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Association of Contextual Factors with Drug Use and Binge Drinking among White, Native American, and Mixed-Race Adolescents in the General Population

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Abstract

Large-scale surveys have shown elevated risk for many indicators of substance abuse among Native American and Mixed-Race adolescents compared to other minority groups in the United States. This study examined underlying contextual factors associated with substance abuse among a nationally representative sample of White, Native American, and Mixed-Race adolescents 12-17 years of age, using combined datasets from the National Survey on Drug Use and Health (NSDUH, 2006-2009, $N = 46{,}675$, 48.77 % female). Native American adolescents displayed the highest rate of past-month binge drinking and past-year illicit drug use (14.06 % and 30.91%, respectively). Results of a logistic regression that included seven predictors of social bonding, individual views of substance use, and delinquent peer affiliations showed that friendships with delinquent peers and negative views of substance use were associated significantly with both substance abuse outcomes among White and Mixed-Race adolescents and, to a lesser extent, Native American adolescents. The association of parental disapproval with binge drinking was stronger for White than for Native American adolescents. Greater attention to specific measures reflecting racial groups' contextual and historical differences may be needed to delineate mechanisms that discourage substance abuse among at-risk minority adolescent populations.

Keywords

adolescents; binge drinking; contextual factors; illicit drug use; Native American; mixed race

Epidemiologic surveys of the general population consistently have shown that Native American (defined as American Indian and Alaska Native) and Mixed-Race adolescents (defined as those who self-identified with two or more races) are at higher risk for the abuse of alcohol and other drugs compared to other minority groups in the United States (Price, Risk, Wong, & Klingle 2002; Wu, Woody, Yang, Pan, & Blazer 2011; Young & Joe 2009). The disproportionate rates of substance use problems in these racial groups call for the identification of malleable risk and protective factors to promote healthful outcomes (Choi, He, Herrenkohl, Catalano, & Toumbourou 2012; Hawkins, Cummins, & Marlatt, 2004; Young & Joe 2009). In addition to understanding adolescents' behaviors from

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developmental perspectives, many psychosocial perspectives can be applied to account for elevated risk among adolescents. Social bonding and social learning perspectives have posited specific contextual influences that help to explain adolescents' substance abuse and other delinquent behaviors (Hawkins, Catalano, & Miller 1992; HeavyRunner-Rioux, & Hollist 2010). Parent-child bonding, parental monitoring, school attachment, community engagement, delinquent peer affiliations, and individual attitudes toward substance use are key contextual predictors most often reported in the literature (Choi, Harachi, Gillmore, Catalano, & Catalano 2005; Jackson, & Lecroy 2009). Empirical evidence has supported these contextual influences, particularly for White adolescents, providing promising directions for prevention and intervention. It is not clear if these factors are generalizable to Native Americans and Mixed-Race adolescents (for information on this issue see Gardner & Shoemaker 1989; HeavyRunner-Rioux & Hollist 2010). Consequently, it is not known whether intervention programs and models based on research findings with White samples can be generalized to these minority adolescents (Jackson & Lecroy 2009).

Contextual attributes associated with substance abuse and their influences on Native Americans and Mixed-Race populations could differ significantly from those that are relevant for the White population, given the differences in the groups' exposure to particular social and cultural influences (Floyd, Alexandre, Hedden, Lawson, & Latimer 2010; Hill 2006). Generally, Native American populations are socially and economically disadvantaged; family and community disorganization is likely to be associated with psychological and behavioral problems for this group (Hawkins, Cummins, & Marlatt 2004; HeavyRunner-Rioux, & Hollist 2010; Young, & Joe 2009; Yuan et al. 2010). However, few studies have used representative samples; instead, they have focused on reservation-based samples. Furthermore, data on contextual factors are limited (for exceptions see HeavyRunner-Rioux & Hollist 2010).

Risk factors such as racial and self-identity, family discord, and social isolation have been discussed in the literature on Mixed-Race adolescents (Choi et al 2005). However, despite recent growth in the Mixed-Race population (Cheng & Klugman 2010), many of the methodological limitations applicable to Native American populations also pertain to Mixed-Race populations. Few existing studies have used representative samples and most have focused on individual factors or family characteristics (e.g., Jackson & Lecroy 2009; Seale et al. 2010). Before the 2000 Census began to include Mixed-Race as a category, studies varied in their definition of this classification. Even after 2000, when some studies began to follow the Census definition of Mixed-Race, other definitions were still used according to the studies' purposes. This variation in defining Mixed-Race makes it difficult to compare findings from previous studies and provides limited information about contextual factors relevant to Mixed-Race individuals' substance use problems.

In this study, we extend past research on Native American and Mixed-Race adolescents' substance misuse with a nationally representative sample. We examined the associations of contextual measures with binge drinking and illicit drug use among White, Native American, and Mixed-Race adolescents. Understanding the similarities and differences in contextual influences among the three racial groups will better inform prevention and intervention programs and policy initiatives designed to reduce substance abuse among adolescents in these populations.

Substance Use among White, Native American, and Mixed-Race Adolescents

According to the Substance Abuse and Mental Health Services Administration (SAMHSA, 2011a, 2011b), 30.3% of Americans aged 12 to 17 had used alcohol and 19.5% used illicit

drugs in the past year. Evidence further suggests racial/ethnic and gender differences in alcohol abuse, substance use, and related problems. White, American Indian/Alaska Native, and Mixed-Race individuals generally have higher drinking rates than do African or Asian Americans (NSDUH 2009; SAMHSA 2008). The disproportionate rates of drug use and related problems in these racial groups call for academic researchers and practitioners to identify malleable risk and protective factors relevant to their experiences.

Alcohol Use/Binge Drinking

In 2008, among the population age 12 or older, drinking rates were 56.2% for Whites, 47.5% for Mixed-Race individuals (those self-identified as non-Hispanic who selected more than one other racial group), 43.3% for American Indians and Alaska Natives, 43.2% for Hispanics, 41.9% for African Americans, and 37.0% for Asians (SAMHSA 2008). A review by Young and Joe (2009) highlighted alcohol-related problems among American Indian and Alaska Native populations. They found that, although Whites generally have rates of current and past-year alcohol use similar to or higher than those of Native Americans, American Indian and Alaska Native populations experience higher rates of alcohol-related violence and deaths than do Whites. The National Vital Statistics Reports showed similar trends. For example, 26.3 % of deaths among American Indian and Alaska Native populations were alcohol induced compared with 7.5% among Whites (Xu et al. 2010). Male American Indians and Alaska Natives are at even greater risk than are males of other races (Young & Joe 2009). The higher rate of alcohol-related problems among American Indians and Alaska Natives than among Whites result, in part, from a heightened binge drinking rate among Native Americans (Pemberton, Colliver, Robbins, & Gfroerer 2012).

In addition to accidental death, binge drinking also is associated with heightened health problems and behavior problems among young people, particularly college students; these problems include unprotected sex, violence, poor academic performance, and alcohol dependence (Wechsler, Lee, Kuo, Seibring, Nelson, & Lee 2002). Although research suggests that a higher legal drinking age and other changes in alcohol policy were associated with decreases in binge drinking from 1979 to 2006, a recent study indicated that college students are still at high risk for binge drinking (Grucza, Norberg, & Bierut 2009). Risk factors such as being male, White, a member of a fraternity, binge drinking during senior year in high school, and involvement in athletics have been discussed frequently (Wechsler et al. 2002). Among these risks, binge drinking during senior year in high school is a key predictor of college binge drinking. Fewer studies examined protective factors for this age group (for an exception see Miller, Naimi, Brewer, & Jones 2007), with far fewer focusing on Native American and Mixed-Race groups.

Illicit Drug Use

From 2008 to 2009, illicit drug use in the United States increased, with marijuana being the most commonly used illicit substance (NSDUH 2009). One reason for this pattern is that adolescents tend to hold relatively liberal attitudes about marijuana (NSDUH 2009). Considerable variability exists in reported rates of illicit drug use. For example, SAMHSA reported that, in 2008, Asians had the lowest rate (3.6%) and Mixed-Race individuals (self-reported non-Hispanics who selected more than one other racial group) had the highest rate (14.7%), followed by American Indians and Alaska Natives (9.5%) and Whites (8.2%) (SAMHSA 2008). Focusing specifically on the adolescent population, the National Longitudinal Study of Adolescent Health (Add Health study) indicated that Mixed-Race adolescents had overall higher rates of substance use problems than did their White counterparts; Mixed-Race adolescents' levels of risk were similar to those of Native American adolescents (Udry, Li, & Hendrickson-Smith, 2003). According to the National Vital Statistics Reports, Whites had the highest rate of drug-induced deaths (13.6%),

followed by American Indians and Alaska Natives (12.1%), African Americans (11.0%), and Asians/Pacific Islanders (2%) (Xu et al. 2010). Among females, American Indians and Alaska Natives were at the highest risk (11.5 %) of drug-related problems; among males, Whites were at highest risk of drug-related problems (16.9 %), followed by American Indians and Alaska Natives (12.6 %) (Xu et al. 2010). No reports for Mixed-Race populations were included. These epidemiologic findings represent the growing evidence that racial and ethnic backgrounds may be associated with youths' risk for problems related to substance abuse. Nevertheless, additional knowledge is needed that highlights unique risk and protective factors for different racial/ethnic groups.

Contextual Factors Associated with Adolescents' Substance Use

Adolescence is a period of dramatic change in human development (Bandura 1986; Brook & Brook 2001; Gardner & Shoemaker 1989; Miller et al. 2007). Beyond obvious physical and psychological changes, social transitions, such as increases in time spent with friends and changes in peer groups from elementary to middle and high school, extend adolescents' networks and relationships with others. This enhances peer influence on adolescents. The developmental period also coincides with the development of more abstract thinking and the establishment of codes of ethics defining acceptable and unacceptable behaviors, which increases their autonomy. Novelty-seeking behaviors are more consistent with peers' norms than with conventional behaviors. Each of these bio-psycho-social changes increases social pressure, distress, and identity confusion for adolescents.

The stressors that characterize this developmental transition are likely to be enhanced among some racial/ethnic minority adolescents (Hawkins, Catalano, & Miller 1992; Jackson & Lecroy 2009; Young & Joe 2009). Native American and Mixed-Race adolescents, whose socioeconomic status and family environments are often marginalized and discordant, may receive limited support from their families that would help them to face the challenges that these transitions bring (Park 1967; Udry, Li, & Hendrickson-Smith 2003; Walls, Whitbeck, & Hoyt 2007). Disadvantaged social environments can further complicate Native American and Mixed-Race adolescents' development of positive racial- and self-identity, preventing them from forming positive relationships with others. This, in turn, may increase delinquency and substance use among these adolescents.

Social bonding and social learning perspectives have specified several additional contextual influences on adolescents' substance abuse and delinquency (Hawkins, Catalano, & Miller 1992). Despite the heightened risk with which Native American or Mixed-Race adolescents live, relatively little research has focused on these groups of adolescents. The following review focuses on Native American and Mixed-Race populations to identify appropriate contextual measures for this study. Where appropriate, information on other racial/ethnic groups, particularly Whites, is presented to provide a general context for youth substance abuse.

The Social Bonding Perspective

The social bonding perspective suggests that adolescents who are strongly attached to conventional institutions and individuals, committed to social norms, and involved in conventional activities are less likely to use substances (Hirschi 1969; Payne 2008). Positive parent-child relationships, parental monitoring of children's whereabouts, and parents' conservative attitudes towards substances have been found to discourage adolescents' substance use. When adolescents have strong attachments to their schools and families, they tend to avoid transgressions against social norms, which could bring disapproval from significant others (Hirschi 1969; Payne 2008). A strong commitment to academics and engagement in school are inversely related to delinquent behaviors generally, whereas

academic failure is associated with a heightened risk of developing behavior problems. Similarly, adolescents who spend more time in conventional activities such as sports, art, and community service are unlikely to encounter delinquency-promoting environments or engage in delinquent activities. Marginalization and disturbances in families and communities that often characterize minority adolescents' lives can limit the protective effects of social bonding; this, in turn, can increase minority adolescents' risk of using substances (Hill, 2006; Hirschi 1969; Park 1967).

Economic deprivation, cultural conflicts, and high unemployment rates often characterize Native American communities; heightened substance use problems have been noted in Native American boarding schools and on reservations (Ellingsen 2000; Hill 2006; Yuan et al. 2010). European colonization and the displacement of Native Americans from their homelands disrupted their connections to their traditional values; this may have encouraged family violence and negative perceptions of mainstream culture. A history of forced attendance at government-run boarding schools may have had lasting effects on some Native American families. Research has found that Native American adolescents' substance use is associated with perceptions of schools as unjust (Jackson & Lecroy 2009). Native American adolescents who experience social isolation and rejection from a dominant culture that differs from their own may struggle to find environments in which they feel they belong (Hill 2006). Discrimination and isolation can limit the protective effects of mainstream social institutions and conventional activities (HeavyRunner-Rioux & Hollist 2010; Hill 2006; Hirschi 1969; Park 1967).

The challenges that Mixed-Race children and adolescents face are characterized mainly by elevated levels of family discord, alienation from mainstream racial/ethnic groups, and identity confusion (Doyle & Kao 2007; Terry & Winston 2010; Udry et al. 2003). However, because of the relative paucity of research on Mixed-Race populations and the scarcity of studies that examine ecological and contextual factors associated with their developmental trajectories, much can be surmised but little can be known about the underlying mechanisms of contextual factors that impact Mixed-Race adolescents' substance use problems. The literature has long suggested that children who are born into interracial marriages that involve members of racial/ethnic groups against whom discrimination is particularly strong, such as those involving White and Black couples, may experience particularly high levels of social pressure (Ellingsen 2000; McDowell et al. 2005). Family conflict severe enough to incite domestic violence can occur among interracial couples who hold extremely conflicting values and beliefs pertaining to child-rearing strategies, gender role expectations, and relationship power (McFadden 2001; Pedrotti, Edwards, & Lopez 2008). Moreover, forming attachments to school can be challenging for Mixed-Race adolescents if the school includes mainly monoracial students and lacks a welcoming environment that encourages Mixed-Race adolescents to recognize and appreciate their multiracial/multicultural heritages (Cheng & Klugman 2010).

Conflicted social and family relationships increase challenges for Mixed-Race adolescents in forming supportive relationships with parents and others. These stressful life experiences could also increase their self- and racial identity confusion. Indeed, Mixed-Race adolescents are more likely to experience stress arising from invalidated identity, that is, differences between adolescents' own perceptions of their identities and the ways in which others perceive them. They may feel forced to choose a single racial identity based on physical appearances, community racial-identification preferences, and social perceptions (e.g., the "one-drop rule" limits biracial Black-White adolescents to select "Black" as their primary identification). Mixed-Race research participants have been known to change their self-reported racial/ethnic identifications depending on context (Doyle & Kao 2007). This unstable racial identification also occurs in emerging adulthood; at this developmental

juncture, some individuals change their identification from Mixed-Race to monoracial. Among various Mixed-Race groups, biracial Native American-White adolescents have the least stable racial identities (Doyle & Kao 2007).

In view of the economic disadvantage, family discord, and social disruption that both Native American and Mixed-Race adolescents often experience, the protective effects of formal and informal social bonds against substance use and other unfavorable health outcomes may be compromised in these groups (Hirschi 1969; Payne 2008). Native Americans' and Mixed-Race individuals' awareness of conflicts between their minority cultures and the dominant culture can further hinder them from forming conventional ties, which, in turn, can lead to psychopathology and behavior problems. Hence, the social ties that historically have been supportive among White adolescents may not have positive effects on those of Native American or Mixed-Race heritage (Park 1967).

Peer Influences and Perceptions of Substance Use

The core premise of the social learning perspective is that individuals often learn by observing and interacting with the persons in their environments (Bandura 1986). This perspective posits that peers influence adolescents' risk-taking behaviors (Jackson & Lecroy 2009; Martino et al. 2006). Greater exposure to delinquent peers could give young people more positive perceptions of substance use; and this would increase adolescents' likelihood of using alcohol, tobacco, and other drugs (Floyd et al. 2010). For example, using data from 1,341 American Indians who took part in the 2004 Montana Prevention Needs Assessment Survey, HeavyRunner-Rioux and Hollist (2010) tested models of social bonding, social learning, and social disorganization variables. They found that adolescents' associations with delinquent peers and pro-delinquency attitudes were the strongest predictors of most of the six substance abuse outcomes they measured in their research. Conversely, attachments to parents and schools were the weakest predictors of adolescents' substance abuse. The authors also concluded that, although some predictors were nonsignificant or demonstrated only weak associations with substance abuse outcomes, existing theories contribute to an understanding of Native Americans' substance use problems.

Individuals who underestimate the risk associated with the use of alcohol and illicit drugs are also likely to use them more often than are those who recognize the harm that use can cause (Leung et al. 2010; Martins et al. 2011). Adolescents' perceptions of substance use are shaped by various influences such as media, neighborhood characteristics, family members' attitudes, and friends' substance use behaviors (Gibbons & Gerrard 1995). Unger et al. (2000) found that White adolescents tend to overestimate the extent of smoking among their peers; motivation to conform may lead White adolescents to use substances to the extent that they perceive their peers to use them. Recent research on binge drinking among college students led to similar conclusions (Wechsler et al. 2002). College students often drink when socializing in groups and overrate their peers' alcohol use; these behaviors are associated with increases in students' own drinking. Similar to research with White samples, research with Native American and Mixed-Race adolescents also suggests that they are motivated to conform to their peers' values and behaviors (HeavyRunner-Rioux, & Hollist 2010; Unger et al. 2000). The marginalized status that Native American and Mixed-Race adolescents experience in their peer networks may lead to a particularly intense desire for acceptance.

Research Purposes and Hypotheses

Despite the dearth of evidence pertaining to contextual influences on Native American and Mixed-Race youths' substance abuse, existing research suggests that risk and protective factors found with White samples can be applied to Mixed-Race and Native American adolescents, indicating that social bonding variables operate as protective factors against

substance use and affiliations with deviant peers and pro-substance use attitudes are risk factors for substance use regardless of race/ethnicity (Choi, Harachi, Gillmore, & Catalano 2005; HeavyRunner-Rioux & Hollist 2010). Nevertheless, the magnitudes of association between social bonding predictors and substance use outcomes may differ among racial/ethnic groups (Cheng & Klugman, 2010; Galliher, Evans, & Weiser 2007; Hirschi 1969; Park 1967). Unlike most previous research, we utilized data from nationally representative samples to determine whether findings with White samples can be replicated with Native American and Mixed-Race samples drawn from the general population. Specifically, we expected social bonding and negative views of substance use to be negatively associated, and friendships with deviant peers to be positively associated, with substance abuse (H1). The literature has long suggested that, in addition to their marginal social status, disturbances in families and communities are likely to prevent Native American and Mixed-Race adolescents from building strong social bonds to conventional systems. This can attenuate their protective effects against substance use. Despite the intuitive appeal of this proposition, empirical evidence is limited. Therefore, this study includes a test of the hypothesis that the association of social bonding with substance use would be weaker among Native American and Mixed-Race adolescents than among White adolescents (H2). Findings on the similarity and differences in these contextual factors can help in developing effective interventions across racial/ethnic groups as well as guiding the development of specific interventions for minority populations.

Data and Methods

Overview of the National Survey of Drug Use and Health

The data are from the National Survey on Drug Use and Health (NSDUH; formerly titled the National Household Survey on Drug Abuse). The NSDUH is an ongoing cross-sectional survey of the civilian non-institutionalized population of the United States, including the 50 states and the District of Columbia, 12 years of age and older. It is the only study that annually reports substance use estimates among the non-institutionalized U.S. civilian general population (excluding homeless persons who do not use shelters, military personnel on active duty, and residents of institutional group quarters, such as jails and hospitals) (SAMHSA 2008). It is also the longest running survey to provide estimates on binge drinking with nationally representative samples (Grucza, Norberg, & Bierut 2009).

Sponsored by SAMHSA within the U.S. Department of Health and Human Services, the NSDUH has been conducted since 1971 (SAMHSA 2009). Between 1979 and 1988, the survey was conducted every 3 years; since 1990, it has been conducted annually. Since 1988, data have been collected by the Research Triangle Institute (RTI), Research Triangle Park, North Carolina. In 1999 the administration mode changed from paper-and-pencil interview to computer-assisted interviewing models, which combine both computer-assisted personal interviewing (CAPI) and audio computer-assisted self-interviewing (ACASI). The ACASI model is used when respondents answer sensitive questions (e.g., drug use) to protect privacy and encourage valid responses.

Multistage probability sampling was utilized for all NSDUH surveys. Past research based on NSDUH datasets has shown that it represents the target population (e.g., Parra, Krull, Sher, & Jackson 2007). Sample sizes, oversampling targets, and other methodological designs have changed periodically throughout the series. For example, since 2002, each respondent has been given an incentive payment of $30, improving the survey response rate (SAMHSA 2008). For our study, given the relatively small sample sizes for Mixed-Race individuals and Native Americans in the annual datasets, we combined datasets from the 2006 to 2009 HSDUH surveys. We chose these years because they were the most current datasets we could obtain when we were conducting data analysis and the methodology remains similar

during these years. During 2005-2009, the NSDUH data were obtained using a four-stage sampling design in which sampling rates were predetermined for each state and age group (SAMHSA 2009). The first stage of selection consisted of selecting 48 census tracts within each state sampling region. Segments were formed within a selected tract by aggregating adjacent census blocks. Second, from each tract, one segment was selected. After segments were selected, field lists were constructed to include eligible dwelling units (DUs) within each segment. Third, DU samples were selected from the lists. Finally, individual respondents were selected using roster information obtained from eligible members of the selected DUs. To increase the precision of estimates in year-to-year trend analyses, from 2005 through 2009 there is a 50% overlap in second-stage sampling units (segments) between each 2 successive years. However, only addresses not sampled in the first year may be included in the second year's sample (SAMHSA 2009). Hence, it is unlikely that any individuals were sampled in more than one year. Respondents were interviewed in their homes. Active parental consent and adolescent assent were required for participation in the survey (Herman-Stahl, Krebs, Kroutil, & Heller 2006).

Study Samples

In the NSDUH survey, respondents were asked to identify their race/ethnicity. They were asked first whether they were Hispanic. They were then asked to identify which racial group best described them: White, Black or African American, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, Asian, or other. Respondents were permitted to select more than one race (SAMHSA 2007). To protect confidentiality, the public-use NSDUH data only provided recorded variables that combine race and Hispanic ethnicity. The race/ethnicity variable that we used for analysis, NEWRACE2, is operationalized as (1) non-Hispanic White, (2) non-Hispanic Black, (3) non-Hispanic American Indian and Alaska Native, (4) non-Hispanic Native Hawaiian /Other Pacific Islander, (5) non-Hispanic Asian, (6) non-Hispanic more than one race, and (7) Hispanic (SAMHSA 2009).

As mentioned previously, the race/ethnicity variable operationalized White as those who identified themselves as non-Hispanic White; Native American as those who identified themselves as non-Hispanic and then selected only the category American Indian or Alaska Native as their race; and Mixed-Race as those who identified themselves as non-Hispanic and then checked more than one other race category. American Indian and Alaska Native populations have been categorized as one racial/ethnic group in surveys such as the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC); federal government agencies such as the Centers for Disease Control and Prevention (CDC) and the Office of Management and Budget also use this definition (CDC 2008; Falk 2008; Robbin 2000). In most of the literature, it is common to use the terms Native, Native American, Indian, and American Indian interchangeably when referring to American Indian or Alaska Native (Hawkins, Cummins, Marlatt 2004). In contrast, when Alaska Native is used alone, it usually refers only to the indigenous peoples of that region. In this study, we used the term Native Americans to refer to American Indian and Alaska Native respondents from the NSDUH surveys.

Of the combined 2006-2009 samples, the total sample used for this research was 46,675 adolescents. Male and female subjects comprised similar proportions of the sample (51.23 % and 48.77 %, respectively). The age distribution from 12 to 17 shows slightly positive skew (14.95%, 16.33%, 16.42%, 17.43%, 17.65%, and 17.22%, respectively). Among these adolescents, 42,593 identified as non-Hispanic White (91.25%), 1,123 as Native American (2.41%), and 2,959 as Mixed-Race (6.34%).

Measurement

As mentioned previously, since 1971 the NSDUH survey series has provided information on substance use in the United States. In 1997, questions were added to the NSDUH regarding risk and protective factors for substance use to index the individual, family, peer group, school, and community factors that Hawkins et al. (1992) identified (R. N. Lipari, personal communication 2011). The measures for these factors were drawn from multiple sources, including the Monitoring the Future survey (e.g., Johnston, O'Malley, Schulenberg, & Bachman 2006), the Connecticut Substance Abuse Prevention Student Survey (e.g., Delaronde, Cook, Ungemack, & Stanger 1999), and instruments developed by the Social Development Research Group (e. g. Arthur et al. 2002; R. N. Lipari, personal communication 2011). The NSDUH measures, particularly those involving substance use variables, have been used broadly in previous studies and have demonstrated reliability and validity (SAMHSA 2010; Wu et al. 2011). For example, in 2000 and 2001, NSDUH collected hair and/or urine from a subsample and found high agreement between the biological specimens test and self-reported drug use (e.g., 89.9% for marijuana and 95.5% for cocaine) (Gfroerer, Bose, Painter, Jones, & Kennet 2012; Wu et al. 2011). In addition, NSDHU conducted 2-week test-retest reliability assessments with respondents participating in the 2006 survey (R. N. Lipari, personal communication 2011; SAMHSA 2010). The Kappa values for lifetime and past-year alcohol use were 0.83 and 0.90, respectively. Kappa values ranged from 0.71-0.93 for lifetime use of various illicit drugs and ranged from 0.72-0.83 for past-year illicit drug use. Kappa values for 12- to 17-year-old respondents' social behaviors and attitudes/psychosocial risk and protective factors (e.g., school commitment, parental behaviors, and perceptions of substance use) were around .60. The relatively lower reliability for psychosocial variables can be attributed to the influence of adolescents' daily interactions and exposure to media (SAMHSA 2010). For the purposes of the present study, some of the psychosocial risk and protective factors were formed into composite variables in accordance with the literature (e.g., Gardner, & Shoemaker 1989; Herman-Stahl, Krebs, Kroutil, & Heller 2006); these composite variables were subjected to reliability tests.

Past-Month Binge Drinking—Binge drinking is commonly defined as consumption of five or more drinks in a row (Miller, Naimi, Brewer, & Jones 2007). Some research defines binge drinking as 4 or more drinks for females and 5 or more drinks for males within 2 hours, reflecting individuals' blood alcohol concentrations of 0.08 gm/100 ml or greater (National Institute on Alcohol Abuse and Alcoholism, 2012; Wechsler, Dowdall, Davenport, & Castillo 1995). In the NSDUH, respondents who reported having five or more drinks on the same occasion on at least 1 day in the past 30 days were classified as binge drinkers. A list of the kinds of beverages to which the survey refers is given to respondents prior to its administration. This list defines a drink as a bottle or can of beer, a glass of wine or a wine cooler, a shot of liquor, or a mixed drink with liquor in it.

Past-Year Illicit Drug Use—Illicit drugs include marijuana, cocaine, inhalants, hallucinogens, heroin, and prescription drugs such as pain relievers, tranquilizers, stimulants, and sedatives used nonmedically. In the NSDUH, any use of these drugs during the past year constituted illicit drug use.

Social Bonding Variables—As mentioned previously, the social bonding perspective suggests that adolescents who are strongly attached to conventional institutions and individuals, committed to social norms, and involved in conventional activities are less likely to use substances (Hirschi 1969). Five variables, therefore, were used that pertain to dimensions of social bonding, including Parental Attachment, School Attachment, Parental Disapproval of Substance Use, Conventional Activities, and Social Control Programs.

Parental Attachment—Parent-child bonding was measured with seven items that index parent-child communication, identification, and supervision (Cronbach's $\alpha = 0.71$). These similarly constructed items have been used in studies assessing parent-child bonding (e.g., Gardner & Shoemaker 1989). For each item, adolescents reported the frequency, ranging from 1 (*always*) to 4 (*never*) with which, for example, parents let adolescents know they have done a good job, tell adolescents they are proud of them, and limit the amount of time adolescents spend out with friends when school is in session.

School Attachment—Five items were used to measure adolescents' overall feelings about going to school during the past 12 months (Cronbach's $\alpha = 0.77$). Adolescents rated the degree to which they agreed with each of five items about their school engagement and enjoyment. Examples include, "How often have you felt overall about going to school in the past 12 months?" "How often have you felt school work was meaningful in the past 12 months?" and "How interesting were courses at school in the past 12 months?" These items have been constructed similarly in studies assessing school commitment and engagement (e.g., Harrison 2006; Herman-Stahl, Krebs, Kroutil, & Heller 2006). Respondents rated Likert-type scales ranging from 1 to 4; higher scores indicating greater school attachment, such as (1) *You liked going to school a lot*, (2) *You kind of liked going to school*, (3) *You didn't like going to school very much*, and (4) *You didn't like going to school a lot.*

Parental Disapproval of Substance Use—Four items were used to measure the degree to which adolescents believed their parents would disapprove of their substance use (Cronbach's $\alpha = 0.85$). For example, "How would your parents feel about your smoking 1 pack of cigarettes?" "trying marijuana /hashish?" and "drinking alcohol daily ?" These items have been commonly used in studies assessing parental attitudes toward substance use (e.g., Harrison 2006; Johnston, O'Malley, Schulenberg, & Bachman 2006). Responses were 1 (*neither approve nor disapprove*), 2 (*somewhat disapprove*), and 3 (*strongly disapprove*).

Conventional Activities—Four items were used to measure the number (0 = *none*, 1 = *one*, 2 = *two*, and 3 = *3 or more*) of school-based, community-based, faith-based, or other activities in which adolescents participated (Cronbach's $\alpha = 0.68$). Examples include, "During the past 12 months, in how many different kinds of community-based activities, such as volunteer activities, sports, clubs, or groups have you participated?" and "During the past 12 months, in how many different kinds of church or faith-based activities, such as clubs, youth groups, Saturday or Sunday school, prayer groups, youth trips, service or volunteer activities have you participated?" These have often been included in research focusing on activities that promote adolescents' health and protect them from substance use and mental health problems (e.g., Delaronde et al. 1999).

Social Control Programs—Participation in social control programs was measured with four items concerning adolescents' participation in substance abuse prevention-related programs in the school or community during the past 12 months (Cronbach's $\alpha = 0.56$). Examples include, "Have you had a special class about drugs or alcohol in school?" "Have you had films, lectures, discussions, or printed information about drugs or alcohol outside of one of your regular classes such as in a special assembly?" and "Have you seen or heard any alcohol or drug prevention messages from sources outside school such as posters, pamphlets, radio, or TV?" Adolescents responded to these items dichotomously (*yes/no*). The items were constructed similarly to those used in research assessing adolescents' engagement in drug prevention programs (e.g., Delaronde et al. 1999; Oregon Healthy Teens 2008).

Given that the score ranges for the composite variables differed, for better interpreting the results, the composite social bonding variables were divided into quartiles that were given values ranging from 0 (the first quartile) to 3 (the fourth quartile). Higher scores indicated greater social bonding. However, because adolescents reported without exception that their parents would disapprove of their using drugs, Parental Disapproval of Substance Use was dichotomized into a binary variable with 0 assigned to *low disapproval* (a score below 12; 18% of respondents) and 1 assigned to *high disapproval* (the maximum score of 12; 82 % of respondents).

Negative View of Substance Use—Adolescents' negative view of substance use was measured with five items regarding adolescents' feelings about someone their age smoking, drinking, or using illicit drugs (Cronbach's $\alpha = 0.87$). Examples include, "How do you feel about someone your age having one or two drinks of an alcoholic beverage nearly every day? " "How do you feel about someone your age trying marijuana or hashish once or twice ?" and "How do you feel about someone your age smoking one or more packs of cigarettes a day?" The items were constructed similarly to those used in research assessing adolescents' attitudes toward substance use (e.g., Harrison 2006; Johnston, O'Malley, Schulenberg, & Bachman 2006). Responses were 1 (*neither approve nor disapprove*), 2 (somewhat disapprove), and 3 (*strongly disapprove*). This composite variable was further dichotomized (0 = *low disapproval*, 1 = *high disapproval*) because its distribution was highly positively skewed.

Delinquent Peers—The proportion of delinquent peers in the respondent's social circle was measured with four items concerning adolescents' perceptions of peer substance use (Cronbach's $\alpha = 0.88$). Examples include, "How many students in your grade at school would you say use marijuana or hashish?" "How many of the students in your grade at school would you say drink alcoholic beverages?" and "How many of the students in your grade at school would you say get drunk at least once a week?" These items have been commonly used in research assessing peers' substance use (e.g., Center for Substance Abuse Prevention 2012; Harrison 2006). The response set ranged from 1 (*none of them*) to 4 (*all of them*). To facilitate interpretation of the data analysis, the resulting measure was divided into quartiles that were given values ranging from 0 to 3; higher scores indicate greater proportions of delinquent peers.

Control Variables—Respondent's Gender, Annual Family Income, and Adolescents' Own Delinquent Behaviors were included as control variables because they could confound the effects of the key predictors of substance use (Hawkins et al. 1992). Annual Family Income was coded into categories ranging from 1 (*less than $20,000*) to 4 (*$75,000 or more*). Delinquent Behaviors were measured with four items pertaining to adolescents' involvement in minor misbehavior, property-related offenses, and violent or illegal behaviors (Cronbach's $\alpha = 0.62$). Examples include, "During the past 12 months, how many times have you attacked someone with the intent to seriously hurt them?" and "During the past 12 months, how many times have you stolen or tried to steal anything worth more than $50?" The items were constructed similarly to those used in research assessing delinquent behaviors (e.g., Harrison 2006). The response set ranged from 1 (*0 times*) to 5 (*10 or more times*). Higher scores indicated greater delinquency. The resulting composite measure was dichotomized (0 = *no delinquent behavior*, 1 = *one or more delinquent behaviors*) because its distribution was skewed, with 86% of respondents reporting no delinquent behaviors.

Analytic Strategy

The complex sample module in SAS 9.2 was used for the data analyses to provide appropriate weights for sample selection and other factors, thus adjusting for estimates'

standard errors. We used a specific analytic procedure suggested in the NSDUH codebook to deal with the aggregated data (SAMHSA 2009). This enabled us to calculate a correct estimate of the average annual number of persons who engaged in a particular behavior. We first sorted the combined data by the strata and cluster variables (i.e. VESTR and VEREP). These variables then were specified in the complex sample module in SAS 9.2 to account automatically for the 50% overlap between successive years when estimating variance and standard errors. The final person-level weight variable, ANALWT_C, was divided by 4 to create an adjusted weight variable, which was used in every analysis reported in this article.

To address the research aims, we first calculated prevalence rates of binge drinking and illicit drug use, and then tested the differences among the three racial groups. Second, for continuous measures of predictors, we conducted least squares means (LS means) comparisons with F tests between Whites and Native Americans and between Whites and Mixed-Race individuals; the Wald chi-square test was applied to dichotomous variables. Logistic regressions were used to examine the associations of contextual factors with binge drinking and illicit drug use for each racial group using SAS domain analysis of the complex sample module. Five social bonding variables, negative views of substance use, and delinquent peers, in addition to adolescent gender, family income, and adolescent's own delinquent behavior, were included in the models of past-month binge drinking and past-year illicit drug use. Model fit was assessed using the C statistic, which varies from 0.5 (random) to 1.0 (perfect prediction) and is asymptotically equivalent to the value of the area under a receiver operating characteristic (ROC) curve (Hanley, & McNeil 1982).We used appropriate two-sample Z-tests (Paternoster, Brame, Mazerolle, & Piquero 1998) to compare the regression coefficients on social bonding variables from logistic regression results to test differences in the effects of these variables between Whites and Native Americans or between Whites and Mixed-Race individuals.

Results

Prevalence Rates of Past-Month Binge Drinking and Past-Year Illicit Drug Use

The results showed that binge drinking was higher among Native American adolescents (14.06 %, SE = 3.37) than among White (11.12 %, SE = 0.20) or Mixed-Race adolescents (9.43%, SE = 0.83). The difference in binge drinking between White and Mixed-Race adolescents was not significant ($p = .06$), neither was that between Whites and Native Americans ($p = .34$). Illicit drug use was more prevalent among Native American (30.91%) and Mixed-Race (23.77%) adolescents than among White adolescents (19.73%). The differences in illicit drug between White and Native American adolescents ($p < .001$) and between White and Mixed-Race adolescents ($p = .003$) were statistically significant.

Racial Group Differences in Predictors

Between-group comparisons in predictors showed that, although Whites scored higher in Parental Attachment, Parental Disapproval of Substance Use, and Conventional Activities than did Native American or Mixed-Race adolescents, only Parental Disapproval of Substance Use differed significantly between Whites and Native Americans (80.69 % for Whites and 74.55% for Native Americans, Wald $\chi^2[1] = 9.98$, $p < .01$). Conventional Activities differed significantly between Whites and Native Americans (LS means = 1.63 vs. 1.45, $F = 12.81$, $p < .001$). In contrast, the LS mean score for School Attachment was higher for Native American and Mixed-Race adolescents than for White adolescents (1.44 vs. 1.91 for Whites and Native Americans, $F = 57.24$, $p < .001$; 1.44 vs. 1.52 for Whites and Mixed-Race adolescents, $F = 7.12$, $p < .01$). Regarding Negative Views of Substance Use, 59.6% of White adolescents reported highly Negative Views of Substance Use compared with 52.05% of Native American adolescents (Wald $\chi^2[1] = 5.29$, $p = .02$) and 54.56% of Mixed-Race

adolescents (Wald $\chi^2[1] = 6.01$, $p = .01$). By contrast, White adolescents reported fewer Delinquent Peers than did Native American and Mixed-Race adolescents (1.42 vs. 1.52 for Whites and Native Americans, $F = 1.41$, $p = 0.24$; 1.42 vs. 1.49 for Whites and Mixed-Race adolescents, $F = 3.49$, $p < .07$). None of the comparisons among groups on other predictors, including Delinquent Peers, attained statistical significance.

Logistic Regression Results for Past-Month Binge Drinking

Model fit was generally excellent: C = 0.85 for Whites, C = 0.73 for Native Americans, and C = 0.84 for Mixed-Race adolescents on specific models. Most of the contextual variables were associated significantly with binge drinking among White adolescents (Table 1). The odds of binge drinking decreased by 20% with each quartile increase in Parental Attachment (OR = 0.80; CI. = 0.75–0.85); and Parental Disapproval of Substance Use (dichotomous measure) resulted in more than a 50% reduction in binge drinking (OR = 0.46). Negative Views of Substance Use (dichotomous) was a powerful protective factor (OR = 0.26), whereas Conventional Activities increased the odds of binge drinking moderately (OR = 1.05) and the proportion of Delinquent Peers (quartile measure) was a strong risk factor (OR = 2.02) for binge drinking. For Native American adolescents, Negative Views of Substance Use was a similarly powerful protective factor (OR = 0.22), as was the case for Whites. The proportion of Delinquent Peers was a strong and significant risk factor (OR = 1.90). For Mixed-Race adolescents, the values of significant odds ratios were consistent with those of White adolescents (Parental Disapproval, OR = 0.44; Negative Views of Substance Use, OR = 0.20; Delinquent Peers, OR = 1.91). Gender and Family Income attained statistical significance only for White adolescents. Adolescents' own Delinquent Behaviors attained statistical significance for White and Mixed-Race adolescents.

Logistic Regression Results on Past-Year Illicit Drug Use

Again, model fit was generally excellent: C = 0.84 for Whites, C = 0.75 for Native Americans, and C = 0.83 for Mixed-Race adolescents. Four of the five social bonding variables were significant protective factors for illicit drug use among Whites, whereas none was significant for Native Americans and only Parental Disapproval of Substance Use was significant for Mixed-Race adolescents (Table 2). For Whites, the odds of illicit drug use decreased with increases in Parental Attachment (OR = 0.85), School Attachment (OR = 0.93), Parental Disapproval of Substance Use (OR = 0.46), and Conventional Activities (OR = 0.94). For Mixed-Race adolescents, Parental Disapproval of Substance Use was the only significant protective social bonding variable (OR = 0.53).

Negative Views of Substance Use (dichotomous) decreased the odds of illicit drug use to one fourth (OR = 0.24) among White adolescents and to a lesser extent among Native American (OR = 0.41) and Mixed-Race (OR = 0.35) adolescents. In contrast, odds of illicit drug use increased by more than half (OR = 1.62) with each quartile increase in the proportion of Delinquent Peers among Whites; the odds were even greater (OR = 1.87) for Mixed-Race youths. The control variable Gender attained statistical significance only for White adolescents, whereas Delinquent Behaviors attained statistical significance for both White and Mixed-Race adolescents.

In summary, overall the logistic regression analyses supported Hypothesis 1. Among the contextual factors attaining statistical significance, the associations with substance abuse were in the expected directions. Social bonding variables and Negative Views of Substance Use were associated negatively, and friendships with Delinquent Peers were associated positively, with substance abuse. One exception was that Conventional Activities was associated positively with substance use among White adolescents.

Between-Group Comparisons for Social Bonding Variables' Effects

Two sample *Z*-tests of logistic regression coefficients across racial groups yielded only one significant difference between White and Native American adolescents and no differences between White and Mixed-Race adolescents. In the binge drinking model, the effects of Parental Disapproval of Substance Use were significantly greater in the model for White ($\beta = -0.39$, $p < .001$) than the model for Native American ($\beta = .13$, $p > .56$) youths ($z = -2.32$, $p < .01$).

Discussion

Early initiation and use of alcohol and other drugs is associated with various severe health and behavior problems in emerging adulthood. Risks for developing problems with binge drinking and illicit drug use have emerged in common across White, Native American, and Mixed-Race adolescents (Choi, Harachi, Gillmore, & Catalano 2006; Young & Joe 2009; Yuan et al. 2010; Wu et al. 2011). To identify malleable predictors in the early stages of substance use, this study focused on the period of transition from early adolescence to young adulthood, a time of increased risk for the initial development of problems with the use of alcohol and other drugs. Existing evidence suggests that the effects of key contextual factors on substance abuse apply across racial groups (e.g., Choi et al. 2005). Nevertheless, most of these findings are based on samples of Whites and nonrepresentative minority samples. Possible differences in the magnitudes of associations of contextual predictors with binge drinking and illicit drug use among racial groups have not been well researched. As a result, without knowing the extent to which previous research is generalizable to young minority populations or the similarities and differences between White and minority adolescents, it is difficult to determine whether intervention models based on research conducted with White populations are equally effective for all adolescents regardless of their racial/ethnic status. Given that a clear understanding of the contextual factors that are associated with substance abuse is essential to inform the development of effective intervention and prevention programs, this study extended previous research by using nationally representative data to determine whether contextual predictors identified from previous studies can be generalized to binge drinking and illicit drug use among Native American and Mixed-Race adolescents. This study also examined the similarities and differences in contextual factors, particularly social bonding, between White and Native American, and White and Mixed-Race adolescents.

Binge drinking was higher among Native American adolescents than among White and Mixed-Race adolescents. Moreover, Native American and Mixed-Race adolescents were at significantly higher risk of illicit drug use than were White adolescents. Overall, the social bonding variables and other contextual predictors showed the expected relationships with substance use among White adolescents. However, the slightly but significantly elevated odds of binge drinking associated with engagement in conventional activities that emerged was unexpected. A possible explanation for this pertains to social drinking circumstances and cultural norms. Young people tend to drink more in certain social situations, particularly with companions, or locations, such as travel destinations during spring break (Clapp & Shillington 2001; Lee, Lewis, & Neighbors 2009). For some White students, drinking is considered appropriate social behavior (Wechsler & Nelson 2008). Hence, participation in school and community activities actually may increase adolescents' access to alcohol; this could, in turn, increase their chances of binge drinking. Alternatively, it is possible that the larger subsample of White adolescents increased statistical power for detecting weak effects of engagement in conventional activities (OR = 1.05).

The results showed that both negative views of substance use and friendships with delinquent peers were associated significantly with binge drinking and illicit drug use

among White and Mixed-Race adolescents and, to a lesser extent, Native American adolescents. The literature has long shown that individuals' attitudes regarding drug and alcohol use affect their substance use behaviors (Wechsler & Nelson 2008). Our findings support the notion that negative attitudes toward substance use prevent adolescents from misusing alcohol and other drugs. Furthermore, consistent with previous research, our findings support the association between affiliations with delinquent peers and adolescents' substance use (HeavyRunner-Rioux & Hollist 2010; Jackson & Lecroy 2009). However, despite evidence supporting peer influence on adolescents' substance use behaviors, mixed findings have been reported in the literature regarding the relative susceptibility of minority adolescents to peer-influenced problem behaviors (Choi et al. 2012; Unger et al. 2000). For example, using a representative sample from Washington State, Choi et al. (2012) compared peer influences on Mixed-Race and single-race youths. They reported that Mixed-Race adolescents were more likely than single-race adolescents to develop friendships with substance-using or antisocial peers. However, the evidence regarding peer risk factors having a stronger influence on multiracial adolescents than on single-race adolescents is limited. Our research yielded similar findings. Another set of analyses (not reported in the text) using z-tests of peer delinquency indicated that delinquency's effect was similar for White, Native American, and Mixed-Race adolescents even though Native Americans and Mixed-Race youths reported slightly higher numbers of friends engaged in delinquency than did White adolescents. These findings together imply that preventive interventions targeting White, Native American, and Mixed-Race youths should address peer delinquency.

We further hypothesized that the association of social bonding with substance use would be weaker among Native American and Mixed-Race adolescents than among White adolescents. The literature has suggested that minority adolescents' marginalization may prevent them from developing social ties to conventional institutions that are as strong as those of mainstream populations; this, in turn, increases their vulnerability to substance use (Hirschi 1969). Results from the present sample provided limited evidence for this. The effects of the social bonding variables were generally similar across groups, with one exception. The two-sample Z test between regression coefficients suggested that the effect of parents' disapproval of substance use on binge drinking was stronger for White adolescents than for Native American adolescents. As the literature suggests, parental conservative attitudes toward substance use constitutes a key protective factor against drinking and other drug use for White children and college students (Miller, Naimi, Brewer, & Jones 2007; Wechsler et al., 2002). It may be that differences between White and Native American cultures in terms of the concepts and meanings attributed to parenthood and family relationships may be reflected in the racial group differences. Many Native American tribes have a broad concept of family, with extended family members such as elders or tribe leaders playing influential roles in the lives of Native American adolescents (Yuan et al. 2010). Conversely, White children are more likely to be reared in nuclear families, in which parents have the primary influence on their children.

Another possible explanation discussed in the literature pertains to high levels of family and community problems among Native American populations, which could weaken the effects of family bonding on adolescents' substance use (Choi et al. 2005; Young & Joe 2009; Yuan et al. 2010). Research on Native American communities has suggested that family bonding, particularly involved-supportive parenting, serves as a protective factor against youth substance use (Galliher, Evans, Weiser 2007). However, if the community context is not supportive, Native American parents' efforts may be less effective. Historical and cultural marginalization may expose Native American adolescents to environmental influences that encourage heavy drinking. Heavy drinking among parents, extended kin, or other influential role models may weaken parents' influence on negative perceptions of drinking (Walls, Whitbeck, & Hoyt 2007). It also should be noted that variations among tribes and

differences in acculturation levels among Native American families could moderate or mediate the effect of parental attachment on substance use.

Although additional research is required to translate the findings into intervention programs, the present study has several implications for the development of interventions for White, Native American, and Mixed-Race adolescents. First, this study identified two predictors of substance abuse common to adolescents from the three racial groups included in the sample. Intervention and prevention programs targeted for these groups should focus on increasing the extent to which adolescents view substance use as risky and enhance resistance to delinquent peers' influences. At the same time, this research suggests that the effect of family influence on substance use may vary by racial group. Parents' disapproval of substance use may be more important to White than to Native American adolescents. Hence, in addition to emphasizing adolescents' cognition and substance use resistance skills, an intervention model for White or Mixed-Race adolescents should include teaching parents the consequences of drinking and illicit drug use. This does not mean that parents are not important to Native American adolescents; rather, interventions must take into account Native American cultural contexts when operationalizing the concepts of parental influence and attachment for Native American populations. Key persons in the Native American community such as tribe leaders and elders should be invited to participate in the development and implementation of an intervention program. Culturally specific programs that local and tribal communities support are most likely to be effective in preventing substance use among Native American adolescents (Hawkins, Cummins, & Marlatt 2004; Yuan et al. 2010). For example, researchers from the University of Washington collaborated with the Seattle Indian Health Board and community to develop a prevention program, "Canoe Journey, Life's Journey", based on the medicine wheel (a Native American worldview pertaining to healing and individual development) and ritual Canoe Family activities from Northwestern Coastal tribes. This intervention targets high-risk urban Native American adolescents. One of the key strengths of this project is that it enhances both individuals' skills and the community value of the Canoe Team as a whole to fight substance use together. The program has been shown to be effective at a 3-month follow-up (for a review see Hawkins, Cummins, & Marlatt 2004).

Although the findings suggest similar effects of contextual factors for White and Mixed-Race adolescents, substance use etiology may not be exactly the same for these groups. Self-identity, racial identity, and family conflict have long been identified as key risk factors for substance use problems among Mixed-Race adolescents. Intervention models for Mixed-Race youths increasingly focus on individual and family characteristics to help Mixed-Race adolescents avoid substance use (Lou, Lalonde, & Wilson 2011; McDowell, Ingoglia, Serizawa, Holland, Dashiell, & Stevens 2005; McFadden 2001). Strengths-focused themes and principles used in working with Mixed-Race families have been discussed in the literature (see Pedrotti, Edwards, Lopez 2008). Nevertheless, more research with this population is required to examine the effectiveness of these models.

The present findings should be interpreted with caution due to several limitations. First, the association between adolescents' substance use and their peers' delinquent behaviors could have been overestimated due to adolescents' self-report bias (Parra, Krull, Sher, & Jackson 2007). Second, although we combined 4 years of data from the largest national survey of substance abuse in the U.S., our Native American and Mixed-Race subsamples were much smaller than the White subsample. This could limit the statistical power with which to detect significant associations between the predictors and substance use outcomes in the models for Native American and Mixed-Race adolescents. However, most regression coefficients were in the same directions as those for the White models, and the effect sizes, when significant, were generally similar. Therefore, insufficient power appears to be a minor concern. Third,

binge drinking and illicit drug use are not disease phenotypes. Racial differences may emerge for more severe addiction phenotypes. Developmentally speaking, addiction phenotypes are less relevant for the age group examined in this study than for older populations. Fourth, the exclusion of most comorbid psychiatric problems may have reduced the models' explanatory power. Fifth, because the NSDUH surveys were not originally designed to study social and contextual factors among racial/ethnic groups, the current study is limited by the availability of measures. More comprehensive measures that reflect Native American and Mixed-Race adolescents' cultural and historical contexts is needed to delineate in greater depth the underlying mechanisms of family and community-related bonding factors that protect adolescents from developing substance use problems. Finally, the Mixed-Race group is diverse, and the most effective risk and protective factors may vary among Mixed-Race subgroups. The public-use NSDUH data files do not include subcategories of mixed race according to origin. Exploring the contextual factors for specific race combinations is also beyond the scope of the current study. Future research should address this important issue.

Conclusions

Given the dearth of evidence on contextual influences on substance abuse among minority adolescents, this study was designed to determine if the effects of contextual factors identified mainly with White adolescents in previous studies can be applied to binge drinking and illicit drug use among Native American and Mixed-Race adolescents. To our knowledge, this is the first study in which a nationally representative sample was used to examine the associations of contextual factors with binge drinking and illicit drug use among Native American and Mixed-Race adolescents. The findings extend the substance use literature regarding family and peer influences and individual attitudes toward substance use during adolescence, a period during which individuals begin to develop their own codes of ethics (e.g., acceptable and unacceptable behaviors) and to spend more time with their peers. In this study, friendships with delinquent peers and negative views of substance use were associated significantly with both substance abuse outcomes among White and Mixed-Race adolescents and, to a lesser extent, Native American adolescents. This implies that preventive interventions targeting White, Native American, or Mixed-Race youth should include these factors. Moreover, the association of parental disapproval with binge drinking was significantly stronger for White than for Native American adolescents. The family disorder and poverty that characterize many Native American populations may weaken parental influence on Native American adolescents. Alternatively, potential mediational and moderational effects of social and community circumstances may attenuate family-level protective effects on Native American adolescents. Further research is warranted to develop a better understanding of the different degrees to which contextual factors influence binge drinking and illicit drug use among various racial and ethnic groups, so that appropriate emphases can be developed for preventive interventions.

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SAMHSA. [Accessed 10 November 2011] Table 1.20B – Illicit Drug Use in Lifetime, Past Year, and Past Month among Persons Aged 12 to 17, by Demographic Characteristics: Percentages, 2008 and 2009. 2011a. http://oas.samhsa.gov/NSDUH/2k9NSDUH/tabs/Sect1peTabs1to46.htm#Tab1.11A

SAMHSA. [Accessed 10 November 2011] Table 2.38B – Alcohol Use in Lifetime, Past Year, and Past Month among Persons Aged 12 to 17, by Demographic Characteristics: Percentages, 2008 and 2009. 2011b. http://oas.samhsa.gov/NSDUH/2k9NSDUH/tabs/Sect2peTabs1to42.htm# Tab2.37A

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Table 1

Contextual factors of past-month binge drinking for the three racial groups, controlling for gender, family income and adolescents' delinquent behavior

	White (n=42,593)		Native American (n=1,123)		Mixed Race (n=2,959)	
Variables (range)	**ORs**	**95% CI**	**ORs**	**95% CI**	**ORs**	**95% CI**
Social Bonding Variables						
Parental Attachment (quartile)	0.80***	0.75-0.85	1.04	0.61-1.76	0.92	0.64-1.32
School Attachment (quartile)	0.98	0.93-1.02	1.06	0.64-1.76	0.10	0.77-1.29
Parental Disapproval of Substance Use (dichotomous)	0.46***	0.42-0.50	1.30	0.54-3.12	0.44**	0.27- 0.73
Conventional Activities (quartile)	1.05*	1.01-1.09	1.10	0.68-1.81	0.94	0.77-1.13
Social Control Programs (quartile)	0.98	0.94-1.02	0.78	0.61-1.01	0.91	0.72-1.16
Perceptions & Peer Influence						
Negative View of Substance Use (dichotomous)	0.26***	0.23-0.30	0.22**	0.07-0.67	0.20***	0.11-0.36
Delinquent Peers (quartile)	2.02***	1.91-2.14	1.90*	1.10-3.29	1.91***	1.43-2.54
Control Variables Gender, male	1.19**	1.07-1.32	1.34	0.54-3.31	0.98	0.60-1.61
Income (4-point scale)	1.10***	1.05-1.16	0.84	0.59-1.21	0.99	0.82-1.19
Delinquent Behaviors (dichotomous)	2.36***	2.10-2.64	0.872	0.33-2.33	3.16***	2.06-4.85

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Contextual factors of past-year illicit drug for the three racial groups, controlling for gender, family income and adolescents' delinquent behavior

	White (n=42,593)		Native American (n=1,123)		Mixed Race (n=2,959)	
Variables (range)	**ORs**	**95% CI**	**ORs**	**95% CI**	**ORs**	**95% CI**
Social Bonding Variables						
Parental Attachment (quartile)	0.85***	0. 18-0.89	0.80	0.56-1.14	0.91	0.72-1.16
School Attachment (quartile)	0.93***	0.90-0.97	1.00	0.75-1.34	0.98	0.80-1.21
Parental Disapproval of Substance Use (dichotomous)	0.46***	0.41-0.51	0.82	0.44-1.54	0.53**	0.34-0.82
Conventional Activities (quartile)	0.94***	0.91-0.97	1.03	0.76-1.39	1.06	0.88-1.29
Social Control Programs (quartile)	1.01	0.97-1.05	0.91	0.70-1.19	1.01	0.84-1.22
Perceptions & Peer Influence						
Negative View of Substance Use (dichotomous)	0.24***	0.22-0.27	0.41*	0.20-0.85	0.35***	0.20-0.63
Delinquent Peers (quartile)	1.62***	1.55-1.69	1.30	0.97-1.75	1.87***	1.53-2.28
Control Variables						
Gender, male	0.84***	0.77-0.91	1.12	0.57- 2.21	0.84	0.55-1.29
Income (4-point scale)	0.984	0.95-1.02	0.70*	0.49-1.00	1.09	0.89-1.34
Delinquent Behaviors (dichotomous)	3.45***	3.07 - 3.87	1.70	0.89-3.25	3.84***	2.08-7.09

* $p < .05$.

** $p < .01$.

*** $p < .001$.