The Relationship Between Protective Factors and Consequences of Substance Use: Ethnic, Socioeconomic, and Gender Disparities in Exposure and Protection

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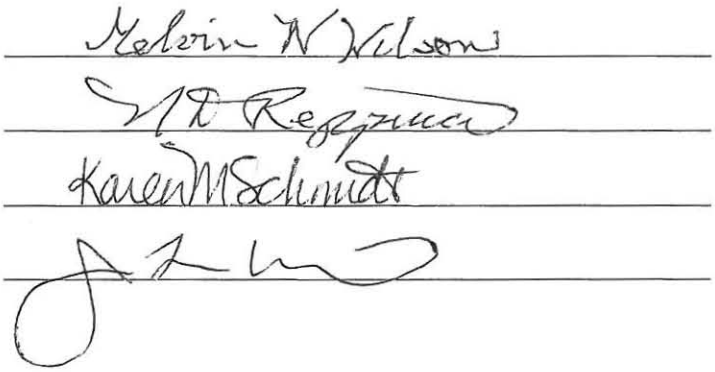
A Dissertation presented to the Graduate Faculty of the University of Virginia
in Candidacy for the Degree of
Doctor of Philosophy

Department of Psychology

University of Virginia
May 2013



Abstract

Although Caucasian American youth are more likely to use substantially higher or sometimes equivalent levels of alcohol and drugs, African American youth report more health and social substance-related consequences (Johnston, O'Malley, Bachman, & Schulenberg, 2007; Jones-Webb, Hsiao, Hannan & Caetano, 1997; Herd, 1989; US Dept of Health and Human Services, 1995; Wallace, 1999). Broadly, this study examines the relationship between 13 protective factors and 2 consequences of substance use. We inquired into whether exposure to protective factors was distributed equally across contexts of ethnicity, socioeconomic status, and gender. Next, we determine if the protective factors equally protect youth from social and health consequences of substance use. Last, item response theory was used to detect items that show differential item functioning between groups, drop the items, and reanalyze the tests of protection. Equivalent exposure to protective factors did not always equal equivalent protection from consequences of substance use, socioeconomic status showed the most disparities. Following the reanalysis, a total of eight disparities in protection were an artifact of DIF and 16 disparities in protection remained. Participants included 585 youth in their 11th and 12th grade year, a caregiver, and a peer recruited from three public schools in a metropolitan area. Theoretical and prevention implications are discussed. Future research should consider social mechanisms that buffer or exacerbate consequences between four represented groups: low SES minorities, high SES minorities, low SES non-minorities, and high SES non-minorities.

Introduction

Contrary to popular assumption, low prevalence rates of substance use among Black adolescents relative to their White counterparts have been well documented for the last 30 years (Welte & Barnes, 1987; Herd, 1988; Substance Abuse and Mental Health Services Administration, 2006). However, Black adolescents report more social and health consequences from substance use than White adolescents (Jones-Webb, Hsiao, Hannan & Caetano, 1997; Herd, 1989; US Dept of Health and Human Services). Despite the ubiquity of alcohol and drug use, the systematic study of disparities is in its infancy (Galea & Rudenstine, 2005) and explanations of disparities remain limited (Wallace, 1999). The current study seeks to identify underlying mechanisms that create or sustain disparities as outcomes of substance use and substance use disorders, and describe the processes in terms of exposure versus protection.

Before presenting the details of the study, six areas of research on adolescent substance use will be considered. First, the prevalence of substance use in the United States is reviewed and followed by a more narrowed focus on ethnic trends between White and Black youth. National and subsample studies are presented that show a high prevalence rate of substance use among youth in general, with exceptions that exist among Black adolescents. The third section presents research on the consequences of drug and alcohol use. Health and social consequences of substance use are discussed and ethnic disparities are highlighted among minority groups who report disproportionate consequences relative the amount of substances consumed. Next, studies on socioeconomic status as a potential cause of ethnic disparities as outcomes of substance

use are presented. The sixth section proposes the use of item response theory and differential item functioning as a statistical technique to determine if item equivalence exists between groups, and if exposure differences still exist after dropping items that show DIF from scoring. The final section proposes an ecological framework to organize protective factors around the study of ethnic disparities as outcomes of substance use. Analytically and statistically, health and social consequences are viewed as a result of substance use and other equally important determinants. The analysis consists of a comprehensive comparative study of exposure to protective factors versus actual protection from consequences in the context of ethnicity, socioeconomic status, and gender. Protective factors are enduring characteristics of an individual, environment, or the interaction between the two that help the individual to adapt competently (Sandler, 2001).

Prevalence of Substance Use

The use of substances in the United States is excessive. Americans, who comprise 4% of the world's population, consume two-thirds of the world's illegal drugs. One in four Americans will have an alcohol or drug disorder at some point in his or her life (Califano, 2007). Among adolescents, smoking, drinking, misusing prescription drugs, and using illegal drugs is a public health problem of epidemic proportion. One national study reported that three-fourths of high school students (75.6 percent) have used addictive substances including cigarettes, alcohol, marijuana or cocaine and almost half are current users. Of high school students who currently smoke cigarettes, drink alcohol,

or use other drugs, 1 in 8 have a diagnosable clinical substance use disorder (The National Center on Addiction and Substance Abuse at Columbia University, 2011).

The Monitoring the Future Study (Johnston, O'Malley, Bachman, & Schulenberg, 2011) is a large-scale epidemiological survey based on a national sample of public and private school students in the United States. Findings from the 2010 report indicate that historically, alcohol was the drug used most frequently by high school youth who used daily; however, marijuana has now surpassed alcohol as the drug used most often by daily users. In particular, 1 in 6 twelfth graders reported daily use of marijuana at some point in their life for at least a month. Marijuana was the most widely used illicit drug and nearly half (48%) of students reported having tried an illicit drug by the time they finished high school; nearly 1 in 3 (29%) have done so as early as 8th grade. The aforementioned prevalence estimates are considered to be low; none includes adolescents who are incarcerated in the juvenile justice system or the large numbers of adolescents who have dropped out of high school. Rates of substance use and substance use disorders are higher in the unsampled populations than among high school students in general.

Ethnic Differences in Prevalence of Substance Use

The following studies present evidence spanning the last 30 years that suggest Black adolescents use fewer substances, and at times substantially fewer substances than their White counterparts use (Harford, Lowman, & Kaelber, 1982; Herd, 1985; Herd, 1988; Welte & Barnes, 1987). Next, recent changing trends in marijuana use are highlighted across ethnic groups that show prevalence rates are becoming more similar.

Following a review of household surveys, Herd (1985) reported that Black youth were less likely to use alcohol than White youth. However, the research specific to delinquent and problem youth was not consistent. That is, some showed higher rates of heavy and problem drinking among Black youth compared to White youth. In a national sample, being a Black female was the strongest predictor of being an abstainer over a drinker, and predicted a lower likelihood of being a heavy drinker (Herd, 1988). Furthermore, the observed differences did not appear to be merely a result of low socioeconomic status which suggests other cultural dimensions, such as religious background or regional differences, may offer more explanation.

The National Household Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration, 2006) has become the most comprehensive source of population-level illegal drug use data in the United States. Results from the 2005 report continue to reflect the historical trends reported by White and Black students. The time when adolescents initiate use of alcohol and tobacco occurs earlier among White students than occurring among Blacks students (Catalano, Hawkins, Krenz, Gillmore, Morrison, Wells, & Abbott, 1993; Wallace & Muroff, 2002). Overall, under the age of 35 African Americans consistently reported lower rates of any substance use than European Americans report; the most prominent differences appeared during early adulthood, ages 18 to 26 years (Guthrie & Low, 2000).

Changing trends. Recently, the ethnic difference in prevalence rates has narrowed in some cases. For example, 8th grade students were an exception to the trend when lifetime rates were slightly higher among African American youth. However,

annual and current marijuana use remained higher among White youth (Johnston et al., 2006; Johnston, O'Malley, Bachman, & Schulenberg, 2011). The rates of substance use among older African Americans may be spreading to the younger cohort, particularly marijuana, cocaine, crack-cocaine, and heroin use among 12 to 17-year olds (U.S. Department Health Human Services, 1998b). The changing drug patterns should signal to researchers that existing interventions are not as effective with a group of ethnically diverse adolescents. By 2030 approximately 18% of adolescents will be from African American backgrounds, and the limited effects of substance use prevention efforts among diverse populations will impact the nation through social, economic, and health-related consequences (U.S. Bureau of the Census, 1992).

Why are there ethnic differences in prevalence? Empirical studies have, thus far, not been able to offer an explanation for the ethnic differences in adolescent alcohol and drug use (Watt & Rogers, 2007). Few empirical studies offer a theoretical framework for studying ethnic differences in substance abuse (Cheung, 1990-1991). However, Wallace (1999a) offered a strong conceptual framework to guide research on this issue. Wallace outlined an ecological framework, referred to as the racialized social system, which can be extended to explain unexpected advantages in adolescence.

Wallace's model (1999a) suggests that racialized social systems contribute to race differences in drug and alcohol use through community characteristics, interpersonal relationships, and individual-level psychology and behavior (Wallace, 1999a). Consistent with Wallace's conceptual model, many scholars have theorized that deficiencies disproportionately present for minority populations such as poverty,

unemployment, and increased availability of licit and illicit drugs contribute to the ethnic differences in substance use rates. The system creates social and economic disadvantages that could suppress substance use rates for youth. One reason is that minority youth are brought into direct contact with the negative consequences of substance abuse. For example, Black youth are more likely than are White youth to report seeing people who are drunk or high in their community (National Institute on Drug Abuse, 1995). Consequently, minority youth likely have few glamorous images of substance abuse (Boyle & Brunswick, 1980). In addition, reporting and arrest rates for substance use have been shown to be higher for African American relative to White populations (Chasnoff, Landress, & Barrett, 1990; Neuspiel, 1996). Thus, Black youth likely have few delusions about their ability to escape detection should they experiment with drugs or alcohol illegally.

The reality of excessive environmental and societal risks from substance use leads many parents to be exceptionally vigilant and strict regarding the issue and rely on tactics such as "no nonsense parenting" (Brody & Murry, 2001) that incorporates high levels of control. Sampson and Laub (1994) made a similar argument that asserted strong family social controls may serve as an important buffer against structural disadvantage in the larger community. In support, research reveals that Black parents, when compared to White parents, drink less, are more opposed to alcohol use, perceive alcohol as more harmful, and are less likely to involve their children in family alcohol use (Peterson, Hawkins, Abbot, & Catalano, 1994).

Health and Social Consequences of Substance Use and Substance Use Disorders

Health consequences. The epidemic of adolescent substance use and related problems in the United States has created diverse and far-reaching consequences, only some of which are captured in this analysis. The research has largely defined health consequences of substance use among teenagers by two categories. Symptomatic indicators of alcoholism (e.g., withdrawal, increase in tolerance) and brain function (e.g., cognitive deficits) are the primary outcomes of health-related research among youth who engage in alcohol and drug use. Although serious health conditions among adults (e.g., cirrhosis) can result from prolonged substance use, often it is the case that adolescents have yet to expose themselves to chronic health effects, with the exception of HIV. The literature on brain function and symptomatic indicators of alcoholism are reviewed in the introduction, and symptomatic indicators are the statistical focus of health consequences in this study

The literature on neurocognitive brain functioning has identified a number of deficits among adolescents with alcohol use disorder (AUD). Compromised performance on verbal and nonverbal retrieval tests was found on a group of 15-16 year olds, and poor visuospatial functioning was associated with recent withdrawal symptoms (Brown, Tapert, & Granholm, 2000). Decrements in problem solving (Moss, Kirisci, Gordon, & Tarter, 1994), and working memory (Tapert, Granholm, Leedy, & Brown, 2002) were found in adolescents with AUD which further suggests adverse effects of alcohol on the adolescent brain. Thus, the accrual of "human capital" may be enormously affected by heavy alcohol consumption during adolescence (Monti, Miranda, Jr., Nixon, Sher, Swartzwelder, & Tapert, 2005). Nonetheless, compared to adult drinking, little is

understood about drinking among youth and its consequences (Monti, Colby, & O'Leary, 2001).

An important factor related to health symptoms of addiction that progress into adulthood is age of onset. Among teens who started smoking, drinking or using other drugs before age 18, 1 in 4 are addicted, compared with 1 in 25 who started at age 21 or older (The National Center on Addiction and Substance Abuse at Columbia University, 2011). Similarly, experimental research on rodents has demonstrated that when alcohol is consumed before and during adolescence, it results in increased alcohol consumption while in adulthood (Rodd, Bell, Sable, Murphy, & McBride, 2004; Siciliano & Smith, 2001).

Social consequences. Researchers have documented social consequences of adolescent substance use that include increased behavioral problems, slower achievement of developmental tasks, and increased financial costs as discussed below. When youth drink they tend to drink intensively, often engaging in heavy episodic drinking which makes them vulnerable to ongoing social problems with violence, unprotected or unwanted sexual intercourse, use of illicit drugs, and driving while intoxicated (Baer, 1993). Today alcohol is involved in 36% of traffic deaths among persons aged 16 to 20 (NIH Traffic related alcohol deaths). Mortality, often considered the ultimate consequence of substance use, occurs among youth under 21 at the rate of 5,000 deaths annually from alcohol-related injuries alone (National Highway Traffic Safety Administration [NHTSA] 2003). Academic and vocational trajectories are additional social consequences that can be altered by drug and alcohol use. For example, Moss

(1994) found lower standardized scores on reading ability and spelling on a sample of adolescent alcoholics. Others reported that academic performance was compromised when adolescents were involved in substance use (Bryant & Zimmerman, 2002).

From a developmental perspective, Baumrind and Moselle (1985) have hypothesized that drug use during adolescence disturbs normative developmental tasks. Adolescence is a time period when fundamental competencies are formed for the transition into adult roles. Drug use during adolescence may create developmental lags. Rather than develop the skills necessary to deal with personal differences with others and themselves, they are substituting a chemical solution. Relationships cultivated by drug-induced intimacies will lack "depth, commitment, and stability," and therefore crumble when confronted with the reality of different perspectives. Drug use may interrupt identity formation as well as stage-sequential progress by enabling adolescents to avoid affect that may have otherwise motivated them to meet the demand characteristics of their context (Baumrind & Moselle, 1985).

The financial costs associated with teen substance use and addiction include an estimated $68 billion from underage drinking alone (Chein, Albert, O'Brien, Uckert, &Steinberg, 2011) and over $14 billion associated with substance-related juvenile justice programs annually (Riggs & Greenberg, 2009). In the long run, the consequences of adolescent substance use and addiction place enormous burdens on our health care, criminal justice, family court, education and social services systems. The U. S. absorbs economic and social cost of substance abuse that exceeds $467 billion per year and is driven by individuals who began their use as teens. At last count, the tab to government

was almost $1,500 per year for every person in America (The National Center on Addiction and Substance Abuse at Columbia University, 2011).

Ethnic Disparities in Social and Health Consequences of Substance Use

There is a substantial burden of drug-related consequences, the weight of which is not carried equally by all groups. Available information indicates that the use of drugs and alcohol is harming the social and health well-being of ethnic populations disproportionately. Often ethnic groups with higher a prevalence of use have a lower likelihood of social and health consequences (Galea & Rudenstine, 2005; Szapocznik, Prado, Burlew, Williams, & Santisteban, 2007; U.S. Dept of Health and Human Services National Institute of Health, 2003).

Numerous studies have documented a social and health paradox between White and Black participants, prior to age 35, who engage in substance use. Although White participants are more likely to use equivalent or substantially higher levels of alcohol and drugs, depending on the type of drug, Black participants report more social and health consequences (Jones-Webb, Hsiao, Hannan & Caetano, 1997; Herd, 1989; US Dept of Health and Human Services, 1995 as cited in Wallace, 1999). Drug and alcohol use is a problem for many individuals, families, and communities; however, the implications appear to be worse for African Americans (Fullilove & Fullilove, 1995).

Ethnic disparities in social consequences. Numerous studies have documented ethnic disparities in social and health consequences as outcomes of substance use. For example, African American females have been shown to initiate drinking at a later age then their European American peers. Regardless of delayed onset, African American

females experience disproportionately higher alcohol-related problems including truancy, unprotected sex, and use of illicit drugs (Guthrie & Low, 2000; U.S. Department Health Human Services, 1998b). Furthermore, African Amerian adolesent females are more likely than European American females to proceed from marijuana use into cocaine, crack-cocaine, and heroin use, that is often accompanied by heavy drinking (Guthrie & Low, 2000).

Criminal justice statistics are sufficient to draw our attention to social disparities in how drugs affect White and Black individuals. Black individuals exhibit excess rates of arrest, conviction, and incarceration for drug-related crimes and of drug-related homicide in particular. For example, even though two-thirds of all crack cocaine users are White, more than 80% of people convicted in federal court for crack cocaine offenses are African American (Piper, 2008). The observed excess rates of criminal justice incidents are not consistent with other evidence on the drug use of Black Americans in the United States (Drug use among racial/ethnic minorities, 2004). As such, social and health disparities that affect our Black citizens is a topic that deserves special focus in research.

Ethnic disparities in health consequences. The 1984 National Survey of Drinking Patterns was collected using personal interviews. Data reported on 1,947 Black and 1,771 White participants illustrated that for every type of problem, with the exception of drinking and driving, Black participants reported higher rates than White participants reported. The excess rates of Black participants were particularly marked for alcohol-related health problems. Nearly 2.5 times as many Black as Whites participants reported

alcohol-related health problems (15.3 percent versus 6.4 percent). Substantially more Black than White participants also indicated experiencing symptoms of physical dependence such as tremors, sweating, and morning drinking (17.1 percent versus 9.9 percent) and loss of control (17.8 percent versus 13.7 percent). The finding is particularly interesting given the fact that a slightly smaller proportion of Black respondents were classified as frequent heavier drinkers.

Socioeconomic Status as a Cause of Ethnic Disparities as Outcomes of Substance Use

Although differences in the prevalence of substance use among U.S. ethnic groups have been well documented, only a hand-full of studies have attempted to explain why substance use is harming our minority populations at a disproportionate rate. The primary explanation stems from ethnic differences in socioeconomic status (SES), with some notable caveats (Jones-Webb, Hsiao, & Hannan, 1995). Social factors such as SES and social connections affect access to important resources, behaviors, and consequences through multiple channels (Link & Phelan, 1995), and Black Americans are overrepresented in the lower and working classes relative to White Americans (Loury, 2000).

Barr and colleagues (1993) conducted an extensive study of alcohol and substance use using a representative New York sample of adults. They found that highly educated Black men who drank were more likely to have problems than highly educated White men who drank. The results indicated that when controlling for socioeconomic status, via education or income, Black adults were still more likely to report more consequences

related to substance use. Therefore, ethnic differences in SES did not fully explain the ethnic disparity in substance use-related consequences. Similarly, Herd (1994) used a statistical model that showed how race interacted with frequency of heavy drinking and sociodemographic characteristics. As the frequency of heavy drinking increased, rates of drinking problems rose faster among Black men than White men. Herd noted that other factors (e.g., sociocultural) were influencing substance-related disparities between Black and White participants besides their socioeconomic status. Jones-Webb and associates (1997) reported that given unfavorable economic neighborhood conditions, Black men will report a greater number of alcohol-related problems in comparison to White men. Thus, lower SES may only partially affect ethnic disparities in consequences of substance use.

Although the disproportionate consequences of substance use have been reliably established, other explanations for the disparity are limited (Wallace, 1999). Thus far, socioeconomic factors are important to explain Black-White differences in substance use and problems, but the disparity is more complex than SES can account for. Evidence consistently indicates that SES, particularly the lower brackets, does not affect Black and White individuals the same in relation to their drug and alcohol-related consequences. Furthermore, the underlying mechanisms through which substance-related disparities transpire have yet to surface, and thus are the focus of the present study.

Item Response Theory

This section is a discussion of how differential item functioning (DIF), within the framework of item response theory (IRT), will be used to test for item equivalence, drop

items that show DIF, and use corrected scores to reanalyze the disparities in protection from consequences of substance use. The final section discusses the advantages of using IRT versus classical test theory. If the goal is to determine whether ethnic, SES, and gender groups are similar on consequences of substance use, then it is imperative that the measures of the consequences be equivalent. Without clear evidence of equivalence, any observed mean differences may be the result of genuine group difference in consequences or the result of bias in the scores introduced by the measurement process.

Differential item functioning. Item response theory is a theory of how people respond to items. Differential item functioning is in the framework of IRT. DIF is an analytical method developed to evaluate and improve the equivalence of measures. DIF is a test of measurement invariance across any two or more groups that can assess the degree to which the internal psychometric qualities of a measure are the same across groups and allow for revaluation of item equivalence. In this study, if disparities in protection from consequences exist between groups, we would determine if the disparities still exist after dropping items that show DIF from scoring.

Hui and Triandis (1985) organized the notion of measurement equivalence into several categories, the focus of this study is item equivalence. Item equivalence exists when the items on a measure have the same meaning across different groups. Equivalence of a measure's items rely on IRT analysis. In IRT analysis, one uses the relationship between the responses on each individual item and the total scale score, without the inclusion of the specific item being evaluated to examine item equivalence.

Measurement bias is an important concern in comparative designs that are being used to examine relationships between constructs, because any observed relationships may be differentially biased, upward or downward, driven by different measurement biases across groups. That is, if there are different measurement biases in an assessment of a construct in one group compared to another, then the observed relationships to that construct will be differentially biased across groups. A differential bias may look very much like a difference in the magnitude of the relationship when it is indeed nothing more than a measurement artifact (Knight, Roosa, & Umaña-Taylor, 2009).

Item response theory or classical test theory. IRT application in the topic of personality assessment is sparse (Embretson & Reise, 2000). However, the advantages of IRT have revealed substantive findings in the issue of cross-cultural measurement and personality (Huang, Church, & Katigbak, 1997). There are several benefits of using IRT compared to classical test theory. For example, the invariance property of item characteristics curves (ICC's) and item parameter values is the most important advantage of IRT when doing DIF research. Equivalent to a linear regression coefficient, IRT parameters are sample invariant across groups with different trait level distributions. IRT parameters do not confound DIF with group differences in trait level (Lim & Drasgrow, 1990). IRT analysis also generates a latent mean score for each examinee, even when the items are exhibiting DIF. By using at least one item that does not show DIF as an anchor, IRT is able to estimate values for examinees from both groups on a common scale (Reise, Widaman, & Pugh, 1993). Additional features that enable a clearer perspective of DIF relative to a classical test theory approach include a common

scale for difficulty parameters and examinee trait level scores, as well as examination of group differences in the latent trait instead of the manifest raw score (Smith & Reise, 1998).

An Ecological, Protective, Strength-Based Approach to Ethnic Disparities as Outcomes of Substance Use

A conceptualization for the current state of ethnic disparities as outcomes of substance use is considered, and then a Bronfenbrenner strength-based approach is proposed as an organizing framework to advance the field. Galea and Rudstein (2005) conceptualized discrepancies between disparities in substance use and its consequences as a reflection of the multiple determinants on substance-related trajectories. The consequences of alcohol and drug use are as much a reflection of family, social and economic circumstances as they are of the substance use itself. The field of minority substance use has focused considerably on description of ethnic trends in rates of alcohol and drug use. Galea and Rudstein discuss a pressing need to advance the research by framing known group differences around a goal to highlight underlying mechanisms. The present study will move beyond description and consider mechanisms that may create or maintain disparities in health and social consequences of substance use. This study will highlight and analyze underlying processes that sustain susceptible minority and nonminority populations against consequences of substance use.

Urie Bronfenbrenner (1989) articulated a heuristic ecological framework for thinking about development that has far-reaching implications for behavioral science. The environment can be conceptualized as an overlapping set of embedded contexts such

as the family, school, neighborhood, and community. A salient feature of the ecological perspective is the integrative framework provided for studying individual differences, as well as environmental influences.

When applying Bronfenbrenner's framework to the study of disparities as outcomes of substance use and substance use disorders, we see that consequences do not occur in a vacuum, but rather are enmeshed in individual and social contexts. Most studies have included a small number of variables, and it has been necessary to piece together the findings and imagine what the comprehensive picture might be (Szapocznik, Prado, Burlew, William, & Santisteban, 2007). The challenge is even more serious for minorities, for whom we know so much less. Substance abuse experts have stated that the most promising studies include a systematic map of all domains of protective factors especially on the role of culture, religiosity, ethnic identity, family, peer, environmental, and community level factors in substance use (Drug use among racial/ethnic minorities, 2003; Szapocznik et al., 2007). In fact, the protective and risk factors paradigm (Hawkins et al. 1992) is one of the most widely accepted frameworks for organizing the contexts that predispose adolescent of all ethnic groups toward or away from drug use.

Protective factors. Protective factors are enduring characteristics of an individual, environment, or the interaction between the two that help individuals adapt competently (Sandler, 2001). Much research has been dedicated to determining which protective factors are related to youth substance use. The family unit has been widely acknowledged as the primary unit responsible for the socialization of child behaviors. Peers are also closely linked to levels of adolescent drug use (Windle, 2000); however,

initiation and experimentation with alcohol, tobacco, and other drugs are critically tied to family factors such as the overall climate of the home environment, relationship quality between parents and children, and attitudes and behaviors of parents (Brown, Mounts, Lamborn, & Steinbrg, 1993; Hoffman & Su, 1998; Kumpfer & Alvarado, 1995; M.A. Miller et al., 2000 as cited in Miller-Day, 2002). For example, King et al. (2004) found that parents who currently used drugs were more likely than parents who currently did not use drugs, to have adolescents who used drugs. Regarding contact with a caregiver, they reported that the more time a parent spent with their child each day, the less likely the child was to have ever used drugs. Marital status has been shown to be differentially influential for Black versus White teenagers. Specifically, having a residential father, nonresidential father, or father figure was not significantly related to having ever drunk alcohol for African American youth (Jordan & Lewis, 2005). Friedman et al. (1998) reported that African American male adolescents referred from a Family Court were at no greater risk for substance use when they reported growing up with their mothers only. Parental monitoring is considered a classic protective strategy to prevent substance use. A five-year longitudinal study reported that effective parenting that consisted of monitoring, communication about substances, and parental warmth protected adolescents from substance use through associations with cognitive elements (Cleveland, Gibbons, Gerrard, Pomery, & Brody, 2005). The effects were strongest in high-risk neighborhoods.

Individual characteristics of teenagers also play a protective role in the development of substance use behaviors. The way teenagers view and engage with their

ethnic identity has consistently shown protective effects (Caldwell, Sellers, Bernat, and Zimmerman, 2004). Not only is high ethnic identity directly related to reduced substance use, it also mediates family psychosocial variables (Brook, Balka, Brook, Win, & Gursen, 1998). When it comes to religion, faith matters. Young people who are highly religious consistently report lower levels of drug use than young people who are less religious (Gorsuch, 1988, 1995; Johnson, Tomkins, & Webb, 2002). Also, relative to White adolescents, African American adolescents have been found to be significantly more religious (Chatter, Taylor, & Lincoln, 1999). Temperament issues, such as effortful control and affiliation, can serve as a resilience factor and is linked with health-promoting cognitions. Effortful control moderates the link between parenting, peer associations, and substance use (Wills & Dishion, 2004).

Mechanisms that create disparities are differential exposure, vulnerabilities, capabilities, and consequences. In the case of disparities as outcomes of alcohol and drug use, protective factors will be tested as an underlying mechanism that contributes to ethnic, SES, and gender differences in health and social consequences of substance use.

Hypotheses

The present study employs a comprehensive, prospective, comparative design of protective factors in the individual, peer, family, neighborhood, and school domains. Using a sample of high-risk teenage students, we will examine exposure to protective factors versus actual protection from consequences of substance use. We examine a general premise regarding the distribution of protective factors in a sample that was selected on the basis of existing risk. Specifically, we are concerned if there is equal

exposure to protective factors, and equal protection from consequences, across ethnicity, socioeconomic status, and gender.

1) Similar to the Wallace and Muroff (2002) study of risk and adolescent drug use, we expect that different ethnic groups will not be equally exposed to all protective factors. That is, greater protective exposure will be demonstrated for Caucasian students relative to African American students on measures of parental marriage and police social control. On average, African American teens will be exposed to higher levels of alcohol and drug free parents (Peterson et al., 1994), parental religion, teen religion (Herd, 1994; Kandel, 1995), and ethnic identity (Szapocznik, Prado, Burlew, Williams, & Santisteban, 2007). With regards to protection against health and social consequences of substance use, we expect Caucasian students to show more occasions of greater protection compared to African American students.

2) Most research has reported on the existence of challenges and difficulties for low income families as compared to high-income families. However, in the case of protection, we anticipate that on average teens from high-SES status will report higher levels of academic grades and exposure to parental marriage. Otherwise, high- and low-SES teens will be equivalently exposed to most of the protective factors and receive comparable protection against health and social consequences of substance use.

3) With regard to gender, it is anticipated that girls will report higher levels of stress recognition and distraction coping when compared to boys. Psychologists have reported for some time that young girls may use more effective coping strategies to deal with stress (Frydenberg & Lewis, 1991). Overall, it is expected that girls and boys will

show equivalent levels of exposure to the majority of protective factors and demonstrate equal protection against health and social consequences of substance use.

4) Given the ethnic, socioeconomic, and gender diversity in the sample, it is anticipated that item equivalence may not exist. Item response theory will be used to detect and drop items that show differential item functioning on the two dependent variables (i.e., health consequences of substance use, social consequences of substance use).

5) Last, using the corrected total scores, we will reanalyze the protection from consequences of substance use for ethnic, SES, and gender disparities. We will compare the results from hypothesis 1, 2, and 3 to the results of the reanalysis. We expect that previously reported disparities in protection are not an artifact of item bias, but are genuine disparities.

Method

Participants

Participants included 999 targeted adolescent students, their caregiver, and a peer, originally recruited for a randomized controlled preventative intervention in the sixth grade (Dishion & Kavanagh, 2003). The students are from three middle schools within an ethnically diverse metropolitan community in the Northwest region of the United States. The subsample used in the present analysis was narrowed to include 585 youth who self-identified as either White/Caucasian (58%) or Black/African American (42%) during their 11th and 12th grade year in high school, 52% are male. Of the 535 caregivers in this sample, 84% are a birth parent, 2% are a grandparent, 2% are an adoptive parent,

and the remaining 12% are step parents, foster parents, siblings, or other relatives. The average annual household income was $30,000-$39,000. There are 544 peers included in the analysis.

Recruitment

The school principals sent a letter to parents of students to introduce and endorse the study during the students sixth grade year. Phone calls or home visits were made, when necessary, to secure consent and to answer questions. Class-wide incentives were given for the return of consent forms, regardless of parental decisions about consent. The sample was divided into two cohorts. The sample represents 85% of the targeted sample for cohort 1 (1996), and 86% for cohort 2 (1998).

Assessment Procedures

Each year, as part of a longitudinal intervention study student surveys were conducted primarily in the school context using an instrument developed and reported by researchers at Oregon Research Institute (Irvine, Biglan, Smolkowski, & Ary, 1999). The youth were assessed using self-report surveys and parent reports. Parents were assessed using self-report and youth report. Peers were assessed using self-report. Youth and their nominated peer were administered the surveys individually in a private location (e.g., guidance office). Paper versions were mailed to the caregivers. If students moved out of their original school, they were tracked and followed to their new location. Students were paid $20 for completing each assessment wave.

Data Source

The sample analyzed in the present study was part of a randomized intervention study testing the effectiveness of the Adolescent Transitions Program in preventing and reducing adolescent problem behavior and substance use. For information on the intervention and its outcomes, see Dishion, Bullock, et al. (2002), Dishion and Kavanagh (2003), or Dishion, Kavanagh, Schneiger, Nelson, and Kaufman (2002).

Measures

Figure 1 displays the measures used in this study. The appendix contains a validity analysis of the variables. The validity analysis presents measurement items, response formats, the range of factor analysis loadings, number of items dropped due to low factor loadings, skewness, and kurtosis. Due to the number of variables contained in this study construct validity was assessed and refined. Construct validity can be evaluated, in part, by statistical methods that show whether one common factor exist underlying the measurement items. Skewness is the extent to which a distribution of values deviates from symmetry around the mean. Kurtosis is a measure of the peakedness of the distribution. Acceptable values for psychometric purposes range between +/-1 to +/-2 for skewness and kurtosis.

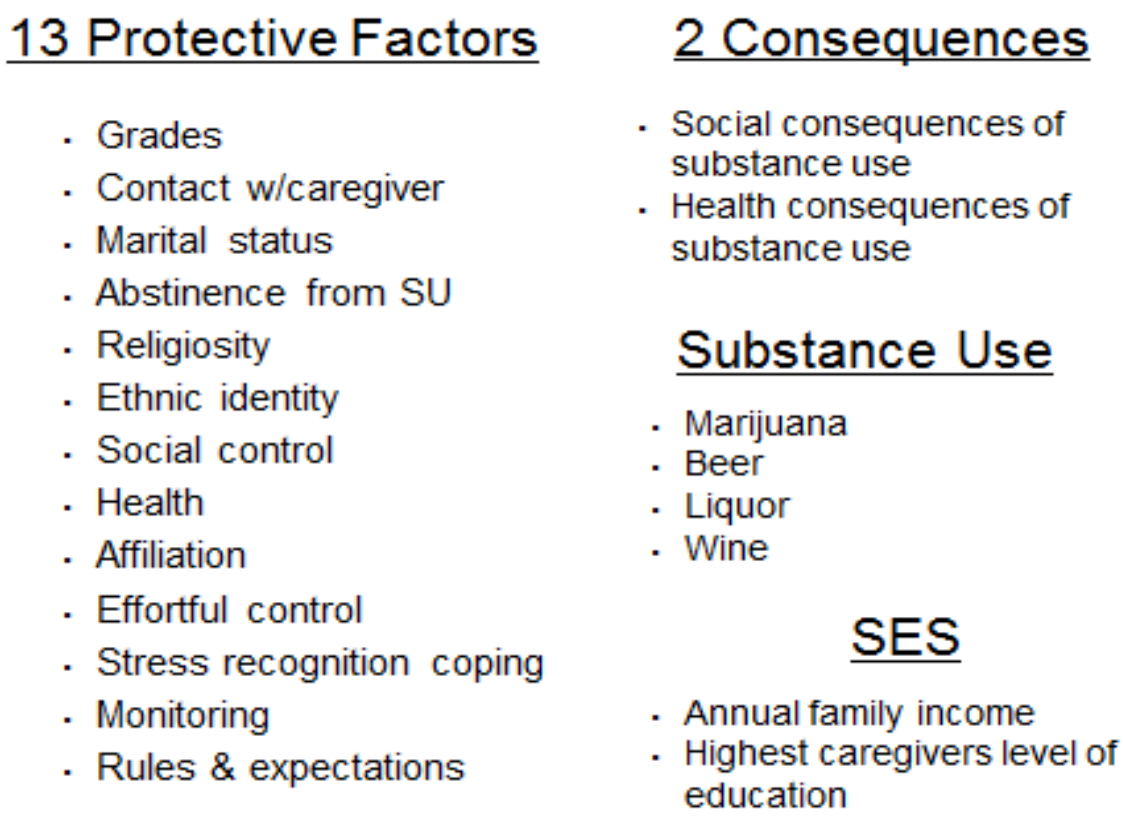


Figure 1. Measures included in this study.

Demographics. Students completed the Demographics (DEMOC; Child and Family Center, 2001) in the 11th grade. Teens reported on a single item that measured **grades** in school ranging from 0= *not in school* to 9= *mostly A's*, **religiosity** was a total of 3-items, and **gender**. Parents completed a Demographic inventory (DEMOP; Child and Family Center, 2001). Religiosity, **marital status** was coded as 0= *other* to 6= *married*, gross annual household **income** was coded 0= *$4,999 or less* to 8= *$90,000 or more*, highest caregivers level of **education** ranged from 0= *no formal school* to 8= *graduate degree*, how much contact with teen was coded as 0= *less than once a month* to

5= *daily contact*. **SES** was a multiplied score between gross annual household income and the highest caregiver's level of education.

Alcohol, marijuana, and drug abstinence by parent. Caregivers completed the Parent Substance Use questionnaire (SUBST; Dishion & Kavanagh, 2001) during the teen's 11th grade year. This 23-item inventory focuses on basic patterns of substance use for the primary caregivers during the past year. In this analysis, a total score of 3-items were used that represented lifetime abstinence from alcohol, marijuana, and other drugs. Sample items such as, "never used alcohol" had a binary response scale of "yes or no" and Cronbach's alpha of $\alpha = .84$.

Ethnic identity. Students completed the 23-item Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992) in their 11th grade year. Ethnic identity indicates the extent that youth report a sense of belonging, commitment, and affirmation to their ethnic group, as well as having searched for ethnic identity. The ethnic identity factor included 14-items with a Cronbach's alpha of $\alpha = .86$. The items had a 4-category likert scale (i.e., strongly agree, somewhat agree, somewhat disagree, and strongly disagree) that were summed to create a total score. Students endorse their ethnicity in a single item.

Social control of police/social control of teachers, peer, and parents. The Social Control Questionnaire (SOCOQ; Dishion, 1985) is a 39-item inventory that measures that the perceived social control by police, teachers, kids at school, kids in the neighborhood, parents, and school. The items ask for a description in terms of honesty, fairness, goodness, kindness, friendliness, warmth, and niceness using a 5-category likert response scale that was summed to create a total score. An exploratory factor analysis

revealed two distinct dimensions. The 7-item police factor had a cronbach's alpha of α = .91 in this sample. The 32-item factor that tapped social control of teachers, peers, parents, and school had a reliability of α = .87. Social control was student reported during the 11th grade year.

Health. Students completed the Teen Health Report (HLTHC; Oregon Social Learning Center, 1997) in the 11th grade year. The 16-item inventory has 4-response categories that range from 0= *do not agree* to 3= *completely agree.* Sample items include, "I resist illness very well", "I am full of energy", "I am very physically fit", "my muscle strength is really good". In this sample, Cronbach's apha was α = .87.

Affiliation/effortful control. Caregivers completed the Revised Early Adolescent Temperament Questionniare (Ellis & Rothbart, 2001). The 62-item parent questionnaire assesses eight aspects of temperament related to self-regulation in adolescents. Items were rated on a 5-point scale ranging from 0= *almost always untrue* to 4 = *almost always true* and were summed to obtain a total score. Following an exploratory factor analysis, we selected two well defined broad factors applicable to this protection study. The 12-item effortful control factor taps the teens ability to shift attention when desired, the capacity to plan, and perform an action when there is a tendency to avoid it, reliability was α = .68. The 9-item affiliation factor had a reliability of α = .76 and reflected a desire for warmth and closeness with others.

Stress recognition and distraction coping. Students completed the Life Events and Coping Inventory (LECI; Dise-Lewis, 1988) in their 11th grade year. The 52-item inventory measures the experience of life stress and the use of five coping strategies.

This study examines the most effective and positive coping behaviors that include stress-recognition and distraction. The 23-items used in this study loaded on a single dimension and had a reliability of α = .84. Items were rated on a 9-point scale ranging from 0= *I would definitely not do this* to 8 = *I would definitely do this* and were summed to create a total score.

Monitoring. Parental knowledge and involvement in the past three months was reported by students who completed the Child and Family Center Youth Questionnaire (CFCQC: Child and Family Center, 2001) in their 11th grade year. The monitoring factor represented a total score from 6-items that each had 5-response categories that ranged from 0= *never or almost never* to 4= *always or almost always*. The items (e.g., have a good idea about your interests and activities, know where you were after school) had a Cronbach's alpha of α = .83 in the teen sample. Parents completed the 6-monitoring items from the Child and Family Center Parent Questionnaire (CFCQP: Child and Family Center, 2001) and had a reliability of α = .84. The reliability for the combined teen and parent items was α = .84. Peers reported on their own parental monitoring using 6-items from CFCQC, Cronbach's alpha was α = .84.

Rules and expectations. Expectations regarding parental rules (e.g., should not use alcohol, do homework daily, should not use marijuana) was measured using teen reports on the Child and Family Center Youth Questionnaire (CFCQC: Child and Family Center, 2001) and parent reports on the Child and Family Center Parent Questionnaire (CFCQP: Child and Family Center, 2001) in the 11th grade. The 7-items had a 4-point response scale that ranged from 0= *didn't have a rule or an expectation* to 3= *had a clear*

rule and covered the last three months. In this sample, student reliability was $\alpha = .81$, caregiver reliability was $\alpha = .80$, and the summed teen and parent items had a Cronbach's alpha of $\alpha = .84$. Peers also completed 7-items from the CFCQC to report on their own parental rules and expectations, peer reliability was $\alpha = .82$.

Substance use by teen. Students completed the Child and Family Center Teen Interview (CINT; Child and Family Center, 2001) in the 11th grade. The 141-item inventory focuses on substance consumption for the teen, peer, and sibling, problems resulting from substance use, and sexual behavior. In this analysis, substance use represents composite score of 8-items concerning frequency and quantity of beer, liquor, wine, and marijuana consumption in the last three months.

Health consequences of substance use. Students completed the Child and Family Center Teen Interview (CINT; Child and Family Center, 2001) in the 12th grade. The 141-item inventory focuses on substance consumption for the teen, peer, sibling, problems resulting from substance use, and sexual behavior. Internal consistency for the 10-items that measured symptomatic problems resulting from substance use (e.g., tolerance or withdrawal) was $\alpha = .96$. Items included, "have you found that you can't get as high or buzzed on alcohol as you used to?", "have you ever passed out from drinking?", "have you ever tried to stop using marijuana and found you couldn't stop?" The response categories were a 2-point binary, "yes or no" and a 3-point Likert scale, "a little, quite a bit, very much".

Social consequences of substance use. Students completed the Child and Family Center Teen Interview (CINT; Child and Family Center, 2001) in the 12th grade. The

141-item inventory focuses on substance consumption for the teen, peer, sibling, problems resulting from substance use, and sexual behavior. This study included 12-items that measured social problems resulting from substance use (e.g., getting into fight, missing homework assignment) with an internal consistency of $\alpha = .87$ in this sample. Three of the 12-items measuring the teens social consequences were reported on by the caregiver (e.g., child tried marijuana; gave consequence) using the binary response scale, "yes or no" from the Adult Substance Use questionnaire (SUBSTS; Dishion & Kavanagh, 2001).

Data Analysis Plan

Descriptive statistics. To view the sample in terms of ethnicity and gender, a cross-tabulation was reported. Next, we examined the distribution of each protective factor in the sample by creating categories. The categories included low promotion, medium promotion, and high promotion (see Figure 2). Participants who scored greater than or equal to one standard deviation below the mean were given a score of 1, or low promotion. Scores that fell between one standard deviation above and below the mean were assigned a score of 2, or medium promotion. A score of 3, or high promotion, was assigned to participants who scored greater than or equal to one standard deviation above the mean.

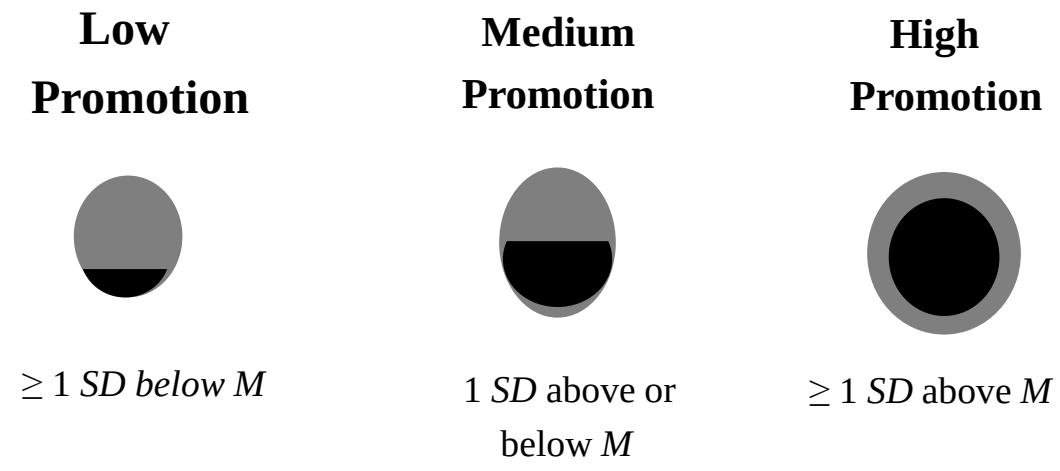


Figure 2. Distribution of protective factors in the sample.

Hypotheses 1, 2 and 3: exposure to protective factors. Exposure to a protective factor means the degree to which a protective factor is more or less present among a given group of students compared to another group of students. We hypothesized that different exposure rates existed within groups of ethnicity (hypothesis 1), SES (hypothesis 2), and gender (hypothesis 3). Similar to Wallace and Muroff (2002), who assessed the extent of teen's exposure to risk factors, we computed a series of analysis of variance models (ANOVA) and compare the means on protective factors within groups of ethnicity, SES, and gender. Where the means differed significantly within groups, we concluded that the students were unequally exposed to that particular protective factor. Figure 3 lists the 3 independent variables, each with 2 levels, and 13 dependent variables/protective factors tested in the ANOVA.

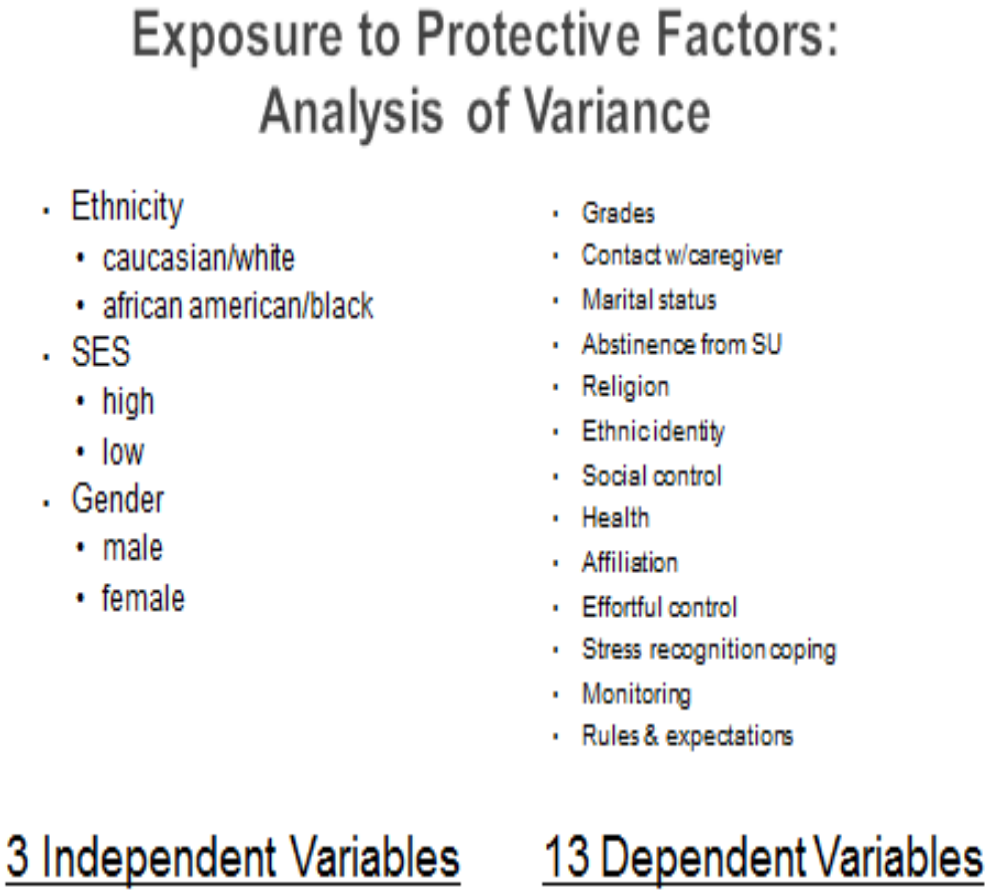


Figure 3. The independent and dependent variables analyzed in the analysis of variance.

Hypotheses 1, 2 and 3: protection from consequences of substance use. Protection is when a protective factor is associated with a reduction in consequences from substance use. We expect that the relationship between certain protective factors and health or social consequences of substance use will depend on ethnicity, SES, or gender. This protection analysis is over a one year period. The control and independent variables

(protective factors) were measured at the 11th grade and the two dependent variables were measured at the 12th grade (health consequences and social consequences of substance use). We tested for protective differences using a two-step process. The first step is a multiple regression equation. We ran a series of regression models in which the dependent variable (i.e., health consequences of substance use or social consequences of substance use) was regressed on the control variable (i.e., treatment /control group status), group membership (i.e., ethnicity, SES, or gender), the protective factor, and a group membership by protective factor cross-product term (see Figure 4).

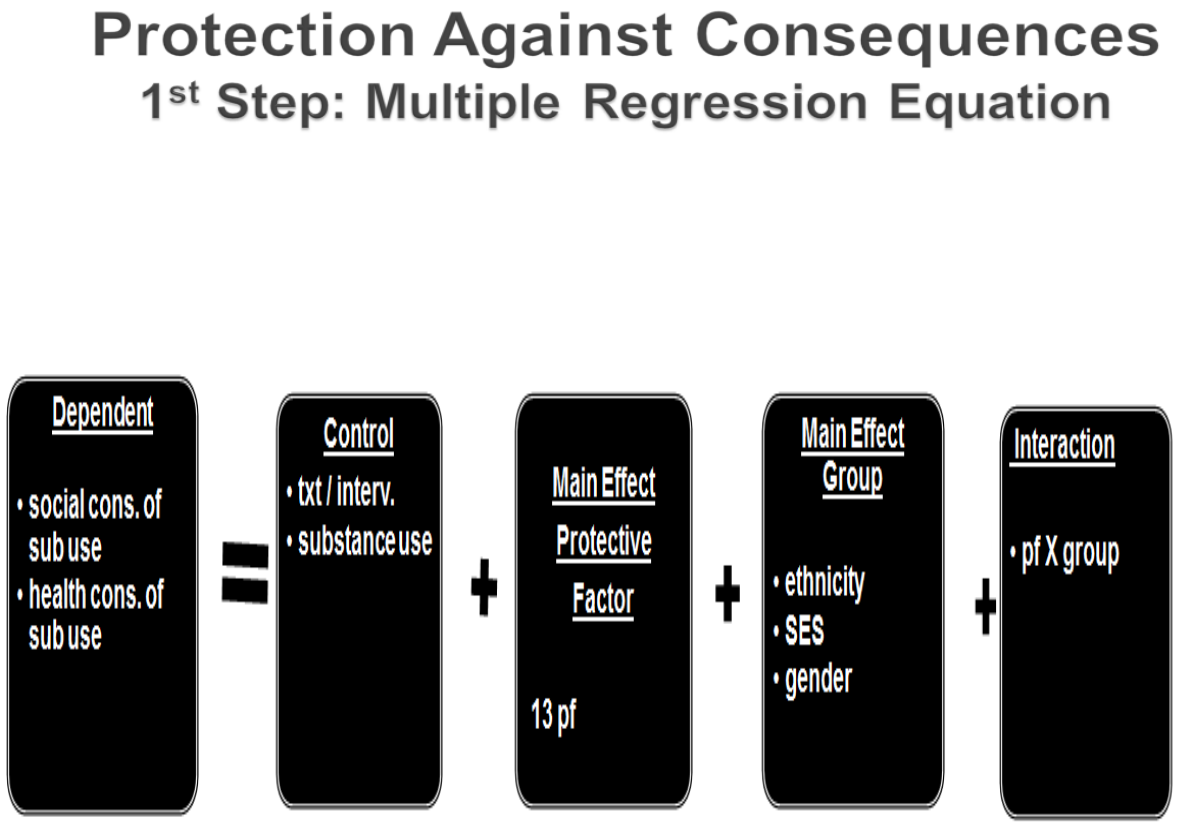


Figure 4. Multiple regression equation used to test protection against consequences of substance use.

For the second step, when the cross-product term showed statistical significance we proceeded to the second step and measured disparities in protection using a partialled correlation (see Figure 5). To measure protection we compared group differences in the strength of the correlation between the protective factor and the health or social consequence of substance use, after statistically accounting for the level of substance use and treatment/control group status. The group of students with the larger negative correlation indicated greater protection from that particular protective factor.

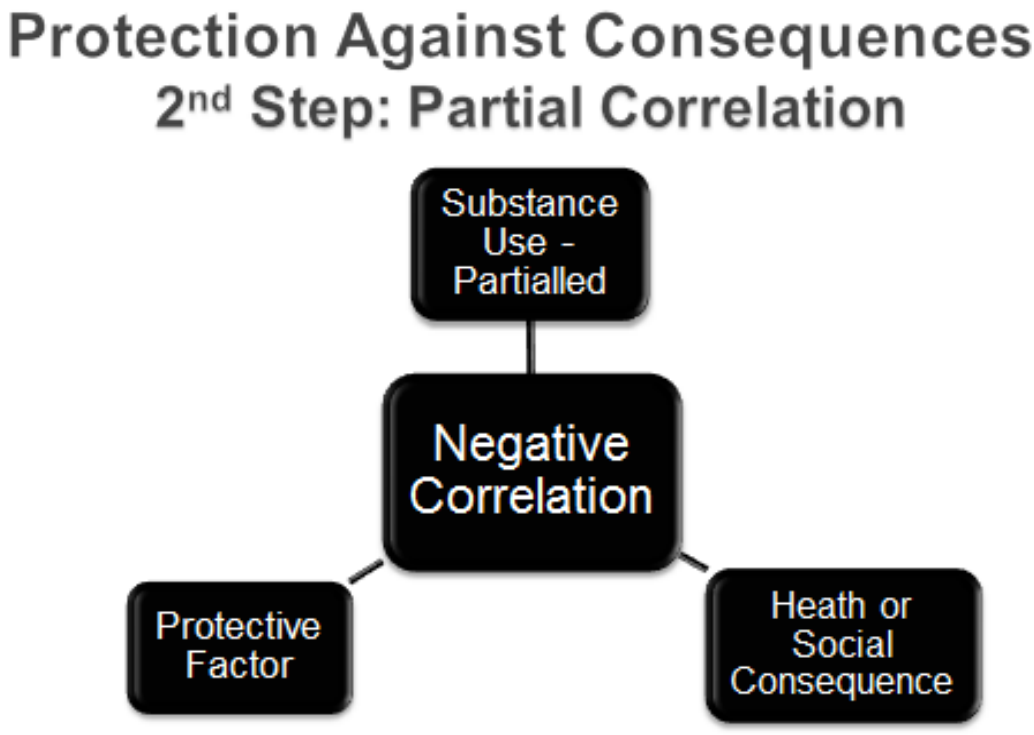


Figure 5. Correlation used to measure the negative linear relationship between the protective factor and health or social consequence of substance use, after partialling out the level of substance use. The bigger correlation means more protection.

Hypothesis 4: comparison of two item response theory (IRT) models and differential item functioning (DIF). This study compared the fit of Partial Credit Model (PCM: Masters, 1982) to the Rating Scale Model (RSM; Andrich, 1978a; 1978b) on the two dependent variables. The two dependent variables that were examined were health consequences of substance use and social consequences of substance use. The best fitted model was selected for a DIF analysis.

The goal was to add to the literature in two ways. First, we focused on ethnic differences in item difficulty instead of item discrimination as typically studied in invariance analysis using classical test theory (Smith & Reise, 1998). Second, applying IRT DIF techniques to personality item responses is a particularly neglected task in nearly all previous cross-cultural research in personality assessment (Oishi, 2006). Prior to comparing IRT models, the assumption of unidimensionality will be confirmed. Unidimensionalty is an assumption of many IRT models and violations may result in non-DIF items statistically appear to contain DIF (Drasgow, 1987).

Comparison of two models. The Partial Credit Model is appropriate for analyzing attitude scale responses where participants rate their beliefs, or respond to statements on a multi-point scale (Masters & Wright, 1996) and is presented in Equation 1:

Equation 1:

$$P_{ix}(\theta) = \frac{\exp\left[\sum_{j=0}^{x}(\theta - \delta_{ij})\right]}{\sum_{r=0}^{m_i}\left[\exp\sum_{j=0}^{r}(\theta - \delta_{ij})\right]}$$

Where: $$\sum_{j=0}^{0}(\theta-\delta_{ij})\equiv 0$$

In PCM, $P_{ix}(\theta)$ refers to the probability of a respondent's response to an item, in a particular category threshold, conditional on trait level. δ_i's are step difficulties associated with a category score of a particular individual (i). The higher the value of a particular δ_i, the more difficult a particular step (category) is to endorse relative to other steps within an item.

Easy to endorse items (i.e., items endorsed even by individuals with low trait level) have negative δ_1 values, and difficult to endorse items (items endorsed only by those with high trait levels) have positive δ_i values. In addition, a δ_i term is also interpreted as the point on the latent trait scale at which two consecutive category response curves intersect, otherwise known as category intersections. In PCM, an examinee's total test score is a sufficient statistic for estimating trait level (θ).

The Rating Scale Model (RSM; Andrich, 1978a; 1978b) is appropriate to use when item responses can be characterized as ordered categorical responses and is displayed in Equation 2:

Equation 2: $$P_{ix}(\theta)=\frac{\exp\left\{\sum_{j=0}^{x}\left[(\theta-(\lambda_i+\delta_j)\right]\right\}}{\sum_{r=0}^{m_j}\exp\left\{\sum_{j=0}^{x}\left[(\theta-(\lambda_i+\delta_j)\right]\right\}}$$

Where: $$\sum_{j=0}^{0}\left[\theta-(\lambda_i+\delta_j)\right]=0$$

And: $\delta_i = \lambda + \delta_i$

In the RSM, $P_{ix}(\theta)$ refers to the probability of a examinee's response to an item, in a particular category threshold, conditional on trait level (θ). The location of the item on the latent scale is indicated by λ_i which reflects the relative difficulty of the particular item, and category intersection parameter is indicated by δ_i.

The RSM is similar to the PCM, except for an important feature. In the RSM each item is described by a single scale location parameter $\lambda_{i;}$ therefore, all items have the same step difficulties. In addition, response categories are assigned intersection parameters that assume thresholds between categories are equal across items (Dodd, 1990). The PCM makes no constraints about step difficulties (intersections), so step difficulties can differ across different items.

The graph of $P_{ix}(\theta)$ as a function of θ is known as an the item characteristic curve (ICC). Equations 1 and 2 are the formulas for the (ICC) for 2-parameter logistic polytomous models. Both models demonstrate that the probability of endorsing an item increases monotonically as a function of examinee trait level (θ), often expressed as a Z score metric. The probability of endorsing an item is also determined by difficulty, a property of the test item.

Differential item functioning. The two dependent variables will be tested for DIF. Three of the twelve items in the Social Consequences of Substance Use measurement were caregiver reported instead of student reported, and thus are not

included in this DIF analysis. Differential item functioning (DIF) is displayed by a scale item when examinees with the same latent trait level have different probabilities of endorsing an item (Embretson & Reise, 2000, p. 319). In essence, DIF analysis indicates if the probability of endorsing an item differs across two groups. Inspection of Equations 1 and 2 shows that the probability of endorsement is influenced by examinee trait level and an item property. If the probability of endorsement is influenced by group membership (e.g., gender, ethnicity) in addition to examinee and item properties, the item is labeled as containing DIF. Items that contain DIF may produce misleading results in terms of group differences in raw scores. Raw scores are not comparable across groups in the presence of DIF because the item is not functioning in the same way.

Hypothesis 5: reanalysis of protection from health and social consequences of substance use. The reanalysis of protection was done to determine if ethnic, SES, or gender group differences in protection that were uncovered using the multiple regression equation from Figure 5, still existed when DIF items were dropped from scoring. We expected the results to remain the same thus implying that previously discovered group differences were genuine and not an artifact of DIF. First, the two dependent variables, health consequences and social consequences of substance use, were rescored after dropping the items that showed DIF. Next, the multiple regression equation detailed in Figure 5 was rerun. If the cross-product term showed statistical significance, a correlation was calculated between the protective factor and consequence of substance use after partialling out the effects of substance use and treatment/control group status. The group of students with the larger negative correlation indicated greater protection

from that particular protective factor.

Three-way factorial ancova: In order to better understand the relationship between the three group classification variables and the two dependent variables, we tested a three way factorial ancova (Figure 6). The factorial ancova included two covariates (treatment/control status and substance use), three fixed factors (ethnicity, SES, and gender), three two-way interactions (ethnicity X SES, ethnicity X gender, SES X gender), one three-way interaction (ethnicity X SES X gender), and the dependent variables (health consequences of substance use and social consequences of substance use).

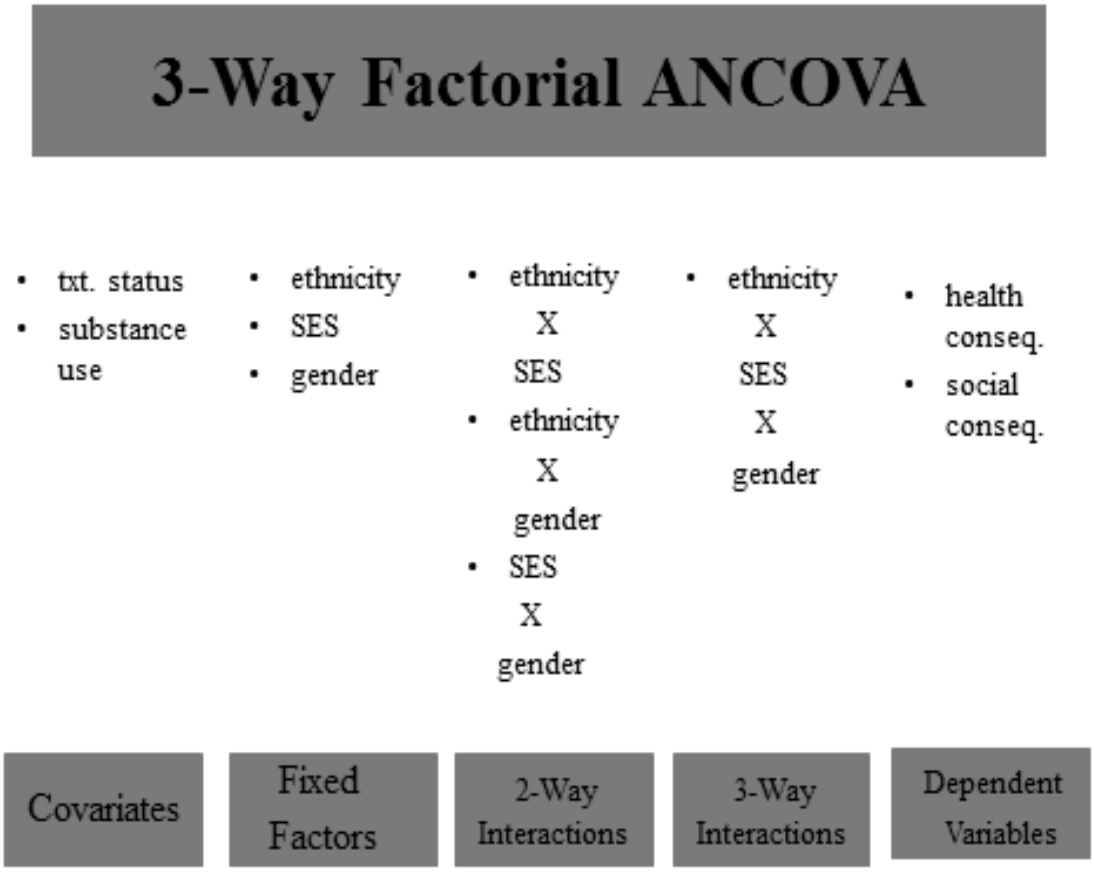


Figure 6. Variables tested in the 3-way factorial ANCOVA.

Results

Descriptive Statistics

Table 1 shows how the sample of 585 families were distributed across ethnicity and SES. Of the Caucasian American students, 76% were above the mean SES compared to 38% of African Americans. Table 2 shows the mean score of 13 protective factors. Because some protective factors have multiple sources who reported (i.e., caregiver, teen, or peer), there were a total of 19 mean scores shown. Higher scores indicated greater quantities of the protective factor. The percent of participants who scored in low or high promotion are displayed in Table 2.

Table 1

Distribution of Ethnicity by Socioeconomic Status

	SES of family		
Teen ethnicity	Below *M*	Below *M*	Total
Caucasian american	78	247	325
African american	160	100	260
Total	238	347	585

Table 2

Mean, Standard Deviation, Low and High Promotion

Protective factor	Mean	*SD*	Percent of sample in low promotion	Percent of sample in high promotion
Teen Report				
Grades in school	4.11	2.5	8.7	34.0
Religiosity of teen	5.9	4.5	31.3	17.6
Ethnic identity of teen	39.2	7.8	16.2	19.0
Social control of police	20.3	6.7	15.9	17.1
Social control of teachers, peers, parents	108.1	14.1	15.4	15.4
Health of teen	52.5	7.2	18.1	19.7
Stress recognition and distraction coping by teen	122.3	26.3	15.9	15.6
Monitoring by parent	15.3	5.4	14.4	20.0
Rules and expectations of parent	15.0	4.3	13.3	13.0
Caregiver Report				
Contact with caregiver	5.94	0.28	4.9	87.0
Marital parent status	6.26	0.98	15.0	48.0
Never used alcohol, marijuana, drugs parent report	0.96	0.83	41.0	4.1
Religiosity of parent	9.4	2.3	17.1	21.4
Affiliativness of teen	31.5	5.9	11.5	12.3
Effortful control by teen	31.9	6.5	11.8	11.5
Monitoring by parent	23.3	4.9	12.6	10.9
Rules and expectations of parent	23.9	3.6	15.6	12.8
Peer Report				
Monitoring by peer parent	15.1	5.6	14.0	15.6
Rules and expectations of peer parent	14.3	4.4	13.2	15.0

Hypothesis 1: Ethnic Differences in Exposure to Protective Factors

The exposure and protection results are presented in Table 3 by ethnicity. The 19 reported measures were reduced to the 17 because caregiver and teen reports were summed

Table 3

Ethnic Differences in Exposure to Protective Factors and Protection from Health and Social Consequences of Alcohol and Drug Use

			Protection			
	Exposure		Health Consequences		Social Consequences	
Protective factor	Caucasian American	African American	Caucasian American	African American	Caucasian American	African American
Grades in school	*6.6	5.7				
Contact with caregiver	5.9	6.0				
Marital parent status	*6.5	5.9				
Never used alcohol, marijuana, drugs parent report	0.8	*1.2				
Religion teen report	5.1	*7.1	-.03	-.05	-.02	-.07
Religion parent report	8.9	*10.2				
Ethnic identity	35.8	*44.1			-.06	-.16
Social control of police	*21.9	17.9				
Social control of teachers, peers, parents	*110.1	105.1				
Health of teen	52.2	53.0				
Affiliativness	*32.0	30.8				
Effortful control	31.7	32.2				
Stress recognition and distraction coping	121.9	122.9				
Monitoring	19.6	19.3				
Monitoring peer report	15.2	15.0				
Rules and expectations	19.0	*20.2				
Rules and expectations peer report	14.1	14.6				

*$p < .01$

together on parental monitoring and parental rules and expectations to reduce single reporter bias. The first two columns present mean scores for the 17 reports on protective factors separately for Caucasian American and African American students, which we interpret as exposure. An asterisk by the number indicates that an analysis of variance revealed statistically significant differences between ethnic groups in exposure to the protective factor.

Consistent with our hypothesis, Caucasian American students reported significantly higher levels of exposure to parental marriage and police social control compared to African American students. Additional support for our hypothesis was shown by African American students who reported significantly more exposure to alcohol and drug free parents, parental religion, teen religion, and ethnic identity compared to Caucasian American students. Unpredicted by the hypothesis, Caucasian American students reported higher average grades in school, social control of teachers/peers/parents, and affiliation. Additionally, African Americans students had higher average scores on rules and expectations. There were a total of ten significant ethnic group differences found in exposure to protective factors. Five protective factors had more exposure to Caucasian Americans and five protective factors had more exposure to African Americans.

Ethnic disparities in protection from health or social consequences of substance use.

The last four columns of Table 3 displayed the partial correlation between the protective factor and the health or social consequence of substance use separately by ethnicity, only

if the protection differences were statistically significant as evidenced by the interaction term of the regression model. Two protective factors conferred differential protection for Caucasian American and African American students. Counter to our expectations, Caucasian students did not show more occasions of greater protection compared to African American students. In fact, for African American teens, religion showed slightly but significantly more protection from health and social consequences of substance use. Ethnic identity also conferred more protection against social consequences of substance use for African Americans compared to Caucasian Americans.

Hypothesis 2: SES Differences in Exposure to Protective Factors

Table 4 presented differences in exposure to protective factors by SES. Consistent with the hypothesis, students from high SES status, defined as above the sample mean, reported significantly higher grades in school and exposure to parental marriage compared to low SES students. Inconsistent with our hypothesis, high SES students reported significantly more exposure to social control of police, social control of teachers, peers, and parents, and affiliation. Low SES students reported, on average, significantly more exposure to parental religion, ethnic identity, and rules and expectations. There were a total of eight significant SES group differences found in exposure to protective factors. High SES students were more exposed to five protective factors and low SES students reported more exposure to three protective factors.

SES disparities in protection from health or social consequences of substance use. The last four columns of Table 4 displayed the partial correlation between the protective factor and the health or social consequence of substance use separately by SES, only if

the protection differences were statistically significant as evidenced by the interaction term of the regression. Counter to our hypothesis, high and low SES students did not report comparable protection against health and social consequences of substance use on 20 occasions, 16 of which favored high SES teens is indicated by the greater negative correlation after statistically accounting for treatment status and substance use. Examination of the outcome health consequences of substance use show that high SES students were significantly more protected by contact with caregiver, teen religion, ethnic identity, effortful control, stress recognition and distraction coping, and rules and expectations compared to low SES students. Low SES students were significantly more protected by parental religion from health consequences of substance use. When examining the outcome social consequences of substance use, the correlations showed that high SES teens were significantly more protected from protection associated with contact with caregiver, teen religion, parent religion, ethnic identity, social control of police, social control of teachers/peer/peers, health, affiliation, effortful control, peer parental monitoring, and rules and expectations. Low SES students were more protected from social consequences of substance use by promotion associated with health and monitoring compared to high SES students.

Hypothesis 3: Gender Differences in Exposure to Protective Factors

Table 5 presents gender differences in exposure to protective factors. Consistent with the hypothesis, females reported significantly more exposure to stress recognition and distraction coping than males. Unpredicted by the hypothesis, there were a total of five significant gender differences in exposure to protective factors, four of which

favored females. In addition to stress recognition coping, females reported significantly more exposure to higher grades in school, teen religion, and social control of police. Males were more exposed to better health on average.

Table 4

Socioeconomic Status Differences in Exposure to Protective factors and Protection from Health and Social Consequences of Alcohol and Drug Use

	Exposure		Protection			
			Health Consequences		Social Consequences	
Protective factors	High SES	Low SES	High	Low	High	Low
Grades in school	*6.9	5.4				
Contact with caregiver	5.9	5.9	-.16	.15	-.15	.16
Marital status	*6.6	5.9				
Never used alcohol, marijuana, drugs parent report	1.0	1.0				
Religion teen report	5.8	6.1	-.12	.17	-.16	.15
Religion parent report	9.0	*9.8	-.03	-.07	-.08	-.07
Ethnic identity	37.6	*41.4	-.15	-.02	-.13	-.03
Social control of police	*21.2	19.1			-.01	.02
Social control of teachers, peers, parents	*110.2	105.4			-.02	.03
Health of teen	52.1	53.0			-.06	-.16
Affiliativness	*32.2	30.7			-.08	.07
Effortful control	32.1	31.6	-.22	-.04	-.24	.00
Stress recognition and distraction coping	122.0	122.8	-.06	.03		
Monitoring	19.7	19.1			-.07	-.08
Monitoring peer report	15.3	14.9			-.09	.01
Rules and expectations	19.2	*19.9	-.05	-.00	-.08	-.05
Rules and expectations peer report	14.2	14.4			.06	.11

*$p < .01$

Gender disparities in protection from health or social consequences of substance use. The last four columns of Table 5 present the partial correlation between the protective factor and the health or social consequence of substance use separately by gender, only if the

Table 5

Gender Differences in Exposure to Protective Factors and Protection from Health and Social Consequences of Alcohol and Drug Use

	Exposure		Protection			
			Health Consequences		Social Consequences	
Protective factor	Male	Female	Male	Female	Male	Female
Grades in school	5.9	*6.6				
Contact with caregiver	5.9	5.6				
Marital status	6.2	6.3				
Never used alcohol, marijuana, drugs parent report	0.9	1.0				
Religion teen report	5.3	*6.7				
Religion parent report	9.4	9.5				
Ethnic identity	38.8	39.6				
Social control of police	19.5	*21.1				
Social control of teachers, peers, parents	108.8	107.4				
Health of teen	*54.7	50.2	.07	-.13	.07	-.14
Affiliativness	31.2	31.9				
Effortful control	32.2	31.6				
Peer acceptance	19.1	19.6				
Stress recognition and distraction coping	116.0	*129.2				
Monitoring	38.3	39.4				
Monitoring peer report	14.9	15.5				
Rules and expectations	19.5	19.5				
Rules and expectations peer report	14.2	14.4				

*$p < .01$

protection differences were statistically significant as evidenced by the interaction term of the regression. Counter to our hypothesis, one protective factor conferred a higher benefit for females compared to males after statistically accounting for treatment status and substance use. On average, teen health was associated with fewer health consequences and social consequences of substance use for females. In fact, the positive correlation between teen health and consequences of substance use implied an opposite directional relationship for males. Even though males reported significantly more exposure to health, health conferred a benefit in reduced substance use consequences for females not males.

Hypothesis 4: Item Response Theory Model Comparison

The two dependent variables used in the model comparison were health consequences of substance use and social consequences of substance use. First, a strong dominant common factor coupled with uncorrelated residuals ran through the dependent variables that confirmed the assumption of unidimensionality. Next, the 10-item measurement, health consequences of substance use, was fitted to the Partial Credit Model and estimated -2LL chi-square = 4449 (3381 df) and the Rating Scale Model estimated -2LL chi-square = 6156 (3391 df). The difference between the two models indicates that chi-square = 1706 (10 df), $p < .005$ was significant and the Partial Credit Model was the best fit. The 9-item measurement, social consequences of substance use, was fitted to the Partial Credit Model and estimated -2LL chi-square = 2380 (2776 df) and the Rating Scale Model which estimated -2LL chi-square = 4780 (2788 df). The

difference between the two models shows that chi-square = 2400 (12 df), $p < .005$ was significant and the Partial Credit Model was the best fit.

Differential item functioning (DIF). The DIF analysis detected interactions between the group parameter and item difficulty parameter that indicated which items were more or less difficult for a group to endorse, after statistically accounting for mean latent trait levels (i.e., consequences of substance use). In the presence of DIF, group members who have equal levels of consequences of substance use do not have the same probability of endorsing an item. Table 6 displays items from the Health Consequences of Substance Use and Social Consequences of Substance Use measurements that demonstrated DIF within groups of ethnicity, SES and gender. The group difficulty parameters that indicated the test of DIF was statistically significant ($p<.05$) are highlighted in red and marked with an asterisk.

Health consequences of substance use measurement. Two of the ten items from the Health Consequences of Substance Use showed DIF. Given equal levels of health consequences, Caucasian American students (b = -.82 and b = 1.90) reported more difficulty than African Americans (b = -1.24 and b = 1.05) endorsing item 8, "When you used marijuana how high did you get?" and item 9, "Have you found that you can't get as high on marijuana as you used to?" respectively.

Social consequences of substance use measurement. Two of the nine items from the Social Consequences of Substance Use showed DIF. Item 1, "Did your mom (or caregiver) give you a consequence or discipline you for drinking wine or wine coolers?" was more difficult for males (b = 3.02) to endorse than females (b = 1.88) after

statistically accounting for the level of social consequences of substance use. Given comparable levels of social consequences, item 3 which read, “Did you mom (or caregiver) give you a consequence or discipline you for using marijuana?” was more difficult for Caucasian American students (b = 2.44) and low SES students (b = 2.41) to endorse compared to African American (b = 1.47) and high SES students (b = 1.79).

Table 6

Differential Item Functioning for Ethnicity, Socioeconomic Status, and Gender

Item	Difficulty					
	Ethnicity		SES		Gender	
	Caucasian American	African American	Above *M*	Below *M*	Male	Female
Health consequences of substance use measurement						
1. When you drank, did you usually get high or buzzed on alcohol?	-1.36	-1.07	-1.32	-1.20	-1.09	-1.45
2. How high or buzzed did you get?	-1.45	-.22	-1.36	-.61	-1.11	-1.02
3. Have you found that you can't get as high or buzzed on alcohol as you used to?	1.17	1.48	1.17	1.41	1.22	1.30
4. Have you ever tried to stop using alcohol and found you couldn't stop?	1.31	.82	1.32	.91	1.31	1.03
5. Have you ever been drunk?	-1.37	-1.21	-1.32	-1.32	-1.25	-1.39
6. Have you ever passed out from drinking?	.12	-.05	.07	.07	-.04	.17
7. Have you ever thrown up from drinking?	-.90	-.77	-.91	-.79	-.80	-.92
8. When you used marijuana how high did you get?	*-.82	*-1.24	-.83	-1.13	-.14	-.76
9. Have you ever tried to stop using marijuana and found you could not?	*1.90	*1.05	1.83	1.37	1.72	1.58
10. Have you found that you can't get as high on marijuana as you used to?	1.41	1.14	1.35	1.30	1.20	1.46
Social consequences of substance use measurement						
1. Did your mom (or caregiver) give you a consequence or discipline you for drinking wine or wine coolers?	2.47	2.29	2.42	2.42	*3.02	*1.88
2. Did your mom (or caregiver) give you a consequence or discipline you for drinking hard liquor?	1.87	1.65	1.97	1.57	1.91	1.71
3. Did your mom (or caregiver) give you a consequence or discipline you for using marijuana?	*2.44	*1.47	*1.79	*2.41	2.27	2.06
4. Have you ever gone to school when you were drunk?	-0.97	-.28	-.92	-.37	-.92	-.44
5. Have you ever been drunk in a public place?	-0.92	-.28	-.87	-.37	-.92	-.40
6. Have you ever had any problems related to school, such as not doing homework or forgetting things because of alcohol?	-3.35	-2.08	-2.87	-2.38	-2.52	-2.71
7. Have you ever lost things or broken things when drinking?	-3.35	-2.08	-2.87	-2.38	-2.52	-2.71
8. Have you ever gone to school when you were high on marijuana?	.20	-.16	.09	.04	-.20	.32
9. Have you ever had any problems related to school, such as not doing homework or forgetting things because of marijuana?	.20	-.16	.09	.04	-.20	.32

*$p<.05$

Exploring the DIF items. In order to explore the 3 items that showed DIF, a variable map of Health Consequences of Substance Use is displayed in Figure 7. What is a variable map and how does one read it? A variable map plots person scores and item difficulty scores on the same scale. So when a person's trait level score, as indicated by "#" or ".", is higher on the map than an item, it means the person is more likely to endorse the item. The left side of the variable map under "person" indicates where participants scored on the latent trait health consequences of substance use, also referred to as trait level or ability. The right side of the variable map indicated each items level of difficulty. The DIF items are highlighted in red. It appears that items 8 and 9, which were the items that showed DIF, had the highest level of difficulty to endorse.

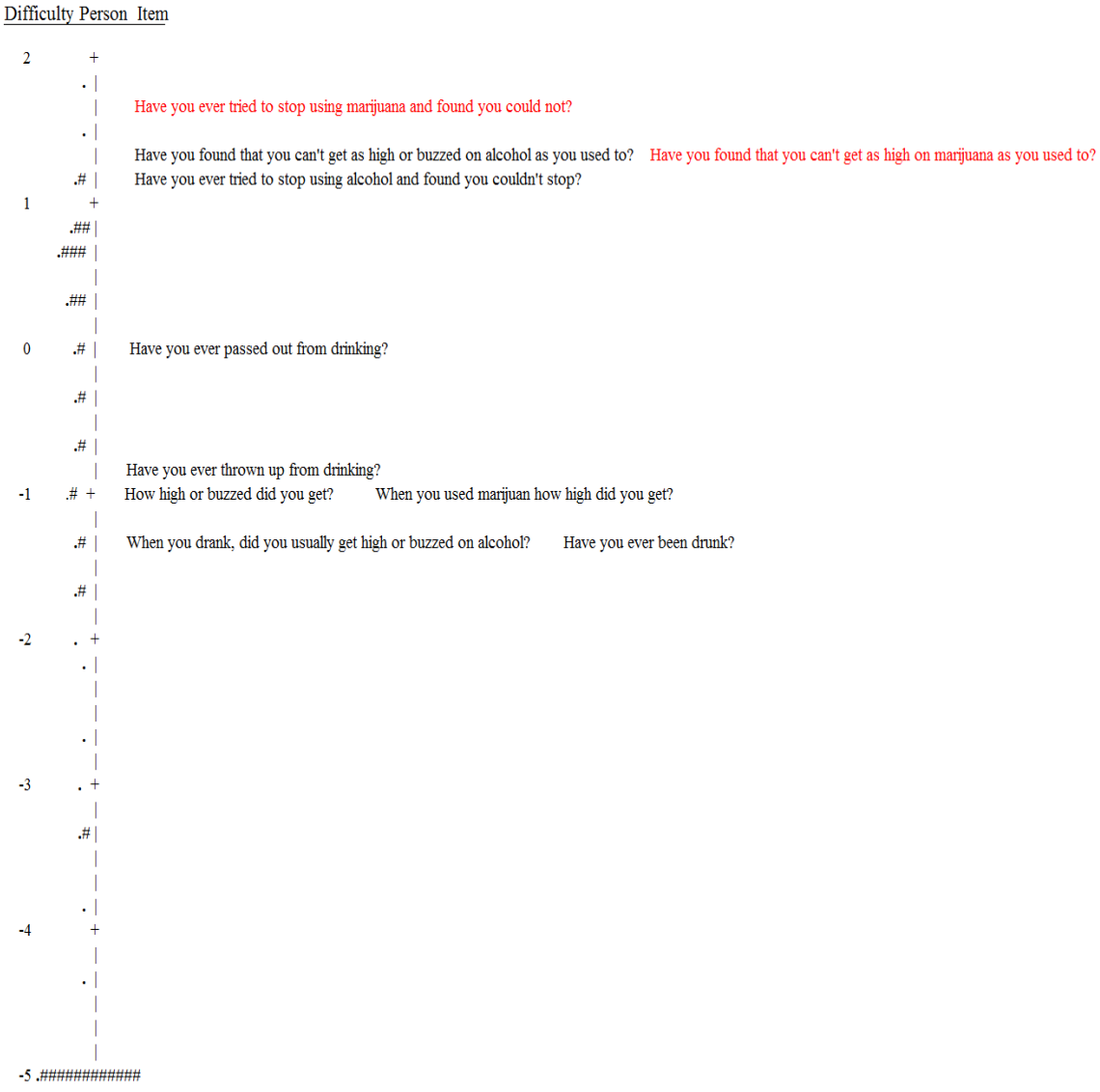
Although a full scale analysis is beyond the scope of this paper, the variable map provides more information. A common goal of scale design is to create items that have a difficulty level equal to examinee trait level. Inspection of Figure 7 reveals that additional items are needed to more accurately measure individuals at the lowest levels and middle levels of health consequences of substance use. A second goal of scale design is to create minimal redundancy in item difficulty such that multiple items are not needed to measure a single trait level. The variable map in Figure 7 shows a small amount redundancy exists in the current items.

The variable map of Social Consequences of Substance Use is presented in Figure 8, the DIF items were highlighted in red. Inspection of Figure 8 indicates that items one and three were the most difficult to endorse. In addition, more items are

needed at the highest and lowest levels of social consequences of substance use to more accurately measure examinee's at the corresponding trait level. There is some redundancy in the current items.

Figure 7

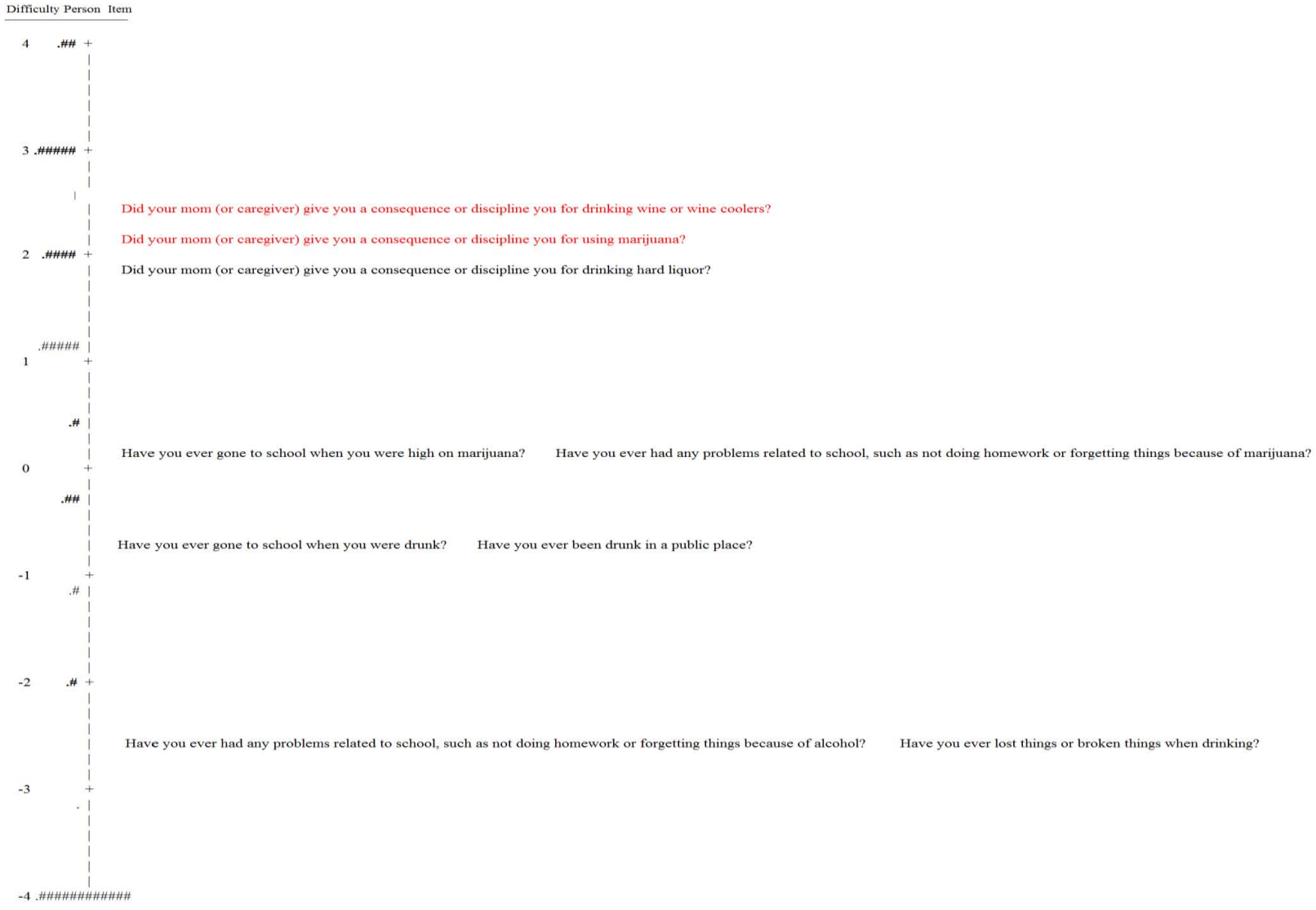
Variable Map for Health Consequences of Substance Use



Note. # = 16; . = 1 to 15

Figure 8

Variable Map for Social Consequences of Substance Use



Note. # = 16; . = 1 to 15

Hypothesis 5: reanalysis of protection from health and social consequences of substance use

Ethnic disparities. As a result of DIF, two items were dropped from the total score of Health Consequences of Substance Use and two items were dropped from the total score of Social Consequences of Substance Use. Table 7 presents the reanalysis of ethnic disparities in protection from health consequences and social consequences of substance use. The columns display the partial correlation between the protective factor and the health consequence or social consequence of substance use separated by ethnicity, only if the protection differences were statistically significant as evidenced by the interaction term of the regression. The larger negative correlation indicates significantly greater protection from that protective factor. Counter to the hypothesis, one protective factor was no longer statistically significant after removing two DIF items from the dependent variable. Specifically, the reanalysis showed that ethnic identity conferred equivalent levels of protection from social consequences of substance use for both Caucasian American and African American students. Ultimately, teen religion was the only ethnic disparity in protection that remained after the reanalysis, the difference in magnitude of the correlations was negligible.

SES disparities. Table 8 displays the reanalysis of SES differences in protection from health consequences and social consequences of substance use. Unexpectedly, six protective factors no longer had a statistically significant interaction term. Therefore, equivalent levels of protection were conferred by the six protective factors for high and low SES that previously showed a disparity. After dropping two items that showed DIF

in the total score of health consequences of substance use, the protective factors contact with caregiver, parental religion, effortful control, stress recognition and distraction coping, and rules and expectations no longer showed differential protection for high and low SES students. Plus, after dropping two items that showed DIF in the total score of social consequences of substance use, social control of teachers/peers/parents no longer showed differential protection. Ultimately, 14 disparities in protection remained after the reanalysis, 11 of which favored students of high SES.

Gender disparities. Table 9 presents the reanalysis of gender differences in protection from health and social consequences of substance use. Counter to expectations, the protective factor teen health no longer conferred differential protection for males and females after dropping two items from the dependent variables. Ultimately, there were no gender disparities in protection from health or social consequences of substance use.

Three-way factorial ANCOVA. Prior to the three-way factorial ANCOVA, a cross tabs was performed to determine if each cell was adequately represented, results are in Table 10. Table 11 displays the results of two models: a three-way factorial model that predicts health consequences of substance use, and a three-way factorial model that predicts social consequences of substance use, both as a function of gender, ethnicity, and SES. Treatment group status was not a significant predictor and thus dropped as a covariate from both models for parsimony. Substance use remained in both models as a covariate.

Table 7

Reanalysis of Ethnic Differences in Protection from Health and Social Consequences of Alcohol and Drug Use

	Protection			
	Health Consequences		Social Consequences	
Protective factors	Caucasian American	African American	Caucasian American	African American
Grades in school				
Contact with caregiver				
Marital parent status				
Never used alcohol, marijuana, drugs parent report				
Religion teen report	-.03	-.05	-.02	-.07
Religion parent report				
Ethnic identity				
Social control of police				
Social control of teachers, peers, parents				
Health of teen				
Affiliativness				
Effortful control				
Stress recognition and distraction coping				
Monitoring				
Monitoring peer report				
Rules and expectations				
Rules and expectations peer report				

*p<.01

Table 8

Reanalysis of Socioeconomic Status Differences in Protection from Health and Social Consequences of Alcohol and Drug Use

	Protection			
	Health Consequences		Social Consequences	
Protective factors	High	Low	High	Low
Grades in school				
Contact with caregiver			-.15	.16
Marital status				
Never used alcohol, marijuana, drugs parent report				
Religion teen report	-.12	.17	-.16	.15
Religion parent report			-.08	-.07
Ethnic identity	-.15	-.02	-.13	-.03
Social control of police			-.01	.02
Social control of teachers, peers, parents				
Health of teen			-.06	-.16
Affiliativness			-.08	.07
Effortful control			-.24	.00
Stress recognition and distraction coping				
Monitoring			-.07	-.08
Monitoring peer report			-.09	.01
Rules and expectations			-.08	-.05
Rules and expectations peer report			.06	.11

*$p < .01$

Table 9

Reanalysis of Gender Differences in Protection from Health and Social Consequences of Alcohol and Drug Use

	Protection			
	Health Consequences		Social Consequences	
Protective factor	Male	Female	Male	Female
Grades in school				
Contact with caregiver				
Marital status				
Never used alcohol, marijuana, drugs parent report				
Religion teen report				
Religion parent report				
Ethnic identity				
Social control of police				
Social control of teachers, peers, parents				
Health of teen				
Affiliativness				
Effortful control				
Peer acceptance				
Stress recognition and distraction coping				
Monitoring				
Monitoring peer report				
Rules and expectations				
Rules and expectations peer report				

*$p < .01$

Social consequences of substance use. The first model, which predicted social consequences of substance use, showed a significant two-way interaction between ethnicity and SES and a main effect of gender. The interaction is graphed in Figure 9. The graph shows that the effect of SES on social consequences was not the same for Caucasian American and African American students. After statistically accounting for the level of substance use, low SES African American students reported more social consequences than their high SES African American counterparts. Conversely, low SES Caucasian American students reported fewer consequences than their high SES Caucasian American counterparts. Unlike Caucasian Americans, low SES adversely affected the social consequences of substance use reported by African American students. The effect of SES was dependent on ethnicity and it appears to be worse for African American students. The first model also had a main effect of gender which means that being male was predictive of more social consequences of substance use.

Health consequences of substance use. The second model was a three way factorial ancova that predicted health consequences of substance use, there was a main effect of ethnicity. On average, being Caucasian American was associated with more health consequences of substance use.

Table 10

Distribution of Ethnicity by Socioeconomic Status and Gender

		Socioeconomic Status		
Gender	Ethnicity	Below *M*	Above *M*	Total
Male	African American	86	33	119
	Caucasian American	57	127	184
Female	African American	74	45	119
	Caucasian American	43	120	163
Total	African American	160	78	238
	Caucasian American	100	247	347
Total		260	325	585

Table 11

Analysis of Covariance of Social and Health Consequences of Substance Use as a Function of Gender, Ethnicity, and Socioeconomic Status, With Substance Use as Covariate

Source	*df*	*SS*	*MS*	*F*	*p*	η^2
Model for social consequences						
Covariate	1	1580.80	1580.80	140.44	.000	.196
Gender	1	64.94	64.94	5.77	.017	.010
Ethnicity	1	399.42	399.42	35.49	.000	.058
SES	1	2.40	2.40	.21	.644	.000
Gender x ethnicity	1	6.86	6.86	.61	.435	.001
Gender x SES	1	2.76	2.76	.25	.620	.000
Ethnicity x SES	1	64.64	64.64	5.74	.017	.010
Gender x ethnicity x SES	1	2.77	2.77	.25	.620	.000
Error	576	6483.49	11.26			
Total	585	117743				
Model for health consequences						
Covariate	1	5015.50	5015.50	125.77	.000	.179
Gender	1	126.25	126.25	3.17	.076	.005
Ethnicity	1	1438.04	1438.04	36.06	.000	.059
SES	1	8.83	8.83	.22	.638	.000
Gender x ethnicity	1	10.64	10.64	.27	.606	.000
Gender x SES	1	18.47	18.47	.46	.496	.001
Ethnicity x SES	1	124.00	3.11	3.11	.078	.005
Gender x ethnicity x SES	1	57.86	57.68	1.45	.230	.003
Error	576	22969.60	39.88			
Total	585	76701.00				

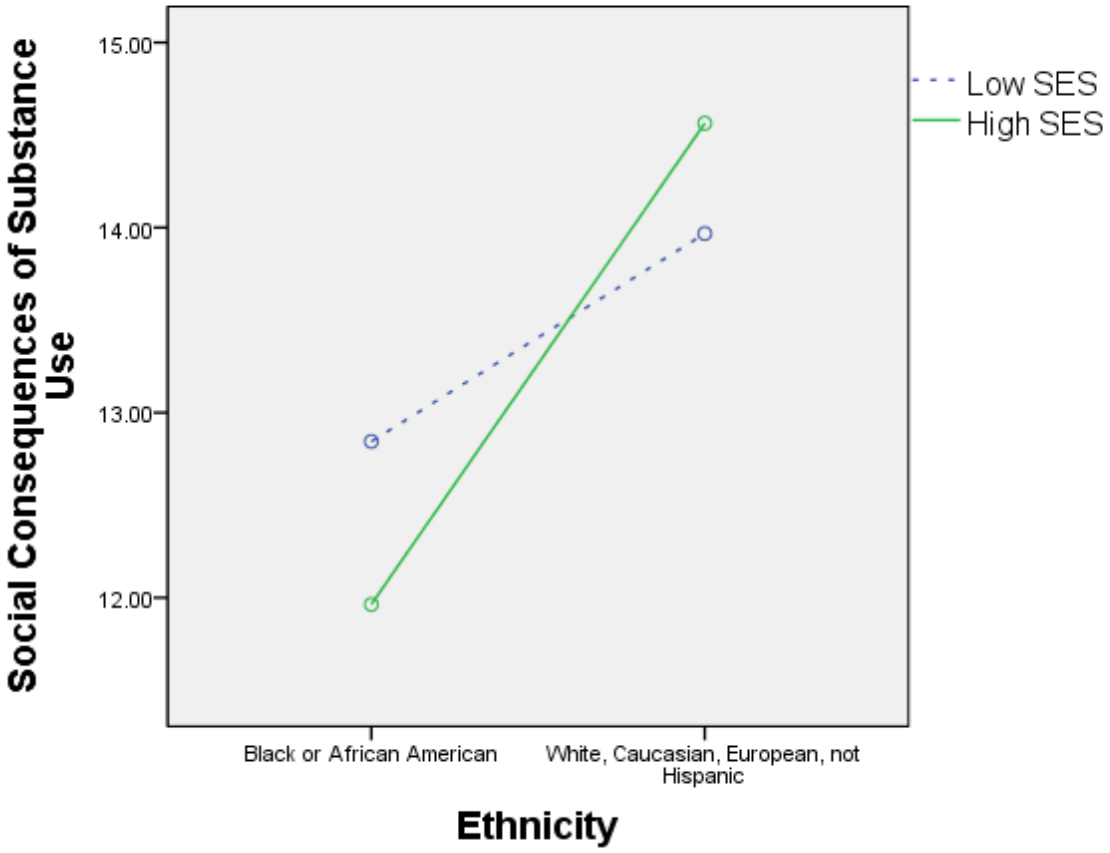


Figure 9. Two-way interaction between ethnicity and SES when predicting social consequences of substance use. Unlike Caucasian American students, low SES status was related to more social consequences reported by African Americans students.

Discussion

Despite equivalent and often lower levels of alcohol and drug use, African American youth experience disproportionate consequences relative to Caucasian youth. Counter to our central hypothesis, there were not ethnic disparities in protection from consequences of substance use. In fact, it was high SES youth who received greater protection from consequences of substance use despite being more exposed to a similar number of protective factors as low SES youth. Thus, there is a socioeconomic disparity in protection from consequences of substance use. As expected, boys and girls did not show many disparities in protection from consequences of substance use. Inconsistent with our hypothesis, a total of eight disparities in protection were an artifact of DIF in the dependent measures, six of which were related to health consequences. Following the reanalysis, 16 disparities in protection remained and were not an artifact of DIF. Similar to Galea and Rudstein's (2005) proposal of discrepancies between substance use levels and consequences, we found that problems from alcohol and drug use reflect multiple determinants from individual, family, social and economic circumstances.

Exposure to Protective Factors

Exposure differences in **affiliation** may be best understood in terms of contextual risks associated with socioeconomic status. Affiliation may be more encouraged in high SES socialization practices for reasons related to locality and safety. Affiliation may be rewarded in environments where it is facilitates social mobility and discouraged where it is perceived as more likely to invite trouble. For example, sociologists such as Elijah Anderson have used ethnographic techniques to document the social ecology of youth

violence and what he refers to as "codes of the street". A part of the codes include behavioral practices intended to avoid attracting attention or interactions with others. Not wearing a lot of jewelry, walking with poise, avoiding eye contact, and minding your own business are strategies used to keep distance between persons. Adults who have grown up in inner-city neighborhoods understand the requirements of the code of the street and the necessity that their children understand them as well. Thus, low SES parents also encourage affiliation but may do so with level of discretion for protective and safety purposes that are appropriate for their environment.

What Exposure Results Explain European American's or African American's Level of Substance Use?

As supported by criminal justice statistics, African American students in this study reported lower levels of **social control** meaning they expect less fairness, honesty, and niceness from the police as well as teachers, peers, and parents. Blacks exhibit excess rates of arrest, conviction, and incarceration for drug-related crimes (Tonry and Melewski, 2008; Kakade, Duarte, Liu, Fuller, Drucker, Hoven, Fan, & Wu, 2012). For example, even though two-thirds of all crack cocaine users are White, more than 80% of those convicted in federal court for crack cocaine offenses are African American (Piper, 2008). Thus, Black youth likely have few delusions about their ability to escape detection should they experiment with drugs or alcohol illegally.

In addition, the reality of excessive societal consequences leads many African American parents to be exceptionally vigilant and strict regarding issues of substance use, which may explain why Black teenagers reported more exposure to **parental rules and**

expectations. In fact, several items on the measure of rules and expectations specifically asked about alcohol and drug use. Black youth more often cite their parent's disapproval and fear of punishment as reasons that they do not use drugs or alcohol (Wallace, 2003). No-nonsense is a parenting style commonly utilized by low-income or single African American parents. No-nonsense parenting is characterized by high levels of parental controls, rules, physical punishment, and affectionate behaviors (Brody and Flor, 1998). Because no-nonsense parenting is used to deter antisocial behaviors and promote compliance with societal rules, it could clearly contribute to less alcohol and drug use among black teenagers.

The results showed that lifetime **abstinence from alcohol or drugs** was reported by more caregivers of African American teenagers than white teenagers. Similarly, previous literature has documented that Black parents, when compared to White parents, drink less, are more opposed to alcohol use, and are less likely to involve their children in family alcohol use (Peterson, Hawkins, Abbot, & Catalano, 1994; Watt & Rogers, 2007). Under social learning theory people learn from one another via observation, imitation and modeling. African American teenagers may use fewer substances than their white peers, in part, because parental role modeling that encourages abstinence.

As previously documented by numerous studies (Barnes, Farrell, and Banerjee, 1994; Maton et al., 1996; Johnson, Elbert-Avila, and Tulsky, 2005) we found that African American teenagers and caregivers reported more exposure to **religiosity**. It is thought that religious involvement protects youth against substance use in a number of ways, through potentiating health-enhancing values, life purposes, and a function of social

control (Yeung, Chan, & Lee, 2009). In addition, evidence from a longitudinal study with adolescents implied that religiosity can operate as a buffering factor, reducing the impact of life stress on the growth rate of substance use (Wills, Yaeger, and Sandy, 2003). Although one study showed that religion had a stronger effect on heavy drinking for Blacks relative to Whites (Barnes et al., 1994), the differential effects of religion have not been consistent in the literature. Watt et al. (2007) reported that religion was not moderated by race or ethnicity in its effect on alcohol use. Nonetheless, a meta-analysis of youth religiosity and substance use reviewed studies published from 1995-2007 concluded that the magnitude of protective effects was an average weighted correlation of -.16 (Yeung, Chan, and Lee, 2009). In this study, African Americans reported more exposure to religiosity which may help explain why they use fewer drugs and alcohol.

Consistent with other research (Amato, 2005), this study has found that Caucasian teenagers were more likely to reside in **two parent** households. On average, two-parent households have higher family incomes compared to single parent households. Teenagers from privileged backgrounds have the option to use more substances, in part, because of the availability of disposable income. Thus, if Caucasian students are more likely to live in two-parent households with higher incomes, they have more financial resources for recreational activities such as alcohol or drug use. Further support is found in several studies that reported single parent status is negatively correlated with alcohol and drug use among Black teenagers (Amey & Albrecht, 1998; Barnes, Farrell, & Banerjee, 1994). In fact, a study on family structure and substance use reported that a positive father-child relationship decreased the likelihood of alcohol use more than father

residency or nonresidency among Blacks (Jordan & Lewis, 2005). Thus, two parent households may increase teenage alcohol or drug use through increased availability of financial resources.

What Exposure Results Explain The Ethnic Paradox of Consequences?

Both Caucasian and high SES students have demonstrated higher academic **grades** than their African American and low SES counterparts for some time (Parke & Keener, 2011; Sohn, 2011; Strand, 2012). This study has captured the same effect. Most parents consider high academic grades a worthwhile goal. Perhaps, when teenagers perform well in an important facet of their life, such as academic performance, then parents are less likely to punish their behavior with alcohol use. In other words, if a teens substance use does not appear to be affecting their ability to master an important task in their life, parents may be less likely to restrict their freedom or address the behavior as a serious concern that warrants consequences.

Similar to Woolard, Harvell, & Graham (2008), we found that African American adolescents expected greater injustice in legal and social contexts as indicated by lower levels of **social control.** Social control is similar to anticipatory injustice which is the degree to which persons expect unfair or discriminatory procedures and outcomes (Shapiro & Kirkman, 2001). Shapiro and Kirkman (2001) argue that anticipatory injustice can engender additional negative consequences. They speculate that persons who expect unfairness are more likely than others to actually find injustice in their specific interactions even if alternative explanations for unfair procedures or outcomes are provided. Thus, African Americans may genuinely experience more consequences of

substance use, but the expectation of injustice may also inflate their anticipation of consequences.

Differential Item Functioning

As demonstrated in previous research (Boutin-Foster, 2008), we found that removing items that showed differential item functioning within groups of ethnicity, socioeconomic status, and gender, can provide more systematic and equivalent trait level measurement across a diverse group of adolescents. Inconsistent with the fourth hypothesis, we found that following the reanalysis 8 disparities in protection were an artifact of DIF but 16 disparities in protection remained. This finding adds to the literature because studies employing diagnostic measures of substance use and consequences often describe variations in aggregate scores. However, few studies have examined variations in response to specific items, especially by ethnicity, SES, or gender. This study showed that testing measurement properties of theoretical constructs at each layer of measurement is a critical step in the research process that can change the scientific results and implications.

Caution should be exercised in the use of items that show DIF due to the impact on clinical decision making or for computerized adaptive testing. Inspection of the health consequences of substance use measurement showed it was easier (i.e., required lower levels of health consequences) for African American teenagers to endorse, "When you used marijuana how high did you get" and "Have you ever tried to stop using marijuana and found you could not?" relative to Caucasian American teenagers. Therefore,

clinicians who rely on the DIF items could misdiagnose a teenager with a substance use disorder, specifically over diagnose African Americans.

Computerized adaptive testing (CAT) has become a popular testing mode in recent decades, so it is of interest to both clinicians and researchers to build CAT on diagnostic models (Cheng, 2009), similar to the diagnostic measure of substance abuse used in this study. There are two reasons that DIF detection may be more important for CAT than it is for nonadaptive tests. First, because fewer items are administered in a CAT, each item response plays a more important role in the examinee's test score than it would in a nonadaptive testing format. Any flaw in an item, therefore, may be more consequential for the examinee. Second, Powers et al. (1992) discussed issues of administering a test by computer because it creates several potential sources of DIF that are not present in conventional tests, such as differential computer familiarity, facility, and differential preferences for computerized administration.

A final step in DIF research is to qualitatively deconstruct why the items showed DIF. In this study, all four items that showed DIF asked about wine and marijuana use. Wine and marijuana share one common similarity, they are both considered to be the least harmful drug in their separate classes of licit and illicit substances. For example, among alcohols, wine or wine coolers are considered the least harmful by the percent of alcohol content. Socially, wine has been included in religious ceremonies and is occasionally shared with members of the family who are not of the legal drinking age. Public perceptions on the acceptability and danger of marijuana use have been changing for several reasons. Sixteen states have legalized cannabis for medical use. Medical

marijuana is prescribed by physicians to ameliorate nausea and vomiting, stimulate hunger in chemotherapy and AIDS patients, lower eye pressure in glaucoma patients, and relieve conditions associated with multiple sclerosis (Aggarwal, 2005). Unlike narcotics that are legally prescribed by physicians, cannabis has not been shown to be physically addictive. In fact, marijuana was often considered a "gateway drug" in policy decision making, but tobacco smoking is a better predictor of concurrent illicit hard drug use than smoking cannabis (Torabi, Bailey, & Majd-Jabbari, 1993). A source of DIF may be that teenagers' experiences or knowledge of wine and marijuana use is qualitatively different from harsher or more concentrated alcohols or drugs.

What Disparities in Protection Shed Light on the Paradox of Ethnicity and Consequences?

As shown in Table 7 and 9, the effect of protective factors on consequences of substance use does not appear to be dependent on ethnicity or gender. Similar to Barnes (1994), religiosity was an exception in which African American teenagers received modestly more protection from health and social consequences. Thus, regardless of ethnicity or gender, most protective factors offered the same level of protection from consequences. However, contrary to our hypothesis, the level of protection from consequences of substance use was dependent on socioeconomic status. Specifically, of the 14 SES disparities in protection from consequences, 11 favored high SES, 2 favored low SES, and 1 showed positive correlations thus not being protective to either group. Thus, the disproportionate consequences of substance use experienced by African

American youth may be driven by risks or disadvantages associated with socioeconomic status.

Is there a Socioeconomic Paradox of Less Substance Use Equals More Consequences?

Generally speaking, when drinking patterns are accounted for, there are no or very few differences in drinking consequences between lower and higher socioeconomic groups (Hammarström, 1994; Huckle, You, & Casswell, 2010; Makela & Palijarvi, 2008). In other words, there is no socioeconomic paradox of consequences like has been documented in the ethnicity literature for 30 years. However, drinking patterns do vary by socioeconomic status. There is much evidence that lower SES groups consume more on a typical drinking occasion, while higher SES groups drink more frequently (as cited in Kuendig, Plant, Plant, Kuntsche, Miller, & Gmel, 2008). Drinking patterns are a stronger predictor of consequences than SES. There is one exception in the literature where lower SES groups experience more harm. A study in Finland found an independent relationship between drinking consequences and SES after controlling for drinking patterns among youth (Janlert & Hammarström, 1992).

Theoretical and Prevention Implications

Theoretical implications. Kwachi and colleagues (2005) outlined three major competing casual interpretations of racial disparities in health and mental health. The first views race as a biologically meaningful category and racial disparities in health as reflecting inherited susceptibility to health conditions. The second approach to racial disparities is one that treats race as a proxy for class. The third view of racial disparities

is one that simultaneously accounts for the independent and interactive effects of both class and race in producing health disparities. According to the last view, race is neither a biologically meaningful category nor a proxy for class, but is a separate construct from class, more akin to caste. The results of this study stand in defense of the third view, race and class as separate constructs that cause racial disparities for three reasons. In rejection of the first view, there were almost no ethnic disparities in protection from *health* consequences which supports the proposition of race being a socially constructed category not a biological status. In rejection of the second view, ethnicity should not be used as a proxy for SES because inspection of Table 7 and Table 8 shows that ethnic disparities in protection are completely different from SES disparities in protection. In support of the third view, ethnicity and SES appear to be separate constructs with the ability to interact as demonstrated in the graph of social consequences in Figure 9. Thus, issues of race and SES should be addressed simultaneously if we are to reduce disparities in consequences from alcohol and drug use.

Prevention implications. Similar to Wallace and Muroff (2002), the results of this study suggest that equal exposure does not always mean equal protection. Therefore, intervention activities must consider additional kinds of information when working with problems related to drug and alcohol use. Exposure to protective factors is different from receiving the benefits of protection. The different rates of protection may suggest implications for screening and intervention strategies, as it appears that low SES youth may receive less protection from protective factors associated with substance use than

their high SES counterparts despite having more exposure to a similar number of protective factors.

Limitations

Several limitations warrant mention. Regarding the use of DIF, no single test can capture the complexity of consequences of substance use. Regardless of correcting for item equivalence, all measurement is imperfect, and no single measure is completely free from cultural bias (Nisbett, Aronson, Blair, Dickens, Flynn, Halpern, & Turkheimer, 2012). In the measurement of substance use, this study collapsed alcohol and marijuana use into a composite score of substance use, this can pose a problem for some analytic strategies. Such a practice can be disadvantageous as it likely obscures important differences in the patterns of use across substances (Brown, Miller, & Clayton, 2004). Caucasian American and African American adolescents have been shown to have substantially different levels of use for certain substances which are evidence at a relatively young age.

The measure of social consequences of substance use contains items that have been validated and used in other measures of consequences (Huckle, You & Casswell, 2010). However, social consequences as reported by juvenile records or the DMV were not available at the time. Therefore, there is an important domain of social consequences in which racial disparities have been well documented (Tonry and Melewski, 2008; Kakade, Duarte, Liu, Fuller, Drucker, Hoven, Fan, & Wu, 2012), but is not represented in this report. In total, this study conducted 142 statistical tests, similar to Wallace and Muroff's (2002) 165 tests of race differences in vulnerability to risk. While it is possible

that some of the differences we identified resulted from chance, their consistency within classification groups, and the reanalysis following the removal of DIF items, makes the likelihood that our findings are primarily statistical artifacts unlikely.

Future Research

The results of this study indicate that the disproportion consequences experienced by African American youth may be due to low SES. However, previous research has indicated that in general, low SES drinkers do not suffer disproportionate consequences relative to their drinking pattern. Therefore, the relationship between SES and consequences of substance use may be dependent on ethnicity. The adverse effect of being poor is worse on African Americans than Caucasian Americans as supported by the graph in Figure 9 and documented by others (Herd, 1994; Jones-Webb, Hasiao, & Hannan, 1995; Jones-Webb, Snowden, Herd, Short, & Hannan, 1997). However, an ANOVA that compares means within classification groups such as ethnicity and SES still does not shed light on underlying mechanisms that create or sustain the disparity in consequences. The next step is to find underlying mechanisms within the group of poor ethnic minorities. Because we did not find many ethnic disparities in protection, and research has reported that drinkers of low SES do not generally experience disproportionate consequences, then future research should compare social mechanisms that buffer or exacerbate consequences between four represented groups: low SES minorities, high SES minorities, low SES non-minorities, and high SES non-minorities.

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APPENDIX

Affiliation

Items

My child…

1. Can generally think of something to say, even with strangers
2. Gets irritated when I will not take her/him someplace s/he wants to go
3. Is shy
4. Likes meeting new people
5. Has a hard time waiting his/her turn to speak when excited
6. Like taking care of other people
7. Gets irritated when someone criticizes her/him
8. Enjoys exchanging hugs
9. Thinks traveling to a place where the culture is different than his/her own would be fun and exciting

Response…

Almost always untrue of my child
Usually untrue of my child
Sometimes true, sometimes untrue of my child
Usually true of my child
Almost always

Factor Analysis

9 items loaded from .44 to .72.
4 items dropped from measurement due to low loadings (.03, .27, .34, .35)

Skewness (standard error)

-.40 (.11)

Kurtosis (standard error)

1.42 (.22)

Effortful Control

Items

My child…

1. Often does not seem to enjoy things as much as friends
2. Would like to spend time with good friend ever day
3. Worries about family when not with them
4. Good at keeping track of several different things happening around him/her
5. Is often in middle of doing one thing then goes off and does something else
6. Worries about getting into trouble
7. Usually gets started right away on assignments
8. Makes fun of how others look
9. Is usually able to stick with plans or goals
10. Is nervous being home alone
11. Feels like crying over little things some days
12. Sad more often than people realize

Response…

Almost always untrue of my child
Usually untrue of my child
Sometimes true, sometimes untrue of my child
Usually true of my child
Almost always

Factor Analysis

12 items loaded from .40 to .63.
3 items dropped from measurement due to low loadings (.12, .19, .31)

Skewness (standard error)

.17 (.11)

Kurtosis (standard error)

.89 (.23)

Ethnic Identity

Items

1. I have spent time trying to find out more about my own ethnic group, such as history, traditions, and customs.
2. I am active in organizations or social groups that include mostly members of my own ethnic group.
3. I have a clear sense of my ethnic background and what it means to me.
4. I think a lot about how my life will be affected by my ethnic group membership.
5. I am happy that I am a member of the group I belong to.
6. I really have not spent much time trying to learn more about the culture and history of my ethnic group.
7. I have a strong sense of belonging to my own ethnic group
8. I understand pretty well what my ethnic group membership means to me, in terms of how to relate to my own group and other groups.
9. In order to learn more about my ethnic background, I have often talked to other people about my ethnic group.
10. I have a lot of pride in my ethnic group and its accomplishments.
11. I participate in cultural practices of my own group, such as special food, music, or customs.
12. I feel a strong attachment towards my own ethic group
13. I feel good about my cultural or ethnic background.

Response…

Strongly disagree
Somewhat disagree
Somewhat agree
Strongly agree

Factor Analysis

13 items loaded from .41 to .72.
1 item dropped from measurement due to low loadings (.20)

Skewness (standard error)

-.34 (.10)

Kurtosis (standard error)

-.23 (.20)

Health

Items

1. I am full of energy
2. I resist illness well
3. When I get sick, I usually recover quickly
4. I am well coordinated
5. I have a lot of good qualities
6. I am very physically fit
7. I have much to be proud about
8. I like being the way I am
9. I am satisfied with how I life my life
10. My muscle strength is really good
11. I feel socially accepted

Response…

Do not agree
Agree a little
Mostly agree
Completely agree

Factor Analysis

11 items loaded from .49 to .78.
4 items dropped from measurement due to low loadings (.12, .15, .28, .28)

Skewness (standard error)

-.41 (.112)

Kurtosis (standard error)

-.17 (.20)

Monitoring

Items

In the past 3 months, how often did you…

1. Know what your teen was doing when he/she was away from home
2. Know where your teen was after school
3. Know about your teens plans for the coming day
4. Have a pretty good idea about your teens interests and activities
5. Compliment your teen for anything he or she did well
6. Give your teen something extra for doing something well

Response…

Never or almost never
Sometimes
About half the time
Often
Always or almost always

Factor Analysis

6 items loaded from .42 to .86.
No items dropped due to low loadings

Skewness (standard error)

-.99 (.11)

Kurtosis (standard error)

.66 (.22)

Never Used Alcohol, Marijuana, Drugs by Parent

Items

1. Never used alcohol
2. Never used marijuana
3. Never used other drugs

Response…

Yes
No

Factor Analysis

3 items loaded from .59 to .80.
No items dropped due to low loadings

Skewness (standard error)

.43 (.10)

Kurtosis (standard error)

-1.04 (.22)

Religiosity

Items

1. Do you have religious or spiritual beliefs?

Yes
No

2. How important are these beliefs in your life?

Very important
Important
Somewhat important
Slightly important
Not at all important

3. In general, how often do you practice your religion or spirituality? For example, attending services, individual prayers, meditation, inspirational reading, or Bible study?

Daily
Several times a week
Weekly
Less than weekly
Holidays
Not at all

Factor Analysis

3 items loaded from .59 to .80.
No items dropped due to low loadings

Skewness (standard error)

-.62 (.11)

Kurtosis (standard error)

-.54 (.22)

Rules and Expectations

Items

Over the past 3 months…

1. I ____ that my teen should do homework every day
2. I _____ that my teen should no smoke cigarettes or use chewing (or smokeless) tobacco
3. I _____ that my teen should not use alcohol
4. I _____ that my teen should not use marijuana
5. I _____ that my teen should not use other drugs
6. I _____ that my teen should not be with friends at our house or someone else's house without an adult around
7. I _____ that my teen should check in with me if he or she was going to be late

Response…

Didn't have a rule or expectations
Sort of expected
Definitely expected
Had a clear rule

Factor Analysis

7 items loaded from .48 to .89.
No items dropped due to low loadings

Skewness (standard error)

-1.02 (.11)

Kurtosis (standard error)

1.09 (.22)

Social Control of Police

Items

How do you describe police?

1.	Unfair	1	2	3	4	5	Fair
2.	Nice	1	2	3	4	5	Nice
3.	Cold	1	2	3	4	5	Warm
4.	Friendly	1	2	3	4	5	Unfriendly
5.	Good	1	2	3	4	5	Bad
6.	Cruel	1	2	3	4	5	Kind
7.	Honest	1	2	3	4	5	Dishonest

Factor Analysis

7 items loaded from .49 to .79.
No items dropped due to low loadings

Skewness (standard error)

-.37 (.11)

Kurtosis (standard error)

-.21 (.23)

Social Control of Teachers, Peers, Parents and School

Items

How do you describe teachers?

1.	Unfair	1	2	3	4	5	Fair
2.	Nice	1	2	3	4	5	Nice
3.	Cold	1	2	3	4	5	Warm
4.	Friendly	1	2	3	4	5	Unfriendly
5.	Good	1	2	3	4	5	Bad
6.	Cruel	1	2	3	4	5	Kind
7.	Honest	1	2	3	4	5	Dishonest

How do you describe kids your age at school?

1.	Unfair	1	2	3	4	5	Fair
2.	Nice	1	2	3	4	5	Nice
3.	Cold	1	2	3	4	5	Warm
4.	Friendly	1	2	3	4	5	Unfriendly
5.	Good	1	2	3	4	5	Bad
6.	Cruel	1	2	3	4	5	Kind
7.	Honest	1	2	3	4	5	Dishonest

How do you describe kids in your neighborhood?

1.	Unfair	1	2	3	4	5	Fair
2.	Nice	1	2	3	4	5	Nice
3.	Cold	1	2	3	4	5	Warm
4.	Friendly	1	2	3	4	5	Unfriendly
5.	Good	1	2	3	4	5	Bad
6.	Cruel	1	2	3	4	5	Kind
7.	Honest	1	2	3	4	5	Dishonest

How do you describe parents?

1.	Unfair	1	2	3	4	5	Fair
2.	Nice	1	2	3	4	5	Nice
3.	Cold	1	2	3	4	5	Warm
4.	Friendly	1	2	3	4	5	Unfriendly
5.	Good	1	2	3	4	5	Bad
6.	Cruel	1	2	3	4	5	Kind
7.	Honest	1	2	3	4	5	Dishonest

How do you describe school?

1.	Fun	1	2	3	4	5	Boring
2.	Waste	1	2	3	4	5	Important
3.	Fair	1	2	3	4	5	Unfair
4.	Good	1	2	3	4	5	Bad

Factor Analysis

32 items loaded from .37 to .73.
No items dropped due to low loadings

Skewness (standard error)

.09 (.11)

Kurtosis (standard error)

-.01 (.21)

Stress Recognition and Distraction Coping

Items

If I felt stressed, I would…

1. Talk to my parents
2. Talk to my friend
3. Talk to my brother or sister
4. Get advice from someone
5. Talk to a teacher or psychologist
6. Write about it for myself only (like in a dairy)
7. Write to someone else about it
8. Get away from everyone and just be alone
9. Relax; try to be less tense
10. Go to sleep or sleep it off
11. Take my mind off it; think about something else
12. Watch TV
13. Clean my room or rearrange it
14. Scribble or draw something
15. Listen to music
16. Run or exercise hard
17. Take a walk or a bike ride
18. Do a hobby or something I enjoy
19. Do a sport with someone else
20. Go over to a friend's house
21. Read a book
22. Talk with a youth group leader
23. Make jokes

Response…

I would definitely not do this
I would probably not do this
I am not sure if I would do this or not
I would probably do this
I would definitely do this

Factor Analysis

23 items loaded from .39 to .77.
4 items dropped from measurement due to low loadings (.09, .14, .19, .25)

Skewness (standard error)

.08 (.10)

Kurtosis (standard error)

.18 (.20)

Substance Use by Teen

Items

How often did you drink beer in the last 3 months?

1. Never
2. Once or twice
3. Once a month
4. Once every 2-3 weeks
5. Once a week
6. 2-3 times a week
7. Once a day
8. 2-3 times a day (or more)

When you drank beer in the last 3 months, how much did you usually drink?

1. Less than one can
2. One can (12 or 16 oz.)
3. Two cans or 22 oz. bottle
4. Three cans or 40 oz. bottle
5. Four to five cans
6. Six-pack or more….If more than six cans, how many? _____

How often did you drink hard liquor in the last 3 months?

1. Never
2. Once or twice
3. Once a month
4. Once every 2-3 weeks
5. Once a week
6. 2-3 times a week
7. Once a day
8. 2-3 times a day (or more)

When you drank hard liquor in the last 3 months, how much did you usually drink?

1. Less than one drink
2. One drink
3. Two drinks
4. Three drinks
5. Four to five drinks
6. Six drinks or more

How often did you drink wine or wine coolers in the last 3 months?

1. Never
2. Once or twice
3. Once a month
4. Once every 2-3 weeks
5. Once a week

6. 2-3 times a week
7. Once a day
8. 2-3 times a day (or more)

When you drank wine or wine coolers in the last 3 months, how much did you usually drink?

1. Less than one glass
2. One glass
3. Two glasses
4. Three glasses
5. Four to five glasses
6. Six drinks or more….If more than six glasses, how many? _____

How often did you use marijuana in the last 3 months?

1. Never
2. Once or twice
3. Once a month
4. Once every 2-3 weeks
5. Once a week
6. 2-3 times a week
7. Once a day
8. 2-3 times a day (or more)

When using marijuana, how much did you usually smoke?

1. 1-2 hits
2. A few hits
3. Half a bowl or joint
4. 1 bowl or joint
5. 2 bowls or joints
6. More than 2 bowls or joints
7. Other (specify): _____

Factor Analysis

8 items loaded from .41 to .78.
No items dropped due to low loadings

Skewness (standard error)

-.92 (.11)

Kurtosis (standard error)

.64 (.22)