Substance Use and Abuse by Asian Americans and Pacific Islanders: Preliminary Results From Four National Epidemiologic Studies

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SYNOPSIS

Objective: The authors analyzed four recent large national surveys to assess the degree of use and abuse of a wide range of psychoactive substances across subgroups of Asian Americans and Pacific Islanders (AAPIs) and in comparison with whites.

Method: The surveys analyzed were the 1999 National Household Survey on Drug Abuse, the 1992 National Longitudinal Alcohol Epidemiologic Survey, and the 1995 National Longitudinal Study of Adolescent Health In-School and In-Home surveys. The AAPI sample sizes varied from 900 to more than 4,500 across the four surveys.

Results: Among major racial groups, use of major substances is lowest for AAPIs. Among disaggregated AAPI groups, Japanese Americans have the highest substance use rates. Mixed-heritage AAPIs are at high risk for substance use, even after controlling for cultural protective factors and socioeconomic measures. Differential rates correspond to the ranking of several acculturation and socioeconomic indices.

Conclusion: The results, while preliminary, point to the importance of rethinking ethnic and racial classifications for estimating substance use and abuse, for studying substance abuse problems in mixed-heritage adolescents, and for studying socioenvironmental and potentially genetic protective factors.

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INTRODUCTION

By 2050 the proportion of Asian Americans and Pacific Islanders (AAPIs) will more than triple, to an estimated 10% of the U.S. population.[1] The proportion of mixed-heritage AAPIs is increasing as well. Among U.S.-born Asians the extent of out-marriage (marriage outside one's own ethnic origin) increased from 35.9% for women and 33.1% for men in 1980 to 42.5% for women and 37.7% for men in 1990.[2] In Hawaii the out-marriage rates for 1980-89 were 65.4% for Chinese, 49.9% for Filipino, 44.8% for Japanese, 67.4% for Korean, and 51.6% for Vietnamese Americans.[3]

The preliminary Census 2000 data analyses show that AAPI adolescents are increasingly likely to be mixed-heritage. In four states with larger than average AAPI representation (Hawaii, California, Washington, New York), AAPIs younger than 18 are twice as likely to report multiple races as those 18 or older (table 1). Including mixed-heritage AAPIs in estimates of the AAPI population increases the estimates significantly. In Hawaii, for example, including mixed-heritage AAPIs increases their proportion of the state's AAPI population from 51% to 81%.

Basic sociodemographic information on mixed-heritage AAPIs from surveys has been scarce until recently. According to the California Vital Statistic Birth Records, mixed-heritage births increased from under 12% in 1982 to more than 14% in 1997.[5] Among this cohort of mixed-heritage children, 23% were of Asian descent.

To address the substance use problems of AAPIs and mixed-AAPI groups, we must understand the prevalences and behavior patterns of these groups. The research on AAPI health disparities in drug abuse is still limited largely to alcohol and cigarette smoking,[6] however; few credible epidemiologic studies document drug use and abuse among a wide range of AAPI subpopulations.[7,8] A 1991 review of more than 250 articles on Asian American populations revealed that about 50 were related to substance use, mental health, and high-risk behaviors; only a handful pertained to epidemiologic information necessary to assess illicit drug use patterns among different AAPI subgroups in the United States. National surveys, which provide aggregate results only for Asian Americans as a whole, indicate that substance abuse among this group is the least problematic of all racial and ethnic groups.[9]

Some local data point to increases in alcohol abuse and use of illicit drugs among segments of AAPIs in Hawaii and on the West Coast.[10-12] AAPIs were among those responsible for local epidemics of "ice," a smokable form of methamphetamine, particularly in San Francisco and Hawaii.[13,14] Cigarette smoking among male immigrants from Southeast Asia is higher than in the general U.S. population.[15] While overall substance use remains less prevalent among AAPIs than white adolescents, higher rates of use are reported for some classes of illicit drugs in some locales.[16] Illicit drug use by Native Hawaiian middle school students, for example, exceeded that of whites in the 1990s.[17]

A persistent perception that AAPIs are at lower risk for substance abuse has been sustained in part because of the recognized ethanol sensitivity among Mongoloids, in which the deficiency of the aldehyde dehydrogenase isozyme (ALDH2) causes high sensitivity to alcohol.[18,19] This sensitivity, also known as the "flushing syndrome," is most commonly observed among Chinese, Japanese, and Koreans. ALDH2 deficiency, rarely found in whites, occurs in 40%-50% of Japanese.[20]

No susceptibility or protective genes have been confirmed for illicit drugs, but much has been learned about the role of genetics in the metabolism of nicotine.[21] A recent study of smoking with genotype frequencies for cytochrome P450 2A6 (CYP2A6) alleles

Table 1. Percentage of mixed-heritage AAPIs in four states

Item	Hawaii	California	Washington	New York
Younger than 18 reporting two or more races	37.2	7.3	6.8	4.2
18 or older reporting two or more races	16.3	3.8	2.5	2.7
AAPI minimum population[a]	51.0	11.2	5.9	5.5
AAPI maximum population[b]	81.3	13.0	7.4	6.4

[a]People who reported multiple races are excluded in the number of AAPIs in the state.
[b]People who reported multiple races are included in the number of AAPIs in the state.
Source: U.S. Census Bureau, Census 2000.

showed a correlation of the wild-type CYP2A6*1 with tobacco dependence.[22] Mutations of CYP2A6 have been reported at a higher frequency among the Japanese[23] and Chinese.[24]

Ethnic group-specific immunity resulting from alcohol or nicotine metabolism genes may have implications beyond the particular substance in which the genes are involved. For example, ALDH2 genotypes among Asian American college students were associated not only with regular drinking and drinking quantity but also with regular tobacco use,[25] shedding new light on ethnic differences in the stages of substance use and abuse.

Socioenvironmental studies that discount a genetic role in alcoholism point to the importance of acculturation in variations in substance use among AAPI populations.[26-28] Another important factor may be stress-induced substance use (self-medication), particularly among groups with a history of trauma, such as refugees.[29] The cultural norms for less-acculturated populations may facilitate substance abuse[30] and obstruct early intervention.[7]

Only a small number of studies has examined differential effects of well-documented risk factors for substance use among European, African, and Asian Americans.[31,32] Little has been documented about the comparability of risk and protective factors across subgroups of AAPIs or the validity of applying risk and protective factors identified for the majority U.S. population to heterogeneous AAPI populations.[17,33] The dearth of research reflects the sparsity of community data that include measures of these factors for AAPI subgroups. This lack of research has contributed to uncritical acceptance of the genetic immunity hypothesis when low prevalence is found or to hasty rejection of biological differences when a drug epidemic erupts in a local population.

Taking advantage of recently improved racial and ethnic classification schemes and the availability of large national epidemiologic surveys that include sufficient information on a wide range of substances used, we assess differences in prevalence of substance use and abuse among AAPI ethnic groups. Attention is paid to the association between mixed heritage and substance abuse because it provides a key to understanding inconsistent national and local survey results. We examine the association of acculturation and socioeconomic status with substance use to determine whether the differential rates among AAPI subgroups reflect underlying differences in these factors.

Methods

Datasets. We used datasets from four large-scale national surveys: the National Household Survey on Drug Abuse, 1999 (NHSDA99),[34] the National Longitudinal Alcohol Epidemiologic Survey, 1992 (NLAES92),[35,36] and the National Longitudinal Study of Adolescent Health In-School and In-Home surveys, 1995 (Add Health S95, Add Health H95).[37,38] We chose these surveys because they included systematic epidemiologic sampling, which allows for the generalization of findings; sufficient numbers of respondents in AAPI subgroups; and measures for assessing use and abuse of a wide range of psychoactive substances, as well as acculturation and socioeconomic measures. Because the measures necessary for replicating the major findings from the NLAES and Add Health were not publicly available at the time of this writing, we relied on published estimates from the NHSDA99.

Samples. We used data from four sources. NHSDA99's computer-assisted self-interviews covered 66,706 civilian, noninstitutionalized people distributed across three age groups: 12-17, 18-25, and 26 years or older. AAPIs accounted for 3.6% of the sample.[34]

The NLAES92 included a total sample size of 42,682, with AAPIs representing 2.3%.[35,36] The population included civilian, noninstitutionalized residents in the contiguous 48 states, 18 years and older.

The Wave I In-School survey (Add Health S95) included a total sample size of 90,118, of whom 51% were AAPIs. The Wave I In-Home survey (Add Health H95), conducted from September 1994 through December 1995, covered 20,745 respondents, of whom 6.6% were AAPIs.[37,38]

Table 2 summarizes sample size, gender, race/ethnicity, and age or grade distribution for the four data sets. The mixed-race category was computed on the basis of the multiple racial and ethnic categories available in the NHSDA99 and Add Health. The numbers in other categories are exclusive of those counted in the mixed-race group. AAPIs represented 3.5% of the nation's population in 2000.[4] Higher percentages of AAPIs are shown for Add Health, primarily because Chinese American students were oversampled.

Measures. *Race and ethnicity.* All four studies used the revised race/ethnicity classification standards defined by the Office of Management and Budget (OMB) Directive 15,[39] and all included questions about AAPI ethnicities. In the NLAES92, AAPI ethnicity

Table 2. Demographic characteristics of respondents in four national studies (percent, except where otherwise indicated)

Household surveys			School surveys		
Demographic	NHSDA 1999	NLAES 1992	Demographic	Add Health S1995	Add Health H1995
Total sample size	66,706	42,862	Total sample size	90,118	20,745
Gender			Gender		
Male	48.1	41.6	Male	49.9	49.5
Female	51.9	58.4	Female	49.5	50.5
Race/ethnicity			Race/ethnicity		
Asian American and Pacific Islander	3.6	2.3	Asian American and Pacific Islander	5.1	6.6
White	69.0	81.0	White	52.2	50.6
African American	12.0	14.2	African American	16.7	21.1
American Indian	1.1	0.7	American Indian	1.5	1.1
Hispanic	12.7	—[a]	Hispanic	3.1	7.2
Other	—[a]	1.7	Other	14.0	8.3
Mixed	1.6	—[a]	Mixed	7.3	5.0
Age			Age		
12-17	38.0	0.0	12-17	13.8	13.5
18-24	29.1	11.9	18-24	13.4	13.5
25-34	15.6	22.9	25-34	20.8	17.9
35-44	6.6	21.0	35-44	19.6	19.7
45-64	7.1	24.2	45-64	17.2	18.9
65 and older	3.6	20.0	65 and older	15.2	16.6

Note: Categories may not add to total because of missing cases. Race/ethnicity may not add to total because the Hispanic category was derived separately from the race classifications from which mixed-race categories were compiled. All percentages are based on unweighted data.
[a]Not assessed, or assessed but overwritten by another race/ethnicity category.

identification was based on a single question about ethnicity of origin. A separate question about self-identified race was combined to create a surrogate category of "mixed heritage." The NHSDA99 and Add Health used race/ethnicity classifications similar to those used in the U.S. Census 2000, making multiple race and/or ethnic identifications possible. However, the published reports of the NHSDA99 did not include overlapping classifications. The AAPI ethnicity identification in Add Health S95 was a discrete category but allowed for multiple-race reporting. In Add Health H95 multiple AAPI ethnicity was also allowed; an adolescent could be thus counted in multiple AAPI subgroups. The comparison group of whites excluded AAPIs who are mixed with white or who self-identify as white.

Substance use and abuse. We attempted to cover a wide range of substance use and abuse measures. However, because of small numbers for some AAPI subgroups and the availability of measures, illicit drug use measures were restricted to those drugs most commonly used, including sedatives, stimulants, marijuana, cocaine, and inhalants (adolescents only) and measures of any drug use. Because results from the NHSDA99 were obtained from published reports, we did not match the NHSDA99 measures to those of the NLAES92 and Add Health. Rather, for the NHSDA99 we chose those measures when reliable estimates were obtained for most AAPI subgroups. Clinical measures were not available from Add Health. For adult AAPI subgroups reliable estimates were obtained only for heavy drinking and DSM-IV alcohol dependence.[40] The Add Health In-School survey had an AAPI sample size of more than 4,500, but it included only crude alcohol and tobacco use measures. Therefore, we used illicit drug use measures from the In-Home survey, even though the AAPI sample size was much smaller.

Table 3. Rates of substance use and abuse among AAPI subgroups

Substance	White n = 46,054	Japanese American n = 214	Filipino American n = 366	Chinese American n = 294	Korean American n = 199	Vietnamese American n = 228
5+ drinks per occasion, 1 or more days, past month	21.0	13.1	10.2	9.1	—	—
5+ drinks per occasion, 5 or more days, past month	6.1	2.8	1.3	1.2	3.5	2.8
Cigarette smoking, past year	31.4	21.6	21.1	19.9	—	—
Marijuana use, past year	8.9	3.7	7.1	2.9	9.2	6.7
Any illicit drug use, past year	11.8	5.6	7.9	4.5	—	7.9

— = not available.
Note: Weighted to the 1999 U.S. population 12 or older. The AAPI ethnicity identification was based on a single question that combined the racial categories according to OMB Directive 15 and AAPI subgroup categories. Those who chose more than one race category were classified to mixed-race category in the report. Actual sample size varied depending on the number of missing cases for a measure.
Source: Office of Applied Studies. Substance Abuse and Mental Health Services Administration. Summary of findings from the 1999 National Household Survey on Drug Abuse, 2000.

Acculturation and socioeconomic status. None of the surveys used was designed to examine acculturation processes among AAPIs. We attempted to show the association of substance use with acculturation and socioeconomic indicators based on the results from Census survey reports, NLAES92, and Add Health. Using Add Health, we also examined the measures of foreign versus native born for adolescents and their parents, family intactness, parents' educational status, parental employment, and the degree of aspiration to college, in combination with mixed-heritage identification.

Estimation. Sampling weights were used for all prevalence estimation analyses to generalize the results on a particular age group to the nation as a whole. In Add Health, sampling weights were not created for adolescents who were added in the field, selected as pairs of twins or half-siblings where only singletons were interviewed, or were without a sample flag.[41] These cases without weights were excluded from prevalence estimation.

The NHSDA99 results were obtained from detailed published tables, which apply a "low precision" estimate formula, $se(p)/-p\ln(p)>.175$, for a single subgroup, where $se(p)$ is the standard error of the proportion estimate (p).[34] We report only those estimates that did not fall into the low-precision criteria. For the NLAES and Add Health data, we suppressed an estimate when the number of mixed-heritage individuals was less than 15.

To assess significant differences across AAPI subgroups, compare AAPIs with whites, and compare mixed and unmixed AAPIs, we used the Taylor series linearization method using SUDAAN to adjust variance estimates.[42] To simultaneously control for acculturation, socioeconomic indicators, and mixed-heritage, we used multivariate logistic regression for weighted data from the Add Health In-School dataset. The Huber-White method in SAS was used to correct for variances.[43]

Results

Prevalence. Past-month prevalence rates of illicit drug use are shown separately for adolescents 12-17 and adults 18 and older (figure 1).[34] In general, adolescents reported higher rates of illicit drug use than adults, across racial and ethnic boundaries. Consistent with past reports derived from national surveys, the rates for Asian Americans were the lowest. Rates for American Indians and Alaska Natives (AIANs) were about four times as high as rates for Asian Americans, and rates for AIAN adolescents were more than twice as high as those of Asian American adolescents. Mixed-race adults had higher use rates (11.1%) than other racial and ethnic groups. The rate for mixed-race adolescents (11.6%) was not substantially different from those for European,

African, or Hispanic Americans. It was substantially lower than the rate for AIAN adolescents.

Usage rates for each of the five representative AAPI subgroups—Japanese, Filipino, Chinese, Korean, and Vietnamese Americans—were substantially lower than those for whites (table 3).[44] No consistent pattern was found that supports differential rates of substance use and abuse among AAPI subgroups. Including both adolescents and adults, for example, the prevalence estimate of past-year marijuana use was highest among Korean Americans (9.2%); the rate for Vietnamese Americans (6.7%) was almost twice as high as the rate among Japanese Americans (3.7%). These estimates are based on relatively small numbers and may reflect random fluctuation.

Our analyses of the NLAES92 data found that substance use rates were highest among Japanese Americans for alcohol and certain classes of illicit drugs (table 4). Those rates were comparable to rates among whites, except for past-year drinking (which is not statistically different from the rate for whites). The rates among Vietnamese Americans were lowest. An exception to this ranking was cigarette smoking, which was highest among Korean Americans (33.5%). Although the sample sizes of AAPI subgroups are small, the rates for several measures among Filipino, Chinese, and Vietnamese Americans were significantly lower than the rates among Japanese Americans.

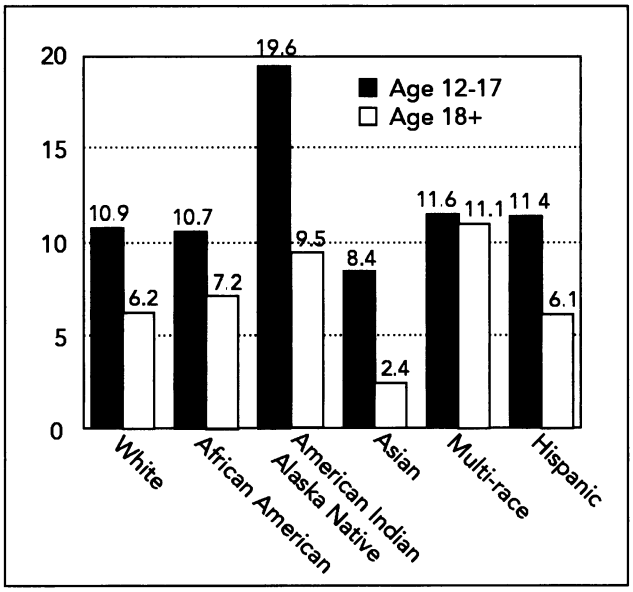

Figure 1. Prevalence of illicit drug use by race/ethnicity, past month

Source: Summary of Findings from the 1999 National Household Survey on Drug Abuse, 2000.

Analysis of Add Health data yielded results that are consistent with the results obtained from the NLAES92 but inconsistent with reported rates from the NHSDA99. Among the five AAPI subgroups, Japanese American adolescents reported the highest levels of use of alcohol, marijuana, inhalants, and other illicit drugs (table 4). Cocaine was the only drug for which AAPI usage rates were not highest among Japanese Americans. Use rates among Japanese Americans were close to those of whites; for marijuana, cocaine, and other illicit drug use, the rates were higher than among whites, although the differences are not statistically significant. Ranking of use levels across the five AAPI subgroups closely resembles the ranking of the rates observed among adult AAPIs in the NLAES92. However, the data reveal higher rates of drinking and smoking by Korean American adolescents than by Chinese American adolescents.

Acculturation and Socioeconomic Status. U.S. Census Bureau data on indicators of acculturation (foreign-born, speak native tongue at home), immigration patterns (immigrated after 1975, median age), and socioeconomic indicators (number of people in household, high school graduation, per capita income) reveal large differences between Japanese and Vietnamese Americans (table 5).[45] Differences are less striking among Filipino, Chinese, and Korean Americans. This ranking is identical to the rankings for use of several licit and illicit classes of substances obtained from the NLAES92 and Add Health (table 4).

Effects of Mixed Heritage on Substance Use. Rates of substance use were estimated separately for mixed and unmixed AAPI subgroups. For the NLAES92, racial identity of white was used as a proxy measure for "mixed race"; for Add Health, reporting of multiple races was used. For the NLAES, the numbers of Korean and Vietnamese Americans who reported being white were too small to conduct meaningful analyses. The results for the other three subgroups show that the rates of current drinking and past-year smoking were generally higher among AAPIs who identified themselves as white (table 6). An exception was past-year cigarette use among Chinese American adults. Cigarette smoking among Chinese Americans who identified themselves as white was significantly lower than among Chinese Americans who considered themselves Asian. Given the small number of Chinese Americans who considered themselves white (n = 17), however, the result is not statistically significant.

Table 4. Rates of substance use and abuse among AAPI subgroups (percent)

Adults[a]

Substance	White n = 34,489	Japanese American n = 314	Filipino American n = 185	Chinese American n = 230	Korean American n = 123	Vietnamese American n = 89
Drank any, past year	46.9	37.5	31.5	19.5[b]	28.9	18.1[b]
Alcohol dependence, ever[c]	14.2	12.8	10.1	4.5[b]	9.7	3.4[b]
Cigarette smoking, past year	30.0	26.4	15.8[b]	8.8[b]	33.5	11.5[b]
Sedative use, 12+ times, ever	2.4	3.0	1.5	0.6	0.0[d]	0.8
Stimulant use, 12+ times, ever	4.5	5.1	2.5	3.0	0.0[d]	0.0[d]
Marijuana use, 12+ times, ever	14.6	12.8	8.5	2.3[b]	3.1[b]	0.0[d]
Cocaine use, 12+ times, ever	3.9	4.0	1.7	0.0[d]	0.0[d]	0.0[d]
Any drug use, 12+ times, ever, and used, past year	5.3	4.2	2.5	2.3	2.3	0.0[d]

Adolescents[e]

In-School survey	White n = 50,397	Japanese American n = 521	Filipino American n = 1,579	Chinese American n = 749	Korean American n = 664	Vietnamese American n = 499
Drank 2-3 times, ever	58.1	56.4	52.7	41.1[b]	48.0[b]	35.8[b]
Drank beer, wine, or liquor, past year	55.5	51.5	50.6	38.9[b]	44.4	36.5[b]
Got drunk, past year	33.2	31.7	28.7	16.4[b]	21.0	20.5
Smoked cigarettes, past year	39.1	36.0	36.0	21.7[b]	31.6	23.4
In-Home survey	**n = 11,621**	**n = 103**	**n = 662**	**n = 389**	**n = 113**	**n = 75**
Marijuana use, ever	25.9	31.6	28.6	19.3	11.1[b]	4.7[b]
Cocaine use, ever	3.6	3.7	4.7	3.3	0.0[d]	0.0[d]
Inhalant use, ever	6.8	6.4	3.6	6.1	5.5	2.1
Other illicit drug use, ever	9.4	12.0	6.4	7.6	2.6	2.2[b]

Note: Actual sample size varied depending on the number of missing cases for a particular measure. Standard errors were adjusted using SUDAAN.

[a]Data on adults come from the National Longitudinal Alcohol Epidemiologic Survey (1992). The data are weighted to the U.S. population 18 or older according to the 1990 Census. AAPI ethnicity was based on a single question about the ethnicity of origin, which was mutually exclusive.

[b]Rate is significantly lower than that for Japanese Americans ($p<.05$).

[c]Based on DSM-IV diagnostic criteria.

[d]Confidence intervals were not computed when prevalence was zero.

[e]Data on adolescents come from the National Longitudinal Study of Adolescent Health In-School and In-Home surveys (1995). The data are weighted to represent the population of adolescents in grades 7-12 in the U.S., 1994-96. AAPI ethnicity identification in the In-School survey was mutually exclusive but allowed for multiple race reporting. The In-Home survey allowed respondents to select multiple AAPI ethnicities, so some adolescents are included in more than one group. Data on adolescents exclude cases without weights (cases added in the field, cases selected as pairs of twins or half-siblings in which only singletons were interviewed, and cases with a sample flag).

Differences between mixed- and unmixed-heritage AAPIs were greater among adolescents in the Add Health Survey, and many of these differences—most notably the measure of getting drunk in the past year—were statistically significant (table 6). The effect of mixed heritage appeared greatest among Chinese and Vietnamese Americans. Chinese American adolescents were 4.3 times as likely to use substances as unmixed-heritage Chinese American adolescents (41.7% versus 9.7%); mixed-heritage Vietnamese Americans were 3.8 times as likely to use substances as unmixed-heritage Vietnamese American adolescents (49.4% versus 12.9%).

A similar trend was observed in the In-Home Add Health data. However, because of small sample sizes of AAPI adolescents (73-389), statistical power was lacking to detect significant differences for most rates.

Preliminary multivariate analyses using the In-School Add Health measures confirmed an independent effect of mixed-race (data not shown). Relative to unmixed-race AAPIs, mixed-race AAPIs were twice as likely to have gotten drunk (OR = 2.06), and more than 40% were more likely to have smoked cigarettes (OR = 1.48) in the past year. (These results controlled for potentially confounding measures, such as age, gender, being foreign-born, each parent being foreign-born, living with two parents, mother and father's employment, aspiration to attend college, and being of a particular AAPI subgroup). For foreign-born adolescents, the risk of getting drunk or smoking cigarettes was about 20% lower than for adolescents born in the United States. If their mothers were also foreign-born, the risk was 40% lower. Parental education and employment did not appear to affect substance use. The lack of predictive power of employment may be due to the crude nature of the employment measures (mother or father work) used. Adolescents with a high aspiration to go to college were about one-half as likely to have gotten drunk or smoked cigarettes in the past year. Overall, mixed race and college aspiration had the strongest and most significant ($p < .001$) effects on these two measures of substance use.

DISCUSSION

The results obtained from our analysis of the NLAES and Add Health data point to different patterns of substance use and abuse among five subgroups of AAPIs in the United States. For both adults and adolescents, use and abuse rates among Japanese Americans are close to those of whites for most substances and exceed them somewhat in a few classes of substances. Adult and adolescent Vietnamese Americans reported the lowest levels of substance use and abuse. These differences have been masked in other national surveys because only the broad "Asian" category has been available.[46] They may unwittingly have helped sustain the notion of Asian Americans as a "model minority."[47]

We also found that the ranking of substance use and abuse documented from the NLAES and Add Health was consistent with the ranking of acculturation and socioeconomic indicators of the five AAPI subgroups. These differences appear to be tied to the year of immigration and the number of years an immigrant has spent living in the United States. Japanese Americans, many of whom are the descendants of immigrants who came to the United States in the early 20th century, have the highest level of acculturation and socioeconomic status. Vietnamese Americans, many of whom arrived after the end of the Vietnam War in 1975, rank lowest in terms of both measures.[48]

The rates of substance use obtained from the NLAES and Add Health are inconsistent with the published estimates of substance use among AAPI subgroups from the 1999 NHSDA. Of course, the estimates obtained from our own analyses were also derived from small numbers of AAPI subgroups. With all surveys using a complex clustered sampling method, it is possible that these differences reflect sampling biases. However, the discrepancies are unlikely to be due solely to a lack of precision in estimates or potential sampling biases. Our preliminary results suggest that

Table 5. Acculturation and socioeconomic status among the five largest AAPI subgroups

Characteristic	Japanese American	Filipino American	Chinese American	Korean American	Vietnamese American
Foreign born (%)	32.4	64.4	69.3	72.7	79.9
Speak native tongue at home (%)	42.8	66.0	82.9	80.8	92.5
Foreign born and migrated after 1975 (%)	20.0	42.7	50.8	56.3	76.9
Median age	36.3	31.1	32.1	29.1	25.2
Number of people in household	3.1	4.0	3.6	3.6	4.4
High school graduate (%)	89.9	84.2	77.2	89.1	68.5
Per capita income ($)	19,373	13,616	14,876	11,177	9,032

Source: U.S. Census Bureau. We the Americans: Asians, 1993.

Table 6. Mixed heritage and substance use among AAPI subgroups (percent)

Adults[a] Item	Japanese American n = 314	Filipino American n = 185	Chinese American n = 230	Korean American n = 123	Vietnamese American n = 89
Unweighted proportion self-identified as white	**56.4**	**16.2**	**7.4**	**5.7**	**2.3**
Drank any, past year					
AAPIs self-identified as Asian	30.4	31.1	15.3	—[b]	—[b]
AAPIs self-identified as white	46.9[c]	30.0	39.8[c]	—[b]	—[b]
Cigarette smoking, past year					
AAPIs self-identified as Asian	20.1	15.0	9.8	—[b]	—[b]
AAPIs self-identified as white	33.7[c]	18.2	1.5	—[b]	—[b]
Adolescents[d]					
Item In-School survey	**n = 521**	**n = 1,579**	**n = 749**	**n = 664**	**n = 499**
Unweighted proportion reporting multiple races	**43.4**	**22.7**	**19.9**	**24.4**	**16.8**
Drank beer, wine, or liquor, past year					
Unmixed AAPIs	48.5	47.3	32.7	41.4	32.4
AAPIs reporting at least 1 more race	54.5	59.7[c]	62.0[c]	54.2[c]	52.2
Got drunk, past year					
Unmixed AAPIs	24.5	24.3	9.7	17.1	12.9
AAPIs reporting at least 1 more race	39.2[c]	40.6[c]	41.7[c]	33.7[c]	49.4[c]
Smoked cigarettes, past year					
Unmixed AAPIs	26.8	34.6	16.2	32.7	16.7
AAPIs reporting at least 1 more race	45.5[c]	39.8	42.3[c]	28.1	48.7[c]
In-Home survey[e]	**n = 103**	**n = 662**	**n = 389**	**n = 113**	**n = 75**
Unweighted proportion reporting multiple races	**36.9**	**11.3**	**19.0**	**8.0**	**8.0**
Marijuana use, ever					
Unmixed AAPIs	32.9	26.3	11.3	—[b]	—[b]
AAPIs reporting at least 1 more race	29.0	40.2	36.5[c]	—[b]	—[b]
Cocaine use, ever					
Unmixed AAPIs	3.2	3.7	1.7	—[b]	—[b]
AAPIs reporting at least 1 more race	4.8	9.9	6.7	—[b]	—[b]
Inhalant use, ever					
Unmixed AAPIs	6.3	2.5	4.8	—[b]	—[b]
AAPIs reporting at least 1 more race	6.7	9.3	9.0	—[b]	—[b]
Other illicit drug use, ever					
Unmixed AAPIs	15.5	4.5	6.4	—[b]	—[b]
AAPIs reporting at least 1 more race	4.6	16.2[c]	10.2	—[b]	—[b]

Note: Standard errors were adjusted using SUDAAN.
[a]Data are weighted to the U.S. population 18 or older according to the 1990 Census. The AAPI ethnicity identification was based on a single question about the ethnicity of origin, which was mutually exclusive. The race identification was a question asking self-identified race according to OMB Directive 15.
[b]The rate not reportable because the number of the mixed heritage within an AAPI subgroup was smaller than 15. Intra-AAPI mixed ethnicity was not considered.
[c]The rate among a mixed-heritage group is significantly higher than its unmixed counterpart ($p<.05$).
[d]Data are weighted to represent the population of adolescents in grades 7-12 ,1994-96 in the U.S. See table 4, note e, for the AAPI ethnicity identification.
[e]Excludes cases without weights.
Source: National Longitudinal Alcohol Epidemiologic Survey (1992) and National Longitudinal Study of Adolescent Health In-School and In-Home surveys (1995).

treatment of mixed-heritage adolescents and adults is a key to understanding the observed inconsistencies. We found that the rate of substance use among Chinese and Vietnamese American mixed-heritage adolescents is up to four times greater than that for unmixed-heritage adolescents of the same subgroups. In light of the genetic protective factor of ALDH2 and potentially CYP2A6, at least among the Japanese and Chinese, it is unclear whether the increased rates in mixed-heritage AAPIs, a majority of whom are mixed with whites, are due to the decreased effect of environmental protective factors, to decreased genetic "immunity," or both. Our preliminary analyses show that mixed heritage has a large, statistically significant effect on adolescent drinking and smoking cigarettes, independent of age, gender, cultural background, parental socioeconomic indicators, and aspiration to attend college.

This study has several limitations. None of the four surveys on which it is based was designed to examine substance use among AAPIs or their risk and protective factors. Neither the NLAES nor the NHSDA99 had sufficient sample sizes for all five AAPI subgroups. The Add Health In-School survey contained a sufficient sample size for each AAPI subgroup, but estimates of illicit drugs had to be derived from the Add Health In-Home survey, which included only small numbers of AAPIs. Some estimates were not reportable because of an insufficient sample size, and some reported estimates lacked sufficient power to show significant group differences (across AAPI subgroups or between mixed and unmixed AAPI subgroups). To our knowledge, however, our study represents the first systematic effort to document the differences in patterns of substance use among AAPIs from large national surveys.

We relied on published estimates from the NHSDA99 survey because the measures needed to replicate the findings from the NLAES and Add Health were not yet available. While systematic compilation of published data helped make the point that those data conform to the notion of Asians as a "model minority," we do not believe that the estimates from the NHSDA99 are incorrect. Once we are able to incorporate the measures of mixed race/ethnicity, the re-estimated results may be consistent with the results from the NLAES and Add Health documented in this study.

Another limitation of this study is the fact that none of the four surveys contained detailed measures of acculturation or socioeconomic status with sufficiently large AAPI sample sizes. We introduced census data to show the association between substance use and socioenvironmental factors. The lack of predictive power of employment in multivariate analyses using the Add Health In-School data may be due to crude assessment of employment measures, thereby potentially overestimating the protective impact of acculturation.

AAPI adolescents are at a higher risk for substance use and abuse than adult AAPIs. Close monitoring is needed of substance use patterns of mixed-heritage AAPIs, who face higher risks than other AAPIs. The confounding factors of acculturation and socioeconomic status also need to be studied. Researchers need to investigate the process by which socioenvironmental protective factors erode, keeping in mind that genetic differences may exist between mixed- and unmixed-heritage AAPIs.

Future studies of substance abuse among AAPIs should obtain histories of ethnic origins of study participants and their family members. More refined race/ethnicity measures would allow researchers to capture the growing heterogeneity of AAPIs, perhaps using intergenerational ethnic composition measures.

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