Alcohol Use					

	χ^2 (df)	χ^2 Differences (df)	RMSEA	CFI : TLI	SRMR	Invariance by Level
Other Drug Use						
Configural	24565.18 (270)		0.18	0.63 : 0.56	0.11	No
Configural/Metric		482.18 (28)***				No
Metric/Scalar		406.01 (28)***				No
Summary	Measurement invariance was **NOT** achieved for Other Drug Use					
Sexual Activity						
Configural	445.91 (27)		0.07	0.98 : 0.96	0.03	Yes
Configural/Metric		159.27 (10)***				No
Metric/Scalar		200.16 (5)***				No
Summary	Measurement invariance was **NOT** achieved for Sexual Activity					
Eating Behaviors						
Configural	1603.55 (60)		0.09	0.93 : 0.90	0.05	Yes
Configural/Metric		268.07 (14)***				No
Metric/Scalar		1855.54 (14)***				No
Summary	Measurement invariance was **NOT** achieved for Eating Behaviors					
Physical Activity						
Configural	32.52 (6)		0.15	0.98 : 0.94	0.03	Yes
Configural/Metric		32.52 (6)***				No
Metric/Scalar		34.40 (6)***				No
Summary	Measurement invariance was **NOT** achieved for Physical Activity					
Resilience						
Configural	19959.31 (231)		0.18	0.61 : 0.53	0.12	Yes
Configural/Metric		555.67 (26)***				No
Metric/Scalar		2142.99 (26)***				No
Summary	Measurement invariance was **NOT** achieved for Resilience					

*** p < 0.05 ** p < 0.01 *** p < 0.001**

MI by Sexual Orientation on Six Health Behavior Factors and the Single Resilience Factor

Summary of MI by sexual orientation. Full measurement invariance (across all three successive levels – configural, metric, and scalar) was not achieved across any of the 7 factors. This indicates that the respondent data does not perform consistently across these factors, with systematic differences between group means on latent factor scores due to differences on the common factors. This implies that respondents who identify as straight or lesbian, gay, bisexual, interpret the individual questions - as well as the underlying latent factors - differently from members of the other group. See Table 11.

Additionally, select indicators within certain factors (Tobacco Use, Other Drug Use, and Resilience) were removed for the measurement invariance testing to terminate normally. The removed indicators were determined to have zero variance, which would not allow the testing to proceed due to zero cells in the bivariate tables. Information about the removed indicators is explained below for each factor.

Tobacco use. The first attempt to run the measurement invariance testing indicated that the configural, metric, and scalar models did not terminate normally due to zero variance on cigarette Question 40 ("During the past 30 days, on how many days did you smoke cigarettes on school property?") for the 'straight' self-identified group. This question for both groups was removed to estimate all 3 models adequately as recommended by Muthén and Muthén (1998-2011).

Other drug use. The first attempt to run the measurement invariance testing indicated that the configural, metric, and scalar models did not terminate normally due to

zero variance on the two drug use variables for the LGB group only: (1) Question 57 ("During your life, how many times have you used any form of cocaine, including powder, crack, or freebase?"); and (2) Question 58 ("During the past 30 days, how many times did you use any form of cocaine, including powder, crack, or freebase?"). These questions for both groups were removed to estimate all 3 models adequately.

Resilience. The first attempt to run the measurement invariance testing indicated that the configural, metric, and scalar models did not terminate normally due to zero variance on the for the LGB group on Question 103 ("At my school, there is a teacher or some other adult who believes that I will be a success."). This question was removed for both groups prior to measurement testing to estimate all 3 models adequately.

Table 11. CFA Model Fit Statistics by Participant Characteristic by Model Type (N=500)

	χ^2 (df)	χ^2 Differences (df)	RMSEA	CFI:TLI	SRMR	Invariance by Level
Cigarette Use Factor						
Configural	128.87 (18)		0.12	0.95 : 0.92	0.04	Yes
Configural/Metric		17.28 (5)***				No
Metric/Scalar		34.33 (5)***				No
Summary	Measurement invariance was **NOT** achieved for Cigarette Use					
Alcohol Use						
Configural	128.88 (18)		0.12	0.95 : 0.92	0.04	Yes
Configural/Metric		17.23 (5)***				No
Metric/Scalar		34.33 (5)***				No
Summary	Measurement invariance was **NOT** achieved for Alcohol Use					
Other Drug Use						
Configural	24565.18 (270)		0.18	0.63 : 0.56	0.11	No

	χ^2 (df)	χ^2 Differences (df)	RMSEA	CFI:TLI	SRMR	Invariance by Level
Configural/Metric		227.32 (12)***				No
Metric/Scalar		****				No
Summary	Measurement invariance was **NOT** achieved for Other Drug Use					
Sexual Activity						
Configural	128.88 (18)		0.12	0.95 : 0.92	0.04	Yes
Configural/Metric		17.22 (5)***				No
Metric/Scalar		34.33 (5)***				No
Summary	Measurement invariance was **NOT** achieved for Sexual Activity					
Eating Behaviors						
Configural	497.77 (40)		0.16	0.82 : 0.75	0.09	Yes
Configural/Metric		40.53 (7)***				No
Metric/Scalar		193.82 (7)***				No
Summary	Measurement invariance was **NOT** achieved for Eating Behaviors					
Physical Activity						
Configural	26.74 (4)		0.11	0.99 : 0.97	0.02	Yes
Configural/Metric		13.10 (3)***				No
Metric/Scalar		1.62 (3), p= 0.65				Yes
Summary	Measurement invariance was **NOT** achieved for Physical Activity					
Resilience						
Configural	2468.31 (130)		0.23	0.48 : 0.37	0.14	No
Configural/Metric		227.32 (12)***				No
Metric/Scalar		****				NO
Summary	Measurement invariance was **NOT** achieved for Resilience					

*** p < 0.05 ** p < 0.01 *** p < 0.001 ****Model unable to terminate normally (non-identified)**

MI by Age on Six Health Behavior Factors and the Single Resilience Factor

Summary of MI by age. Full measurement invariance (across all three successive levels – configural, metric, and scalar) was not achieved across any of the seven factors. This indicates that the respondent data does not perform consistently across these factors, with systematic differences between group means on latent factor scores due to differences on the common factors. This implies that respondents who identify, in one age group as being 14-15, or those in a second older age group of 16 years and older, interpret the individual questions and underlying latent factors differently from members of the other age group. See Table 12.

This study aimed to determine measurement invariance across two combined age groups (14-15 and 16-17 and older) groups. In order to determine age groups for measurement invariance testing, an exploratory two-step cluster analysis (TCA) was performed across the demographic (4 variables: age, sex, grade, and ethnicity), behavior (47 variables: cigarette use, alcohol use, drug use, sexual activity, eating behaviors, and physical activity), and resilience (13 variables) variables. This approach was used because it was able to accommodate dichotomous and categorical variables. The results of the TCA produced a two-cluster solution across the demographic, behavior, and resilience variables, indicating that the Cluster 1 group represented most of the students who were 14 and 15 years of age. Cluster 2 group represented most of the students who were 16 and 17 and older. Cluster 1, the younger age group, represented those students who did not engage or minimally engaged in any of the risk behaviors. Cluster 2, the older student group, represented those students who indicated higher rates of risk behavior engagement. Of the behavior variables used in the analysis, the sexual activity variables were more highly predictive of creating higher

contrasts between Cluster 1 and Cluster 2. Additionally, of the demographic variables, student age was more predictive of creating higher contrasts between Cluster 1 and Cluster 2. The TCA results were used to determine groups for comparison for measurement invariance testing.

Table 12. CFA Model Fit Statistics by Participant Characteristic by Model Type (N=500)

	χ^2 (df)	χ^2 Differences (df)	RMSEA	CFI : TLI	SRMR	Invariance by Level
Cigarette Use Factor						
Configural	355.78 (28)		0.26	0.79 : 0.68	0.15	No
Configural/Metric		47.53 (6)***				No
Metric/Scalar		39.20 (6)***				No
Summary	Measurement invariance was **NOT** achieved for Cigarette Use					
Alcohol Use						
Configural	72.82 (18)		0.10	0.96 : 0.93	0.04	Yes
Configural/Metric		28.66 (5)***				No
Metric/Scalar		7.80 (5), p= 0.17				Yes
Summary	Measurement invariance was **NOT** achieved for Alcohol Use					
Other Drug Use						
Configural	3080.55 (180)		0.19	0.63 : 0.57	0.11	No
Configural/Metric		87.39 (14)***				No
Metric/Scalar		21.33 (14), p= 0.09				Yes
Summary	Measurement invariance was **NOT** achieved for Other Drug Use					
Sexual Activity						
Configural	210.44 (18)		0.16	0.90 : 0.83	0.06	Yes
Configural/Metric		17.48 (5)***				No
Metric/Scalar		13.94 (5)**				No

	χ^2 (df)	χ^2 Differences (df)	RMSEA	CFI : TLI	SRMR	Invariance by Level
Summary	Measurement invariance was **NOT** achieved for Sexual Activity					
Eating Behaviors						
Configural	374.17 (40)		0.15	0.83 : 0.77	0.06	Yes
Configural/Metric		72.76 (7)***				No
Metric/Scalar		165.83 (7)***				No
Summary	Measurement invariance was **NOT** achieved for Eating Behaviors					
Physical Activity						
Configural	58.89 (4)		0.11	0.99 : 0.97	0.02	Yes
Configural/Metric		41.15 (3)***				No
Metric/Scalar		14.12 (3)**				No
Summary	Measurement invariance was **NOT** achieved for Physical Activity					
Resilience						
Configural	2777.47 (154)		0.21	0.59 : 0.52	0.13	No
Configural/Metric		74.08 (13)***				No
Metric/Scalar		120.64 (13)***				No
Summary	Measurement invariance was **NOT** achieved for Resilience					

*** p < 0.05 ** p < 0.01 *** p < 0.001**

Table 13. Summary Table of Measurement Invariance Testing for all Demographic Groups

	Demographic Group			
	Gender	**Ethnicity**	**Sexual Orientation**	**Age**
Tobacco Use	No	No	No	No
Alcohol Use	**Yes**	No	No	No
Other Drug Use	No	No	No	No
Sexual Activity	**Yes**	No	No	No
Eating Behaviors	No	No	No	No
Physical Activity	**Yes**	No	No	No
Resilience	**Yes**	No	No	No

Yes - Can compare factor scores across indicated group by behavior
No - Cannot compare factor scores across indicated group by behavior

Discussion

This study examined the co-variation within and between health behaviors and resilience indicators from the 2013 high school Youth Risk and Resiliency Survey (YRBS) in a large racially and ethnically diverse population (N=12,533) and tested for measurement invariance between age groups, gender, race/ethnicity, and sexual orientation. The results of this study indicate: (1) The use of confirmatory factor analysis (CFA) validated the four-factor structure, originally defined by Kulbok and Cox (2002), with similar strengths of associations and valences between each behavior factor; (2) A six-factor structure was also confirmed that was based on five of six behaviors that contribute most to adolescent death and disability (CDC, 2011b) – with equivalent model fit compared to the confirmed four-factor structure; (3) The single resilience factor was determined to positively correlate with all behavior factors; most strongly with the 'physical activity' factor and weakly with the 'sexual activity' factor; (4) Measurement invariance was established across gender and only across the 'alcohol use', 'sexual activity', 'physical activity', and 'resilience' factors.

Not only is this study unique in terms of investigating high-risk health behaviors of adolescents, but it also examined a resilience factor structure that is not included in the standard CDC Youth Risk Behavior Survey. Finally, this appears to be the first study that investigated the covariation of health behaviors within vulnerable populations (Native American and LGBT) previously not included in these types of analyses due to sample size limitations.

Confirmatory Factor Analysis

To our knowledge, this is the only study that has replicated the Kulbok and Cox (2002) four-factor structure of adolescent health behaviors within an ethnically/racially

diverse sample. The stability and strength of replicating the four-factor structure 11 years later indicates that conceptualizing certain adolescent health-risk behaviors as co-occurring phenomena is as valid in 2013 as it was in 2002. Although the four-factor structure indicated comparable model fit to the six-factor structure (which included an 'eating behavior' factor and allowed 'alcohol use' to become an independent factor), the benefit of the six-factor structure allowed for additional opportunities to investigate the covariation of a more comprehensive set of health behaviors.

Comparing interfactor correlations between the 2002 and 2013 models reveals an increase in the strength of the relationship between tobacco use, alcohol and other drug use, and sexual activity. These findings are consistent with those of other researchers who report positive correlations among the use of various types of substances and adolescent sexual behavior (Osgood & Wilson, 1991; Kulbok & Cox, 2002; Kulbok, Earls, & Montgomery, 1988; Jessor & Jessor, 1984; van Nieuwenhuijzen et al., 2009). The correlations of these variables for the large Native American sample in the current study are consistent with prior research that employed a large American Indian-only sample of adolescents (Potthoff, Bearinger, Skay, Cassuto, & Resnick, 1998).

In contrast to the four-factor structure, the expanded six-factor structure did not indicate a relationship between the 'physical activity' and 'sexual activity' factors. This result could be due to increased model complexity and increases in error variances on the 'physical activity' factor. Considering that the 'physical activity' factor exhibited unacceptable internal consistency, reliable conclusions cannot be made about either four- or six-factor interfactor correlations involving 'physical activity'.

Theory of Triadic Influence. The study's findings about substance use and sexual activity lend some validity to the Theory of Triadic Influence (TTI) (Flay, Snyder, & Petraitis, 2009). TTI has conceptualized some behaviors as being closely related due to very similar etiologies and experiences (see Figure 3). It organizes determinants into three streams (intrapersonal, interpersonal, and cultural) and at three levels of influence (proximal, distal, and ultimate). The ultimate level of influence includes determinants that are thought to be predictive of multiple behaviors but are typically beyond an individual's ability to modify (e.g., personality characteristics or the broader sociocultural environment). The multitude of causal paths and mediated/moderated influences are too numerous to be accounted for in any one study, which leads researchers to investigate only a few paths per study.

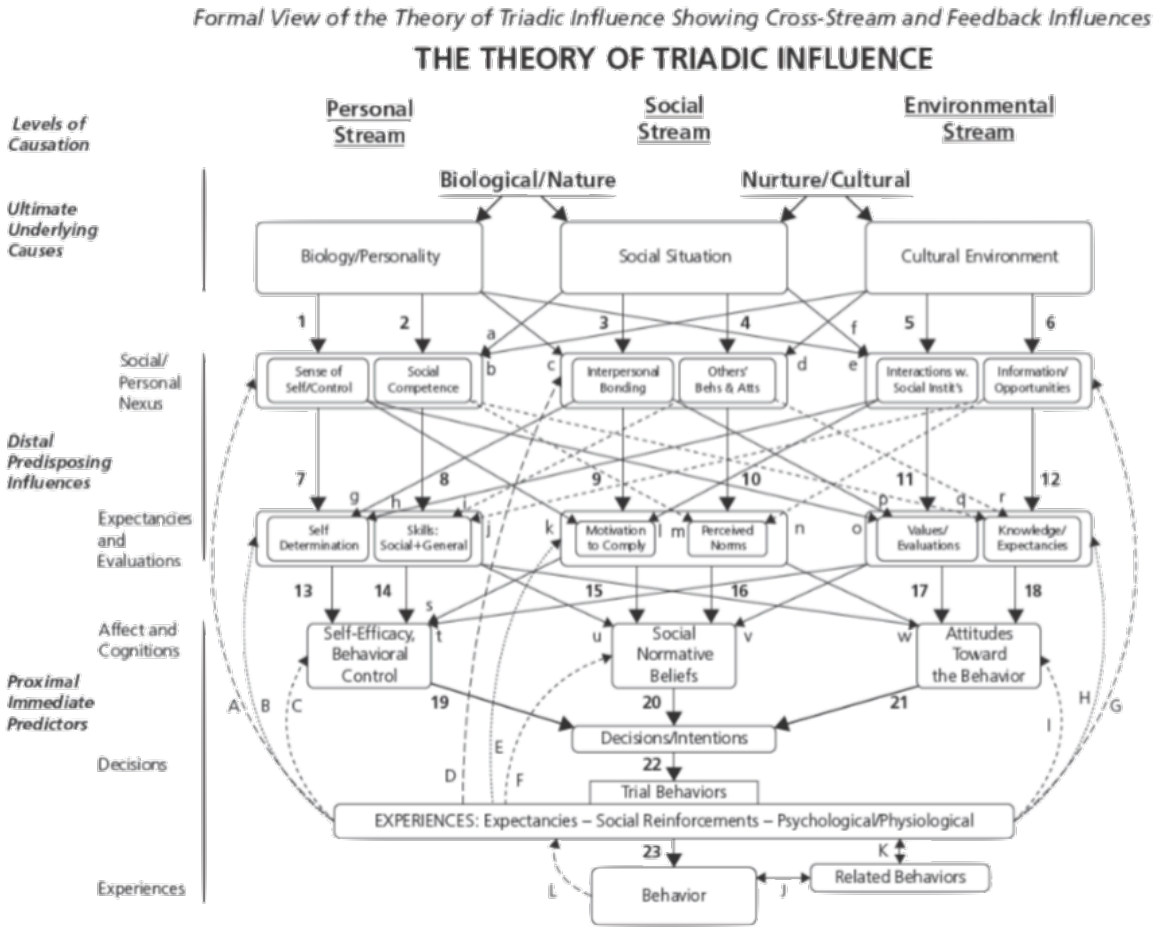


Figure 3. Formal View of the Theory of Triadic Influence.

According to the TTI, co-occurring behaviors can follow similar, overlapping, and inter-stream paths, suggesting that adolescents may engage in substance use and sexual activity to feel socially competent, adhere to social norms, develop interpersonal bonding, or gain a sense of behavioral self-control – and this can be mediated by affective and cognitive influences. In relation to sexual activity and substance use specifically, adolescents might use a substance to help them feel more comfortable with engaging in sexual activity, thereby lowering their inhibitions and their cognitive attitudes about sex. If the affective sexual

experience was pleasurable while under the influence of a substance, it may increase the likelihood of repeating these combined behaviors in the future, which may generalize to additional social contexts. This is only one causal example of how multiple behaviors can have similar social-cognitive determinants. Thus, it seems clear from the TTI that interventions should: (1) target multiple variables and (2) include the social context and (3) that addressing multiple causes should have greater and longer-lasting effects on more behaviors than interventions that do not address these three issues. For a full review of interventions based on TTI across many health domains see Flay, Snyder, and Petraitis (2009).

Theory of Transfer. The current study's findings of covariation between the multiple substance use factors and sexual activity also support the Theory of Transfer. This theory provides insight into why certain behaviors co-occur by understanding how acquired competencies in one behavior domain can be applied to other behavior domains (Perkins & Salomon, 1992). The degree of transfer may be facilitated to other behavior domains if they share enough similarities (i.e., socio-cognitive determinants [Barnett, & Ceci, 2002]), which is why Transfer can be seen as complimentary to the TTI. This suggests that if an adolescent changes one behavior (e.g., alcohol use), other behavior domains that share common determinants (e.g., sexual activity) may change as well. This would seem to support the current study's findings of strong interfactor correlations between substance use (tobacco, alcohol, and other drugs) with sexual activity.

An example of an intervention using principles of TTI and the Theory of Transfer was demonstrated by the Aban Aya Youth Project (Flay, Graumlich, Segawa, Burns, & Holliday, 2004). This intervention was designed to target multiple risk behaviors and build

health promoting behaviors (i.e., resilience attributes) among urban African American youth. Their multi-level intervention demonstrated that targeted efforts across ecological adolescent domains can be effective in reducing health risk behaviors while increasing health promoting ones. For instance, their school based climate intervention supports findings from the National Longitudinal Study of Adolescent Health (Add Health) studies, which demonstrate that when schools provide a climate where youth feel socially, emotionally, and physically safe and supported, they are less likely to use substances, engage in violence, or initiate sexual activity (McNeely, Nonnemaker, & Blum, 2002). This is especially true for LGBT students, where a positive school climate has been associated with decreases in depression, suicidal feelings, substance use, and unexcused absences (Espelage, Aragon, Birkett, & Koenig, 2008). Additional approaches across a variety of behaviors have been demonstrated using a TTI framework (see Flay, Snyder, & Petraitis, 2009 for a full review).

In accordance with the theories of Triadic Influence and Transfer, the observed low correlations between the substance use factors with the eating behavior factor and the physical activity factor in the current study suggest that this combination of behaviors may not be a candidate for an intervention that targets multiple behavior change. These behaviors do not appear to share enough determinants (to support TTI) or have similar shared acquired competencies to support transfer effects. This point does not appear to have been empirically tested, but it should be investigated to validate the theoretical underpinnings of TTI and Transfer.

Applying the Theory of Transfer appears to be promising for behavior change interventions. An adolescent intervention by Prochaska et al. (2004) targeted multiple behaviors and was effective in changing all targeted behaviors (compared to controls).

Unfortunately, other studies that targeted multiple behaviors were not particularly effective (e.g., Koelewijn-van Loon et al., 2010; Werch et al., 2010), possibly due to dissimilar health domain competences. It appears that a theory-guided approach to facilitating multiple behavior change is possible, but that it needs to be further refined among multiple population subgroups (i.e., Native American and LGBT) using longitudinal data.

Resilience Covariation with Health Behaviors

Despite the evidence that health-related risk behaviors can negatively impact one's physical and mental well-being, most studies have focused on clusters of health behaviors that increase one's risk of negative health outcomes. Minimal research attention has been paid to the relationship between psychosocial factors (e.g., resilience) and health behaviors. This is unfortunate, as resilience factors are often targets of health-promoting interventions (Clift & Jensen, 2005; Denman, 1999).

A resiliency approach provides a conceptual framework for understanding why some youth who are exposed to threats to their well-being do not exhibit the negative outcomes typically associated with those threats (Luthar, Sawyer, & Brown, 2006). One explanation is that personal and family assets that contribute to adolescent resiliency (Sharkey, You, & Schnoebelen, 2008) can foster healthier lifestyles by mitigating the effect of these threats (Rew & Horner, 2003). The current study examined peer, home, school, and community resilience factors, because they are known be protective against risky behaviors (Garmezy & Rutter, 1983, Zimmerman, Bingenheimer, & Notaro, 2002). Our results indicated that increases in resilience *risk* (i.e., a lack of or decreased engagement from peers, family, school, or home) were most associated with increases in physical activity risk (e.g., decreased physical activity, increased TV, video game, or computer time, and fewer days in

physical education class). This correlation makes sense in that decreased community engagement shown by the resilience indicators (lack of hobbies, sports involvement, extracurricular involvement, or social activities) and a lack of parental support/involvement would be associated with increased sedentary behaviors (e.g., increased television viewing, decreased physical activity, and increased time using electronic devices such as iPads and other gaming devices). This finding remains speculative considering the unacceptable internal reliability of the physical activity factor, but it should be explored using strongly validated measures of the construct.

The covariance of increased resilience risk (i.e., decreased parental support/involvement, pro-social peers, and community engagement) with substance use risk (i.e., cigarette use, alcohol use, and other drug use) suggests approaching these behaviors as a combined intervention target. Previous findings that supportive parenting and parental supervision can protect against smoking (Jackson, Henriksen, Dickinson, & Levine, 1997; Nowlin & Colder, 2007) and drinking (Cohen, Richardson, & LaBree, 1994; Petrie, Bunn, & Byrne, 2007; Steinberg, Lamborn, Dornbusch, & Darling, 1992) are in line with this considered approach. This suggests that the likelihood of engagement in health risk behaviors could be decreased by promoting adolescent resilience, by focusing efforts on improvements in neighborhood quality and school environment, and by promoting policies to bolster family social and economic resources (Rew & Horner, 2003).

Although the problematic nature of health risk behaviors overall receives more attention in the literature, it is important to consider how health promoting behaviors such as resilience factors can be used in tandem to inform and strengthen prevention and intervention initiatives that target multiple behaviors. This is crucial in light of past findings

demonstrating that low family attachment, strong peer orientation, and low school attachment are among the strongest correlates of high engagement in substance use and sexual activity (Buhi & Goodson, 2007; Engels, Knibbe, & Drop, 1999; Engels & ter Bogt, 2001; Hummel, Shelton, Heron, Moore, & Bree, 2013).

Measurement Invariance

While there is growing awareness for the need to examine the etiology of problem behaviors across cultural, racial, socioeconomic, and gender groups, much research tends to assume that constructs are equivalent and that the measures developed within one group equally assess constructs across groups. The meaning of constructs, however, may differ across groups. And even if the constructs are similar in meaning, measures developed for a given construct in one particular group may not be assessing the same construct or may not be assessing the construct in the same manner in other groups.

According to the APA (1999), methodological guidelines have been set forth to recommend that researchers perform validity tests of psychological assessment tools, such as assessments of measurement invariance, between groups of interest before using them to explore differences among those groups. Without measurement invariance, inferences drawn from these surveys may be based on flawed assumptions. Since intervention and prevention strategies often derive their information from state and national surveys, it is critical to confirm measurement invariance across these groups of interest in such surveys.

To our knowledge, no other study has conducted measurement invariance testing across the broad set of health behaviors and resilience factors simultaneously using the Youth Risk Behavior Survey or the New Mexico specific Youth Risk and Resiliency Survey. The results indicated that full measurement invariance was only achieved for the following

factors within *gender* only: (1) Alcohol use; (2) Sexual Activity; (3) Physical Activity; and (4) Resilience. This suggests that respondent data perform consistently across these factors for females and males in that they interpret the individual questions and the underlying latent factors in the same way. This would allow for meaningful comparison of mean factor scores to determine which gender group is at a higher risk for alcohol use, sexual activity, lack of physical activity, and lack of external resilience attributes (e.g., minimal parent supervision/involvement, minimal adults caring about their success or whereabouts, and peers who engage in deviant behavior).

As for the results of gender comparisons for the current study for one factor, alcohol use, the mean was not significantly different by gender. Thus, prevention/intervention efforts should be aimed at both male and female adolescents. Furthermore, the results showed that females and males of *each* ethnic/racial group should be targeted. However, the mean difference for alcohol risk did differ statistically by gender for age groups, with the 16 and older age group having a higher mean alcohol risk for males. This means that it is important to specifically target male alcohol risk among those who are 16 and older. Additionally, our findings also indicate that statistically significant mean risk differences exist by gender and sexual activity (higher male risk), physical activity (higher female risk), and resilience (higher male risk). This warrants further within-group investigations by race/ethnicity, age, and sexual orientation for tailored programmatic prevention and intervention efforts.

The lack of measurement invariance for the majority of factors across the four demographic groups remains problematic, but suggests that there are opportunities to explore these non-invariant differences through qualitative approaches that might better inform how and why each group may perceive each latent factor differently. Considering that this study

included subgroups that have typically been excluded from similar analyses (e.g., Native American and lesbian, gay, and bisexual students) but which oftentimes have been at a higher risk for developing problematic behaviors with increased negative health outcomes (Coker, Austin, & Schuster, 2010; Kann, 2011; Russell, Ryan, Toomey, Diaz, & Sanchez, 2011; Walls, Whitbeck, Hoyt, & Johnson, 2007), the results suggest that it is important to investigate the source of their differential responding to health behaviors and resilience variables.

Recommendations

Although more is known about specific single behaviors and the factors associated with their onset, maintenance, and negative outcomes, investigations into health behavior covariation has been more prominent between substance use, sexual activity, and vehicle use (Windle, 2000). This approach may have several important policy, theoretical, and treatment implications. First, if several types of adolescent behaviors covary and have similar correlates and antecedents, then designing separate interventions for each specific behavior may be inefficient. The use of tobacco or alcohol or other drugs as well as sexual activity among adolescents should be recognized as a warning for co-occurring risk behaviors. As such, this implies that a substance use prevention/intervention program should focus simultaneously on other co-occurring risk behaviors. Second, examining each behavior in isolation from the others may limit our understanding about the nature and origins of each behavior (Busch, Van Stel, Schrijvers, & de Leeuw, 2013).

Furthermore, it is equally important to understand the resilience factors that assist in promoting health. These factors are present in various domains, including the social environment, the youth's perceived environment, the youth's values, and the youth's protective behaviors. Preventing health-compromising behaviors and promoting health-enhancing behaviors are complementary objectives, and they require attention to physical, social, psychological, and personal health domains (Perry & Jessor, 1985). This approach also supports the Theory of Transfer, which can be used to further explain the determinants of co-occurring behaviors by explicitly evaluating behavior change in related behavior domains. This has been demonstrated in the adult behavior change literature with obese adults (Mata et al., 2009) and individuals with substance use disorders (Weinstock, Barry, &

Petry, 2008). Transfer effects within adolescent populations have been reported in various subject domains in the education sector (Alexander, 2005; Mayer & Wittrock, 1996), but to our knowledge, the explicit examination of transfer effects within heath risk domains for adolescents has occurred in only one study that primarily focused on physical activity and nutrition (Prochaska & Sallis, 2004).

From a research perspective, these study designs were planned to assess Transfer effects within a set of behaviors; however, in non-research/academic settings where interventions are implemented (mostly single behavior interventions) program evaluators do not typically examine explicit transfer effects, as the focus is typically directed towards outcome measures. We would recommend that if single-behavior interventions are implemented, and those behaviors are known to co-occur with other behaviors, evaluation agendas should make explicit efforts to measure the degree of change that the primary behavior target may have had on other related behaviors.

Limitations

School-based surveys of adolescents often underestimate substance use within this population, as substance use rates are higher among adolescents who drop out of school and thus do not complete the surveys (Chavez, Edwards, & Oetting, 1989; Swaim, Beauvais, Chavez, & Oetting, 1997). This means that our results are only generalizable to adolescents who attend school. Also, since our analyses were only focused on students with complete data for the variables of interest, we observed a relatively high percentage of respondents with missing data (34%). A comparison between respondents with missing and complete data revealed that missing data respondents exhibited higher endorsements of problematic substance use, sexual activity, low physical activity, poorer eating habits, and low resilience

engagement within their homes, schools, and communities. This population warrants further investigation that could only be achieved by using multiple imputation techniques, which were beyond the scope of the current study.

Although this secondary data analysis allowed us to investigate a research question for populations that are typically difficult to reach (e.g., Native American and LGBT), we encountered some challenges that are typical with pre-collected data from large surveys. There has been a large length of time since this instrument has undergone reliability and validity testing. This creates concerns for the appropriateness and understanding of the language used for certain items, which could contribute to unreliable responses that may have influenced our results.

Additionally, while it is understood that this instrument is epidemiological in purpose and design, and while the response options may suit epidemiological needs for health surveillance, item response options were problematic in terms of time scale inconsistencies within each health domain. Some questions anchored the response to time periods ranging from a lifetime, past year, past 30 days, and past week. For the investigation of co-occurring behaviors, one behavior may have occurred out of the time scale of another behavior, which may have influenced our results.

Future Directions

The results of this project contribute to the literature on the importance of empirically examining measurement equivalency and the expanded relationship of co-occurring behaviors. Future research should: (1) Seek to understand the synergistic effects of co-occurring health behaviors on overall health outcomes; (2) Aim to test the theoretical underpinnings of the Theory of Triadic Influence and the Theory of Transfer through

longitudinal study designs that explore developmental profiles of health behaviors mediated/moderated by psychological resilience factors; and (3) Examine the consistency of measurement equivalency in other health behavior and resilience-related measurements similar to the YRRS instrument.

References

Adhikari, B., Kahende, J., Malarcher, A., Pechacek, T., & Tong, V. (2009). Smoking attributable mortality, years of potential life lost, and productivity losses—United States, 2000-2004. *JAMA: Journal of The American Medical Association*, *301*(6), 593–594.

Alexander, P. A. (2005). *Psychology in learning and instruction*. Prentice Hall.

Ambrosini, G. L., Oddy, W. H., Robinson, M., O'Sullivan, T. A., Hands, B. P., De Klerk, N. H., ... & Beilin, L. J. (2009). Adolescent dietary patterns are associated with lifestyle and family psycho-social factors. *Public health nutrition*, *12*(10), 1807–1815.

American Educational Research Association, American Psychological Association, National Council on Measurement in Education, Joint Committee on Standards for Educational, & Psychological Testing (US). (1999). *Standards for educational and psychological testing*. Amer Educational Research Assn.

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders DSM-IV-TR fourth edition (text revision).

American Psychological Association. (2002). Developing adolescents: A reference for professionals. *Washington, DC: American Psychological Association*.

Anderson, B. J., & Stein, M. D. (2011). A behavioral decision model testing the association of marijuana use and sexual risk in young adult women. *AIDS and Behavior*, *15*(4), 875–884.

Arnett, J.J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5): 469–480.

Ary, D. V., Tildesley, E., Hops, H., & Andrews, J. (1993). The influence of parent, sibling, and peer modeling and attitudes on adolescent use of alcohol. *Substance Use & Misuse*, *28*(9), 853-880.

Asbridge, M., Hayden, J. A., & Cartwright, J. L. (2012). Acute cannabis consumption and motor vehicle collision risk: Systematic review of observational studies and meta-analysis. *BMJ: British Medical Journal*, *344*(7846), 1–9.

Avery, L. L., & Lazdane, G. G. (2008). What do we know about sexual and reproductive health of adolescents in Europe?. *European Journal Of Contraception & Reproductive Health Care*, *13*(1), 58–70.

Barnett, S. M., & Ceci, S. J. (2002). When and where do we apply what we learn?: A taxonomy for far transfer. *Psychological bulletin*, *128*(4), 612.

Bava, S., & Tapert, S. F. (2010). Adolescent brain development and the risk for alcohol and other drug problems. *Neuropsychology Review*, *20*(4), 398–413.

Bellis, M. A., Hughes, K., Calafat, A., Juan, M., Ramon, A., Rodriguez, J. A., ... & Phillips-Howard, P. (2008). Sexual uses of alcohol and drugs and the associated health risks: a cross sectional study of young people in nine European cities. *BMC Public Health*, *8*(1), 155.

Biddle, S., Cavill, N., & Sallis, J. F. (Eds.). (1998). *Young and active?: Young people and health-enhancing physical activity: evidence and implications*. Health Education Authority.

Branstetter, S. A., Low, S., & Furman, W. (2011). The influence of parents and friends on adolescent substance use: a multidimensional approach. *Journal of Substance Use*, *16*(2), 150–160.

Brener, N., & Collins, J. (1998). Co-occurrence of health-risk behaviors among adolescents in the United States. *Journal of Adolescent Health*, *22*(3), 209–213.

Brindis, C. D., Millstein, S. G., Knopf, D. K., & Irwin, C. E. (1998). *America's adolescents: Are they healthy?* National Adolescent Health Information Center, Division of Adolescent Medicine, Department of Pediatrics and Institute for Health Policy Studies, School of Medicine, University of California, San Francisco.

Brody, G. H., Conger, R., Gibbons, F. X., Ge, X., McBride Murry, V., Gerrard, M., & Simons, R. L. (2001). The influence of neighborhood disadvantage, collective socialization, and parenting on African American children's affiliation with deviant peers. *Child Development*, *72*(4), 1231–1246.

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. Sociological Methods and Research, 21, 230–258.

Brown, J. D., & Witherspoon, E. M. (2002). The mass media and American adolescents' health. *Journal of Adolescent Health*, *31*(6), 153–170.

Bryan, A. D., Schmiege, S. J., & Magnan, R. E. (2012). Marijuana use and risky sexual behavior among high-risk adolescents: trajectories, risk factors, and event-level relationships. *Developmental Psychology*, *48*(5), 1429.

Buhi, E. R., & Goodson, P. (2007). Predictors of adolescent sexual behavior and intention: A theory-guided systematic review. *Journal of Adolescent Health*, *40*(1), 4-21.

Busch, V., Van Stel, H. F., Schrijvers, A. J., & de Leeuw, J. R. (2013). Clustering of health-related behaviors, health outcomes and demographics in Dutch adolescents: a cross-sectional study. *BMC Public Health*, *13*(1), 1.

Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological bulletin*, *105*(3), 456.

Centers for Disease Control and Prevention. (2003). Dietary intake of ten key nutrients for public health, United States, 1999-2000. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2003.

Centers for Disease Control and Prevention. (2011a). HIV Among Youth. Retrieved from http://www.cdc.gov.libproxy.unm.edu/hiv/pdf/library_factsheet_HIV_amongYouth.pdf

Centers for Disease Control and Prevention. (2011b). Youth Risk Behavior Surveillance – United States, vol. 4. 61st ed. Atlanta: MMWR 2011: 24–29.

Centers for Disease Control and Prevention. (2013). Alcohol Related Disease Impact (ARDI) application, 2013. Retrieved from http://apps.nccd.cdc.gov/DACH_ARDI/Default.aspx

Chavez, E. L., Edwards, R., & Oetting, E. R. (1989). Mexican American and white American school dropouts' drug use, health status, and involvement in violence. *Public Health Reports*, *104*(6), 594.

Chen, C., & Farruggia, S. (2002). Culture and adolescent development. In W. J. Lonner, D. L. Dinnel, S. A. Hayes, & D. N. Sattler (Eds.), *Online Readings in Psychology and Culture* (Unit 11, Chapter 2), Center for Cross-Cultural Research, Western Washington University, Bellingham, Washington USA.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural equation modeling*, *9*(2), 233–255.

Cicchetti, D. (2013). Annual research review: resilient functioning in maltreated children–past, present, and future perspectives. *Journal of Child Psychology and Psychiatry*, *54*(4), 402–422.

Clift, S., & Jensen, B. B. (2005). *The health promoting school: International advances in theory, evaluation and practice*. Copenhagen: Danish University of Education Press.

Cobb, C., Ward, K. D., Maziak, W., Shihadeh, A. L., & Eissenberg, T. (2010). Waterpipe tobacco smoking: an emerging health crisis in the United States. *American journal of health behavior*, *34*(3), 275.

Cohen, D. A., Richardson, J., & LaBree, L. (1994). Parenting behaviors and the onset of smoking and alcohol use: a longitudinal study. *Pediatrics*, *94*(3), 368-375.

Coker, T. R., Austin, S. B., & Schuster, M. A. (2010). The health and health care of lesbian, gay, and bisexual adolescents. *Annual review of public health*, *31*, 457-477.

Costello, A. B., & Osborne, J. W. (2011). Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation, 10*, 1–9.

Darroch, J., Singh, S., & Frost, J. (2001). Differences in teenage pregnancy rates among five developed countries: the roles of sexual activity and contraceptive use. *Family Planning Perspectives*, *33*(6), 244.

De La Haye, K., Robins, G., Mohr, P., & Wilson, C. (2011). How physical activity shapes, and is shaped by, adolescent friendships. *Social Science & Medicine*, *73*(5), 719–728.

Denman, S. (1999). Health promoting schools in England-a way forward in development. *Journal of Public Health*, *21*(2), 215-220.

DiClemente, R. J., Hansen, W. B., & Ponton, L. E. (Eds.). (1996). *Handbook of adolescent health risk behavior*. Springer.

Donenberg, G. R. (2005). Youths and HIV/AIDS: Psychiatry's role in a changing epidemic. *Journal of the American Academy of Child & Adolescent Psychiatry*, *44*(8), 728–747.

Donovan, J. E., & Jessor, R. (1985). Structure of problem behavior in adolescence and young adulthood. *Journal of Consulting and Clinical Psychology*, *53*(6), 890.

Dunn, M. S., Ilapogu, V., Taylor, L., Naney, C., Blackwell, R., Wilder, R., & Givens, C. (2008). Self‐reported substance use and sexual behaviors among adolescents in a rural state. *Journal of School Health*, *78*(11), 587–593.

Engels, R. C., Knibbe, R. A., & Drop, M. J. (1999). Why do late adolescents drink at home? A study on psychological well-being, social integration and drinking context. *Addiction Research*, *7*(1), 31-46.

Engels, R. C., & ter Bogt, T. (2001). Influences of risk behaviors on the quality of peer relations in adolescence. *Journal of youth and adolescence*, *30*(6), 675-695.

Escobedo, L. G., Reddy, M., & DuRant, R. H. (1997). Relationship between cigarette smoking and health risk and problem behaviors among US adolescents. *Archives of Pediatric and Adolescent Medicine, 151*(1), 66–71.

Espelage, D. L., Aragon, S. R., Birkett, M., & Koenig, B. W. (2008). Homophobic teasing, psychological outcomes, and sexual orientation among high school students: What influence do parents and schools have?. *School Psychology Review*, *37*(2), 202.

Faden, V. B. (2006). Trends in initiation of alcohol use in the United States 1975 to 2003. *Alcoholism: Clinical and Experimental Research*, *30*(6), 1011–1022.

Farhat, T., Iannotti, R. J., & Simons-Morton, B. G. (2010). Overweight, obesity, youth, and health-risk behaviors. *American journal of preventive medicine*, *38*(3), 258–267.

Federal Interagency Forum on Child and Family Statistics. (2013). *America's Children: Key National Indicators of Well-Being*. Washington, DC: U.S. Government Printing Office.

Fergus, S., & Zimmerman, M. A. (2005). ADOLESCENT RESILIENCE: A Framework for Understanding Healthy Development in the Face of Risk. *Annual Review Of Public Health*, *26*(1), 399–419

Finer, L. B., & Philbin, J. M. (2013). Sexual initiation, contraceptive use, and pregnancy among young adolescents. *Pediatrics*, *131*(5), 886–891.

Flay, B. R., Graumlich, S., Segawa, E., Burns, J. L., & Holliday, M. Y. (2004). Effects of 2 prevention programs on high-risk behaviors among African American youth: a randomized trial. *Archives of Pediatrics & Adolescent Medicine*, *158*(4), 377-384.

Flay, B. R., Snyder, F., & Petraitis, J. (2009). The theory of triadic influence. *Emerging theories in health promotion practice and research*, *2*, 451–510.

Garmezy, N. E., & Rutter, M. E. (1983). Stress, coping, and development in children. In *Seminar on Stress and Coping in Children, 1979, Ctr for Advanced Study in the Behavioral Sciences, Stanford, CA, US*. Johns Hopkins University Press.

Gardner, M., & Steinberg, L. (2005). Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: An experimental study. *Developmental Psychology*, *41*(4), 625.

Gilman, S. E., Rende, R., Boergers, J., Abrams, D. B., Buka, S. L., Clark, M. A., et al. (2009). Parental smoking and adolescent smoking initiation: An intergenerational perspective on tobacco control. *Pediatrics, 123*(2), e274–e281.

Grant, B. F., Dawson, D. A., Stinson, F. S., Chou, S. P., Dufour, M. C., & Pickering, R. P. (2006). The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence. *Alcohol Research and Health*, *29*(2), 79–91.

Green D, Peñaloza L, & FitzGerald C. (2012). New Mexico Youth Risk & Resiliency Survey: High School Survey Results 2011. Epidemiology and Response Division, New Mexico Department of Health, School and Family Support Bureau, New Mexico Public Education Department, and University of New Mexico Prevention Research Center.

Gregorich, S. E. (2006). Do self-report instruments allow meaningful comparisons across diverse population groups? Testing measurement invariance using the confirmatory factor analysis framework. *Medical care*, *44*(11 Suppl 3), S78.

Grossman, M., Kaestner, R., & Markowitz, S. (2004). Get high and get stupid: The effect of alcohol and marijuana use on teen sexual behavior. *Review of Economics of the Household*, *2*(4), 413–441.

Guo, J., Chung, I. J., Hill, K. G., Hawkins, J. D., Catalano, R. F., & Abbott, R. D. (2002). Developmental relationships between adolescent substance use and risky sexual behavior in young adulthood. *Journal of Adolescent Health*, *31*(4), 354–362.

Hanewinkel, R., Isensee, B., Sargent, J. D., & Morgenstern, M. (2011). Cigarette advertising and teen smoking initiation. *Pediatrics, 127*(2), e271–e278.

Hanson, T. L., & Kim, J. O. (2007). Measuring resilience and youth development: The psychometric properties of the Healthy Kids Survey. *Issues & Answers Report, REL*, (034).

Hummel, A., Shelton, K. H., Heron, J., Moore, L., & Bree, M. (2013). A systematic review of the relationships between family functioning, pubertal timing and adolescent substance use. *Addiction*, *108*(3), 487-496.

Hyattsville, M. D. (2012). Health, United States 2011 With Special Feature on Socioeconomic Status and Health Table 94; p310. *National Center for Health Statistics*.

Jackson, C., Henriksen, L., Dickinson, D., & Levine, D. W. (1997). The early use of alcohol and tobacco: its relation to children's competence and parents' behavior. *American Journal of Public Health*, *87*(3), 359-364.

Jessor, R. (1991). Risk behavior in adolescence: a psychosocial framework for understanding and action. *Journal of adolescent Health*, *12*(8), 597–605.

Jessor, R., & Jessor, S. L. (1977). Problem behavior and psychosocial development: A longitudinal study of youth.

Jessor, R., & Jessor, S. L. (1984). Adolescence to young adulthood: A twelve-year prospective study of problem behavior and psychosocial development. *Handbook of longitudinal research*, *2*, 34-61.

Johnston, L. D., O'Malley, P. M., Miech, R. A., Bachman, J. G., & Schulenberg, J. E. (2014). Monitoring the Future national results on drug use: 1975-2013: Overview, Key Findings on Adolescent Drug Use. Ann Arbor: Institute for Social Research, The University of Michigan.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Scientific Software International.

Kann, L. (2011). *Sexual identity, sex of sexual contacts, and health-risk behaviors among students in grades 9-12: Youth risk behavior surveillance, selected sites, United States, 2001-2009* (Vol. 60, No. 7). DIANE Publishing.

King, K. A., Tergerson, J. L., & Wilson, B. R. (2008). Effect of social support on adolescents' perceptions of and engagement in physical activity. *Journal Of Physical Activity & Health*, *5*(3), 374–384.

Kipke, M. D. (1999). *Risks and opportunities: Synthesis of studies on adolescence*. National Academies Press.

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford publications.

Koelewijn-van Loon, M. S., van der Weijden, T., Ronda, G., van Steenkiste, B., Winkens, B., Elwyn, G., & Grol, R. (2010). Improving lifestyle and risk perception through patient involvement in nurse-led cardiovascular risk management: a cluster-randomized controlled trial in primary care. *Preventive medicine*, *50*(1), 35-44.

Kost, K., & Henshaw, S. (2012). US teenage pregnancies, births and abortions, 2008: National trends by age, race and ethnicity. *New York: Guttmacher Institute. Retrieved from http://www. guttmacher. org/pubs/USTPtrends08. pdf*.

Kulbok, P. A., & Cox, C. L. (2002). Dimensions of adolescent health behavior. *Journal of Adolescent Health*, *31*(5), 394–400.

Kulbok, P. P., Earls, F. J., & Montgomery, A. C. (1988). Life style and patterns of health and social behavior in high-risk adolescents. *Advances in Nursing Science*, *11*(1), 22-35.

Lammers, C., Ireland, M., Resnick, M., & Blum, R. (2000). Influences on adolescents' decision to postpone onset of sexual intercourse: A survival analysis of virginity among youths aged 13 to 18 years. *Journal of Adolescent Health*, *26*(1), 42–48.

Lawrence, R. S., Gootman, J., & Sim, L. J. (2009). *Adolescent health services: Missing opportunities*. Washington, DC US: National Academies Press.

Lerner, R. M., & Galambos, N. (1998). Adolescent development: Challenges and opportunities for research, programs, and policies. In J. T. Spence (Ed.), *Annual review of psychology* (Vol. 49, pp. 413–446). Palo Alto, CA: Annual Reviews.

Lowry, R., Kann, L., Collins, J. L., & Kolbe, L. J. (1996). The effect of socioeconomic status on chronic disease risk behaviors among us adolescents. *JAMA: Journal of The American Medical Association*, *276*(10), 792–797.

Luthar, S. S., Sawyer, J. A., & Brown, P. J. (2006). Conceptual issues in studies of resilience. *Annals of the New York Academy of Sciences*, *1094*(1), 105–115.

Lytle, L., Kelder, S., Perry, C., & Klepp, K. (1995). Covariance of adolescent health behaviors: the class of 1989 study. *Health Education Research*, *10*(2), 133–146.

MacKellar, D. A., Valleroy, L. A., Hoffmann, J. P., Glebatis, D., LaLota, M., McFarland, W., ... & Kihuguru, S. M. (2000). Gender differences in sexual behaviors and factors associated with nonuse of condoms among homeless and runaway youths. *AIDS Education and Prevention*, *12*(6), 477–91.

Masten, A. S. (2004). Regulatory processes, risk, and resilience in adolescent development. *Annals of the New York Academy of Sciences*, *1021*(1), 310–319.

Masten, A. S. (2006). Developmental psychopathology: Pathways to the future. *International Journal of Behavioral Development*, *30*(1), 47–54.

Masten, A. S. (2014). Global Perspectives on Resilience in Children and Youth. *Child development*, *85*(1), 6–20.

Masten, A. S., & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist*, *53*(2), 205.

Masten, A. S., & Gewirtz, A. H. (2006). Vulnerability and resilience in early child development. *Blackwell handbook of early childhood development*, 22–43.

Masten, A. S., & Obradović, J. (2006). Competence and resilience in development. *Annals of the New York Academy of Sciences*, *1094*(1), 13–27.

Masten, A. S., & Powell, J. L. (2003). A resilience framework for research, policy, and practice. In S. S. Luthar (Ed.), *Resilience and vulnerability: Adaptation in the context of childhood adversities* (pp. 1-25). New York, NY US: Cambridge University Press.

Masten, A. S., Faden, V. B., Zucker, R. A., & Spear, L. P. (2008). Underage drinking: A developmental framework. *Pediatrics*, *121*(Supplement 4), S235-S251.

Masten, A. S., Burt, K. B., & Coatsworth, J. (2006). Competence and psychopathology in development. In D. Cicchetti, D. J. Cohen (Eds.), *Developmental psychopathology, Vol 3: Risk, disorder, and adaptation (2nd ed.)* (pp. 696-738). Hoboken, NJ US: John Wiley & Sons Inc.

Mata, J., Silva, M. N., Vieira, P. N., Carraça, E. V., Andrade, A. M., Coutinho, S. R., ... & Teixeira, P. J. (2009). Motivational "spill-over" during weight control: Increased self-determination and exercise intrinsic motivation predict eating self-regulation. *Health Psychology*, *28*(6), 709.

Mayer, R. E., & Wittrock, M. C. (1996). Problem-solving transfer. *Handbook of educational psychology*, 47-62.

McLanahan, S., Haskins, R., Paxson, C., & Sawhill, I. (2010). Transition to Adulthood. *The Future of Children, 20*(1).

McNeely, C. A., Nonnemaker, J. M., & Blum, R. W. (2002). Promoting school connectedness: Evidence from the national longitudinal study of adolescent health. *Journal of school health*, *72*(4), 138-146.

Meier, M. H., Caspi, A., Ambler, A., Harrington, H., Houts, R., Keefe, R. S., ... & Moffitt, T. E. (2012). Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proceedings of the National Academy of Sciences*, *109*(40), E2657-E2664.

Meredith, W., & Millsap, R. E. (1992). On the misuse of manifest variables in the detection of measurement bias. *Psychometrika*, *57*(2), 289-311.

Miller, J. W., Naimi, T. S., Brewer, R. D., & Jones, S. E. (2007). Binge drinking and associated health risk behaviors among high school students. *Pediatrics*, *119*(1), 76–85.

Millstein, S. G., & Moscicki, A. B. (1995). Sexually transmitted disease in female adolescents: Effects of psychosocial factors and high-risk behaviors. *Journal of Adolescent Health*, *17*(2), 83–90.

Millstein, S. G., Petersen, A. C., & Nightingale, E. O. (1994). *Promoting the health of adolescents: New directions for the twenty-first century*. Oxford University Press.

Mulye, T., Park, M., Nelson, C. D., Adams, S. H., Irwin, C. R., & Brindis, C. D. (2009). Trends in adolescent and young adult health in the United States. *Journal of Adolescent Health*, *45*(1), 8–24.

Muthén, B.O. (1984), A general structural equation model with dichotomous, ordered, categorical, and continuous latent variable indicators. *Pychometrika*, 49, 115132.

Muthén, B., & Kaplan, D. (1992). A comparison of some methodologies for the factor analysis of non‐normal Likert variables: A note on the size of the model. *British Journal of Mathematical and Statistical Psychology*, *45*(1), 19–30.

Muthén, L. K., & Muthén, B. O. (1998-2011). Mplus User's Guide. Sixth Edition. Los Angeles, CA: Muthén & Muthén.

Muthén, L. K., & Muthén, B. (2001). *Mplus: Statistical analysis with latent variables*. Los Angeles: Muthén & Muthén.

Muthén, B., Du Toit, S. H., & Spisic, D. (1997). Robust inference using weighted least squares and quadratic estimating equations in latent variable modeling with categorical and continuous outcomes. *Psychometrika*, *75*, 1–45.

Nader, P. R., Bradley, R. H., Houts, R. M., McRitchie, S. L., & O'Brien, M. (2008). Moderate-to-vigorous physical activity from ages 9 to 15 years. *Journal of the American Medical Association*, *300*(3), 295–305.

National Center on Addiction and Substance Abuse. (2011). Adolescent Substance Use: America's #1 Public Health Problem. Retrieved from http://www.casacolumbia.org/addiction-research/reports/adolescent-substance-use

National Institute on Alcohol Abuse and Alcoholism. (2013). Underage drinking: A growing health care concern. Retrieved from http://pubs.niaaa.nih.gov/publications/PSA/underagepg2.htm

National Institute on Drug Abuse. (2014). Drug Facts Marijuana [Fact sheet]. Retrieved from http://www.drugabuse.gov/sites/default/files/drugfactsmarijuana2014.pdf.

Neumark-Sztainer, D., Story, M., Hannan, P. J., & Croll, J. (2002). Overweight status and eating patterns among adolescents: where do youths stand in comparison with the healthy people 2010 objectives?. *American Journal of Public Health*, *92*(5), 844–851.

Nowlin, P. R., & Colder, C. R. (2007). The role of ethnicity and neighborhood poverty on the relationship between parenting and adolescent cigarette use. *Nicotine & Tobacco Research*, *9*(5), 545-556.

Nunnally, J. C., & Bernstein, I. H. (1994). The assessment of reliability. *Psychometric theory*, *3*(1), 248-292.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Jama*, *311*(8), 806–814.

Ohye, B.Y., & Daniel, J.H. (1999). The "other" adolescent girls: Who are they? In N. Johnson, M. Roberts, & J. Worell (Eds.), Beyond appearance: A new look at adolescent girls. Washington, DC: American Psychological Association.

O'Loughlin, J. O., Karp, I., Koulis, T., Paradis, G., & DiFranza, J. (2009). Determinants of first puff and daily cigarette smoking in adolescents. *American Journal of Epidemiology, 170*(5), 585–597.

Olsson, U. (1979). Maximum likelihood estimation of the polychoric correlation coefficient. *Psychometrika*, *44*(4), 443–460.

Osgood, D. W., & Wilson, J. K. (1991). Covariation among health-compromising behaviors in adolescence. In *A background paper for the Adolescent Health Project of the US Congress, Office of Technoloogy Assessment. Springfield, VA: National Technical Information Service*.

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: A review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry*, *18*(2), 189–193.

Perkins, D. N., & Salomon, G. (1992). Transfer of learning. *International encyclopedia of education*, *2*, 6452–6457.

Perry, C. L., & Jessor, R. (1985). The concept of health promotion and the prevention of adolescent drug abuse. *Health Education & Behavior*, *12*(2), 169-184.

Petrie, J., Bunn, F., & Byrne, G. (2007). Parenting programmes for preventing tobacco, alcohol or drugs misuse in children< 18: a systematic review. *Health education research*, *22*(2), 177-191.

Potthoff, S. J., Bearinger, L. H., Skay, C. L., Cassuto, N., Blum, R. W., & Resnick, M. D. (1998). Dimensions of risk behaviors among American Indian youth. *Archives of Pediatrics & Adolescent Medicine*, *152*(2), 157-163.

Prochaska, J. J., & Sallis, J. F. (2004). A randomized controlled trial of single versus multiple health behavior change: promoting physical activity and nutrition among adolescents. *Health Psychology*, *23*(3), 314.

Prochaska, J. O., Velicer, W. F., Rossi, J. S., Redding, C. A., Greene, G. W., Rossi, S. R., ... & Plummer, B. A. (2004). Multiple risk expert systems interventions: impact of simultaneous stage-matched expert system interventions for smoking, high-fat diet, and sun exposure in a population of parents. *Health Psychology*, *23*(5), 503.

Pronk, N. P., Anderson, L. H., Crain, A. L., Martinson, B. C., O'Connor, P. J., Sherwood, N. E., & Whitebird, R. R. (2004). Meeting recommendations for multiple healthy lifestyle

factors: prevalence, clustering, and predictors among adolescent, adult, and senior health plan members. *American Journal of Preventive Medicine*, *27*(2), 25–33.

Rew, L., & Horner, S. D. (2003). Youth resilience framework for reducing health-risk behaviors in adolescents. *Journal of pediatric nursing*, *18*(6), 379-388.

Rimal, R. N., & Real, K. (2005). How behaviors are influenced by perceived norms a test of the theory of normative social behavior. *Communication Research*, *32*(3), 389–414.

Rizzo, N. S., Ruiz, J. R., Hurtig-Wennlöf, A., Ortega, F. B., & Sjöström, M. (2007). Relationship of physical activity, fitness, and fatness with clustered metabolic risk in children and adolescents: the European youth heart study. *The Journal of pediatrics*, *150*(4), 388–394.

Russell, S. T., Ryan, C., Toomey, R. B., Diaz, R. M., & Sanchez, J. (2011). Lesbian, gay, bisexual, and transgender adolescent school victimization: Implications for young adult health and adjustment. *Journal of School Health*, *81*(5), 223-230.

Salvy, S. J., Roemmich, J. N., Bowker, J. C., Romero, N. D., Stadler, P. J., & Epstein, L. H. (2009). Effect of peers and friends on youth physical activity and motivation to be physically active. *Journal of Pediatric Psychology*, *34*(2), 217–225.

Sanchez, A., Norman, G. J., Sallis, J. F., Calfas, K. J., Cella, J., & Patrick, K. (2007). Patterns and correlates of physical activity and nutrition behaviors in adolescents. *American Journal of Preventive Medicine*, *32*(2), 124–130.

Schulenberg, J. E., & Maggs, J. L. (2002). A developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. *Journal of Studies on Alcohol and Drugs*, (14), 54–70.

Schlegel, A., & Barry, H. (1991). Adolescence: An anthropological inquiry. New York: Free Press.

Schoenborn, C. A., Vickerie, J. L., & Barnes, P. M. (2003). *Cigarette smoking behavior of adults: United States, 1997-98*. US Department of Health & Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.

Shafer, M. A., & Boyer, C. B. (1991). Psychosocial and behavioral factors associated with risk of sexually transmitted diseases, including human immunodeficiency virus infection, among urban high school students. *The Journal of Pediatrics*, *119*(5), 826–833.

Sharkey, J. D., You, S., & Schnoebelen, K. (2008). Relations among school assets, individual resilience, and student engagement for youth grouped by level of family functioning. *Psychology in the Schools*, *45*(5), 402-418.

Slining, M. M., Mathias, K. C., & Popkin, B. M. (2013). Trends in food and beverage sources among US children and adolescents: 1989-2010. *Journal of the Academy of Nutrition and Dietetics*, *113*(12), 1683–1694.

Snedker, K. A., Herting, J. R., & Walton, E. (2009). Contextual effects and adolescent substance use: Exploring the role of neighborhoods. *Social Science Quarterly*, *90*(5), 1272–1297.

Sneed, C. D. (2009). Sexual risk behavior among early initiators of sexual intercourse. *AIDS Care*, *21*(11), 1395–1400.

Stang, J., Story, M. T., Harnack, L., & Neumark-Sztainer, D. (2000). Relationships between vitamin and mineral supplement use, dietary intake, and dietary adequacy among adolescents. *Journal of the American Dietetic Association*, *100*(8), 905–910.

Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review*, *28*(1), 78–106.

Steinberg, L., Lamborn, S. D., Dornbusch, S. M., & Darling, N. (1992). Impact of parenting practices on adolescent achievement: Authoritative parenting, school involvement, and encouragement to succeed. *Child development*, *63*(5), 1266-1281.

Story, M., Neumark-Sztainer, D., & French, S. (2002). Individual and environmental influences on adolescent eating behaviors. *Journal of the American Dietetic Association*, *102*(3), S40-S51.

Substance Abuse and Mental Health Services Administration, Office of Applied Studies (2008). *Results from the 2007 National Survey on Drug Use and Health: National Findings* (NSDUH Series H-34, DHHS Publication No. SMA 08-4343). Rockville, MD.

Substance Abuse and Mental Health Services Administration, Office of Applied Studies (2013). *Results from the 2012 National Survey on Drug Use and Health: Summary of National Findings* (NSDUH Series H-46, HHS Publication No. SMA 13-4795). Rockville, MD.

Sutherland, E. H. (1973). Development of the theory. In: Schuessler K, editor. Edwin Sutherland on Analyzing Crime. Univ. of Chicago Press; Chicago, IL: 1973. pp. 13–29.

Swaim, R. C., Beauvais, F., Chavez, E. L., & Oetting, E. R. (1997). The effect of school dropout rates on estimates of adolescent substance use among three racial/ethnic groups. *American Journal of Public Health*, *87*(1), 51-55.

Tapert, S. F., Aarons, G. A., Sedlar, G. R., & Brown, S. A. (2001). Adolescent substance use and sexual risk-taking behavior. *Journal of Adolescent Health*, *28*(3), 181–189.

Tomkinson, G. R., & Olds, T. S. (2007). *Secular changes in pediatric aerobic fitness test performance: the global picture* (Vol. 50, pp. 46–66). Karger Publishers.

U.S. Department of Health and Human Services. (2012). *Preventing tobacco use among youth and young adults: A report of the Surgeon General*. Rockville, MD: Office of the Surgeon General. Retrieved from http://www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/full-report.pdf

van Nieuwenhuijzen, M., Junger, M., Velderman, M. K., Wiefferink, K. H., Paulussen, T. W., Hox, J., & Reijneveld, S. A. (2009). Clustering of health-compromising behavior and delinquency in adolescents and adults in the Dutch population. *Preventive medicine*, *48*(6), 572-578.

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, *3*(1), 4–70.

Walls, M. L., Whitbeck, L. B., Hoyt, D. R., & Johnson, K. D. (2007). Early-Onset alcohol use among Native American youth: Examining female caretaker influence. *Journal of Marriage and Family*, *69*(2), 451-464.

Weinstock, H., Berman, S., & Cates, W. (2004). Sexually transmitted diseases among American youth: Incidence and prevalence estimates, 2000. *Perspectives on Sexual and Reproductive Health*, *36*(1), 6–10.

Weinstock, J., Barry, D., & Petry, N. M. (2008). Exercise-related activities are associated with positive outcome in contingency management treatment for substance use disorders. *Addictive behaviors*, *33*(8), 1072-1075.

Weissberg, R. P., Kumpfer, K. L., & Seligman, M. E. (2003). Prevention that works for children and youth: An introduction. *American Psychologist*, *58*(6-7), 425.

Werch, C. E. C., Moore, M. J., Bian, H., DiClemente, C. C., Huang, I. C., Ames, S. C., ... & Pokorny, S. B. (2010). Are effects from a brief multiple behavior intervention for college students sustained over time?. *Preventive medicine*, *50*(1), 30-34.

Werner, E. E. (1995). Resilience in Development. *Current Directions In Psychological Science (Wiley-Blackwell)*, *4*(3), 81–85.

Werner, E. E., & Smith, R. S. (1989). *Vulnerable but invincible: A longitudinal study of resilient children and youth*. New York: Adams-Bannister-Cox.

Williams, J., Jones, S. B., Pemberton, M. R., Bray, R. M., Brown, J. M., & Vandermaas-Peeler, R. (2010). Measurement invariance of alcohol use motivations in junior military personnel at risk for depression or anxiety. *Addictive behaviors*, *35*(5), 444-451.

Williams, P. T. (2001). Physical fitness and activity as separate heart disease risk factors: a meta-analysis. *Medicine and Science in Sports and Exercise*, *33*(5), 754.

Windle, M. (2000). Parental, sibling, and peer influences on adolescent substance use and alcohol problems. *Applied Developmental Science*, *4*(2), 98–110.

Young, S. E., Rhee, S. H., Stallings, M. C., Corley, R. P., & Hewitt, J. K. (2006). Genetic and environmental vulnerabilities underlying adolescent substance use and problem use: general or specific?. *Behavior genetics*, *36*(4), 603–615.

Zimmerman, M. A., Bingenheimer, J. B., & Notaro, P. C. (2002). Natural mentors and adolescent resiliency: A study with urban youth. *American journal of community psychology*, *30*(2), 221-243.

Appendices

Appendix A Final Study Sample Characteristics

Table A-1: Full Sample Characteristics (N=19,093)

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Gender					
Female	6,671	53%	2878	44%	0.09
Male	5,853	46%	3646	56%	0.10
Age in years					
14 years old	2,747	22%	1339	21%	0.01
15 years old	3,408	27%	1775	27%	0.0
16 years old	3,040	24%	1587	24%	0.0
17 years old or older	3,335	26%	1826	28%	0.02
Grade					
9th grade	3,695	29%	2053	32%	0.03
10th grade	3,346	27%	1755	27%	0.0
11th grade	2,893	23%	1393	22%	0.01
12th grade	2,490	20%	1227	19%	0.01
Race/Ethnicity					
AIAN-only	1,755	14%	1138	18%	0.04
Hispanic-only	6,976	55%	3906	61%	0.06
Non-Hispanic White-only	3,009	24%	1004	16%	0.08
Body Wt. Status					
Not Overweight or obese	8,491	68%	3902	66%	0.02
Overweight	1,864	15%	1041	18%	0.03
Obese	1,638	13%	927	16%	0.03
Mother's Education					
Completed grade school or less	438	3%	294	5%	0.02
Some high school	1,464	12%	972	15%	0.03
Completed high school	2,608	21%	1368	21%	0.0
Some college	2,289	18%	1086	17%	0.01
Completed college	2,899	23%	1135	18%	0.05
Graduate or professional school	1,261	10%	449	7%	0.03
Not sure	1,524	12%	1148	18%	0.06

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Father's Education					
Completed grade school or less	542	4%	356	5%	0.01
Some high school	1,432	11%	955	14%	0.03
Completed high school	3,061	24%	1609	25%	0.01
Some college	1,750	14%	717	11%	0.03
Completed college	2,055	16%	788	12%	0.04
Graduate or professional school	1,118	9%	394	6%	0.03
Not sure	2,502	20%	1625	25%	0.05
Sexual Orientation					
Straight	10,485	84%	4777	80%	0.04
Lesbian, Gay, Bisexual	1,172	9%	846	14%	0.05
CIGARETTE USE					
Q36 – How old when first smoked					
Never smoked a cigarette	8,924	71%	2922	50%	0.11
8 years old or younger	262	2%	348	6%	0.04
9 or 10 years old	301	2%	311	5%	0.03
11 or 12 years old	690	6%	582	10%	0.04
13 or 14 years old	1,260	10%	879	15%	0.05
15 or 16 years old	925	7%	602	10%	0.03
17 years old or older	171	1%	150	3%	0.02
Q37 – How many days smoked past 30 days					
0 days	10,834	86%	3948	77%	0.11
1 or 2 days	649	5%	422	8%	0.03
3 to 5 days	292	2%	186	4%	0.02
6 to 9 days	191	2%	135	3%	0.01
10 to 19 days	176	1%	123	2%	0.01
20 to 29 days	111	1%	82	2%	0.01
All 30 days	280	2%	252	5%	0.03
Q38-How many cigarettes/day past 30 days					
Did not smoke cigarettes	10,834	86%	3924	75%	0.11
Less than 1 cigarette	595	5%	433	8%	0.03
1 cigarette	393	3%	253	5%	0.02

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
2 to 5 cigarettes	536	4%	383	7%	0.03
6 to 10 cigarettes	111	1%	106	2%	0.01
11 to 20 cigarettes	24	<1%	42	1%	<0.01
More than 20 cigarettes	40	<1%	60	1%	<0.01
Q40-How many days smoked at school in past 30 days					
0 days	12,107	97%	5507	93%	0.04
1 or 2 days	207	2%	199	3%	0.01
3 to 5 days	82	1%	62	1%	0.0
6 to 9 days	27	<1%	36	<1%	<0.01
10 to 19 days	39	<1%	36	1%	<0.01
20 to 29 days	14	<1%	19	0%	<0.01
All 30 days	57	<1%	70	1%	<0.01
Q42-How many days use chewing tobacco, snuff, or dip in past 30 days					
0 days	11,708	93%	5338	83%	0.10
1 or 2 days	310	2%	339	5%	0.03
3 to 5 days	129	1%	189	3%	0.02
6 to 9 days	92	1%	138	2%	0.01
10 to 19 days	76	1%	121	2%	0.01
20 to 29 days	48	<1%	59	1%	<0.01
All 30 days	170	1%	227	4%	0.03
Q43-How many days smoke cigars in past 30 days					
0 days	11,446	91%	4985	78%	0.03
1 or 2 days	606	5%	644	10%	0.05
3 to 5 days	209	2%	252	4%	0.02
6 to 9 days	105	1%	185	3%	0.02
10 to 19 days	72	1%	101	2%	0.01
20 to 29 days	23	<1%	57	1%	<0.01
All 30 days	72	1%	177	3%	0.02
Q44-Days smoked hookah in the past 30 days					
0 days	10,466	84%	4373	69%	0.15
1 or 2 days	1,009	8%	771	12%	0.04

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
3 to 5 days	424	3%	414	6%	0.03
6 to 9 days	257	2%	279	4%	0.02
10 to 19 days	186	1%	213	3%	0.02
20 to 29 days	67	1%	90	1%	0.0
All 30 days	124	1%	238	4%	0.03
ALCOHOL USE					
Q46 – How old when first drank alcohol					
Never drank alcohol	5,613	45%	1683	27%	0.18
8 years old or younger	797	6%	729	12%	0.06
9 or 10 years old	590	5%	509	8%	0.03
11 or 12 years old	1,130	9%	762	12%	0.03
13 or 14 years old	2,472	20%	1400	23%	0.03
15 or 16 years old	1,704	14%	900	15%	0.01
17 years old or older	227	2%	156	3%	0.01
Q47-How many days drink alcohol in past 30 days					
0 days	9,312	74%	2762	58%	0.16
1 or 2 days	1,746	14%	850	18%	0.04
3 to 5 days	710	6%	470	10%	0.04
6 to 9 days	393	3%	272	6%	0.03
10 to 19 days	247	2%	189	4%	0.02
20 to 29 days	51	<1%	84	2%	<0.01
All 30 days	74	1%	127	3%	0.02
Q48-How many days had 5+ drinks in past 30 days					
0 days	10,520	84%	4328	76%	0.08
1 day	862	7%	511	9%	0.02
2 days	511	4%	346	6%	0.02
3 to 5 days	350	3%	241	4%	0.01
6 to 9 days	163	1%	128	2%	0.01
10 to 19 days	61	<1%	62	1%	<0.01
20 or more days	66	1%	98	2%	0.01
Q49-Max # drinks in a row in the past 30 days					

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Did not drink in past 30 days	9312	74%	2909	60%	0.14
1 or 2 drinks	1227	10%	552	11%	0.01
3 drinks	333	3%	222	5%	0.02
4 drinks	242	2%	213	4%	0.02
5 drinks	323	3%	218	4%	0.01
6 or 7 drinks	392	3%	212	4%	0.01
8 or 9 drinks	203	2%	135	3%	0.01
10 or more drinks	501	4%	408	8%	0.04
Q51-Where did you usually drink alcohol in the past 30 days					
Did not drink in past 30 days	9,315	74%	3563	58%	0.16
At my home	906	7%	692	11%	0.04
At another person's home	1,811	14%	1271	21%	0.07
While in a vehicle	105	1%	176	3%	0.02
At a restaurant, bar, or club	38	<1%	89	1%	<0.01
At a public place	176	1%	161	3%	0.02
At a public event	123	1%	99	2%	0.01
On school property	59	<1%	128	2%	<0.01
Q53-How many days drank at school in the past 30 days					
0 days	12,106	97%	5389	86%	0.11
1 or 2 days	273	2%	354	6%	0.04
3 to 5 days	61	1%	155	2%	0.01
6 to 9 days	24	<1%	110	2%	<0.01
10 to 19 days	24	<1%	87	1%	<0.01
20 to 29 days	9	<1%	54	1%	<0.01
All 30 days	36	<1%	116	2%	<0.01
OTHER DRUG USE					
Q54-How old when first tried marijuana					
Never tried marijuana	6,983	56%	2293	38%	0.18
8 years old or younger	304	2%	489	8%	0.06
9 or 10 years old	439	4%	431	7%	0.03
11 or 12 years old	1,127	9%	897	15%	0.06
13 or 14 years old	2,272	18%	1265	21%	0.03
15 or 16 years old	1,257	10%	642	11%	0.01

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
17 years old or older	151	1%	90	1%	0.0
Q55-How many times used marijuana in past 30 days					
0 times	9,637	77%	3627	59%	0.18
1 or 2 times	946	8%	619	10%	0.02
3 to 9 times	663	5%	580	9%	0.04
10 to 19 times	369	3%	350	6%	0.03
20 to 39 times	281	2%	263	4%	0.02
40 or more times	637	5%	721	12%	0.07
Q56-How many times used synthetic marijuana in past 30 days					
0 times	11,859	95%	5111	82%	0.13
1 or 2 times	349	3%	425	7%	0.04
3 to 9 times	152	1%	245	4%	0.03
10 to 19 times	69	<1%	173	3%	<0.02
20 to 39 times	44	<1%	105	2%	<0.01
40 or more times	60	<1%	185	3%	<0.02
Q57-How many times have you used cocaine					
0 times	11,667	93%	5095	82%	0.11
1 or 2 times	414	3%	405	7%	0.04
3 to 9 times	175	1%	238	4%	0.03
10 to 19 times	102	1%	138	2%	0.01
20 to 39 times	56	<1%	111	2%	<0.01
40 or more times	119	1%	238	4%	0.03
Q58-How many times used cocaine in past 30 days					
0 times	12182	97%	5515	88%	0.09
1 or 2 times	172	1%	278	4%	0.03
3 to 9 times	83	1%	160	3%	0.02
10 to 19 times	32	<1%	92	1%	<0.01
20 to 39 times	21	<1%	47	1%	<0.01
40 or more times	43	<1%	156	2%	<0.02

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Q59-How many times used inhalants in past 30 days					
0 times	12,160	97%	5422	87%	0.10
1 or 2 times	214	2%	340	5%	0.03
3 to 9 times	88	<1%	184	3%	<0.02
10 to 19 times	24	<1%	113	2%	<0.01
20 to 39 times	7	<1%	57	1%	<0.01
40 or more times	40	<1%	122	2%	<0.01
Q60-How many times used heroin in lifetime					
0 times	12,341	98%	5602	90%	0.08
1 or 2 times	92	1%	211	3%	0.02
3 to 9 times	38	<1%	138	2%	<0.01
10 to 19 times	12	<1%	80	1%	<0.01
20 to 39 times	4	<1%	48	1%	<0.01
40 or more times	46	<1%	139	2%	<0.01
Q61-Times used heroin in past 30 days					
0 times	12,431	99%	5671	91%	0.08
1 or 2 times	36	<1%	139	2%	<0.01
3 to 9 times	15	<1%	116	2%	<0.01
10 to 19 times	7	<1%	111	2%	<0.01
20 to 39 times	8	<1%	53	1%	<0.01
40 or more times	36	<1%	127	2%	<0.01
Q62-How many times used methamphetamines					
0 times	12,233	98%	5538	89%	
1 or 2 times	148	1%	240	4%	
3 to 9 times	58	<1%	137	2%	<0.01
10 to 19 times	21	<1%	87	1%	<0.01
20 to 39 times	16	<1%	67	1%	<0.01
40 or more times	57	<1%	148	2%	<0.01
Q63-How many times used methamphetamines in past 30 days					
0 times	12,377	99%	5620	91%	0.08
1 or 2 times	71	<1%	153	2%	<0.01

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
3 to 9 times	27	<1%	119	2%	<0.01
10 to 19 times	9	<1%	81	1%	<0.01
20 to 39 times	10	<1%	72	1%	<0.01
40 or more times	39	<1%	153	2%	<0.01
Q64-How many times used ecstasy in lifetime					
0 times	11,713	93%	5185	84%	0.09
1 or 2 times	434	3%	403	7%	0.04
3 to 9 times	209	2%	244	4%	0.02
10 to 19 times	80	1%	126	2%	0.01
20 to 39 times	31	<1%	92	1%	<0.01
40 or more times	66	<1%	149	2%	<0.01
Q65-How many times used ecstasy in past 30 days					
0 times	12,210	97%	5486	89%	0.08
1 or 2 times	183	1%	239	4%	0.03
3 to 9 times	62	1%	153	2%	0.01
10 to 19 times	28	<1%	99	2%	<0.01
20 to 39 times	8	<1%	62	1%	<0.01
40 or more times	42	<1%	136	2%	<0.01
Q66-Times used Rx drugs w/o a Rx in lifetime					
0 times	10,802	86%	4687	76%	0.10
1 or 2 times	660	5%	510	8%	0.03
3 to 9 times	461	4%	367	6%	0.02
10 to 19 times	230	2%	263	4%	0.02
20 to 39 times	129	1%	130	2%	0.01
40 or more times	251	2%	230	4%	0.02
Q67-Times used pain killer to get high in past 30 days					
0 times	11,779	94%	5166	84%	0.10
1 or 2 times	375	3%	377	6%	0.03
3 to 9 times	216	2%	260	4%	0.02
10 to 19 times	82	<1%	148	2%	<0.01
20 to 39 times	26	<1%	69	1%	<0.01
40 or more times	55	<1%	151	2%	<0.01

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Q68-How many time injected drugs in lifetime					
0 times	12,374	99	5626	91%	0.08
1 time	68	<1%	260	4%	<0.03
2 or more times	91	<1%	280	5%	<0.04
SEXUAL ACTIVITY					
Q72-How old at first sex					
Never had sex	7,808	62%	2050	45%	0.17
11 years old or younger	288	2%	320	7%	0.05
12 years old	255	2%	223	5%	0.03
13 years old	677	5%	386	8%	0.03
14 years old	1,134	9%	621	14%	0.05
15 years old	1,295	10%	565	12%	0.02
16 years old	796	6%	299	7%	0.01
17 years old or older	280	2%	125	3%	0.01
Q73-How many sex partners					
Never had sex	7,808	62%	2047	45%	0.17
1 person	1917	15%	850	19%	0.04
2 people	914	7%	482	11%	0.04
3 people	627	5%	378	8%	0.03
4 people	390	3%	217	5%	0.02
5 people	259	2%	150	3%	0.01
6 or more people	618	5%	421	9%	0.04
Q74-How many sex partners in the past 3 months					
Never had sex	7,808	62%	2035	45%	0.17
None during past 3 months	1571	13%	831	18%	0.05
1 person	2420	19%	1136	25%	0.06
2 people	392	3%	223	5%	0.02
3 people	154	1%	111	2%	0.01
4 people	63	<1%	43	1%	<0.01
5 people	24	<1%	19	0%	<0.01
6 or more people	101	1%	131	3%	0.02
Q75-Did you use alcohol/drugs at					

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
last sexual intercourse					
Never had sex	7,808	62%	2026	44%	0.18
No	3,897	31%	1917	42%	0.11
Yes	828	7%	666	14%	0.07
Q76-Did you use a condom at last sexual intercourse					
Never had sex	7,808	62%	2018	46%	0.16
Yes	2,967	24%	1384	32%	0.08
No	1,758	14%	982	22%	0.08
Q77-What birth control method did you use at last sexual intercourse					
I have never had sexual intercourse	7,808	62%	2004	51%	0.09
An IUD (such as Mirena or Paragard) or implant (such as Implanon)	189	2%	79	2%	0.0
A shot (such as Depo-Provera, path (such as Ortho Evra), or birth control ring (such as NuvaRing)	279	2%	87	2%	0.0
Birth control pills	664	5%	267	7%	0.02
Condoms	2403	19%	957	24%	0.05
Withdrawal or some other method	428	3%	171	4%	0.01
No method was used to prevent pregnancy	762	6%	357	9%	0.03
EATING BEHAVIORS					
Q81-How many times drank fruit juice in the past 7 days					
Did not drink fruit juice	3,112	25%	1474	25%	0.0
1 to 3 times	4,895	39%	1960	33%	0.06
4 to 6 times	1,877	15%	865	15%	0.0
1 time per day	800	6%	428	7%	0.01
2 times per day	836	7%	407	7%	0.0
3 times per day	401	3%	245	4%	0.01
4 or more times per day	612	5%	521	9%	0.04
Q82-How many times ate fruit in					

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
the past 7 days					
Did not eat fruit	1,294	10%	837	14%	0.04
1 to 3 times	4,690	37%	1887	32%	0.05
4 to 6 times	2,661	21%	1109	19%	0.03
1 time per day	1,270	10%	617	11%	0.01
2 times per day	1,268	10%	541	9%	0.01
3 times per day	602	5%	318	5%	0.0
4 or more times per day	748	6%	564	10%	0.04
Q83-How many times ate green salad in the past 7 days					
Did not eat green salad	4,687	37%	2032	35%	0.02
1 to 3 times	5,007	40%	1972	34%	0.06
4 to 6 times	1,364	11%	687	12%	0.01
1 time per day	850	7%	505	9%	0.02
2 times per day	314	3%	263	5%	0.02
3 times per day	114	1%	121	2%	0.01
4 or more times per day	197	2%	263	5%	0.03
Q84-How many times ate potatoes in the past 7 days					
Did not eat potatoes	3,573	29%	1526	26%	0.03
1 to 3 times	6256	50%	2389	41%	0.09
4 to 6 times	1604	13%	783	13%	0.0
1 time per day	563	4%	467	8%	0.04
2 times per day	240	2%	237	4%	0.02
3 times per day	103	1%	146	3%	0.02
4 or more times per day	194	2%	271	5%	0.03
Q85-How many times ate carrots in the past 7 days					
Did not eat carrots	6,515	52%	2701	47%	0.05
1 to 3 times	4,214	34%	1673	29%	0.05
4 to 6 times	869	7%	514	9%	0.02
1 time per day	473	4%	326	6%	0.02
2 times per day	180	1%	223	4%	0.03
3 times per day	98	1%	98	2%	0.01
4 or more times per day	184	1%	263	5%	0.04

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Q86-How many times ate other vegetables in the past 7 days					
Did not eat other vegetables	2,386	19%	1294	22%	0.03
1 to 3 times	4,980	40%	1998	35%	0.05
4 to 6 times	2,681	21%	1028	18%	0.03
1 time per day	1,106	9%	544	9%	0.0
2 times per day	705	6%	377	7%	0.01
3 times per day	306	2%	208	4%	0.02
4 or more times per day	369	3%	333	6%	0.03
Q87-How many times drank soda in the past 7 days					
Did not drink soda or pop	3,067	24%	1302	23%	0.01
1 to 3 times	4,806	38%	1796	31%	0.07
4 to 6 times	2,137	17%	914	16%	0.01
1 time per day	967	8%	547	10%	0.02
2 times per day	777	6%	494	9%	0.03
3 times per day	323	3%	258	4%	0.01
4 or more times per day	456	4%	445	8%	0.04
Q88-How often ate breakfast in the past 7 days					
7 days	4,552	36%	1672	29%	0.07
6 days	812	6%	265	5%	0.01
5 days	1,172	9%	461	8%	0.01
4 days	1,061	8%	463	8%	0.0
3 days	1,220	10%	608	11%	0.01
2 days	1,252	10%	636	11%	0.01
1 day	925	7%	575	10%	0.03
0 days	1,539	12%	999	18%	0.06
PHYSICAL ACTIVITY					
Q89-Days active for min of 60 minutes for the past 7 days					
7 days	3,950	32%	1733	30%	0.02
6 days	1,055	8%	364	6%	0.02
5 days	1,844	15%	682	12%	0.03
4 days	1,147	9%	497	9%	0.0

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
3 days	1,225	10%	542	10%	0.0
2 days	983	8%	530	9%	0.01
1 day	801	6%	471	8%	0.02
0 days	1,528	12%	884	16%	0.04
Q90-How many hours watched TV					
No TV on average school day	2,203	18%	1005	18%	0.0
Less than 1 hour per day	2,634	21%	1079	19%	0.02
1 hour per day	1,826	15%	817	14%	0.01
2 hours per day	2,546	20%	1109	19%	0.01
3 hours per day	1,672	13%	719	13%	0.0
4 hours per day	771	6%	380	7%	0.01
5 or more hours per day	881	7%	592	10%	0.03
Q91-How many hours/day played video games					
No playing video/computer game	2,588	21%	1318	23%	0.02
Less than 1 hour per day	2,092	17%	931	17%	0.0
1 hour per day	1,619	13%	783	14%	0.01
2 hours per day	1,781	14%	720	13%	0.01
3 hours per day	1,528	12%	585	10%	0.02
4 hours per day	948	8%	376	7%	0.01
5 or more hours per day	1,977	16%	916	16%	0.0
Q92-How many days attended PE in avg week					
5 days	3,641	29%	1573	28%	0.01
4 days	729	6%	357	6%	0.0
3 days	1,135	9%	510	9%	0.0
2 days	330	3%	324	6%	0.03
1 day	228	2%	304	5%	0.03
0 days	6,470	52%	2520	45%	0.07
RESILIENCE					
Q100-Parents/adult interest in work					
Very much true	6,761	54%	2270	42%	0.12

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Pretty much true	3,184	25%	1470	27%	0.02
A little true	1,781	14%	1015	19%	0.05
Not true at all	807	6%	692	13%	0.07
Q101-Parent/adult believes will be a success					
Very much true	9,053	72%	3196	59%	0.13
Pretty much true	2,048	16%	1038	19%	0.03
A little true	961	8%	645	12%	0.04
Not true at all	471	4%	529	10%	0.06
Q102-Teacher/adult who listens					
Very much true	4,949	39%	1732	32%	0.07
Pretty much true	4,156	33%	1618	30%	0.03
A little true	2,326	19%	1277	24%	0.05
Not true at all	1,102	9%	774	14%	0.05
Q103-Teacher/adult who believes will a success					
Very much true	6,184	49%	2180	41%	0.08
Pretty much true	3,746	30%	1516	28%	0.02
A little true	1,829	15%	996	19%	0.04
Not true at all	774	6%	675	13%	0.07
Q104-Adult (non-home/sch) who cares					
Very much true	8,429	67%	3046	57%	0.10
Pretty much true	2,222	18%	1059	20%	0.02
A little true	1,101	9%	701	13%	0.04
Not true at all	781	6%	555	10%	0.04
Q105-Adult(non-home/sch) who tells good job					
Very much true	6,632	53%	2363	44%	0.09
Pretty much true	3,162	25%	1357	25%	0.0
A little true	1,635	13%	893	17%	0.04
Not true at all	1,104	9%	727	14%	0.05
Q106-Friend who cares					
Very much true	7,880	63%	2842	53%	0.10

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Pretty much true	2,732	22%	1181	22%	0.0
A little true	1,261	10%	744	14%	0.04
Not true at all	660	5%	567	11%	0.06
Q107-Parents knows when gone					
Very much true	7,071	56%	2344	44%	0.12
Pretty much true	3,550	28%	1508	28%	0.0
A little true	1,362	11%	913	17%	0.06
Not true at all	550	4%	569	11%	0.07
Q108-Clear rules at school					
Very much true	6,143	49%	2262	43%	0.06
Pretty much true	4,408	35%	1651	31%	0.04
A little true	1,461	12%	803	15%	0.03
Not true at all	521	4%	580	11%	0.07
Q109-College, other school after h.s.					
Very much true	9,392	75%	3136	59%	0.16
Pretty much true	1,800	14%	983	19%	0.05
A little true	804	6%	618	12%	0.06
Not true at all	537	4%	551	10%	0.06
Q110-In sports, clubs at school					
Very much true	6,498	52%	2147	41%	0.11
Pretty much true	1,477	12%	755	14%	0.02
A little true	1,185	9%	755	14%	0.05
Not true at all	3,373	27%	1614	31%	0.04
Q111-In clubs, sports outside of school					
Very much true	5,009	40%	1748	33%	0.13
Pretty much true	1,706	14%	843	16%	0.02
A little true	1,782	14%	898	17%	0.03
Not true at all	4,036	32%	1776	34%	0.02
Q112-Hobbies outside of home/sch					
Very much true	5,902	47%	2053	39%	0.08
Pretty much true	2,214	18%	977	19%	0.01
A little true	1,791	14%	866	16%	0.02

	Complete Data N=12533		Incomplete Data N=6560		Effect Size
	N	%	N	%	
Not true at all	2,626	21%	1359	26%	0.05
Q113-Friends who get into trouble					
Not true at all	4,811	38%	1611	31%	0.07
A little true	5,546	44%	2080	40%	0.04
Pretty much true	1,359	11%	828	16%	0.05
Very much true	817	7%	721	14%	0.07

Table A-2: Full Sample Characteristics: Effect Size Differences on Variables of Interest (N=19093)

	Complete Data N=12533			Incomplete Data N=6560			Effect Size
	N	Mean	SD	N	Mean	SD	
CIGARETTE USE							
Q36 – How old when first smoked	12533	1.09	1.84	5794	1.75	2.02	0.91
Q37 – How many days smoked past 30 days	12533	0.38	1.18	5148	0.70	1.59	0.73
Q38-How many cigarettes/day past 30 days	12533	0.30	0.88	5201	0.59	1.24	0.66
Q40-How many days smoked at school in past 30 days	12533	0.08	0.54	5929	0.18	0.84	0.51
Q42-How many days use chewing tobacco, snuff, or dip in past 30 days	12533	0.19	0.88	6411	0.51	1.38	0.82
Q43-How many days smoke cigars in past 30 days	12533	0.17	0.71	6401	0.54	1.30	0.96
Q44-Days smoked hookah in the past 30 days	12533	0.36	1.00	6378	0.81	1.53	1.12
ALCOHOL USE							
Q46 – How old when first drank alcohol	12533	2.01	2.06	6139	2.45	1.94	0.09
Q47-How many days drink alcohol in past 30 days	12533	0.48	1.02	4754	0.96	1.49	1.79
Q48-How many days had 5+ drinks in past 30 days	12533	0.34	0.94	5714	0.58	1.27	0.54
Q49-Max # drinks in a row in the past 30 days	12533	0.85	1.84	4869	1.49	2.32	NaN
Q51-Where did you usually drink alcohol in the past 30 days	12533	0.56	1.18	6179	1.04	1.61	NaN
Q53-How many days drank at school in the past 30 days	12533	0.07	0.45	6265	0.37	1.13	1.13

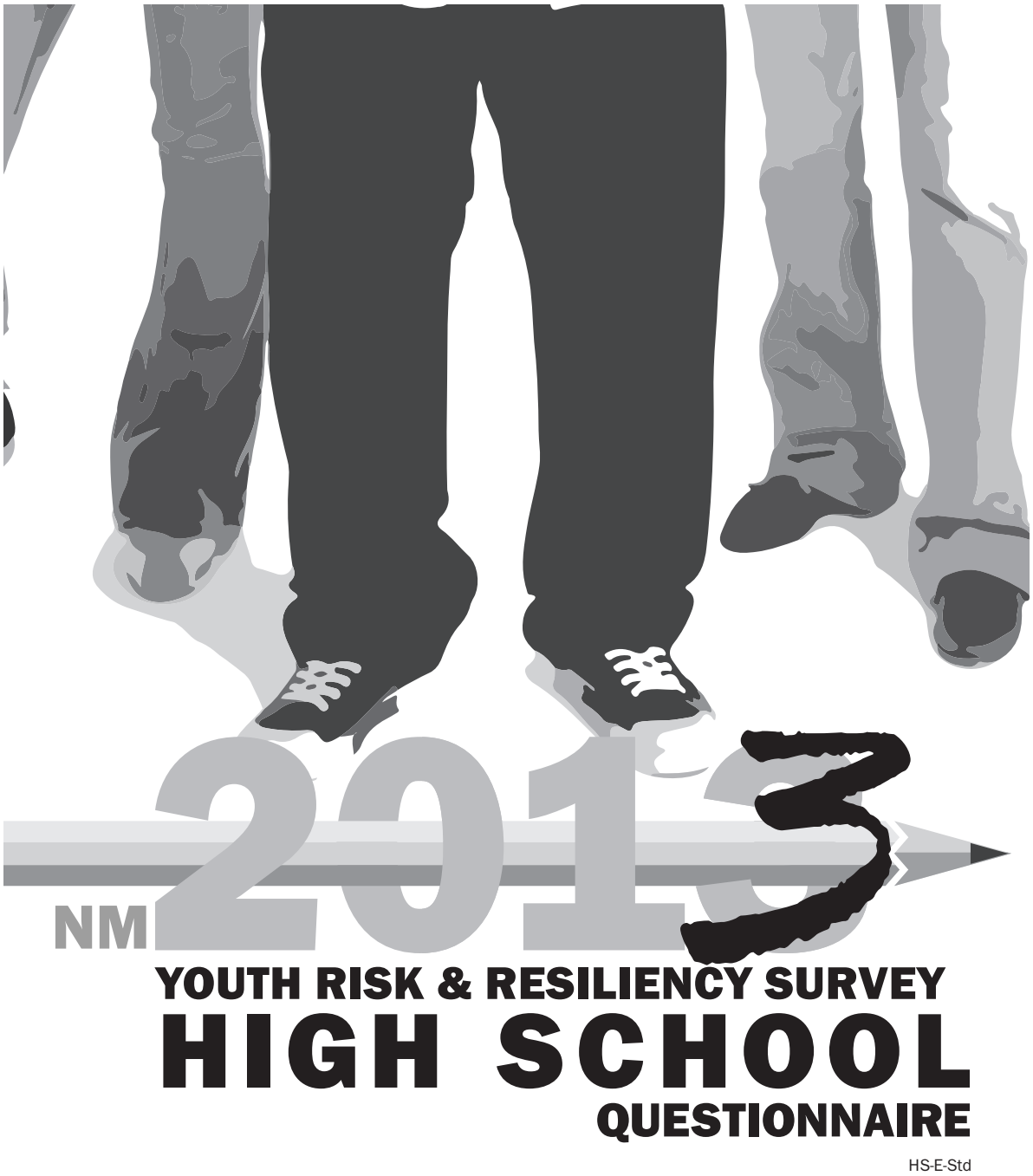
	Complete Data N=12533			Incomplete Data N=6560			Effect Size
	N	Mean	SD	N	Mean	SD	
OTHER DRUG USE							
Q54-How old when first tried marijuana	12533	1.66	2.01	6107	2.10	1.93	0.15
Q55-How many times used marijuana in past 30 days	12533	0.61	1.34	6160	1.22	1.77	NaN
Q56-How many times used synthetic marijuana in past 30 days	12533	0.11	0.54	6244	0.45	1.13	1.04
Q57-How many times have you used cocaine	12533	0.15	0.67	6225	0.47	1.20	0.89
Q58-How many times used cocaine in past 30 days	12533	0.06	0.42	6248	0.29	0.97	1.02
Q59-How many times used inhalants in past 30 days	12533	0.06	0.38	6238	0.30	0.94	1.04
Q60-How many times used heroin in lifetime	12533	0.04	0.35	6218	0.26	0.92	1.18
Q61-Times used heroin in past 30 days	12533	0.02	0.31	6217	0.25	0.92	1.54
Q62-How many times used methamphetamines	12533	0.05	0.42	6217	0.29	0.97	1.13
Q63-How many times used methamphetamines in past 30 days	12533	0.03	0.33	6198	0.27	0.97	1.37
Q64-How many times used ecstasy in lifetime	12533	0.12	0.56	6199	0.38	1.05	0.82
Q65-How many times used ecstasy in past 30 days	12533	0.05	0.38	6175	0.29	0.95	1.12
Q66-Times used Rx drugs w/o a Rx in lifetime	12533	0.32	0.96	6187	0.60	1.27	0.63
Q67-Times used pain killer to get high in past 30 days	12533	0.11	0.54	6171	0.38	1.04	0.88
Q68-How many time injected drugs in lifetime	12533	0.02	0.18	6166	0.13	0.45	1.09
SEXUAL ACTIVITY							
Q72-How old at first sex	12533	1.64	2.30	4589	2.16	2.30	0.18
Q73-How many sex partners	12533	0.97	1.65	4545	1.56	1.96	NaN
Q74-How many sex	12533	0.75	1.19	4529	1.21	1.54	NaN

	Complete Data N=12533			Incomplete Data N=6560			Effect Size
	N	Mean	SD	N	Mean	SD	
partners in the past 3 months							
Q75-Did you use alcohol/drugs at last sexual intercourse	12533	0.44	0.62	4609	0.70	0.71	0.60
Q76-Did you use a condom at last sexual intercourse	12533	0.52	0.73	4384	0.76	0.79	0.59
Q77-What birth control method did you use at last sexual intercourse	12533	1.52	2.09	3922	2.01	2.23	0.21
EATING BEHAVIORS							
Q81-How many times drank fruit juice in the past 7 days	12533	1.60	1.62	5900	1.86	1.86	0.11
Q82-How many times ate fruit in the past 7 days	12533	2.11	1.63	5873	2.23	1.83	0.03
Q83-How many times ate green salad in the past 7 days	12533	1.06	1.23	5843	1.39	1.59	0.88
Q84-How many times ate potatoes in the past 7 days	12533	1.10	1.13	5819	1.49	1.55	0.70
Q85-How many times ate carrots in the past 7 days	12533	0.77	1.14	5798	1.15	1.58	NaN
Q86-How many times ate other vegetables in the past 7 days	12533	1.61	1.42	5782	1.77	1.67	0.07
Q87-How many times drank soda in the past 7 days	12533	1.55	1.52	5756	1.95	1.81	0.17
Q88-How often ate breakfast in the past 7 days	12533	2.70	2.58	5679	3.28	2.67	0.05
PHYSICAL ACTIVITY							
Q89-Days active for min of 60 minutes for the past 7 days	12533	2.67	2.48	5703	2.99	2.61	0.03
Q90-How many hours watched TV	12533	2.37	1.79	5701	2.52	1.89	0.02

	Complete Data N=12533			Incomplete Data N=6560			Effect Size
	N	Mean	SD	N	Mean	SD	
Q91-How many hours/day played video games	12533	2.66	2.09	5629	2.55	2.13	0.01
Q92-How many days attended PE in avg week	12533	2.97	2.24	5588	2.89	2.17	0.01
RESILIENCE							
Q100-Parents/adult interest in work	12533	0.73	0.93	5447	1.02	1.05	NaN
Q101-Parent/adult believes will be a success	12533	0.43	0.79	5408	0.72	1.01	0.67
Q102-Teacher/adult who listens	12533	0.97	0.96	5401	1.20	1.04	NaN
Q103-Teacher/adult who believes will a success	12533	0.78	0.91	5367	1.03	1.05	NaN
Q104-Adult (non-home/sch) who cares	12533	0.54	0.89	5361	0.77	1.03	0.58
Q105-Adult(non-home/sch) who tells good job	12533	0.78	0.98	5340	1.00	1.07	Infinity
Q106-Friend who cares	12533	0.58	0.87	5334	0.82	1.03	0.65
Q107-Parents knows when gone	12533	0.63	0.84	5334	0.95	1.02	1.32
Q108-Clear rules at school	12533	0.71	0.83	5296	0.94	1.01	1.02
Q109-College, other school after h.s.	12533	0.40	0.79	5288	0.73	1.03	0.77
Q110-In sports, clubs at school	12533	1.11	1.29	5271	1.35	1.29	0.53
Q111-In clubs, sports outside of school	12533	1.39	1.30	5265	1.51	1.26	0.10
Q112-Hobbies outside of home/sch	12533	1.09	1.20	5255	1.29	1.23	0.55
Q113-Friends who get into trouble	12533	0.85	0.86	5240	1.13	1.00	NaN

Appendix B

2013 High School New Mexico Youth Risk & Resilience Survey



Healthy Choices, Healthy Students

Appendix B (continued)

PERSONAL INFORMATION

1 How old are you?

- A 12 years old or younger
- B 13 years old
- C 14 years old
- D 15 years old
- E 16 years old
- F 17 years old
- G 18 years old or older

2 What is your sex?

- A Female
- B Male

3 In what grade are you?

- A 9th grade
- B 10th grade
- C 11th grade
- D 12th grade
- E Ungraded or other grade

4 Are you Hispanic or Latino?

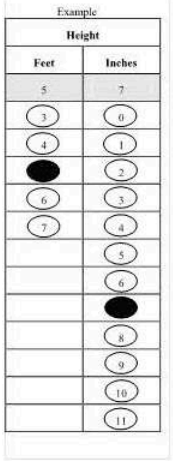
- A Yes
- B No

5 What is your race?

(Select one or more responses.)

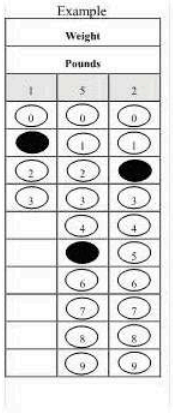
- A American Indian or Alaska Native
- B Asian
- C Black or African American
- D Native Hawaiian or Other Pacific Islander
- E White

6 How tall are you without your shoes on?



Directions: Write your height in the shaded blank boxes. Fill in the matching oval below each number.

7 How much do you weigh without your shoes on?



Directions: Write your weight in the shaded blank boxes. Fill in the matching oval below each number.

8 Which one of these groups best describes you? (Select **only one** response.)

- A American Indian or Alaska Native
- B Asian
- C Black or African American
- D Hispanic or Latino
- E Native Hawaiian or Other Pacific Islander
- F White

9 What is the highest level of schooling your mother completed?

- A Completed grade school or less
- B Some high school
- C Completed high school
- D Some college
- E Completed college
- F Graduate or professional school
- G Not sure

10 What is the highest level of schooling your father completed?

- A Completed grade school or less
- B Some high school
- C Completed high school
- D Some college
- E Completed college
- F Graduate or professional school
- G Not sure

11 During the past 12 months, how would you describe your grades in school?

- A Mostly A's
- B Mostly B's
- C Mostly C's
- D Mostly D's
- E Mostly F's
- F None of these grades
- G Not sure

PERSONAL SAFETY

The next 6 questions ask about safety.

12 **When you rode a bicycle** during the past 12 months, how often did you wear a helmet?

- A I did not ride a bicycle during the past 12 months
- B Never wore a helmet
- C Rarely wore a helmet
- D Sometimes wore a helmet
- E Most of the time wore a helmet
- F Always wore a helmet

13 How often do you wear a seat belt when **riding** in a car driven by someone else?

- A Never
- B Rarely
- C Sometimes
- D Most of the time
- E Always

14 During the past 30 days, how many times did you **ride** in a car or other vehicle **driven by someone who had been drinking alcohol**?

- A 0 times
- B 1 time
- C 2 or 3 times
- D 4 or 5 times
- E 6 or more times

15 During the past 30 days, how many times did you **drive** a car or other vehicle **when you had been drinking alcohol**?

- A I did not drive a car or other vehicle during the past 30 days
- B 0 times
- C 1 time
- D 2 or 3 times
- E 4 or 5 times
- F 6 or more times

16 During the past 30 days, on how many days did you text or e-mail while driving a car or other vehicle?

- A I did not drive a car or other vehicle during the past 30 days
- B 0 days
- C 1 or 2 days
- D 3 to 5 days
- E 6 to 9 days
- F 10 to 19 days
- G 20 to 29 days
- H All 30 days

17 Is there a gun in your home?

- A Yes
- B No
- C Not sure

VIOLENCE-RELATED BEHAVIORS

The next 9 questions ask about violence-related behaviors.

18 During the past 30 days, on how many days did you carry **a weapon** such as a gun, knife, or club?

A 0 days
B 1 day
C 2 or 3 days
D 4 or 5 days
E 6 or more days

19 During the past 30 days, on how many days did you carry **a gun**?

A 0 days
B 1 day
C 2 or 3 days
D 4 or 5 days
E 6 or more days

20 During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club **on school property**?

A 0 days
B 1 day
C 2 or 3 days
D 4 or 5 days
E 6 or more days

21 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?

A 0 days
B 1 day
C 2 or 3 days
D 4 or 5 days
E 6 or more days

22 During the past 12 months, how many times were you in a physical fight?

A 0 times
B 1 time
C 2 or 3 times
D 4 or 5 times
E 6 or 7 times
F 8 or 9 times
G 10 or 11 times
H 12 or more times

23 During the past 12 months, how many times were you in a physical fight **on school property**?

A 0 times
B 1 time
C 2 or 3 times
D 4 or 5 times
E 6 or 7 times
F 8 or 9 times
G 10 or 11 times
H 12 or more times

24 Have you ever been physically forced to have sexual intercourse when you did not want to?

A Yes
B No

25 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.)

A I did not date or go out with anyone during the past 12 months
B 0 times
C 1 time
D 2 or 3 times
E 4 or 5 times
F 6 or more times

26 During the past 12 months, how many times did someone you were dating or going out with force you to do sexual things that you did not want to do? (Count such things as kissing, touching, or being physically forced to have sexual intercourse.)

A I did not date or go out with anyone during the past 12 months
B 0 times
C 1 time
D 2 or 3 times
E 4 or 5 times
F 6 or more times

BULLYING

The next 2 questions ask about bullying. Bullying is when 1 or more students tease, threaten, spread rumors about, hit, shove, or hurt another student over and over again. It is not bullying when 2 students of about the same strength or power argue or fight or tease each other in a friendly way.

27 During the past 12 months, have you ever been bullied **on school property**?

A Yes
B No

28 During the past 12 months, have you ever been **electronically** bullied? (Count being bullied through e-mail, chat rooms, instant messaging, websites, or texting.)

A Yes
B No

SELF INJURY

The next question asks about hurting yourself on purpose.

29 During the past 12 months, how many times did you do something to purposely hurt yourself without wanting to die, such as cutting or burning yourself on purpose?

A 0 times
B 1 time
C 2 or 3 times
D 4 or 5 times
E 6 or more times

SADNESS AND ATTEMPTED SUICIDE

The next 5 questions ask about sad feelings and attempted suicide. Sometimes people feel so depressed about the future that they may consider attempting suicide, that is, taking some action to end their own life.

30 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?

A Yes
B No

31 During the past 12 months, did you ever **seriously** consider attempting suicide?

A Yes
B No

32 During the past 12 months, did you make a plan about how you would attempt suicide?

A Yes
B No

33 During the past 12 months, how many times did you actually attempt suicide?

A 0 times
B 1 time
C 2 or 3 times
D 4 or 5 times
E 6 or more times

34 **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?

A **I did not attempt suicide** during the past 12 months
B Yes
C No

TOBACCO USE

The next 11 questions ask about tobacco use.

35 Have you ever tried cigarette smoking, even one or two puffs?

A Yes
B No

Appendix B (continued)

36 How old were you when you smoked a whole cigarette for the first time?

- A I have never smoked a whole cigarette
- B 8 years old or younger
- C 9 or 10 years old
- D 11 or 12 years old
- E 13 or 14 years old
- F 15 or 16 years old
- G 17 years old or older

37 During the past 30 days, on how many days did you smoke cigarettes?

- A 0 days
- B 1 or 2 days
- C 3 to 5 days
- D 6 to 9 days
- E 10 to 19 days
- F 20 to 29 days
- G All 30 days

38 During the past 30 days, on the days you smoked, how many cigarettes did you smoke **per day**?

- A I did not smoke cigarettes during the past 30 days
- B Less than 1 cigarette per day
- C 1 cigarette per day
- D 2 to 5 cigarettes per day
- E 6 to 10 cigarettes per day
- F 11 to 20 cigarettes per day
- G More than 20 cigarettes per day

39 During the past 30 days, how did you **usually** get your own cigarettes? (Select only **one** response.)

- A I did not smoke cigarettes during the past 30 days
- B I bought them in a store such as a convenience store, supermarket, discount store, or gas station
- C I bought them from a vending machine
- D I gave someone else money to buy them for me
- E I borrowed (or bummed) them from someone else
- F A person 18 years old or older gave them to me
- G I took them from a store or family member
- H I got them some other way

40 During the past 30 days, on how many days did you smoke cigarettes **on school property**?

- A 0 days
- B 1 or 2 days
- C 3 to 5 days
- D 6 to 9 days
- E 10 to 19 days
- F 20 to 29 days
- G All 30 days

41 During the past 12 months, did you ever try **to quit** smoking cigarettes?

- A I did not smoke during the past 12 months
- B Yes
- C No

42 During the past 30 days, on how many days did you use **chewing tobacco, snuff, or dip**, such as Redman, Levi Garrett, Beechnut, Skoal, Skoal Bandits, or Copenhagen?

- A 0 days
- B 1 or 2 days
- C 3 to 5 days
- D 6 to 9 days
- E 10 to 19 days
- F 20 to 29 days
- G All 30 days

43 During the past 30 days, on how many days did you smoke **cigars, cigarillos, or little cigars**?

- A 0 days
- B 1 or 2 days
- C 3 to 5 days
- D 6 to 9 days
- E 10 to 19 days
- F 20 to 29 days
- G All 30 days

44 During the past 30 days, on how many days did you smoke tobacco or flavored tobacco in a hookah, even just a puff?

- A 0 days
- B 1 or 2 days
- C 3 to 5 days
- D 6 to 9 days
- E 10 to 19 days
- F 20 to 29 days
- G All 30 days

45 During the past 7 days, on how many days were you in the same room with someone who was smoking cigarettes?

- A 0 days
- B 1 day
- C 2 days
- D 3 days
- E 4 days
- F 5 days
- G 6 days
- H 7 days

ALCOHOL

The next 8 questions ask about drinking alcohol. This includes drinking beer, wine, wine coolers, and liquor such as rum, gin, vodka, or whiskey. For these questions, drinking alcohol does not include drinking a few sips of wine for religious purposes.

46 How old were you when you had your first drink of alcohol other than a few sips?

- A I have never had a drink of alcohol other than a few sips
- B 8 years old or younger
- C 9 or 10 years old
- D 11 or 12 years old
- E 13 or 14 years old
- F 15 or 16 years old
- G 17 years old or older

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

- A 0 days
- B 1 or 2 days
- C 3 to 5 days
- D 6 to 9 days
- E 10 to 19 days
- F 20 to 29 days
- G All 30 days

48 During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?

- A 0 days
- B 1 day
- C 2 days
- D 3 to 5 days
- E 6 to 9 days
- F 10 to 19 days
- G 20 or more days

49 During the past 30 days, what is the largest number of alcoholic drinks you had in a row, that is, within a couple of hours?

- A I did not drink alcohol during the past 30 days
- B 1 or 2 drinks
- C 3 drinks
- D 4 drinks
- E 5 drinks
- F 6 or 7 drinks
- G 8 or 9 drinks
- H 10 or more drinks

50 During the past 30 days, how did you **usually** get the alcohol you drank?

- A I did not drink alcohol during the past 30 days
- B I bought it in a store such as a liquor store, convenience store, supermarket, discount store, or gas station
- C I bought it at a restaurant, bar, or club
- D I bought it at a public event such as a concert or sporting event
- E I gave someone else money to buy it for me
- F Someone gave it to me
- G I took it from a store or family member
- H I got it some other way

51 During the past 30 days, where did you **usually** drink alcohol? (Select only **one** response.)

- A I did not drink alcohol during the past 30 days
- B At my home
- C At another person's home
- D While riding in or driving a car or other vehicle
- E At a restaurant, bar, or club
- F At a public place such as a park, beach, or parking lot
- G At a public event such as a concert or sporting event
- H On school property

52 During the past 30 days, what type of alcohol did you **usually** drink? (Select only **one** response.)

- A I did not drink alcohol during the past 30 days
- B I do not have a usual type
- C Beer
- D Flavored malt beverages, such as Smirnoff Ice, Bacardi Silver, or Hard Lemonade
- E Wine coolers, such as Bartles & James or Seagrams
- F Wine
- G Liquor, such as vodka, rum, scotch, bourbon, or whiskey
- H Some other type

53 During the past 30 days, on how many days did you have at least one drink of alcohol **on school property**?

- A 0 days
- B 1 or 2 days
- C 3 to 5 days
- D 6 to 9 days
- E 10 to 19 days
- F 20 to 29 days
- G All 30 days

MARIJUANA USE

The next 3 questions ask about marijuana use. Marijuana also is called grass or pot.

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

- A I have never tried marijuana
- B 8 years old or younger
- C 9 or 10 years old
- D 11 or 12 years old
- E 13 or 14 years old
- F 15 or 16 years old
- G 17 years old or older

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

- A 0 times
- B 1 or 2 times
- C 3 to 9 times
- D 10 to 19 times
- E 20 to 39 times
- F 40 or more times

56 During the past 30 days, how many times did you use synthetic marijuana (also called K2 or Spice)?

- A 0 times
- B 1 or 2 times
- C 3 to 9 times
- D 10 to 19 times
- E 20 to 39 times
- F 40 or more times

OTHER DRUGS

The next 15 questions ask about other drugs.

57 During your life, how many times have you used **any** form of cocaine, including powder, crack, or freebase?

- A 0 times
- B 1 or 2 times
- C 3 to 9 times
- D 10 to 19 times
- E 20 to 39 times
- F 40 or more times

Appendix B (continued)

58 During the past 30 days, how many times did you use **any** form of cocaine, including powder, crack, or freebase?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

59 During the past 30 days, how many times did you sniff glue, breathe the contents of aerosol spray cans, or inhale any paints or sprays to get high?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

60 During your life, how many times have you used **heroin** (also called smack, junk, or China White)?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

61 During the past 30 days, how many times did you use **heroin** (also called smack, junk, or China White)?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

62 During your life, how many times have you used **methamphetamines** (also called speed, crystal, crank, or ice)?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

63 During the past 30 days, how many times did you use **methamphetamines** (also called speed, crystal, crank, or ice)?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

64 During your life, how many times have you used **ecstasy** (also called MDMA)?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

65 During the past 30 days, how many times did you use **ecstasy** (also called MDMA)?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

66 During your life, how many times have you taken a prescription drug (such as OxyContin, Percocet, Vicodin, codeine, Adderall, Ritalin, or Xanax) without a doctor's prescription?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

67 During the past 30 days, how many times did you use a **pain killer** to get high, like Vicodin, OxyContin (also called Oxy or OC), or Percocet (also called Percs)?

A 0 times
B 1 or 2 times
C 3 to 9 times
D 10 to 19 times
E 20 to 39 times
F 40 or more times

68 During your life, how many times have you used a needle to inject any **illegal** drug into your body?

A 0 times
B 1 time
C 2 or more times

69 During the past 12 months, has anyone offered, sold, or given you an illegal drug **on school property**?

A Yes
B No

70 If you wanted to, how hard or easy would it be for you to get cocaine, LSD, methamphetamines, or other illegal drug?

A Very hard
B Sort of hard
C Sort of easy
D Very easy

71 How many adults have you known personally who, in the past year, have used marijuana, cocaine, or other drugs?

A 0 adults
B 1 adult
C 2 adults
D 3 or 4 adults
E 5 or more adults

SEXUAL BEHAVIOR

The next 8 questions ask about sexual behavior.

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

A I have never had sexual intercourse
B 11 years old or younger
C 12 years old
D 13 years old
E 14 years old
F 15 years old
G 16 years old
H 17 years old or older

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

A I have never had sexual intercourse
B 1 person
C 2 people
D 3 people
E 4 people
F 5 people
G 6 or more people

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

A I have never had sexual intercourse
B I have had sexual intercourse, but not during the past 3 months
C 1 person
D 2 people
E 3 people
F 4 people
G 5 people
H 6 or more people

75 Did you drink alcohol or use drugs before you had sexual intercourse the **last time**?

A I have never had sexual intercourse
B Yes
C No

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

A I have never had sexual intercourse
B Yes
C No

77 The **last time** you had sexual intercourse, what **one** method did you or your partner use to **prevent pregnancy**? (Select only **one** response.)

- A I have never had sexual intercourse
- B No method was used to prevent pregnancy
- C Birth control pills
- D Condoms
- E An IUD (such as Mirena or ParaGard) or implant (such as Implanon or Nexplanon)
- F A shot (such as Depo-Provera), patch (such as Ortho Evra), or birth control ring (such as NuvaRing)
- G Withdrawal or some other method
- H Not sure

78 During your life, with whom have you had sexual contact?

- A I have never had sexual contact
- B Females
- C Males
- D Females and Males

79 Which of the following best describes you?

- A Heterosexual (straight)
- B Gay or lesbian
- C Bisexual
- D Not sure

BODY WEIGHT

The next question asks about body weight.

80 During the past 30 days, did you **vomit or take laxatives** to lose weight or to keep from gaining weight?

- A Yes
- B No

FOOD

The next 8 questions ask about food you ate or drank during the past 7 days. Think about all the meals and snacks you had from the time you got up until you went to bed. Be sure to include food you ate at home, at school, at restaurants, or anywhere else.

81 During the past 7 days, how many times did you drink **100% fruit juices** such as orange juice, apple juice, or grape juice? (Do **not** count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks.)

- A I did not drink 100% fruit juice during the past 7 days
- B 1 to 3 times during the past 7 days
- C 4 to 6 times during the past 7 days
- D 1 time per day
- E 2 times per day
- F 3 times per day
- G 4 or more times per day

82 During the past 7 days, how many times did you eat **fruit**? (Do **not** count fruit juice.)

- A I did not eat fruit during the past 7 days
- B 1 to 3 times during the past 7 days
- C 4 to 6 times during the past 7 days
- D 1 time per day
- E 2 times per day
- F 3 times per day
- G 4 or more times per day

83 During the past 7 days, how many times did you eat **green salad**?

- A I did not eat green salad during the past 7 days
- B 1 to 3 times during the past 7 days
- C 4 to 6 times during the past 7 days
- D 1 time per day
- E 2 times per day
- F 3 times per day
- G 4 or more times per day

84 During the past 7 days, how many times did you eat **potatoes**? (Do **not** count french fries, fried potatoes, or potato chips.)

A I did not eat potatoes during the past 7 days
B 1 to 3 times during the past 7 days
C 4 to 6 times during the past 7 days
D 1 time per day
E 2 times per day
F 3 times per day
G 4 or more times per day

85 During the past 7 days, how many times did you eat **carrots**?

A I did not eat carrots during the past 7 days
B 1 to 3 times during the past 7 days
C 4 to 6 times during the past 7 days
D 1 time per day
E 2 times per day
F 3 times per day
G 4 or more times per day

86 During the past 7 days, how many times did you eat **other vegetables**? (Do **not** count green salad, potatoes, or carrots.)

A I did not eat other vegetables during the past 7 days
B 1 to 3 times during the past 7 days
C 4 to 6 times during the past 7 days
D 1 time per day
E 2 times per day
F 3 times per day
G 4 or more times per day

87 During the past 7 days, how many times did you drink a **can, bottle, or glass of soda or pop**, such as Coke, Pepsi, or Sprite? (Do **not** count diet soda or diet pop.)

A I did not drink soda or pop during the past 7 days
B 1 to 3 times during the past 7 days
C 4 to 6 times during the past 7 days
D 1 time per day
E 2 times per day
F 3 times per day
G 4 or more times per day

88 During the past 7 days, on how many days did you eat breakfast?

A 0 days
B 1 day
C 2 days
D 3 days
E 4 days
F 5 days
G 6 days
H 7 days

PHYSICAL ACTIVITY

The next 4 questions ask about physical activity.

89 During the past 7 days, on how many days were you physically active for a total of **at least 60 minutes per day**? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)

A 0 days
B 1 day
C 2 days
D 3 days
E 4 days
F 5 days
G 6 days
H 7 days

90 On an average school day, how many hours do you watch TV?

A I do not watch TV on an average school day
B Less than 1 hour per day
C 1 hour per day
D 2 hours per day
E 3 hours per day
F 4 hours per day
G 5 or more hours per day

91 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 tables, a smartphone, YouTube, Facebook or other networking tools, and the Internet.)

- A I do not play video or computer games or use a computer for something that is not school work
- B Less than 1 hour per day
- C 1 hour per day
- D 2 hours per day
- E 3 hours per day
- F 4 hours per day
- G 5 or more hours per day

92 In an average week when you are in school, on how many days do you go to physical education (PE) classes?

- A 0 days
- B 1 day
- C 2 days
- D 3 days
- E 4 days
- F 5 days

HEALTH-RELATED TOPICS

The next 4 questions ask about other health-related topics.

93 Have you ever been taught about AIDS or HIV infection in school?

- A Yes
- B No
- C Not sure

94 Has a doctor or nurse ever told you that you have asthma?

- A Yes
- B No
- C Not sure

95 Do you have any physical disabilities or long-term health problems? (Long-term means 6 months or more.)

- A Yes
- B No
- C Not sure

96 Do you have any long-term emotional problems or learning disabilities? (Long-term means 6 months or more.)

- A Yes
- B No
- C Not sure

YOU AND YOUR FAMILY

The next 3 questions ask for some information about you and your family.

97 How often do you speak a language other than English at home?

- A Never
- B Less than half the time
- C About half the time
- D More than half the time but not all of the time
- E All of the time

98 Were you born in the USA?

- A Yes
- B No

99 Do you have enough food to eat, sometimes not enough to eat, or often not enough to eat?

- A Enough food to eat
- B Sometimes not enough to eat
- C Often not enough to eat

RESILIENCY FACTORS

How true do you feel the following statements are for you?

100 In my home, there is a parent or some other adult who is interested in my school work.

- A Not true at all
- B A little true
- C Pretty much true
- D Very much true

101 In my home, there is a parent or some other adult who believes that I will be a success.

- A Not true at all
- B A little true
- C Pretty much true
- D Very much true

102 At my school, there is a teacher or some other adult who listens to me when I have something to say.

A Not true at all
B A little true
C Pretty much true
D Very much true

103 At my school, there is a teacher or some other adult who believes that I will be a success.

A Not true at all
B A little true
C Pretty much true
D Very much true

104 Outside of my home and school, there is an adult who really cares about me.

A Not true at all
B A little true
C Pretty much true
D Very much true

105 Outside of my home and school, there is an adult who tells me when I do a good job.

A Not true at all
B A little true
C Pretty much true
D Very much true

106 I have a friend about my own age who really cares about me.

A Not true at all
B A little true
C Pretty much true
D Very much true

107 When I am not at home, one of my parents or guardians knows where I am and who I am with.

A Not true at all
B A little true
C Pretty much true
D Very much true

108 In my school, there are clear rules about what students can and cannot do.

A Not true at all
B A little true
C Pretty much true
D Very much true

109 I plan to go to college or some other school after high school.

A Not true at all
B A little true
C Pretty much true
D Very much true

110 At school I am involved in sports, clubs, or other extra-curricular activities (such as band, cheerleading, or student council).

A Not true at all
B A little true
C Pretty much true
D Very much true

111 Outside of my home and school, I am a part of clubs, sports teams, church, temple, or other group activities.

A Not true at all
B A little true
C Pretty much true
D Very much true

112 Outside of my home and school, I am involved in music, art, literature, sports, or a hobby.

A Not true at all
B A little true
C Pretty much true
D Very much true

113 My friends get into a lot of trouble.

A Not true at all
B A little true
C Pretty much true
D Very much true