

# Racial/Ethnic Differences in Adolescent Substance Use: Mediation by Individual, Family, and School Factors\*

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**ABSTRACT. Objective:** This study examined racial/ethnic differences in alcohol, cigarette, and marijuana use among a diverse sample of approximately 5,500 seventh and eighth graders. We also evaluated the extent to which individual, family, and school factors mediated racial/ethnic disparities in use. **Method:** Students (49% male) from 16 participating middle schools in southern California reported on lifetime and past-month substance use, individual factors (expectancies and resistance self-efficacy), family factors (familism, parental respect, and adult and older sibling use), and school factors (school-grade use and perceived peer use). We used generalized estimating equations to examine the odds of consumption for each racial/ethnic group adjusting for sex, grade, and family structure. Path analysis models tested mediation of racial/ethnic differences through individual, family, and school factors. **Results:** After adjusting for sex, grade, and family structure, Hispanics reported

higher and Asians reported lower lifetime and past-month substance use, compared with non-Hispanic Caucasians. Rates of substance use did not differ between non-Hispanic African Americans and Caucasians. Several individual factors mediated the relationship between Hispanic ethnicity and substance use, including negative expectancies and resistance self-efficacy. Higher use among Hispanics was generally not explained by family or school factors. By contrast, several factors mediated the relationship between Asian race and lower alcohol use, including individual, family (parental respect, adult and older sibling use), and school (perceived peer use, school-grade use) factors. **Conclusions:** Results highlight the importance of targeting specific individual, family, and school factors in tailored intervention efforts to reduce substance use among young minority adolescents. (*J. Stud. Alcohol Drugs*, 71, 640-651, 2010)

**A**LCOHOL, CIGARETTE, AND MARIJUANA USE during adolescence presents a significant public health burden. Substance use during adolescence has been associated with an increased likelihood of substance-use disorders in young adulthood (Agrawal et al., 2008; D'Amico et al., 2005a; DeWit et al., 2000; Englund et al., 2008; Kandel and Logan, 1984; Segal, 1991), violent and aggressive behavior (DuRant et al., 1999a), early initiation of sexual intercourse (Paul et al., 2000), and carrying weapons (DuRant et al., 1999b). Some research has suggested that experimentation with alcohol and/or drugs is a normative behavior during adolescence (Guilamo-Ramos et al., 2004; Hurrelmann, 1990; Newcomb and Bentler, 1988). However, other evidence has shown that, compared with youths who experiment with substances during adolescence, abstaining youths have better health outcomes; have fewer alcohol and drug problems; and are at lower risk for criminal behavior, academic difficulties, employment problems, and less satisfaction with peer relationships in young adulthood (Ellickson et al., 2003a; Tucker et al., 2006).

Three large national surveys—the Youth Risk Behavior

Survey, Monitoring the Future, and the National Survey on Drug Use and Health—have found considerable racial/ethnic differences in alcohol, cigarette, and marijuana consumption rates among adolescents and adults (Caetano and Clark, 1998; Grunbaum et al., 2002; Johnston et al., 2009; Substance Abuse and Mental Health Services Administration [SAMHSA], 2002a, 2002b, 2002c; Wallace et al., 2002). For example, Asian and non-Hispanic African American adolescents ages 11-16 report lower rates of lifetime (Best et al., 2001; SAMHSA, 2000) and past-week alcohol use (Rodham et al., 2005) in comparison with their non-Hispanic Caucasian and Hispanic counterparts, and lifetime cigarette use was higher for non-Hispanic Caucasians (40%), compared with non-Hispanic African Americans (28%), Asians (24%), and Hispanics (34%) ages 12-17 (SAMHSA, 2000). In addition, among youths ages 12-17, Hispanics (19%) and Caucasians (17%) reported a higher lifetime prevalence of marijuana use, compared with African Americans (15%) (SAMHSA, 2002c).

A number of different mechanisms have been hypothesized to explain racial/ethnic differences in substance use, such as racial/ethnic variation in genetic polymorphisms and physiology (Luczak et al., 2001; Takeshita et al., 2001; Wall et al., 1997), individual beliefs, family or cultural factors (Li and Rosenblood, 1994; Oei and Jardim, 2007; Unger et al., 2002), and peer use at school (Ellickson et al., 2003b; Gillmore et al., 1990; Rountree and Clayton, 1999). Of these factors, individual, family, and school factors are modifiable, and have been targeted in intervention efforts (Dunn et al.,

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2000; Eisen et al., 2003; Faggiano et al., 2008; Liu and Flay, 2009; Orlando et al., 2005). The current study adds to the literature by examining individual, peer, and family factors that may be associated with alcohol, cigarette, and marijuana use, and assessing whether these factors may differ by racial/ethnic groups among a racially/ethnically diverse sample of young adolescents.

Studies on individual factors such as positive and negative expectancies and resistance self-efficacy (RSE) are equivocal. Some studies report that African American adolescents have higher rates of both negative and positive alcohol expectancies, compared with Caucasians (Hipwell et al., 2005; Meier et al., 2007), whereas others report no differences (Rinehart et al., 2006). Oei and Jardim (2007) found that, compared with Asians, Caucasian college students reported more positive expectancies and less RSE for alcohol. However, only alcohol RSE explained a portion of the racial differences in alcohol consumption among Asians versus Caucasians. Research on younger adolescents is needed to understand whether alcohol expectancies and RSE may mediate potential racial/ethnic disparities in drinking behavior. Furthermore, few studies have assessed racial/ethnic variation in expectancies and RSE for cigarette and marijuana use. Research with middle school youths has typically grouped all substances together (Barkin et al., 2002) or exclusively studied Hispanic adolescents (Elder et al., 2000). Overall, findings indicate that higher positive expectancies about alcohol, cigarettes, or marijuana are associated with greater risk of any lifetime use of these substances (Barkin et al., 2002; Elder et al., 2000; Spruijt-Metz et al., 2005). Yet, no studies to our knowledge have addressed whether cigarette or marijuana expectancies and RSE mediate racial/ethnic disparities in use.

In addition to individual factors, family factors are often related to alcohol, cigarette, and marijuana use among adolescents (Bauman et al., 1990; Kaplan et al., 2001; Moreno et al., 1994; Unger et al., 2002). Two potentially important indicators of family relationships, familism and parental respect, have been investigated as protective factors for substance use by Unger et al. (2002). High levels of familism, or strength of family relationships, is a traditionally Hispanic value, and high parental respect is a traditionally Asian value (Kaplan et al., 2001; Unger et al., 2002). Hispanic adolescents with higher familism have decreased risk for cigarette initiation (Kaplan et al., 2001) and heavy drinking (Wahl and Eitle, 2010), and Asians may be less likely to disobey their parents' rules related to substance use (Unger et al., 2002).

Other family factors such as substance use by parents or older siblings may also play a role in adolescent substance use. For example, when young adolescents live with adults and siblings who smoke cigarettes, those adolescents are more likely to report lifetime (Bauman et al., 1990; Moreno et al., 1994) and past-month (Komro et al., 2003) cigarette, alcohol, and marijuana use (Ary et al., 1993; Li et al., 2002;

van der Vorst et al., 2005; Windle, 2000). To date, no studies have assessed the contribution of multiple family factors to racial/ethnic disparities in adolescent alcohol, cigarette, or marijuana consumption.

School factors, such as availability of alcohol, cigarettes, and marijuana, and the proportion of students who use these substances in school settings may also affect adolescent substance use (Hanson et al., 2003; Kim and McCarthy, 2006; Maes and Lievens, 2003; Rountree and Clayton, 1999; Skager and Fisher, 1989). Moreover, Ellickson et al. (2003b) found that, above and beyond objectively measured prevalence of peer cigarette use, perceived peer cigarette use was independently related to smoking frequency. Similar associations have been reported between substance use and perceived alcohol, cigarette, and marijuana use among high school (D'Amico et al., 2001), middle school (D'Amico and McCarthy, 2006; Henry et al., 2005), and elementary school students (Iannotti et al., 1996). Some racial/ethnic groups may be more vulnerable to greater rates of peer smoking if they are more likely to use substances in social situations. For example, Asian American college students report that cigarette smoking facilitates a sense of belonging and peer acceptance (Hsia and Spruijt-Metz, 2003; Otsuki et al., 2008).

Overall, the majority of prior work on racial/ethnic disparities in alcohol, cigarette, and marijuana use is limited by small sample sizes and insufficient racial and ethnic heterogeneity to adequately assess differences in the patterns of alcohol, cigarette, and marijuana consumption. Moreover, most studies have focused on only one substance and assessed differences in consumption rates among older adolescents and young adults. The current study adds to the existing literature by examining racial/ethnic differences in alcohol, cigarette, and marijuana use among a racially/ethnically diverse sample of approximately 5,500 seventh and eighth graders in southern California. We also address whether any racial/ethnic differences may be partially mediated by key individual, family, and school factors.

## Method

### *Participants and procedure*

Seventh- and eighth-grade students ( $N = 10,199$ ) in 16 participating middle schools across three school districts in southern California received consent forms to participate in the study, and 91.8% of parents returned this form ( $n = 9,360$ ). Seventy-one percent of parents gave permission for their child to participate in the study ( $n = 6,646$ ), and 90.9% of students completed the survey ( $n = 6,038$ ). These numbers are comparable to other school-based survey completion rates with youths (Johnson and Hoffmann, 2000; Johnston et al., 2008; Kandel et al., 2004). Surveys at all 16 schools were completed within a 4-week time frame from late Sep-

tember to early October 2008. Spanish-speaking staff were available at each administration, and survey booklets were available in Spanish and Korean. Responses were protected by a Certificate of Confidentiality from the National Institutes of Health. All materials and procedures were approved by the institution's internal review board, school districts, and individual schools.

### *Study measures*

*Sociodemographic characteristics.* The survey asked students about their age, sex, grade level, and race/ethnicity. Respondents initially classified themselves by ethnicity and then by race (U.S. Department of Health and Human Services, 2001), which included categories of Caucasian, African American, and Asian or Pacific Islander. Hereafter, we refer to non-Hispanic Caucasians as Caucasians, non-Hispanic African Americans as African Americans, and Asians or Pacific Islanders as Asians. Individuals of other race or of mixed race were not included in the analytic sample ( $n = 552$ ). The survey also asked about which adults the student lived with, and a nuclear family structure was defined as the student living with both his/her mother and father (Ellickson et al., 2001).

*Alcohol, cigarette, and marijuana use.* Lifetime and past-month frequency of alcohol, cigarette, and marijuana use were assessed using well-established measures from the California Healthy Kids Survey (WestEd, 2008) and Project ALERT (Ellickson et al., 2003c). A "drink" was defined as one whole drink of alcohol (not including a few sips of wine for religious purposes). For lifetime use, cigarette use was defined as "a cigarette, even one or two puffs." Variability in responses for higher frequency of consumption in this young population was low. For analytic purposes, we used dichotomous categories of any use (one time or more) and no use (never used the substance).

*Individual factors.* For each of the three substances, we assessed positive and negative expectancies with six-item scales (Ellickson et al., 2003c). For example, one item each for alcohol and marijuana positive expectancies asked whether students thought that using the substance would relax them or let them have more fun; one item each for alcohol and marijuana negative expectancies asked whether students thought that using the substance would make them do poorly in school. Cigarette expectancies asked, for example, whether students thought cigarettes would make other people not want to be around them or would help them stay thin. Students indicated their extent of agreement with each statement (1 = *strongly agree* to 4 = *strongly disagree*) and responses were averaged ( $\alpha$ 's ranged from .75 to .87). Scores for negative expectancies were reverse coded, with higher scores indicating higher expectancies.

RSE for each substance was assessed by asking students: "Suppose you are offered alcohol (or marijuana or cigarettes)

and you do not want to use it (them). What would you do in these situations (e.g., your best friend is drinking alcohol [smoking cigarettes/marijuana])?" (Ellickson et al., 2003c). Three items were rated on a scale ranging from 1 = "*I would definitely drink/smoke cigarettes/use marijuana*" to 4 = "*I would definitely not drink/smoke cigarettes/use marijuana*," and scores were reverse coded and then averaged to develop a single RSE scale for each of the three substances ( $\alpha$ 's for the three scales ranged from .93 to .96). Higher scores indicated higher RSE.

*Family factors.* Two scales from Unger et al.'s (2002) work measured familism (Cuellar et al., 1995) and parental respect (Ho, 1994). Both scales were assessed with four items (sample item for familism: "If anyone in my family needed help, we would all be there to help them," sample item for parental respect: "It is important to honor my parents") that were rated on a 4-point scale and averaged (1 = *strongly agree* to 4 = *strongly disagree*;  $\alpha = .77$  for familism and .89 for parental respect). Higher scores indicated greater familism and parental respect. For family substance use, students reported how often the adult most important to them and whom they spend time with used alcohol, cigarettes, or marijuana (1 = *never*, 2 = *less than once/week*, 3 = *1-3 days/week*, and 4 = *4-7 days/week*). Students also reported if their older siblings used each substance (yes/no). If students did not have older siblings, this was classified as "no."

*School factors.* We calculated the proportion of respondents in each student's school and grade that reported lifetime or past-month alcohol, cigarette, or marijuana use to obtain the mean level of consumption for each school-grade combination. Perceived use among peers at school was a continuous variable that was measured by asking approximately how many students in 100 have smoked cigarettes/drank alcohol/ever tried marijuana at least once a month (WestEd, 2008). Responses were recorded on a scale of 1 to 11, where 0 or no students of 100 was coded as "1," 10 students of 100 was coded as "2," and so forth.

*Analyses.* To adjust for potential bias caused by missing data within the survey, we used a multiple imputation-based approach to impute 15 datasets using a sequence of regression models with IVEware (Raghunathan et al., 2002). Imputations were conducted separately for males and females in the sample to preserve any information about interaction effects (Allison, 2001), and clustering at the school level was taken into account. The 15 imputed datasets were analyzed separately, and the results were combined (Little and Rubin, 1987) with the MIAnalyze procedure within SAS 9.2 (SAS Institute Inc., Cary, NC). Across all variables of interest (except age, sex, and race), missing data ranged from 0.2% (past-month alcohol use) to 24.6% (respect) and were imputed. Where age, sex, and race/ethnicity variables were missing (<0.1%), the case was excluded from the analysis ( $n = 24$ ) for a total of 5,462 adolescents included in the analyses.

To examine the association between racial/ethnic groups

and substance use, we estimated the odds of reporting use of each of the six outcomes (three substances: alcohol, cigarettes, and marijuana; two usage periods: past month and lifetime) using generalized estimating equation (GEE; Zeger et al., 1988) regressions with SAS 9.2. This GEE model served as the base model (Model 1), which adjusted for sex, grade, and nuclear family structure. It also accounted for clustering of the 16 schools and provided corrected standard errors. These analyses were conducted for each imputed dataset, and the results were combined.

We then examined the extent to which racial/ethnic differences in substance use were explained by or reduced when individual, family, or school factors were added to the model. We used path analysis modeling (Baron and Kenny, 1986; Fritz and MacKinnon, 2007) to examine the mediating pathways between race and consumption through three different sets of potential mediating factors grouped as (a) individual, (b) family, and (c) school factors. For each of the three path analysis models, African American, Asian, and Hispanic students were compared with Caucasian students using three dummy variables. Each path analysis model (Models 2-4) adjusted for the sex, grade, and family structure covariates from the base model (GEE Model 1) and a new set of mediating individual, family, or school variables. Model 2 included individual factors to determine whether racial/ethnic differences in Model 1 were mediated by this group of individual factors. Model 3 included all family factors (familism, respect, and adult and older sibling use), and Model 4 included all school factors (average school and grade consumption for each student and perceived peer use). In all models, we matched the version of the independent variable (e.g., alcohol expectancies, older sibling alcohol use) to the particular outcome variable (e.g., lifetime alcohol use). Models were estimated using Mplus 5.1 (Muthén and Muthén, 1998-2007) using weighted least squares with mean and variance correction estimation, with standard errors corrected via the complex samples procedure. We estimated standardized direct and indirect effects of race/ethnicity based on a polychoric correlation matrix, and calculated their standard errors using the delta method (see, e.g., MacKinnon, 2008), using the Model Indirect command in Mplus. The Model Indirect command provides the statistical significance of indirect effects and is considered to be a test of significant mediation between race/ethnicity and consumption.

## Results

Table 1 provides demographic, and individual, family, and school factors by each racial/ethnic group. Approximately 22% of seventh and eighth graders reported lifetime alcohol use, 10% reported any lifetime cigarette smoking, and 7% reported lifetime marijuana use. Students reported relatively low levels of positive expectancies and high levels of nega-

tive expectancies and RSE. Students reported low frequencies of substance use by adults, and approximately 18%, 9%, and 7% reported having older siblings who drank alcohol, smoked cigarettes, or used marijuana, respectively.

Table 2 shows the odds of substance use in Model 1, adjusting for sex, grade, and family structure. The overall pattern for all six outcomes was similar: Across all substances, Hispanic adolescents had odds of past-year or past-month consumption that were 1.58-1.97 times higher than that of Caucasians, indicating statistically significant higher risk of reporting consumption for all three substances. The odds of consumption for Asians were 0.25-0.73 times the odds of consumption for Caucasian adolescents, indicating a statistically significant lower risk of consumption of all substances among Asians. There were no statistically significant differences (all  $ps > .05$ ) between African American and Caucasian students in lifetime or past-month use.

Odds ratios estimate the increased or decreased odds of reporting use for each racial/ethnic subgroup in comparison with Caucasians. However, odds ratios can be misleading if the risk in the reference group is high (Long, 1997). To aid interpretation, we also provide the sex-, age-, and family structure-adjusted probability of reporting lifetime use for each racial/ethnic group as predicted by Model 1 (Table 2). We arbitrarily selected the reference categories, male eighth graders who were not in a nuclear family, to calculate predicted probabilities. Thus, an adjusted odds ratio of 1.58 for lifetime alcohol consumption for Hispanics, compared with Caucasians, translates into the probability of lifetime alcohol consumption of 38% for eighth-grade Hispanic males with a nonnuclear family structure, compared with 29% for African Americans, 28% for Caucasians, and 18% for Asians (Table 2).

Model 1 results showed that the total race effect was not significant for African Americans because they did not differ from Caucasians in their rates of use. Thus, for the path analysis models, we do not report parameter estimates for this group, although African American race was retained in the model as an indicator. Table 3 provides parameter estimates for the indirect race effects for lifetime consumption. If the total indirect effect through all individual, or family, or school factors was not significant ( $p > .05$ ), we did not further examine the indirect effects through specific factors in Table 3.

Model 2 (individual factors) results showed that higher lifetime use of alcohol, cigarettes, and marijuana among Hispanics (as indicated in Model 1) was significantly mediated by RSE and negative expectancies (all  $p$  values  $< .05$ ). None of the family factors (Model 3) or school factors (Model 4) significantly explained higher rates of lifetime alcohol, cigarette, or marijuana use among Hispanics ( $p > .05$ ), with one exception: Higher school-grade consumption (in Model 4) did mediate the relationship between higher use in Hispanics, compared with Caucasian students, but only for alcohol.

TABLE 1. Imputed sample characteristics of seventh and eighth grade participants in Project Choice

Variable	Caucasian ( <i>n</i> = 954)	African American ( <i>n</i> = 212)	Hispanic ( <i>n</i> = 3,270)	Asian ( <i>n</i> = 1,026)	Total ( <i>N</i> = 5,462)
Male, <i>n</i> (%)	498 (55.20%)	102 (48.11%)	1,558 (47.65%)	496 (48.34%)	2,654 (48.59%)
Age, in years, <i>M</i> ( <i>SD</i> )	12.50 (0.66)	12.58 (0.73)	12.58 (0.72)	12.48 (0.68)	12.50 (0.70)
Nuclear family structure, <i>n</i> (%)	353 (0.37%)	112 (0.53%)	2,289 (0.70%)	718 (0.70%)	3,168 (0.58%)
Consumption rates, <i>n</i> (%)					
Lifetime use					
Alcohol	175 (18.37%)	44 (20.88%)	866 (26.50%)	98 (9.57%)	1,183 (21.65%)
Cigarettes	64 (6.72%)	20 (9.43%)	413 (12.64%)	49 (4.82%)	546 (10.00%)
Marijuana	38 (3.99%)	12 (5.66%)	316 (9.66%)	15 (1.42%)	381 (6.97%)
Past-month use					
Alcohol	68 (7.13%)	16 (7.54%)	359 (10.98%)	32 (3.15%)	475 (8.69%)
Cigarettes	15 (1.57%)	6 (2.83%)	117 (3.58%)	5 (0.50%)	144 (2.63%)
Marijuana	17 (1.79%)	4 (1.89%)	151 (4.62%)	4 (0.43%)	176 (3.23%)
Individual variables, <i>M</i> ( <i>SD</i> )					
Positive expectancy score <sup>a</sup>					
Alcohol	1.60 (0.83)	1.46 (0.72)	1.69 (0.92)	1.45 (0.72)	1.62 (0.86)
Cigarettes	1.51 (0.77)	1.55 (0.80)	1.53 (0.81)	1.42 (0.68)	1.50 (0.78)
Marijuana	1.55 (0.86)	1.54 (0.89)	1.62 (0.95)	1.37 (0.72)	1.55 (0.90)
Negative expectancy score <sup>a</sup>					
Alcohol	3.23 (0.98)	3.01 (1.09)	2.95 (1.04)	3.29 (0.91)	3.07 (1.02)
Cigarettes	3.20 (1.02)	3.05 (1.14)	2.91 (1.15)	3.30 (1.00)	3.04 (1.12)
Marijuana	3.25 (1.03)	3.09 (1.17)	2.96 (1.16)	3.30 (0.99)	3.09 (1.12)
Resistance self-efficacy score <sup>a</sup>					
Alcohol	3.56 (0.74)	3.61 (0.71)	3.41 (0.86)	3.71 (0.60)	3.50 (0.80)
Cigarettes	3.80 (0.58)	3.73 (0.75)	3.72 (0.69)	3.86 (0.47)	3.76 (0.64)
Marijuana	3.77 (0.60)	3.71 (0.73)	3.65 (0.78)	3.86 (0.48)	3.71 (0.71)
Family variables					
Familism score, <i>M</i> ( <i>SD</i> ) <sup>a</sup>	3.63 (0.47)	3.48 (0.60)	3.58 (0.50)	3.63 (0.50)	3.59 (0.57)
Parental respect score, <i>M</i> ( <i>SD</i> ) <sup>a</sup>	3.77 (0.50)	3.72 (0.65)	3.80 (0.50)	3.85 (0.40)	3.80 (0.49)
Any older sibling use, <i>n</i> (%) <sup>b</sup>					
Alcohol	172 (18.01%)	34 (15.91%)	667 (20.41%)	81 (7.92%)	954 (17.47%)
Cigarettes	86 (9.04%)	22 (10.57%)	324 (9.92%)	39 (3.79%)	472 (8.64%)
Marijuana	63 (6.62%)	19 (8.77%)	263 (8.03%)	23 (2.26%)	368 (6.73%)
Frequency of adult use, <i>M</i> ( <i>SD</i> ) <sup>c</sup>					
Alcohol	1.92 (1.95)	1.59 (1.66)	1.70 (1.73)	1.60 (1.63)	1.72 (1.74)
Cigarettes	1.46 (1.49)	1.47 (1.55)	1.54 (1.57)	1.49 (1.52)	1.52 (1.54)
Marijuana	1.09 (1.10)	1.13 (1.18)	1.12 (1.15)	1.02 (1.04)	1.10 (1.12)
School variable, <i>M</i> ( <i>SD</i> )					
Perceived peer use <sup>d</sup>					
Alcohol	2.16 (1.78)	2.29 (1.12)	2.30 (2.05)	1.67 (1.32)	2.14 (1.91)
Cigarettes	1.79 (1.38)	1.82 (1.47)	1.88 (1.56)	1.43 (1.00)	1.77 (1.45)
Marijuana	1.97 (1.76)	2.15 (2.03)	2.14 (1.99)	1.47 (1.20)	1.99 (1.84)

Notes: Subgroup statistics do not always add up to exact total because of averaging of statistics across imputed data sets and rounding. <sup>a</sup>Scores range from 1 to 4, where higher scores indicate higher expectancies, resistance self-efficacy, familism, and parental respect; <sup>b</sup>any older sibling use is defined as "yes" only if a student has an older sibling and if that older sibling uses substances; any older sibling use is categorized as "no use" if a student reported not having an older sibling, or if her or his older sibling does not use substances; <sup>c</sup>frequency of adult use ranges from 1 to 4 where 1 = "never," 2 = "less than once/week," 3 = "1-3 days/week," 4 = "4-7 days/week"; <sup>d</sup>perceived peer use ranges from 1 to 11 where "1" represents a student perceiving 0 of 100 students using each type of substance, 2 represents 10 of 100, 3 represents 20 of 100, etc.

The pattern of mediating relationships for past-month use in Models 2-4 among Hispanics was the same as for lifetime use of alcohol, cigarettes, and marijuana (data not shown).

Lower Asian lifetime use of alcohol and marijuana, compared with Caucasians, was significantly mediated by RSE ( $p < .05$ ) and positive ( $p < .05$ ) and negative expectancies ( $p < .10$ ) (Model 2). Lower Asian lifetime use of cigarettes was mediated by RSE ( $p < .10$ ) and negative expectancies only ( $p < .05$ ). Model 3 showed that lower alcohol, cigarette, and marijuana use was mediated, in general, by family factors, such as parental respect, older sibling use, and adult use,

although this was most consistent across all substances for parental respect and older sibling use. In contrast to Hispanics, perceived peer use consistently mediated lower Asian use of all substances (Model 4). School-grade use additionally explained lower alcohol use among Asians.

Overall, patterns of mediating relationships were very similar for lifetime and past-month substance use in Asians. The only difference between the models for lifetime and past-month use was that adult use additionally explained differences in marijuana use between Asians and Caucasians in Model 3 (data not shown).

TABLE 2. Model 1 parameter, odds ratio, and predicted probability estimates for consumption associated with race/ethnicity ( $N = 5,462$ )

Variable	Lifetime			Past month		
	Parameter (SE)	OR [95% CI]	Predicted probability for a male eighth grader without nuclear family	Parameter (SE)	OR [95% CI]	Predicted probability for a male eighth grader without nuclear family
<b>Alcohol</b>						
African American	0.05 (0.21)	1.05 [0.69, 1.60]	.29	0.01 (0.29)	1.01 [0.57, 1.77]	.10
Hispanic	0.46** (0.10)	1.58 [1.31, 1.92]	.38	0.47** (0.14)	1.60 [1.22, 2.12]	.15
Asian	-0.60** (0.17)	0.55 [0.40, 0.76]	.18	-0.66* (0.27)	0.52 [0.30, 0.88]	.05
Caucasian <sup>a</sup>			.28			.10
<b>Cigarettes</b>						
African American	0.07 (0.33)	1.07 [0.56, 2.05]	.17	0.22 (0.42)	1.25 [0.55, 2.80]	.05
Hispanic	0.49** (0.14)	1.63 [1.23, 2.16]	.23	0.58** (0.20)	1.79 [1.21, 2.64]	.07
Asian	-0.32* (0.14)	0.73 [0.55, 0.94]	.12	-1.15** (0.42)	0.32 [0.14, 0.72]	.01
Caucasian <sup>a</sup>			.16			.04
<b>Marijuana</b>						
African American	0.03 (0.26)	0.97 [0.58, 1.62]	.11	-0.35 (0.49)	0.70 [0.27, 1.86]	.04
Hispanic	0.67** (0.13)	1.95 [1.51, 2.53]	.20	0.68** (0.16)	1.97 [1.43, 2.69]	.10
Asian	-1.03** (0.21)	0.36 [0.23, 0.54]	.04	-1.39** (0.52)	0.25 [0.09, 0.68]	.01
Caucasian <sup>a</sup>			.11			.05

Notes: Model 1 adjusts for grade, sex, and nuclear family structure. <sup>a</sup>Reference group.  
\* $p \leq .05$ ; \*\* $p \leq .01$ .

## Discussion

The current study addresses several gaps in the literature by examining racial/ethnic differences in alcohol, cigarette, and marijuana consumption among a racially/ethnically diverse sample of young adolescents. We also examined whether individual, family, and school factors partially explained racial/ethnic differences in consumption. These findings may inform public health intervention efforts that aim to reduce consumption during the period of greatest risk for substance-use initiation and escalation. Furthermore, findings from the mediation analyses clarify the types of factors that may explain racial/ethnic disparities and serve as targets for interventions.

It is worth noting that, in this sample of seventh and eighth graders, rates of lifetime and past-month substance use were comparable to national samples (SAMHSA, 2008). For example, in the 2007 National Survey on Drug Use and Health (SAMHSA, 2008), 28.2% of eighth graders reported lifetime alcohol use, compared with 29.2% in our sample of eighth graders.

Overall, we found substantial racial/ethnic differences in both lifetime and past-month alcohol, cigarette, and marijuana use. After adjusting for sex, grade, and family structure, Hispanics reported significantly higher rates of lifetime and past-month use, and Asians reported significantly lower rates of lifetime and past-month use, compared with Cauca-

sians. We found no evidence that African American students differed from Caucasians in their rates of lifetime or past-month alcohol, cigarette, and marijuana use.

Our findings support previous research that showed that Asians ages 12-17 report lower use of alcohol, cigarettes, and marijuana (SAMHSA, 2000), compared with Caucasians. Research findings that compare prevalence rates of substance use among Hispanic versus Caucasian youths have been mixed (French et al., 2002; Herd, 1990; Kandel, 1995; SAMHSA, 2000; Watt, 2004). Survey research from the Monitoring the Future study suggests that Hispanics may have higher rates of substance use than Caucasians in eighth grade; however, by 12th grade, Caucasians may have a slightly higher rate of use, compared with Hispanics (Johnston et al., 2009). This may be a result of higher dropout rates later in high school for Hispanics who are more likely to have initiated substance use (Johnston et al., 2009). Given that our sample involved middle school adolescents, those at higher risk for substance use may still be in school. In addition, the Hispanics in the current sample may have been more likely to have been born in the United States or were more acculturated than Hispanics in other samples, thereby contributing to the higher rates of use among Hispanics observed in this study (Brook et al., 1998; Chen et al., 2002; De La Rosa, 2002; Epstein et al., 2001; Litrownik et al., 2000; Love et al., 2006; McQueen et al., 2003; Unger et al., 2000).

TABLE 3. Mediation of race/ethnicity disparities in lifetime consumption: Standardized parameter estimates for individual, family, and school factors

Variable	Hispanics vs. Caucasians			Asians vs. Caucasians		
	Estimate	SE	p	Estimate	SE	p
<b>Model 2: Individual factors</b>						
Alcohol						
Total indirect race effect	.11	.04	<.01	-.11	.04	<.01
Positive expectancies	–	–	–	-.04	.01	.02
Negative expectancies	.03	.01	<.01	-.01	.01	.08
Resistance self-efficacy	.06	.02	.01	-.07	.02	<.01
Cigarettes						
Total indirect race effect	.07	.03	<.01	-.06	.03	.03
Positive expectancies	–	–	–	–	–	–
Negative expectancies	.03	.01	<.01	-.02	.01	.02
Resistance self-efficacy	.03	.01	.02	-.03	.02	.08
Marijuana						
Total indirect race effect	.09	.04	.03	-.12	.04	<.01
Positive expectancies	–	–	–	-.07	.03	.01
Negative expectancies	.03	.01	<.01	-.02	.01	.08
Resistance self-efficacy	.04	.02	<.01	-.03	.01	.01
<b>Model 3: Family factors</b>						
Alcohol						
Total indirect race effect	–	–	–	-.11	.02	<.01
Familism	–	–	–	–	–	–
Parental respect	–	–	–	-.02	.01	<.01
Adult use	–	–	–	-.04	.01	<.01
Older sibling use	–	–	–	-.05	.03	.09
Cigarettes						
Total indirect race effect	–	–	–	-.05	.02	<.01
Familism	–	–	–	–	–	–
Parental respect	–	–	–	-.02	.01	<.01
Adult use	–	–	–	–	–	–
Older sibling use	–	–	–	-.03	.01	.02
Marijuana						
Total indirect race effect	–	–	–	-.07	.02	<.01
Familism	–	–	–	–	–	–
Parental respect	–	–	–	-.02	.01	<.01
Adult use	–	–	–	–	–	–
Older sibling use	–	–	–	-.03	.02	.05
<b>Model 4: School factors</b>						
Alcohol						
Total indirect race effect	.09	.05	.04	-.14	.04	<.01
Perceived peer use	–	–	–	-.08	.03	<.01
School-grade consumption	.07	.03	.02	-.06	.02	.02
Cigarettes						
Total indirect race effect	–	–	–	-.07	.02	<.01
Perceived peer use	–	–	–	-.06	.02	<.01
School-grade consumption	–	–	–	–	–	–
Marijuana						
Total indirect race effect	–	–	–	-.09	.02	<.01
Perceived peer use	–	–	–	-.11	.02	<.01
School-grade consumption	–	–	–	–	–	–

Notes: Parameters for race effects are reported for Hispanic and Asian dummy variables compared with Caucasian as the reference group. The African American total race effect compared with Caucasians was not significant, and therefore indirect parameters are not reported for African Americans. A dash (–) indicates a nonsignificant indirect effect ( $p > .10$ ). Model 2 adjusts for grade, sex, nuclear family structure, positive and negative expectancies, and resistance self-efficacy. Model 3 adjusts for grade, sex, nuclear family structure, familism, parental respect, adult use, and older sibling use. Model 4 adjusts for grade, sex, nuclear family structure, school-grade consumption, and perceived peer use.

We did not find any differences in consumption between African American and Caucasian youths, which is inconsistent with other research that has generally found lower rates of alcohol and drug use in African American compared with Caucasian youths ages 12 and older (Chen and Unger, 1999; French et al., 2002; Herd, 1990; Kandel, 1995). Our null

findings for any difference between African Americans and Caucasians could be explained in part, by the smaller sample of African American adolescents, which somewhat reduced the power of the study to detect such differences.

Findings from the mediation analyses suggest that different individual, family, and school factors may partially

explain higher Hispanic and lower Asian use of substances, compared with Caucasians. Individual factors consistently explained higher alcohol, cigarette, and marijuana use among Hispanics. By contrast, family and school factors generally did not play a role in the higher alcohol, cigarette, and marijuana use among Hispanic adolescents. Other research in middle schools has also shown that some family factors, such as familism, are not associated with risk for substance use (Unger et al., 2002). Although high familism is typically linked with Hispanic ethnicity, familism may not have been an important predictor of substance use in this sample, because the Hispanic adolescents in our sample could have been more acculturated to U.S. culture and, therefore, have lower familism, compared with more recent immigrants for example. In addition, the average familism scores were high, and there was limited variability, perhaps contributing to the inability to detect a significant association due to low power.

Results for Hispanics in this sample highlight the importance of targeting individual factors in prevention efforts. For example, providing skills training to strengthen RSE and discussing the effects that expectancies can have on alcohol and drug use are important intervention components that have been used with younger adolescents. Specifically, programs to change outcome expectancies and RSE in adolescents ages 12-18 have been associated with marked reductions in alcohol, cigarette, and marijuana intentions (D'Amico and Edelen, 2007; Orlando et al., 2005; Skenderian et al., 2008; Trudeau et al., 2003; Winkleby et al., 2004). Thus, universal prevention efforts that focus on individual-level factors, and especially negative expectancies and RSE, may be particularly important for young Hispanic adolescents.

For Asians, individual, family, and school factors partially accounted for lower use. The observation that RSE mediated differences in alcohol use among Asians concurs with findings for college students (Oei and Jardim, 2007). However, we found that, in this younger sample, not only RSE but also positive alcohol expectancies were mediators, suggesting that targeting positive expectancies during earlier adolescence may be especially useful to maintaining the lower rates of alcohol use in Asians.

Lower use in Asians was also influenced by parental respect and older sibling use but not by familism. This is consistent with prior research that has found that parental respect is a characteristic frequently associated with Asian culture (Unger et al., 2002), and is also associated with lower substance use (Unger et al., 2002, 2006). Thus, prior interventions that have successfully targeted individual factors to reduce substance use in adolescents could be particularly important for Asians to maintain low positive expectancies and promote RSE. In addition, interventions that aim to provide a more realistic estimation of perceived peer use may be particularly salient to reduce substance use in younger Asian adolescents. Parental respect also appears to be protective for

Asians in this younger age group; thus, interventions that specifically encourage positive parent-child communication, cohesion, and interaction—and also strengthen adolescents' respect for their obligations and responsibilities to their parents (Unger et al., 2002; Velleman et al., 2005; Weiss et al., 2006)—may be especially successful in maintaining lower alcohol, cigarette, and marijuana use among some Asians.

There are several limitations to note in our study. First, our sample consists of a very diverse group of adolescents in southern California and is not necessarily generalizable to the larger population of middle school adolescents in the United States. Second, we were not able to assess other community or family factors that have been linked to racial disparities in substance use among adolescents, including low neighborhood socioeconomic status, which may influence access to substances; parental attitudes toward alcohol, cigarette, and marijuana use; or other psychosocial correlates (e.g., social support, violence in the home) that have been linked to racial/ethnic disparities in substance use among adolescents (Bossarte and Swahn, 2008; Watt, 2004; Watt and Rogers, 2007). Third, our goal was to examine the variation in substance-use rates by broad categories of race/ethnicity, and therefore we did not examine variation in substance use by Asian or Hispanic subgroups. Fourth, given the young age of this sample and low rates of use, we did not have enough variability to examine age of initiation and escalation in the level of use over time. Finally, we used self-reported substance use, of which the limitations are well documented (Chan, 2008), although our protocol discussed confidentiality, used scan forms, and had study staff rather than teachers conduct the administration and collect forms (D'Amico and McCarthy, 2006; Dennis et al., 2002; Shillington and Clapp, 2000). Despite these limitations, this study is an important first step to estimate racial/ethnic differences in substance use across a diverse sample of young adolescents.

In sum, our findings provide valuable information on racial/ethnic disparities in alcohol, cigarette, and marijuana use, and add substantial knowledge about the importance of individual, family and school factors in contributing to racial/ethnic disparities in alcohol and drug use among a very large sample of younger adolescents. Few existing intervention programs are culturally grounded for the ethnic culture of students (Gosin et al., 2003) or the stage of development of adolescents (Brown, 2001; D'Amico et al., 2005b). We identified consistent individual, family, and school factors that may serve as important targets for future intervention research that is more culturally appropriate for younger adolescents of different racial/ethnic groups. Future research is needed to examine other individual, family, and school factors that may contribute to racial/ethnic differences in alcohol, cigarette, and marijuana use, including sensation-seeking behavior, parental attitudes toward substance use, parental monitoring, acculturation, and racial/ethnic make-up of school populations, which have been previously linked



with early adolescent substance use (Beyers et al., 2004; Botvin et al., 1998; Chilcoat and Anthony, 1996; Fosados et al., 2007; Kim and McCarthy, 2006; Kopstein et al., 2001; Steinberg et al., 1994; Unger et al., 2009). In addition, studies with prospective data should examine whether individual, family, and school factors contribute to both age of initiation and escalation of alcohol and other drug use among younger adolescents over time. This future work could help identify additional targets for intervention, with the ultimate goal of reducing the incidence of alcohol, cigarette, and marijuana use among middle school adolescents.

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