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A Clearer Picture of Multiracial Substance Use: Rates and Correlates of Alcohol and Tobacco  
Use in Multiracial Adolescents and Adults

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## Abstract

Existing studies indicate that Multiracial adolescents face greater substance use rates than monoracial adolescents. However, it is unclear whether the risk identified in adolescence persists into adulthood. The current study uses data from the 2001 California Health Interview Survey to analyze the alcohol and tobacco use of Multiracial adolescents and adults compared to European American, African American, Native American, Asian/Pacific Islander American, and Latino American individuals. Results generally support the hypothesis that Multiracial adolescents and adults face higher rates of substance use than African American and Asian/Pacific Islander American individuals, though this pattern of results was reversed in comparison to Native Americans and European Americans, and less consistent compared to Latino Americans. We further establish and discuss the correlates of drinking and smoking behavior for mixed-race individuals—comparing them to other racial groups. We review the limitations of our design, and the implications for future research on Multiracial substance use.

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## A Clearer Picture of Mixed-Race Risks: Rates and Correlates of Alcohol and Tobacco Use in Multiracial Adolescents and Adults

The scholarship on Multiracial people has made significant strides in recent years, focusing on the psychological and social implications of belonging to more than one race. Current research addresses the psychological health of Multiracial adolescent populations—considering their experiences of racial discrimination, prevalence of violent behaviors, and level of parental guidance (Choi, Harachi, Gillmore, & Catalano, 2006). Considerable research on the health of Multiracial people suggests that they are more at risk for substance use than other racial groups (Choi, et al., 2006; Shakib, Mouttapa, Johnson, Ritt-Olson, Trinidad, Gallaher, & Unger, 2003). However, the import of many of these studies is unclear, with most studies failing to include adults in their analyses (e.g. Beal, Ausiello, & Perrin, 2001), and others focusing only on comparisons between Multiracial people and other minorities (e.g. Whaley & Francis, 2006). Clarifying the health risks face by mixed-race individuals is important not only because of the neglect of this growing racial group in health research (Shih & Sanchez, 2005), but because work indicates that Multiracial people deal with unique experiences and obstacles shaping their psychological health and health behaviors (Shih & Sanchez, 2009). The current research aims to address a number of gaps in the study of Multiracial substance use by including adults, including comparisons to both ethnic minorities and Whites, and considering correlates to substance use.

### *Patterns of Substance Use Between Races*

Studies of Multiracial substance primarily employ *qualitative* methods and *clinical* populations (Shih & Sanchez, 2005). Only recently, with the advent of “check all that apply” options to questions of respondent racial identity, has Multiracial research incorporated large scale surveys. Thus, research on health disparities in Multiracial populations lags behind

research on racial disparities addressing other minority populations. While some early studies show Multiracial populations at similar levels of substance use in comparison to their monoracial peers (Beal, Ausiello, & Perrins, 2001; Cooney & Radina, 2000), current research demonstrates consistently high levels of substance use in Multiracial populations relative to their monoracial peers (Choi, Harachi, & Catalano, 2006; Choi, Harachi, Gillmore, & Catalano, 2006; Shakib, Mouttapa, Johnson, Ritt-Olson, Trinidad, Gallaher, & Unger, 2003; Whaley & Francis, 2006). For example, using a nationally representative survey, Choi, Harachi, Gillmore, & Catalano (2006) found that Multiracial adolescents are more likely to report substance use than African Americans (AA) and Asian and Pacific Islander Americans (APIA). Similarly, Whaley and Francis (2006) show that Multiracial groups are more frequent cigarette smokers than monoracial Latino Americans—indicating that mixed-race individuals confront greater substance use risks than other racial groups.

Despite the elevated rates of substance use in Multiracial individuals, European American (EA) and Native American racial groups consistently demonstrate higher smoking and drinking rates than all other monoracial groups (Blum, Beuhring, Shew, Bearinger, Sieving, & Resnick, 2002; Griffin, Botvin, Scheier, Doyle, & Williams, 2003). While Cooney and Radina (2000) remark that EA and Multiracial adolescents have comparable substance use rates, most work rarely compares Multiracial to those populations at the greatest risk. A large scale comparison with both monoracial minority groups and EA youth would yield a clearer picture of the risks associated with Multiracial populations.

#### Development of Substance Use

Peer influences play a key role in determining substance use outcomes by establishing peer norms regarding substance use (Borsari & Carey, 2001; Urberg, Luo, Pilgrim, &

Degirmencioglu, 2003). The social development model (SDM) suggests that adolescents internalize the values of a close social unit, and are either rewarded for positive behavior (i.e. prosocial) or negative/delinquent behavior (i.e. antisocial; Catalano & Hawkins, 1996; Hawkins & Weis, 1985). These rewards, whether provided by parents or peers, provide strong incentives for acceptance and reinforce a particular pattern of behavior for adolescents (Fleming, Catalano, Oxford, & Harachi, 2002).

The SDM suggests that race and ethnicity affect adolescent behavior indirectly, often through cultural differences in socialization processes (Choi, Harachi, Gillmore, & Catalano, 2005). Socialization processes, such as parenting strategies, are known to differ across racial groups (Kagitçibasi, 1996). For instance, authoritative parenting practices are less evident for APIA and AA than EA individuals (Huebner & Howell, 2003). Furthermore, “parental” bonding in Native American groups extends well beyond a child’s biological guardians (LaFromboise & Low, 1989). Because Multiracial adolescents are more likely to have divorced parents than other racial groups (Zhang & Van Hook, 2009), Multiracial youth may be less likely to form strong relationships with both parents, though some scholars debate the importance of family structure for explaining adolescent substance use (Blum, Beuhring, Shew, Bearinger, Sieving, & Resnick, 2002). Still, parental marital status has proven itself as a predictor of substance use initiation (Flewelling & Bauman, 1990), and is even associated with substance use in adulthood (Hope, Power, & Rodgers, 1998).

Most SDM related research has established peer influence as a consistent predictor of substance use, but there is reason to believe that the nature of peer influence differs across race and ethnicity (Unger, Rohrbach, Cruz, Baezconde-Garbanati, Howard, Palmer, & Johnson, 2001). Research by Unger and colleagues (2001) provides evidence that ethnicity determines

whether *informational* or *normative* peer influences are more predictive of substance use outcomes. EA adolescents tend to rely more on informational peer influence (e.g. “How often my good friend smokes.”), while adolescents from collectivist backgrounds (APIA) are more affected by normative peer influence (e.g. “How often I think most of my friends smoke”). This suggests that children from collectivist cultures (typically ethnic minorities) are less susceptible than individualistic children to peer pressure by individual friends (Unger, et al., 2001), perhaps explaining elevated substance use rates in EA individuals. Though peer influence is particularly notable in adolescents, these influences on substance use likely extend into adulthood (Andews, Tildesley, Hops, & Li, 2002; Labouvie, 1996).

Less work has focused on the affect of peer influence on substance use in Multiracial groups. Peer influence models typically assume same-race peer networks because research shows that people from minority racial groups tend to have friends of the same race (McPherson, Smith-Lovin, & Cook, 2001). Yet, for Multiracial adolescents, peer networks tend to be less homogeneous and more racially diverse (Bonam & Shih, 2009; Doyle & Kao, 2007; Shih, Bonam, Sanchez, & Peck, 2007; Quillian & Redd, 2009). The diversity of peer networks may reflect the diversity of the neighborhoods they live in as well as the tendency for parents to de-emphasize race in interracial families and therefore, to view race as less of a barrier in close relationships (Shih et al., 2007; Sanchez, Shih, & Garcia, 2009). Multiracial populations are far more likely to have best friends who are of a different racial background than monoracial populations (Doyle & Kao, 2007). Moreover, Multiracial populations, composed largely of half-EA/half-minority individuals, tend to have best friends of EA descent (Doyle & Kao, 2007). Befriending members of a high risk racial group may affect the substance use behaviors of

Multiracial individuals, since associating with substance using peers predicts substance use (Urberg, Luo, Pilgrim, & Degirmencioglu, 2003).

Familial risk-factors also encourage adolescents to associate with more deviant peers (Urberg, Luo, Pilgrim, & Degirmencioglu, 2003). Researchers have found that parental divorce is more likely to decrease the parent-child bond (Lopez, Melendez, & Rice, 2000). Consistent with the SDM, substance use researchers have evidence that adolescents who befriend substance users value parental contact less than those who did not (Urberg, et al., 2003). This is particularly troubling for Multiracial individuals, who are more likely to come from parents who experience marital dissolution (Zhang & Van Hook, 2009). These findings indicate that Multiracial adolescents are more likely to seek out substance using peers by virtue of their familial experiences, though more research is necessary to clarify this relationship.

Experiences of racial discrimination have also been found to be related to a number of substance use behaviors among Multiracial youth (Choi, Harachi, Gillmore, & Catalano, 2006). For minority group members, experiencing racial discrimination leads to distress (Gibbons, Gerrard, Cleveland, Wills, & Brody, 2004). Distress encourages association with more deviant, substance using peers which, consistent with the SDM, increases one's likelihood for substance use (Gibbons, et al., 2004). Though different from the experiences faced by monoracial individuals, Multiracial Americans confront discrimination in the form of social rejection based on their Multiracial identity (Shih & Sanchez, 2005); experiences which are no less distressing for Multiracial adolescents than they are for monoracial minorities. However, few studies have explicitly linked Multiracial discrimination with substance use (but see, Choi, Harachi, Gillmore, & Catalano, 2006). Despite advances in how researchers understand the development of substance use, little is understood about the development of substance use in specifically

Multiracial individuals. . The current article is directed at addressing this gap in the substance use literature.

### Mixed-Race Adults in Research

Adolescence has traditionally been viewed as a period of identity crisis for Multiracial youth, during which problem behaviors like truancy and drinking manifest (Hauser, 1972; Teicher, 1968). Multiracial substance use research has therefore focused almost exclusively on the outcomes of adolescents. The more general, non-Multiracial substance use literature tends to gravitate towards youth samples as well, in part because late adolescence and young adulthood appear to represent the most severe periods of substance use (Sher & Gotham, 1999). Yet researchers have far from neglected the importance of studying substance use in later years, frequently noting the connection between adult alcohol abuse and family dysfunction (Dube, Anda, Felitti, Edwards, & Croft, 2002; Johnson & Leff, 1999). Research on the substance use of Multiracial adults, however, is heavily understudied.

The substance use literature indicates that Multiracial individuals may face just as much risk for substance use in adulthood, as in adolescence. One of the most prominent predictors of smoking in adulthood is smoking frequency in adolescence, with heavier smoking adolescents and young adults having greater smoking rates later in life (Jefferis, Graham, Manor, & Power, 2003). This pattern persists in the alcohol consumption literature, in which binge drinking adolescents are more likely to face adult alcohol dependence (Viner & Taylor, 2007). Buffers of alcohol and drug use, like job employment and family stability are less present in minorities (Wallace, 1998), suggesting that Multiracial individuals, as minorities, are more subject to continued substance use in adult life. Furthermore, experiences of discrimination continue into

adulthood for Multiracial individuals (Miville, Constantine, Baysden, & So-Lloyd, 2005), and have been shown to significantly predict increased substance use frequency (Choi, Harachi, Gillmore, & Catalano, 2006). Therefore, as they enter adulthood the substance use risks of Multiracial minorities may remain above most monoracial groups.

The current study clarifies the pattern of substance use in Multiracial individuals by using a large representative sample of respondents to a state health survey in order to (a) compare adolescent substance use rates between racial groups, (b) compare adult substance use rates between races, and (c) compare the factors of substance use for Multiracial Americans to other racial groups. We included six major race/ethnicities in the study—European American (EA), African American (AA), Asian and Pacific Islander American (APIA), Latino American, Native American and Multiracial groups. In accordance with previous literature on the elevated substance use risks faced by Multiracial compared to other minority groups (Choi, Harachi, Gillmore, & Catalano, 2006; Whaley & Francis, 2006), we hypothesize that Multiracial individuals have higher rates of substance use and initiation than their Latino American, APIA, and AA counterparts. Substance use research generally finds EA and Native American as the two racial groups with the highest incidences of substance use (Blum, Beuhring, Shew, Bearinger, Sieving, & Resnick, 2002; Griffin, Botvin, Scheier, Doyle, & Williams, 2003; Parker, Davis, Wingo, Ries, & Heath, 1998). We therefore hypothesize that Multiracial individuals will have lower substance use rates than EA and Native American individuals. We hypothesize that this pattern will be consistent for both adolescent and adult age groups.

Consistent with literature on the social developmental model of substance use (Hawkins and Weis, 1985) and concurrent research (Barrett & Turner, 2005), we suggest that parental factors will be strongly associated with substance use in adolescents. Specifically, we

hypothesize that having two-parent households will be negatively correlated with substance use. Similarly, parental knowledge of a child's substance use should have an inverse relationship with substance use. We further hypothesize that experiences of discrimination will be associated with increased substance use (Choi, Harachi, Gillmore, & Catalano, 2006). Scholars have indicated that socioeconomic status (SES), independent of other social class related factors, may contribute to racial disparities in substance use (Buka, 2002). We therefore hypothesize that SES will be negatively correlated with both alcohol and tobacco use. Furthermore, the SDM suggests that negative affect, such as depression or sadness brought on by experiences of rejection, represents one risk factor for substance use (Hawkins, Catalano, & Miller, 1992). We hypothesize that negative affect will be positively correlated with Multiracial substance use.

### Methods

#### *Data Set: California Health Interview Survey (CHIS)*

Data for this study was obtained from both the adolescent and adult portions of the 2001 California Health Interview Survey (CHIS) conducted from November 2000 and October 2001. The CHIS 2001 is a statewide telephone survey on health and health related behaviors for a wide range of age and ethnic groups. We were motivated to use the CHIS data set for two primary reasons: 1) The CHIS contains responses to questions measuring alcohol and tobacco related behaviors, as well as a number of substance use factors and 2) the CHIS provides substance use data for both adolescents (ages 12-17) and adults (ages 18 and above). The aim of the CHIS is to provide information regarding healthcare access and behavior for California residents (California Health Interview Survey, 2001).

The CHIS 2001 used a random-digit-dial design to obtain subjects. After obtaining a random sample of California telephone numbers and screening for residential households, adult

participants were interviewed via phone. If the household had one or more adolescent individuals, the adult was then asked for consent to interview one random adolescent. When necessary, the interview was conducted in one of six different languages (English, Spanish, Cantonese, Mandarin, Korean, and Khmer). Samples were weighted upon completion of data collection, and are based on the 2001 population projections for the state and counties from the California Department of Finance.

The study involves a secondary data analysis of the California Health Interview Study. The benefits of using this C.A. representative data set include the ability to examine Multiracial substance use rates compared to white monoracial and minority populations. In addition, this is the first representative data set that we know of that includes Multiracial *adults* when so much of the literature on multiracial substance use has included only adolescent populations (Choi, Harachi, Gillmore, & Catalano, 2006; Shih & Sanchez, 2005). However, the design of the study had several limitations such as single item measurements of substance use behavior and discrimination, as well as a discrimination measure addressing health care discrimination, rather than racial discrimination more broadly. While such limitations exist, the design of the survey allowed for important comparisons of Multiracial populations to minority populations that use methods similar to other health disparities research designs.

### *Sample Description*

The total number of participants in the following analysis was 5,827 adolescents and 56,089 adults. The mean age of participants in the adolescent and adult data sets was 14.49 years and 48.11 years, respectively. The median poverty level for the households of adolescents was 200-299% above the federal poverty level. The median poverty level for the households of adults was over 299% above the poverty level. The median level of education attained by adults

was “some college.” For our analyses, adult participants reporting their ethnicity as Pacific Islander were combined with those reporting themselves as Asian due to the low sample size of the former. Participants were considered Multiracial if they reported belonging to *more than one* of the remaining racial/ethnic groups (i.e. EA, AA, APIA, Native American, and Latino American).

These changes yielded five remaining ethnic groups used in further analyses: EA (Adolescent  $n = 2,780$ ; Adult  $n = 34,397$ ), AA (Adolescent  $n = 234$ ; Adult  $n = 2,502$ ), Native American (Adolescent  $n = 68$ ; Adult  $n = 425$ ), APIA (Adolescent  $n = 393$ ; Adult  $n = 4,844$ ), Latino American (Adolescent  $n = 924$ ; Adult  $n = 6,264$ ), and Multiracial American (Adolescent  $n = 1,428$ ; Adult  $n = 7,657$ ). Respondents making up the Multiracial American category reported belonging to: AA/EA (Adolescent  $n = 42$ , Adult  $n = 90$ ), Native American/EA (Adolescent  $n = 184$ ; Adult  $n = 1380$ ), Native American/APIA (Adolescent  $n = 0$ ; Adult  $n = 4$ ), APIA/EA (Adolescent  $n = 79$ ; Adult  $n = 251$ ), Latino American/EA (Adolescent  $n = 698$ ; Adult  $n = 4422$ ), Native American/AA (Adolescent  $n = 22$ ; Adult  $n = 157$ ), APIA/AA (Adolescent  $n = 12$ ; Adult  $n = 20$ ), Latino American/AA (Adolescent  $n = 54$ ; Adult  $n = 118$ ), Latino American/Native American (Adolescent  $n = 174$ ; Adult  $n = 515$ ), Latino American/APIA (Adolescent  $n = 29$ ; Adult  $n = 128$ ), and more than 2 races (Adolescent  $n = 71$ ; Adult  $n = 424$ ). More women ( $n = 32,808$ ; 58.5%) than men ( $n = 23,281$ ) participated in the adult survey. Relatively similar numbers of girls ( $n = 2,902$ ; 49.8%) and boys ( $n = 2,925$ ) participated in the adolescent survey.

### *Measures*

*Self-reported race.* Race was measured with a series of “yes” or “no” questions, asking respondents whether they were of EA, AA, Native American, APIA, or Latino American

descent. Participants were considered Multiracial if they answered “yes” to more than one of these questions (e.g. answered yes to both, “Are you African American?” and “Are you European American?”).

*Drinking behavior.* Alcohol consumption was measured in adolescents with one item asking whether they had ever had an alcoholic drink. Adult drinking behavior was measured with five single-item scales, to which they answered (1) whether they drank any alcohol in the past month, (2) whether they engaged in binge drinking (five or more drinks a day) in the past month, (3) how many days they drank alcohol in the past month, (4) the number of drinks on the days they drank alcohol, and (5) the number of days they engaged in binge drinking in the past month.

*Tobacco use.* Cigarette smoking was assessed with two single-item scales each for adolescents and adults. Adolescent participants were asked (1) whether they had ever smoked regularly, and (2) the number of cigarettes they smoked per day in the past month. Adult respondents were asked (1) whether they had smoked at least 100 cigarettes in their life, and (2) the number of cigarettes they smoked per day in the past month.

*Discrimination.* Experience of discrimination was measured in both adolescents and adults with a single item, requesting participants to respond yes or no to the question, “Thinking of your experiences with receiving healthcare in the past 12 months, have you felt you were discriminated against for any reason?” Though interpersonal racism is generally more relevant to the prediction of substance use behaviors, previous literature has shown that discrimination in healthcare, like other forms of discrimination, is related to substance use (Harris, Tobias, Jeffreys, Waldegrave, Karlsen, & Nazroo, 2006). The CHIS 2001 did not include measures of

interpersonal racism, therefore we use healthcare discrimination as a proxy for experiences of discrimination in general.

*Poverty level.* Socioeconomic status was measured by poverty level, which was assessed by asking either adults or the parents of adolescents to place themselves within one of the following brackets: (1) At or below 100% the Federal Poverty Level (FPL), (2) Above 100% FPL but at or below 200% FPL, (3) Above 200% FPL but at or below 300% FPL, or (4) Above 300% FPL. The federal poverty level is assessed by taking into account the total household size and annual income, and for the CHIS 2001 the 1999 federal poverty guidelines were used.

*Negative affect.* Negative affect was measured for both adolescents and adults with a single item, “Have you felt downhearted and sad? How much of the time during the past 4 weeks?” to which respondents answered either (1) Not at all, (2) A little of the time, (3) Some of the time, (4) Most of the time, or (5) All of the time.

*Parental knowledge of substance use.* This was measured among adolescents by asking, “About your use of alcohol (tobacco), even if you do not drink (smoke). Would you say, your parents know a lot, a little, or nothing?” Responses were coded as either (1) Know nothing, (2) Know a little, or (3) Know a lot. This item was specifically framed to be either about drinking or smoking behavior. Therefore in analyses of drinking behavior, the item used was framed to be specifically about drinking.

*Parental marital status.* Marital status was measured for adolescents by asking participants the marital status of their parents. Responses were coded as either (1) Not married, or (2) Married.

*Marital status.* Marital status was measured among adults with responses to the question, “Are you now married, living with a partner in a marriage-like relationship, widowed, divorced,

separated, or never married?” Similar to parental marital status, responses were coded as either (1) Not married, or (2) Married.

### *Data Analysis Plan*

We first compared the rates of alcohol and tobacco use of each racial group—performing these analyses for both the adolescent and adult samples. We performed two types of analyses: logistic regressions and analyses of covariances (ANCOVAs). Logistic regressions are used to determine the likelihood of engaging in a particular substance use behavior when belonging to one group, compared to a reference group. These regressions were used for dichotomous measures, and the Multiracial group was always coded as the reference group. Each logistic regression therefore yielded five ratios—Multiracial substance use compared to each of the other five remaining racial/ethnic groups. ANCOVAs were used to assess the rate of alcohol and tobacco usage in each group. For both logistic regression and ANCOVA analyses, the following covariates were included: age, gender, and percent above the poverty level.

We then performed bivariate and chi-square analyses for the correlates of substance use in Multiracial adolescents and adults. We observed correlations of percent above the poverty level, negative affect, and parental knowledge of substance use, with alcohol and tobacco use in Multiracial adolescents. We tested the frequencies of Multiracial adolescents reporting discrimination and parental marital dissolution with substance use via chi-squared tests. For Multiracial adults, we observed the relationship between alcohol and tobacco use with poverty level and negative affect. We performed chi-square tests for the relationship of discrimination and marital status with substance use.

To determine whether the correlates of substance use differed across races, we performed Fisher’s *Z* transformations—comparing Multiracial correlates with each of the other five racial

groups. For adolescents, we compared the correlations of poverty level, negative affect, and parental knowledge with having initiated drinking and smoking. For adults, we compared the correlations of poverty level and negative affect with substance use.

## Results

### *Adolescent Sample*

*Alcohol consumption.* Table 1 shows the results of logistic regressions (unstandardized logistic coefficients with odds ratios in parentheses) performed on the item assessing whether adolescents had ever had a drink of alcohol. A significant odds ratio *below* 1 indicates that membership in the comparison group (e.g. APIA), as opposed to reference group (always Multiracial), reduced the odds of substance use. These analyses revealed that Multiracial adolescents were significantly more likely to have initiated alcohol use than all other minorities, save for Native American adolescents. The odds of alcohol initiation were 64% lower for APIA, 42% lower for AA, and 27% lower for Latino American adolescents than for Multiracial adolescents.

*Tobacco use.* The results of a logistic regression to determine the likelihood of smoking regularly are also included in Table 1. This analysis showed that Multiracial adolescents were more likely to have ever smoked regularly than APIA (63% decrease), AA (68% decrease), and Latino American adolescents (38% decrease). However, EA adolescents faced a 46% increase in the odds of cigarette use compared to Multiracial adolescents. An ANCOVA on the number of cigarettes smoked per day yielded a significant difference,  $F(5, 264) = 5.61, p < .001$ . Post-hoc Tukey's comparisons show that EA adolescents smoked significantly more cigarettes per day ( $M = 2.70$ ) than Latino American adolescents ( $M = 2.0$ ),  $p = .007$  (see Table 1 for means).

*Substance use factors.* We further analyzed the factors associated with increased substance use in Multiracial adolescents. The following variables were analyzed via correlational analysis with alcohol and cigarette use: poverty level, negative affect, and parental knowledge of substance use. Results are shown in Table 2. As predicted, parental knowledge of substance use was negatively correlated with alcohol initiation for Multiracial ( $r = -.18$ ), EA ( $r = -.27$ ), AA ( $r = -.24$ ), and Latino American groups ( $r = -.09$ ,  $p < .05$  for all). Parental knowledge was similarly correlated with cigarette use in Multiracial ( $r = -.06$ ,  $p < .05$ ), EA ( $r = -.06$ ,  $p = .05$ ), and Latino American adolescents ( $r = -.09$ ,  $p < .01$ ). Negative affect was positively correlated with cigarette and alcohol consumption in Multiracial ( $r = .08$  and  $.14$ , respectively,  $p < .01$  for both), EA ( $r = .14$  and  $.17$ , respectively,  $p < .01$  for both), and Native American adolescents ( $r = .28$  and  $.31$ , respectively,  $p < .05$  for both), but only associated with drinking in APIA ( $r = .13$ ,  $p < .05$ ) and Latino Americans ( $r = .14$ ,  $p < .01$ ). For EA and AA groups, higher socioeconomic status was negatively correlated with cigarette use ( $r = -.09$  and  $-.18$ , both  $p < .01$ ). However, socioeconomic status was positively correlated with alcohol consumption in Multiracial adolescents ( $r = .06$ ,  $p < .05$ ).

We performed Fisher's Z transformations to test whether the magnitude of the relationships between substance use and the proposed substance use factors (poverty level, negative affect, and parental knowledge) was different for Multiracial adolescents compared to their monoracial peers (see Table 2). When comparing Multiracial adolescents to EA adolescents, the relationship between socioeconomic status and both alcohol initiation ( $z = 2.46$ ,  $p < .05$ ) and smoking initiation ( $z = 2.16$ ,  $p < .05$ ) was significantly different: Unlike Multiracial adolescents, the higher the income of EA adolescents, the less likely they were to have engaged in alcohol initiation. The relationship between cigarette smoking and poverty level was also

significantly weaker for Multiracial than AA adolescents ( $z = 2.28, p < .05$ ). Multiracial adolescents also had a significantly weaker correlation between parental knowledge and alcohol initiation compared to EA adolescents ( $z = 2.91, p < .01$ ), yet stronger correlation compared to APIA adolescents ( $z = 2.13, p < .05$ ).

We conducted chi-squared significance tests to analyze the relationship between drinking initiation and the following variables: discrimination and parental marital status (see Table 3). Multiracial adolescents whose parents were not married engaged in alcohol initiation more than would be expected by chance ( $\chi^2(1, N = 1,416) = 28.09, p < .001$ ), though this relationship was not repeated for discrimination and drinking in Multiracial respondents. EA adolescents were more likely than chance to drink alcohol if they experienced discrimination ( $\chi^2(1, N = 2,760) = 22.13, p < .001$ ) and had unmarried parents ( $\chi^2(1, N = 2,770) = 61.41, p < .001$ ). APIA ( $\chi^2(1, N = 393) = 11.18, p < .001$ ) and Latino American adolescents ( $\chi^2(1, N = 919) = 5.10, p < .05$ ) were more likely than chance to drink when their parents weren't married.

We performed chi-squared tests for significance on the association of discrimination and parental status with smoking initiation (see Table 4). Experiences of discrimination were significantly associated with cigarette smoking in Multiracial ( $\chi^2(1, N = 1,417) = 9.18, p < .01$ ), EA ( $\chi^2(1, N = 2,762) = 9.12, p < .01$ ), and APIA adolescents ( $\chi^2(1, N = 388) = 3.89, p < .05$ ). Having unmarried parents was also significantly associated with smoking initiation in Multiracial ( $\chi^2(1, N = 1,416) = 7.06, p < .01$ ), EA ( $\chi^2(1, N = 2,772) = 66.26, p < .001$ ), and APIA adolescents ( $\chi^2(1, N = 393) = 5.97, p < .05$ ).

#### *Adult Sample*

*Alcohol consumption.* We performed logistic regressions on two variables assessing alcohol behavior: 1) Whether adults drank an alcoholic beverage in the past month and 2)

whether adults engaged in binge drinking in the past month. Several significant effects emerged (see Table 5). Multiracial adults were significantly more likely to have had an alcoholic drink in the past month than AA, APIA, and Latino American adults. The odds of having had alcohol in the last month were 42% lower for APIA adults, 14% lower for Latino American adults, and 12% lower for AA adults compared to Multiracial adults. However, EA adults were 52% more likely to have had alcohol than Multiracial adults. The odds of having had a binge drinking episode were 50% lower for APIA adults and 28% lower for AA adults than for Multiracial adults. Having a binge drinking episode was 17% more likely for EA and 42% more likely for Native American adults than for Multiracial adults.

We analyzed alcohol consumption using ANCOVAs, entering age, poverty level, and gender as covariates, followed by Tukey post hoc comparisons for the following variables in the adult data set: 1) number of days drinking per month, 2) number of drinks on drinking days, and 3) frequency of binge drinking episodes per month (see Table 6 for means). The ANCOVAs revealed a significant effect for self-reported race on the number of days drinking alcohol per month,  $F(5, 33,335) = 136.70, p < .001$ . Post-hoc Tukey's tests showed that both EA American ( $M = 10.0$ ) and Native American ( $M = 8.6$ ) adults drank alcoholic beverages on more days of the month than Multiracial ( $M = 6.7; p < .001$  compared to EA;  $p < .05$  compared to Native American), AA ( $M = 6.4, p < .001; p < .01$ ), APIA ( $M = 6.1, p < .001; p = .001$ ), and Latino American ( $M = 5.3, p < .001$  compared to both) adults. Latino Americans drank on significantly fewer days than Multiracial ( $p < .001$ ), AA ( $p < .01$ ), and APIA individuals ( $p < .01$ ).

We also found a significant effect for self-reported race on the number of drinks on drinking days,  $F(5, 32,855) = 91.72, p < .001$ . Post-hoc tests revealed that Native American ( $M = 3.0$ ), Latino American ( $M = 2.8$ ), and Multiracial adults ( $M = 2.3$ ) drank more often on the

days they drank alcohol than EA ( $M = 1.9$ ), AA ( $M = 1.9$ ) and APIA ( $M = 1.7$ ) adults ( $p < .001$  for all). Native Americans and Latino Americans additionally drank more than Multiracial individuals ( $p < .001$  for both). Additionally, EA and AA adults were more severe drinkers on drinking days than APIA adults ( $p < .05$  for both).

We also found a significant effect for self-reported race on binge drinking episodes in the past month,  $F(5, 33,289) = 18.43, p < .001$ . Both Native American ( $M = 1.5$ ) Latino American ( $M = 1.0$ ) adults were more frequent binge drinkers than EA ( $M = .8, p < .01$  for Native Americans;  $p < .001$  compared to Latino Americans), AA ( $M = .6, p < .001$  for both), and APIA ( $M = .6, p < .001$  for both) adults. Only Native Americans binge drank more often than Multiracial individuals ( $M = .9, p < .05$ ). Multiracial adults showed a similar pattern as Latino American and Native Americans, binge drinking more frequently than EA ( $p < .05$ ), AA ( $p < .01$ ), and APIA adults ( $p < .001$ ). Lastly, EA respondents tended to binge drink during the month more than APIA adults ( $p < .05$ ).

*Tobacco use.* We performed a logistic regression on whether adult respondents reported smoking over 100 cigarettes in their lifetime (see Table 5). The odds that individuals had smoked more than 100 cigarettes in their lifetime was 41% less for APIA adults and 38% less for Latino American adults compared to Multiracial adults. However, the odds of having smoked 100 cigarettes for EA adults were 35% higher, and Native Americans 135% higher, than for Multiracial adults.

We ran one way ANOVAs to analyze differences in smoking frequency among adult racial groups (Table 6). We found a significant effect of self-reported race on the number of cigarettes smoked per day,  $F(5, 9,541) = 148.26, p < .001$ . Post hoc tests showed that Native American ( $M = 3.8$ ) and EA adults ( $M = 3.6$ ) smoked significantly more cigarettes a day than

AA ( $M = 3.1$ ), Multiracial ( $M = 3.0$ ), APIA ( $M = 3.0$ ) and Latino American individuals ( $M = 2.5$ ;  $p < .001$  for all). Latino American adults appeared least affected by high smoking rates—smoking significantly less than AA, Multiracial, and APIA adults ( $p < .001$  for all).

*Substance use factors.* We conducted a series of correlation analyses between the three substance use variables used in the previous logistic regression (Alcohol consumption in the past month, binge drinking in the past month, and consumption of 100 cigarettes in one's lifetime) and two proposed factors of substance use: percent above the poverty level and negative affect. Results from this analysis are shown in Table 7. Socioeconomic status was positively correlated with consuming any alcohol in the past month for Multiracial ( $r = .24$ ), EA ( $r = .21$ ), AA ( $r = .16$ ), APIA ( $r = .19$ ), and Latino American adults ( $r = .25$ ,  $p < .01$  for all). Socioeconomic status was also positively related to binge drinking for Multiracial ( $r = .08$ ), EA ( $r = .05$ ), APIA ( $r = .04$ ), and Latino American adults ( $r = .08$ ,  $p < .01$  for all). However, socioeconomic status was only positively correlated with high smoking rates in Multiracial ( $r = .04$ ) and Latino Americans ( $r = .04$ ), while it was negatively correlated with high smoking rates in EA ( $r = -.05$ ) and AA adults ( $r = -.09$ ,  $p < .01$  for all). Surprisingly, negative affect was negatively correlated with alcohol consumption in Multiracial ( $r = -.04$ ,  $p < .01$ ), EA ( $r = -.04$ ,  $p < .01$ ), APIA ( $r = -.04$ ,  $p < .05$ ) and Latino Americans adults ( $r = -.05$ ,  $p < .01$ ). Negative affect was positively correlated with binge drinking in EA adults ( $r = .02$ ,  $p < .01$ ), but negatively correlated with binge drinking in Latino Americans ( $r = .03$ ,  $p < .05$ ). Smoking of 100 cigarettes was associated with increased negative affect in Multiracial ( $r = .06$ ), EA ( $r = .05$ ), and AA adults ( $r = .10$ ,  $p < .01$  for all).

We conducted Fisher's Z transformations to test whether the strength of correlations between substance use factors and behaviors were different between Multiracial Americans and other racial groups. Socioeconomic status was a stronger predictor of alcohol consumption in

Multiracial adults than in EA ( $z = 2.50, p < .05$ ), AA ( $z = 3.62, p < .01$ ), Native American ( $z = 3.49, p < .01$ ), and APIA adults ( $z = 2.86, p < .01$ ). Similarly, socioeconomic status was significantly more correlated with binge drinking for Multiracial individuals than for EA ( $z = 2.38, p < .05$ ), AA ( $z = 3.04, p < .01$ ), and APIA individuals ( $z = 2.19, p < .05$ ). The relationship between socioeconomic status and having smoked 100 cigarettes was reversed in Multiracial adults compared to EA ( $z = 7.12$ ), AA ( $z = 5.65$ ), and Native American ( $z = 2.59, p < .01$  for all). Negative affect had a significantly different correlation with binge drinking in Multiracial adults, than for Latino American adults ( $z = 2.34, p < .05$ ). The correlation between negative affect and having smoked 100 cigarettes was also significantly stronger in Multiracial adults than for APIA ( $z = 2.18, p < .05$ ) and Latino American adults ( $z = 4.11, p < .01$ ).

We ran chi-square independence tests to analyze the relationship between alcohol consumption and the factors of discrimination and marital status (see Table 8). Not being married was associated with monthly drinking in Multiracial ( $\chi^2(1, N = 7,634) = 5.44, p < .05$ ), EA ( $\chi^2(1, N = 34,299) = 45.26, p < .001$ ) and APIA adults ( $\chi^2(1, N = 4,820) = 17.98, p < .001$ ). Surprisingly, EA adults who reported experiences of discrimination were more likely than chance to *not* consume alcohol in the past month ( $\chi^2(1, N = 34,069) = 35.00, p < .001$ ).

Chi-square independence tests further showed that not being married was significantly associated with binge drinking in Multiracial ( $\chi^2(1, N = 7,610) = 49.33, p < .001$ ), EA ( $\chi^2(1, N = 34,218) = 145.12, p < .001$ ), APIA ( $\chi^2(1, N = 4,807) = 63.38, p < .001$ ), and Latino American adults ( $\chi^2(1, N = 6,221) = 29.89, p < .001$ ) (see Table 9).

Chi-square independence tests revealed that smoking 100 cigarettes was significantly related to reporting experiences of discrimination for Multiracial ( $\chi^2(1, N = 7,593) = 42.04, p < .001$ ), EA ( $\chi^2(1, N = 34,019) = 63.72, p < .001$ ), AA ( $\chi^2(1, N = 2,479) = 7.02, p < .05$ ), and

Latino American adults ( $\chi^2(1, N = 6,226) = 7.83, p < .05$ ) (see Table 10). Furthermore, adults who were not married were more likely than chance to have smoked 100 cigarettes in the Multiracial ( $\chi^2(1, N = 7,618) = 15.03, p < .001$ ) and EA groups ( $\chi^2(1, N = 34,242) = 99.70, p < .001$ ).

### Discussion

In the present study, we aim to clarify the comparative substance use risks faced by Multiracial individuals by considering the rates of alcohol and tobacco consumption in both adolescents and adults. Recognizing the lack of research on the factors of Multiracial substance use, we additionally illustrate the relationship between substance use in mixed-race individuals and some common predictors of alcohol and tobacco use: discrimination, percent above poverty level (SES), negative affect, parental (and personal) marital status, and parental knowledge of youth substance use. Furthermore, we compare the strengths of these factors in predicting substance use in Multiracial individuals to other racial groups. The results largely support the hypothesis that Multiracial adults and adolescents show greater substance use rates than most single-race minority individuals.

Multiracial respondents were more similar to high-risk EA and Native American groups than we had expected (particularly in the adolescent sample). Though we hypothesized Multiracial individuals would be at greater risk for substance use by virtue of the risk factors of parental marital dissolution and association with deviant peer networks, we did not expect Multiracial rates to reach those of EA or Native Americans. We believed this due to our understanding that while Multiracial individuals associate with EA and Native Americans who are more likely to be deviant, EA and Native Americans themselves are more likely to associate with their racial ingroup than are any other groups. We find these results particularly troubling,

as it suggests that the growing number of Multiracial individuals may face substance use risks similar to those *most* at risk for substance use. This is evident in their high substance use rates relative to AA, APIA, and Latino Americans. Though the CHIS 2001 does not contain any information on the peer networks of adolescents, information on Multiracial peer networks might help clarify risk factors that lie outside of the family.

One notable deviation from our hypotheses involved an unexpected drop-off in *severe* drinking habits among EA and Multiracial adults—particularly in comparison to Latino American adults. Elevated scores on the measures of *number of drinks on drinking days* and *number of days binge drinking a month* reflect binge or severe drinking habits, suggesting that while EA and Multiracial adults are more likely to space out their alcohol consumption within the month, Latino American adults drink more alcohol in a single sitting. Indeed, the severity of Latino American drinking behavior has been noted by a number of substance use researchers (Dawson, 1998; Galvan & Caetano, 2003), with some indicating that norms about drinking alcohol, gained largely from Latino American individuals' cultural background, may explain this risk (Caetano & Clark, 1999). However, our results should be observed in light of the subtle differences in the actual means presented, as well as the unevenness in the sample size of each racial group. In particular, the means in table 2 suggest that Native Americans may actually have more severe drinking habits than Latino Americans, but the number of Native American respondents in our adult set was less than a quarter of the number of the second least represented racial group. Despite this fact, our results show that risks associated with Multiracial alcohol consumption may have more to do with the frequency of drinking behavior over time, rather than the severity of drinking.

We received mixed support for our hypotheses regarding the correlates of substance use in Multiracial individuals. Parental knowledge of substance use generally appeared to be the strongest factor of adolescent alcohol initiation, with greater parental knowledge discouraging substance use for all but Native Americans and APIAs. These results have been echoed by substance use scholars who examine the role of decreased parental monitoring on increased substance use (Barrett & Turner, 2005). Furthermore, the SDM (Catalano & Hawkins, 1996) supports a view of parental bonding and monitoring as one buffer against the influence of deviant peers. However, parental knowledge did not have as strong a relation on cigarette use.

Interestingly, there appeared to be some overlap in the ability for parental marital status to predict smoking and drinking for Multiracial, EA, and APIA adolescents. Having unmarried parents was associated with engaging in substance use for these three groups. Yet, parental knowledge was only associated with substance use in Multiracial and EA adolescents. This suggests that family structure and parental monitoring may have separate affects on substance use in APIA populations. We also found that both parental marital status and personal marital status were associated with substance use in Multiracial Americans. These findings are reflected in the literature of adult substance use, in which divorce and single status are predictive of substance abuse (Power, Rodgers, & Hope, 1999). This research may be particularly relevant to Multiracial individuals, considering that they are more likely to experience marital dissolution (Zhang & Van Hook, 2009).

Experiences of discrimination were also related to cigarette use in Multiracial, EA, and APIA adolescents. However, these results are difficult to interpret. First, substance use researchers note that *institutional* racism, which healthcare discrimination may be a component of, is less predictive of health outcomes than *interpersonal* racism (Harris, Tobias, Jeffreys,

Waldegrave, Karlsen, & Nazroo, 2006). Therefore, the CHIS measure of healthcare discrimination may not adequately assess the more commonly influential effect of interpersonal racism on substance use. Second, the types of discrimination faced by mixed-race peoples varies from racism directed towards one of their monoracial components (e.g. towards African-Americans, if one is AA-EA biracial) to Multiracial racism directed towards their ambiguous racial identity (e.g. *What are you supposed to be?*; Miville, Constantine, Baysden, & So-Lloyd, 2005). The effects of these different types of discrimination on health and substance use are not yet fully understood.

Much of these results echo previous work by substance use researchers (e.g. Choi, Harachi, Gillmore, & Catalano, 2006). In particular, Choi and colleagues similarly found that Multiracial adolescents were at greater risk for substance use behaviors than their monoracial counterparts. The current study adds to this growing literature by not only including a comparison of substance use factors between races, but providing insight into the substance use rates of Multiracial adults. While substance use researchers often observe the trajectory of substance use from adolescence into young adulthood (Flory, Lynam, Milich, Leukefeld, & Clayton, 2004), we are aware of no studies that observe these differences in Multiracial individuals. The current study offers some initial impressions of how Multiracial adults fare in relation to adolescents.

The current study sheds some light on the similar substance abuse behaviors of Multiracial adolescents and adults, which we believe contributes to the prevention and management of substance use behaviors. Multiracial individuals confront unique psychological and social challenges (e.g. racial identity conflict, negotiating more diverse peer networks, minority and majority peer rejection; Doyle & Kao, 2007; Shih & Sanchez, 2005) influencing

their health behaviors. Our results show that parental and personal marital status is one salient factor for Multiracial individuals. Recognizing that marital dissolution is a reality that many people of mixed-race backgrounds face (Zhang & Van Hook, 2009), field workers may strive to put in place buffers that protect against the risk associated with familial tension—for instance, encouraging more positive peer networks external to the family. Our results also indicate that experiences of discrimination are also shown to be associated with substance use in Multiracial adolescents. Since Multiracial discrimination is largely related to ambiguity and uncertainty regarding their racial identity (Root, 1996), stressing a social constructivist view of race might be one way to combat substance use risk, and is already known to reduce the effect of stereotype threat (Shih, Bonam, Sanchez, & Peck, 2007). Additionally, previous research has suggested that parental monitoring strategies are effective at reducing the risk that racial discrimination poses to associating with deviant peers (Gibbons, Gerrard, Cleveland, Wills, & Brody, 2004).

### *Limitations*

While the current study is an important examination of substance use risk in Multiracial adults and adolescents, the design of the current study has some limitations. One key limitation of our study was the lack of a longitudinal design to more clearly monitor the development of substance use problems over the life course. Yet, given the virtual absence of both Multiracial adult data and the scarcity of Multiracial adolescent data in substance use research, we believe that our study represents an important addition to studies of multiracial substance use.

Additionally, significant results from our analyses should be viewed in the context of our relatively small effect sizes. For instance, in our correlational analyses, none of our factors led to coefficients large enough to be considered “medium” (Cohen, 1992). Substance use is likely a product of a number of interrelated environmental and social factors. Though these factors may

have small effects on substance use individually, understanding substance use requires further research on understanding exactly how these factors interact.

Our study is further limited by its focus on California residents, who may not be representative of the Multiracial or minority population as a whole. For example, a Multiracial individual living in the Midwest is not likely to experience the same socio-cultural environment as one living in California. In addition, California may be a unique environment for smokers with an especially low rate of adult smokers (California Smoking, 2005). In addition, the large differences in the sampling of specific racial groups prevented us from analyzing groups, such as Pacific Islander and Asian, separately. Inequality in group sizes also prevented us from analyzing different Multiracial groups (e.g. EA/APIA Multiracial versus EA/AA Multiracial) separately, as a large number of these groups were too small to include in our comparisons.

The present study represents a secondary data analysis of the California Health Interview Survey. Thus, the results and conclusions are limited by the design of the original study. The CHIS 2001 was designed as a random-digit dial survey in which adolescent data was gathered from households in which adults also participated. Thus, one household's substance use is overrepresented in this analysis when both an adolescent and adult from the same household participated. Due to the design of the CHIS, the data from adolescents and adults were interdependent but we could not statistically account for that interdependence. Thus, the adolescent data should be interpreted with caution because their substance use rates may, for example, reflect the habits, practices, and norms set by their parents.

The single-item measure of self-reported race has also been criticized in Multiracial research. Recent research indicates that Multiracial respondents may report belonging to one of

their component races at one time, and to another of their component races at another time (Brown, Hitlin, & Elder, 2006; Harris & Sim, 2002; Sanchez, Shih, & Garcia, 2009). Using data from the National Longitudinal Study of Adolescent Health, Harris and Sim (2002) found that some Multiracial youth report belonging to different races in different social contexts. The single-item measure of race underestimates the number of Multiracial individuals in the state of California. This is particularly problematic for a study of substance use, as some research suggests that individuals with a malleable racial identity (i.e. racial self-identification based on the social context) may be more likely to have lower well-being (Sanchez, et al., 2009), which is heavily tied to the substance use factor of negative affect. However, without multiple measures of racial identification, it is unclear exactly how or whether the inclusion of a single-item measure of race changes our pattern of results.

Our results should also be viewed in the context of our use of single-item measures of alcohol and tobacco use. The CHIS survey used several single item measures and several questions were designed to have dichotomous (yes/no) responses. These questions (although common in racial disparities research on substance use) represent an important limitation and potential source of unaccounted for error in the measurement of substance use in this data set.

### *Conclusions*

Despite these limitations, our results provide some initial support for the hypothesis that the pattern of substance use for Multiracial adolescents is similar to those faced by Multiracial adults. Previous research has largely been qualitative in nature (Gibbs, 1998; Gibbs & Hines, 1992), and when quantitative, substance use research rarely includes data from both adolescents and adults. The current study provides quantitative substance use data for both adolescents and adults, showing that Multiracial individuals are more at risk for substance use than most

monoracial minorities during both adolescence and adulthood. This research also depicts the unique differences in substance use behaviors for different minority groups. While we found generally negative drinking behaviors for Multiracial adults in comparison to AA and APIA respondents, our study allows us to distinguish between increased drinking frequency and decreased drinking severity in Multiracial as opposed to Latino American adults.

We suggest that further research untangle these differences by looking at the causes of each of these unique substance use behaviors. Lastly, our study brings attention to the relatively increased risk of substance use behavior in Multiracial individuals. The validity of the “more than one race” category has been established not only in scholarly literature (Renn, 2004; Root, 1996; Shih & Sanchez, 2005), but by the 2000 Census as well. Yet, the substance use literature overwhelmingly focuses on monoracial majority and minority ethnic groups (Williams & Chang, 2000). The current study is aimed at indicating the need for research on the risks associated with having multiple racial/ethnic identities and the importance of detailing the unique factors leading to these substance use risks. Further research in this area will aid in the prevention and treatment of substance use problems for this heavily understudied group.

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Table 1  
*Substance Use Initiation in Adolescents*

Group	Yes (%)		<i>M</i> (SD)
	Ever drank alcohol	Ever smoked regularly	Cigarettes smoked per day
EA	38.6	7.9	2.70 (1.09)
AA	26.1	2.1	2.00 (.0)
Native American	22.1	7.4	2.00 (1.15)
APIA	20.1	2.5	2.29 (.76)
Latino American	31.6	5.0	2.00 (.85)
Multiracial	36.3	6.0	2.34 (.10)

  

	Log (Odds)	
	Ever drank alcohol	Ever smoked regularly
EA vs Multi	-.03 (.97)	.38 (1.46)***
AA vs Multi	-.54 (.58)**	-1.13 (.32)*
Native American vs Multi	-.51 (.60)	.64 (1.26)
APIA vs Multi	-1.04 (.36)***	-.99 (.37)*
Latino American vs Multi	-.32 (.73)**	-.48 (.62)*
<i>N</i>	5,821	5,823

*Note.* The coefficients reported are adjusted for age, poverty level, and gender. EA = European American, AA = African American, APIA = Asian and Pacific Islander American, Multi = Multiracial

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 2

*Correlations of Substance Use Factors with Adolescent Substance Initiation Across Race*

Race	Substance Use Factors					
	Percent <i>above</i> poverty level		Negative affect		Parental knowledge of substance use	
	Alcohol <i>r</i> ( <i>Z</i> )	Cigarettes <i>r</i> ( <i>Z</i> )	Alcohol <i>r</i> ( <i>Z</i> )	Cigarettes <i>r</i> ( <i>Z</i> )	Alcohol <i>r</i> ( <i>Z</i> )	Cigarettes <i>r</i> ( <i>Z</i> )
Multiracial	.06*	-.02	.14**	.08**	-.18**	-.06*
(Reference Group)						
EA	-.02 (2.46*)	-.09** (2.16*)	.17** (.94)	.14** (1.86)	-.27** (2.91*)	-.06* (.00)
AA	.07 (.14)	-.18** (2.28*)	.07 (1.00)	-.04 (1.69)	-.24** (.89)	.02 (1.13)
Native American	.21 (1.21)	.08 (.79)	.31* (1.41)	.28* (1.64)	-.13 (.40)	-.15 (.72)
APIA	.01 (.88)	.02 (.70)	.13* (.18)	.04 (.70)	-.06 (2.13*)	-.06 (.00)
Latino American	.01 (1.18)	-.05 (.71)	.14** (.00)	.06 (.48)	-.22** (.99)	-.09** (.71)

*Note.* Fisher’s *Z* between comparison group and reference group (Multiracial) presented in parenthesis.

Significance of *r* indicated outside of parentheses. Significance of Fisher’s *Z* indicated within parentheses.

\**p* < .05, \*\**p* < .01.

Table 3

*Chi Squared Results for the Role of Discrimination and Parental Status on Alcohol Initiation in Adolescents*

Race		Ever Drank		$\chi^2$	$\phi$
		No	Yes		
Factor					
<b>Multiracial</b>					
Discrimination	No	875 (874.0)	501 (502.0)	.12	.01
	Yes	25 (26.0)	16 (15.0)		
Parental Status	Not Married	326 (373.3)	262 (214.7)	28.09***	-.14***
	Married	573 (525.7)	255 (302.3)		
<b>EA</b>					
Discrimination	No	1668 (1649.3)	1024 (1042.7)	22.13***	.09***
	Yes	23 (41.7)	45 (26.3)		
Parental Status	Not Married	543 (640.2)	499 (401.8)	61.41***	-.15***
	Married	1159 (1061.8)	569 (666.2)		
<b>AA</b>					
Discrimination	No	166 (164.3)	56 (57.7)	1.66	.09
	Yes	5 (6.7)	4 (2.3)		
Parental Status	Not Married	101 (106.2)	42 (36.8)	2.54	-.10
	Married	72 (66.8)	18 (23.2)		
<b>Native American</b>					
Discrimination	No	52 (52)	15 (15)	--	--
	Yes	--	--		
Parental Status	Not Married	27 (28.1)	9 (7.9)	.39	-.08
	Married	26 (24.9)	6 (7.1)		
<b>APIA</b>					
Discrimination	No	305 (304.4)	76 (76.6)	.32	.03
	Yes	5 (5.6)	2 (1.4)		
Parental Status	Not Married	34 (43.1)	20 (10.9)	11.18***	-.17***
	Married	280 (270.9)	59 (68.1)		
<b>Latino American</b>					
Discrimination	No	610 (605.6)	279 (283.4)	3.73	.06
	Yes	12 (16.4)	12 (7.6)		
Parental Status	Not Married	162 (176.3)	96 (81.7)	5.10*	-.07*
	Married	466 (451.7)	195 (209.3)		

*Note.* No Native Americans reported experiencing discrimination; therefore we did not compute chi-Square ( $\chi^2$ ) and phi ( $\phi$ ) for this group.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

Table 4

*Chi Squared Results for the Role of Discrimination and Parental Status on Smoking Initiation in Adolescents*

Race		Ever Smoked		$\chi^2$	$\phi$
		No	Yes		
Factor		Observed	(Expected)		
<b>Multiracial</b>					
Discrimination	No	1298 (1293.5)	78 (82.5)	9.18**	.08**
	Yes	34 (38.5)	7 (2.5)		
Parental Status	Not Married	541 (552.7)	47 (35.3)	7.06**	-.07**
	Married	790 (778.3)	38 (49.7)		
<b>EA</b>					
Discrimination	No	2488 (2481.4)	206 (212.6)	9.12**	.06**
	Yes	56 (62.6)	12 (5.4)		
Parental Status	Not Married	906 (961.9)	138 (82.1)	66.26***	-.16***
	Married	1648 (1592.1)	80 (135.9)		
<b>AA</b>					
Discrimination	No	218 (217.2)	4 (4.8)	3.54	.12
	Yes	8 (8.8)	1 (.2)		
Parental Status	Not Married	138 (139.9)	5 (3.1)	3.22	-.12
	Married	90 (88.1)	0 (1.9)		
<b>Native American</b>					
Discrimination	No	62 (62)	5 (5)	--	--
	Yes	--	--		
Parental Status	Not Married	33 (33.4)	3 (2.6)	.11	-.04
	Married	30 (29.6)	2 (2.4)		
<b>APIA</b>					
Discrimination	No	372 (371.2)	9 (9.8)	3.89*	.10*
	Yes	6 (6.8)	1 (.2)		
Parental Status	Not Married	50 (52.6)	4 (1.4)	5.97*	-.12*
	Married	333 (330.4)	6 (8.6)		
<b>Latino American</b>					
Discrimination	No	846 (844.2)	43 (44.8)	2.87	.06
	Yes	21 (22.8)	3 (1.2)		
Parental Status	Not Married	240 (245.1)	18 (12.9)	2.93	-.06
	Married	633 (627.9)	28 (33.1)		

*Note.* No Native Americans reported experiencing discrimination; therefore we did not compute chi-Square ( $\chi^2$ ) and phi ( $\phi$ ) for this group.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

Table 5  
*Substance Use Odds in Multiracial Adults*

Group	Yes (%)		
	Drank at all in the past month	Binge drank at all in the past month	Had over 100 cigarettes in lifetime
EA	65.8	13.8	51.4
AA	50.6	9.7	44.6
Native American	48.9	17.9	64.5
APIA	44.6	8.8	30.4
Latino American	48.7	16.2	30.5
Multiracial	54.0	14.9	41.7

  

	Log (odds)		
	Drank at all in the past month	Binge drank at all in the past month	Had over 100 cigarettes in lifetime
EA vs Multi	.42 (1.52)***	.15 (1.17)***	.30 (1.35)***
AA vs Multi	-.13 (.88)**	-.33 (.72)***	.08 (1.09)
Native American vs Multi	-.19 (.83)	.35 (1.42)**	.85 (2.35)***
APIA vs Multi	-.54 (.58)***	-.69 (.50)***	-.53 (.59)***
Latino American vs Multi	-.15 (.86)***	-.05 (.95)	-.48 (.62)***
<i>N</i>	56,067	55,910	55,973

*Note.* The coefficients reported are adjusted for age, poverty level, and gender. Multi = Multiracial. \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 6  
*Substance Use in Multiracial Adults*

Group	<i>M</i> ( <i>SD</i> )			
	Days drinking per month	Drinks on drinking days	Days binge drinking in past month	Cigarettes smoked per day
EA	10.0 (9.3) <sup>ab</sup>	1.9 (1.4) <sup>ab</sup>	0.8 (2.9) <sup>ab</sup>	3.6 (1.3) <sup>ab</sup>
AA	6.4 (7.4) <sup>bc</sup>	1.9 (1.5) <sup>ab</sup>	0.6 (2.3) <sup>ab, cd</sup>	3.1 (1.2) <sup>bc</sup>
Native American	8.6 (9.1) <sup>ab</sup>	3.0 (3.2) <sup>bc</sup>	1.5 (4.1) <sup>bc</sup>	3.8 (1.3) <sup>ab</sup>
APIA	6.1 (7.2) <sup>bc</sup>	1.7 (1.5) <sup>cd</sup>	0.6 (2.2) <sup>cd</sup>	3.0 (1.2) <sup>bc</sup>
Latino American	5.3 (6.2) <sup>cd</sup>	2.8 (2.5) <sup>bc</sup>	1.0 (2.9) <sup>bc, de</sup>	2.5 (1.1) <sup>cd</sup>
Multiracial	6.7 (7.5) <sup>bc</sup>	2.3 (2.0) <sup>de</sup>	0.9 (2.8) <sup>de</sup>	3.0 (1.3) <sup>bc</sup>
<i>F</i>	136.70***	91.72***	18.43***	148.26***
<i>N</i>	33,344	32,864	33,298	9,550

*Note.* Significantly different means are indicated by differing superscripts within columns,  $p < .05$ . Age, poverty level, and gender were entered as covariates.

\*\*\*  $p < .001$ .

Table 7

*Correlations of Substance Use Factors with Adult Substance Use Across Race*

Race	Multiracial Correlates					
	Percent above poverty level			Negative affect		
	Any Alcohol <i>r</i> ( <i>Z</i> )	Binge Drinking <i>r</i> ( <i>Z</i> )	100 Cigarettes <i>r</i> ( <i>Z</i> )	Any Alcohol <i>r</i> ( <i>Z</i> )	Binge Drinking <i>r</i> ( <i>Z</i> )	100 Cigarettes <i>r</i> ( <i>Z</i> )
Multiracial	.24**	.08**	.04**	-.04**	.01	.06**
(Reference)						
EA	.21** (2.50*)	.05** (2.38*)	-.05** (7.12**)	-.04** (.00)	.02** (.79)	.05** (.79)
AA	.16** (3.62**)	.01 (3.04**)	-.09** (5.65**)	-.01 (1.30)	.03 (1.75)	.10** (1.75)
Native American	.07 (3.49**)	.02 (1.20)	-.09 (2.59**)	-.08 (.80)	.01 (.00)	.04 (.40)
APIA	.19** (2.86**)	.04** (2.19*)	.01 (1.63)	-.04* (.00)	.01 (.00)	.02 (2.18*)
Latino American	.25** (.62)	.08** (.00)	.04** (.00)	-.05** (.59)	-.03* (2.34*)	-.01 (4.11**)

*Note.* Fisher’s *Z* between comparison group and reference group (Multiracial) presented in parenthesis.

Significance of *r* indicated outside of parentheses. Significance of Fisher’s *Z* indicated within parentheses.

\**p* < .05, \*\**p* < .01.

Table 8

*Chi Squared Results for the Role of Discrimination and Marital Status on Drinking in Adults*

Race		Any alcohol in past month		$\chi^2$	$\phi$
		No	Yes		
Factor		Observed	(Expected)		
<b>Multiracial</b>					
Discrimination	No	3231 (3245.4)	3852 (3837.6)	1.72	-.02
	Yes	255 (240.6)	270 (284.4)		
Marital Status	Not Married	1707 (1757.8)	2115 (2064.2)	5.44*	-.03*
	Married	1804 (1753.2)	2008 (2058.8)		
<b>EA</b>					
Discrimination	No	10919 (11027.9)	21565 (21456.1)	35.00***	-.03***
	Yes	647 (538.1)	938 (1046.9)		
Marital Status	Not Married	6004 (5708.7)	10704 (10999.3)	45.26***	.04***
	Married	5715 (6010.3)	11876 (11580.7)		
<b>AA</b>					
Discrimination	No	1153 (1154.6)	1196 (1194.4)	.08	-.01
	Yes	67 (65.4)	66 (67.6)		
Marital Status	Not Married	840 (840.4)	864 (863.6)	.00	.00
	Married	389 (388.6)	399 (399.4)		
<b>Native American</b>					
Discrimination	No	188 (192.4)	194 (189.6)	2.26	-.07
	Yes	23 (18.6)	14 (18.4)		
Marital Status	Not Married	111 (120.8)	125 (115.2)	3.67	-.09
	Married	106 (96.2)	82 (91.8)		
<b>APIA</b>					
Discrimination	No	2562 (2563.9)	2083 (2081.1)	.10	-.01
	Yes	83 (81.1)	64 (65.9)		
Marital Status	Not Married	958 (1029.2)	900 (828.8)	17.98***	-.06***
	Married	1712 (1640.8)	1250 (1321.2)		
<b>Latino American</b>					
Discrimination	No	2965 (2975.4)	2856 (2845.6)	1.13	-.01
	Yes	221 (210.6)	191 (201.4)		
Marital Status	Not Married	1392 (1420.3)	1378 (1349.7)	2.08	-.02
	Married	1806 (1777.7)	1661 (1689.3)		

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

Table 9

*Chi Squared Results for the Role of Discrimination and Marital Status on Binge Drinking in Adults*

Race		Binge Drinking		$\chi^2$	$\phi$
		Observed	(Expected)		
Factor		No	Yes		
<b>Multiracial</b>					
Discrimination	No	6012 (6003.4)	1047 (1055.6)	1.20	.01
	Yes	437 (445.6)	87 (78.4)		
Marital Status	Not Married	3132 (3241.1)	676 (566.9)	49.33***	-.08***
	Married	3345 (3235.9)	457 (566.1)		
<b>EA</b>					
Discrimination	No	27919 (27920.9)	4488 (4486.1)	.02	.00
	Yes	1364 (1362.1)	217 (218.9)		
Marital Status	Not Married	13982 (14366.0)	2681 (2297.0)	145.12***	-.07***
	Married	15519 (15135.0)	2036 (2420.0)		
<b>AA</b>					
Discrimination	No	2107 (2108.0)	229 (228.0)	.09	-.01
	Yes	121 (120.0)	12 (13.0)		
Marital Status	Not Married	1520 (1531.8)	176 (164.2)	2.98	-.04
	Married	719 (707.2)	64 (75.8)		
<b>Native American</b>					
Discrimination	No	305 (307.7)	71 (68.3)	1.48	-.06
	Yes	33 (30.3)	4 (6.7)		
Marital Status	Not Married	184 (190.9)	48 (41.1)	3.19	-.09
	Married	160 (153.1)	26 (32.9)		
<b>APIA</b>					
Discrimination	No	4225 (4222.1)	409 (411.9)	.75	-.01
	Yes	131 (133.9)	16 (13.1)		
Marital Status	Not Married	1612 (1688.3)	240 (163.7)	63.38***	-.12***
	Married	2770 (2693.7)	185 (261.3)		
<b>Latino American</b>					
Discrimination	No	4851 (4861.7)	953 (942.3)	2.20	-.02
	Yes	355 (344.3)	56 (66.7)		
Marital Status	Not Married	2236 (2314.9)	526 (447.1)	29.89***	-.07***
	Married	2978 (2899.1)	481 (559.9)		

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

Table 10

*Chi Squared Results for the Role of Discrimination and Marital Status on Smoking in Adults*

Race		100 Cigarettes in Lifetime		$\chi^2$	$\phi$
		Observed (Expected)			
Factor		No	Yes		
<b>Multiracial</b>					
Discrimination	No	4199 (4128.4)	2869 (2939.6)	42.04***	.07***
	Yes	236 (306.6)	289 (218.4)		
Marital Status	Not Married	2141 (2224.4)	1673 (1589.6)	15.03***	-.04***
	Married	2302 (2218.6)	1502 (1585.4)		
<b>EA</b>					
Discrimination	No	15931 (15776.1)	16507 (16667.9)	63.72***	.04***
	Yes	614 (768.9)	967 (812.1)		
Marital Status	Not Married	7648 (8109.6)	9038 (8576.4)	99.70***	-.05***
	Married	8994 (8532.4)	8562 (9023.6)		
<b>AA</b>					
Discrimination	No	1316 (1301.2)	1030 (1044.8)	7.02**	.05**
	Yes	59 (73.8)	74 (59.2)		
Marital Status	Not Married	928 (943.7)	774 (758.3)	1.84	-.03
	Married	452 (436.3)	335 (350.7)		
<b>Native American</b>					
Discrimination	No	138 (134.0)	242 (246.0)	2.12	.07
	Yes	9 (13.0)	28 (24.0)		
Marital Status	Not Married	80 (83.2)	154 (150.8)	.42	-.03
	Married	70 (66.8)	118 (121.2)		
<b>APIA</b>					
Discrimination	No	3233 (3227.6)	1402 (1407.4)	.96	.01
	Yes	97 (102.4)	50 (44.6)		
Marital Status	Not Married	1306 (1291.7)	549 (563.3)	.85	.01
	Married	2044 (2058.3)	912 (897.7)		
<b>Latino American</b>					
Discrimination	No	4065 (4039.7)	1749 (1774.3)	7.83**	.04**
	Yes	261 (286.3)	151 (125.7)		
Marital Status	Not Married	1897 (1923.4)	873 (846.6)	2.14	-.02
	Married	2429 (2402.6)	1031 (1057.4)		

*Note.* \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$