Gender and ethnic differences in smoking, drinking and illicit drug use among American 8th, 10th and 12th grade students, 1976–2000

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Submitted 3 January 2002;
initial review completed 15 April 2002;
final version accepted 17 May 2002

ABSTRACT

Aims This paper examines ethnic differences in licit and illicit drug use among American 8th, 10th and 12th grade students, with a particular focus on girls.
Design The study uses cross-sectional data from large, ethnically diverse, nationally representative samples of 8th, 10th and 12th grade girls.
Setting Data were collected through questionnaires administered in schools.
Participants A total of 40 416 8th grade girls and 37 977 8th grade boys, 35 451 10th grade girls and 33 188 10th grade boys, and 33 588 12th grade girls and 31 014 12th grade boys took part in the study.
Findings Across ethnic groups, drug use is highest among Native American girls and lowest among black and Asian American girls. Trend data suggest that there have been important changes in girls' drug use over time and that girls' and boys' drug use patterns are converging.
Conclusions Drug use is widespread among American adolescent girls. Future research should examine further girls' drug use and seek to identify whether risk and protective factors identified in past research, based on predominantly white samples, are also important predictors for drug use among non-white girls.

KEYWORDS Adolescents, alcohol, drugs, ethical differences, gender, tobacco.

INTRODUCTION

Historically the abuse of tobacco, alcohol and illicit drugs has been perceived primarily as a problem of men. Despite this perception, however, numerous recent studies demonstrate that substance abuse severely impacts the well-being of women as well (Wetherington & Roman 1998; USDHHS 1998, 2000, 2001; Lex 2000). In fact, substance abuse is the leading preventable cause of women's morbidity and mortality, accounting for 200 000 premature deaths each year (Wetherington & Roman 1998). Women who use drugs and experience their negative consequences initiated use typically during adolescence (Johnson & Gerstein 1998; Wetherington & Roman 1998). Accordingly, efforts to prevent drug use and drug-related problems among *women* should begin with an accurate understanding of drug use among *girls*.

To date, much of the research on girls' drug use and on gender differences in girls' and boys' drug use has focused on white youth (Caetano 1994; USDHHS 1994; Wetherington & Roman 1998; Johnston, O'Malley & Bachman 2001). The few studies that have examined drug use among non-white girls, and/or gender differences in drug use within non-white populations, tend to share a number of important limitations. These limitations include a lack of ethnic diversity, the use of samples that are small or locationally restricted (e.g. inner-city), and/or a focus on a single drug (USDHHS 1998, 2000, 2001). Because of these and other limitations, the generalizability of the findings from past

research is largely unknown. Even studies that include girls of different ethnic groups in their samples have, typically, been limited to comparisons between white, black and, on occasion, Hispanic girls. As a result, knowledge about the substance use patterns of Asian American and Native American girls is especially limited, particularly within the national context (USDHHS 1994, 2000; Wetherington & Roman 1998).

One of the few national studies to examine ethnic differences in adolescent drug use and to include data on girls and boys found that drug use was, on average, highest among Native Americans, at an intermediate level among whites and Hispanics and lowest among blacks and Asian Americans (Bachman *et al.* 2001). Although gender differences were not an explicit focus of the study, the data indicated that drug use was typically higher among boys than girls and that the patterns of gender and ethnic differences in drug use were relatively consistent over time and across drugs. A key limitation of the study was that the findings were based on data from high school seniors and thus missed the onset of substance use for most young people, and underestimated the level of drug use among those groups most likely to drop out of school before their senior year (e.g. Hispanics). An additional concern associated with the study is the fact that the findings are now over a decade old.

Although past research finds higher drug use among boys than girls, trend data suggest that males' and females' drug use prevalence rates for many drugs have converged over time, and in the case of cigarettes the difference has become virtually non-existent (Wetherington & Roman 1998; Johnston *et al.* 2001; USDHHS 2001). Although the extent to which the 'gender convergence' in drug use has occurred across ethnic groups is not yet fully examined, researchers have hypothesized that younger women in the various non-white ethnic subgroups may be more acculturated than their older counterparts and thus may be increasingly likely to ignore traditional cultural norms that advocate for limited use of substances among females versus their male counterparts (Caetano 1994; Wetherington & Roman 1998; Lex 2000).

The present study examines data from large, ethnically diverse, nationally representative samples of 8th, 10th and 12th grade students to increase knowledge on the relationships between gender, ethnicity, age and drug use. Specifically, the data analyses presented below examine the life-time, 30-day, daily and historical trends in tobacco, alcohol and illicit drug use among white, black, Mexican American, Puerto Rican, other Latin American, Asian American and Native American girls.

METHODS

Samples

The data for this investigation were drawn from the University of Michigan's Monitoring the Future study. The study design and methods are summarized briefly below; a detailed description is available elsewhere (Johnston *et al.* 2001). Monitoring the Future uses a multi-stage sampling procedure (Kish 1965) to obtain nationally representative samples of 8th, 10th and 12th graders from the 48 contiguous states. Stage one is the selection of geographic region; stage two is the selection of specific schools—approximately 420 each year; and stage three is the selection of students within each school. This sampling strategy has been used to collect data annually from high school seniors since 1975 and from 8th and 10th graders since 1991. Sample weights were assigned to each student to take into account differential probabilities of selection.

Because Monitoring the Future was designed primarily to provide data representative of the nation as a

Table 1 Gender and racial/ethnic distribution for 8th, 10th and 12th graders (1996–2000 data combined).

	8th				*10th*				*12th*			
	Girls		*Boys*		*Girls*		*Boys*		*Girls*		*Boys*	
Total	40 416	100.0%	37 977	100.0%	35 451	100.0%	33 188	100.0%	33 588	100.0%	31 014	100.0%
White	24 744	61.2%	23 395	61.6%	24 261	68.4%	22 904	69.0%	23 143	68.9%	22 206	71.6%
Black	5857	14.5%	4848	12.8%	4062	11.5%	3493	10.5%	4599	13.7%	3301	10.6%
Mexican American	3101	7.7%	2961	7.8%	2768	7.8%	2656	8.0%	1970	5.9%	1697	5.5%
Puerto Rican	791	2.0%	737	1.9%	434	1.2%	403	1.2%	434	1.3%	329	1.1%
Other Latino/a American	723	1.8%	674	1.8%	632	1.8%	507	1.5%	667	2.0%	619	2.0%
Asian American	1600	4.0%	1661	4.4%	1140	3.2%	1080	3.3%	1082	3.2%	1231	4.0%
American Indian	734	1.8%	801	2.1%	437	1.2%	437	1.3%	274	0.8%	273	0.9%

The multi-stage sampling design with respondents clustered in schools produces larger sampling errors than would a simple random sample of equivalent size. For statistics in the present paper the largest estimated design effects are 6.9, 3.2, 2.6, 2.2, 2.1, 2.3 and 2.1, respectively, for white, black, Mexican American, Puerto Rican, other Latina, Asian and Native American girls and 6.7, 3.0, 2.6, 2.2, 2.1, 2.3 and 2.1, respectively, for white, black, Mexican American, Puerto Rican, other Latino, Asian American and American Indian boys.

whole, not data on gender or ethnic differences, no special effort was made to over-sample girls in any of the ethnic subgroups. Because a number of the ethnic subgroups examined here are a relatively small proportion of the total population, their numbers in the annual samples are also relatively small. To increase the numbers of cases for analysis, we combined data from 1996 to 2000. Because the data came from independent samples of 8th, 10th and 12th graders the analyses were conducted separately, by grade level. The combined samples include data from approximately 78 000 8th graders, 68 000 10th graders and 64 000 12th graders (see Table 1). Even after combining data across years there were too few Cuban Americans in our samples to provide reliable estimates ($n < 200$ per grade), and thus we do not report results for them separately. For the trend analyses we combined the data into two 5-year intervals for 8th and 10th graders: 1991–95 and 1996–2000, and five 5-year intervals for seniors: 1976–80, 1981–85, 1986–90, 1991–95 and 1996–2000.

The statistical significance of the differences in drug use between the various ethnic subgroups is a function of sample size, percentage size and design effects. Accordingly, all variance estimates presented are adjusted for the sampling design (see note to Table 1). In light of the large number of drugs and subgroups that we examine, however, it would be unwieldy to specify significance levels for each comparison. To avoid this problem, we focus our discussion of the results primarily upon those differences that exceed conventional standards for statistical significance (i.e. $P < 0.01$).

Materials and measures

The students completed self-administered, machine-readable questionnaires during a normal class period. Student response rates averaged around 90% for 8th graders, 86% for 10th graders and 84% for 12th graders. Absence on the day of data collection was the primary reason that students were missed; it is estimated that less than 1% of students refused to complete the questionnaire.

The dependent variables focus on the proportion of students who used tobacco, alcohol and a variety of illicit drugs in their life-time, in the last 30 days and on a daily basis. An additional cigarette measure examines the proportion of students who smoked a half-pack or more of cigarettes per day, and an additional alcohol measure focuses on heavy use (i.e. having had five or more drinks in a row, in a single sitting, within the last 2 weeks).

The key independent measures are gender and ethnic identification. Gender is measured by the question, 'what is your sex?' with the response categories, 1 = male, 2 = female. Ethnicity is measured by the following item: 'how do you describe yourself?' The response categories for this measure are 1 = American Indian, 2 = black or African American, 3 = Mexican American or Chicano, 5 = Puerto Rican American, 6 = other Latin American, 7 = Oriental or Asian American, 8 = white or Caucasian. (The authors recognize that each of the ethnic and racial groups is diverse and that treating them as homogeneous groups may mask important within- and between ethnic-group differences. Ideally, more refined measures would be used; unfortunately, no such measures are available in the present dataset. For the sake of simplicity we use the term 'ethnic' throughout the paper although one could argue that we are examining both racial and ethnic group differences.)

RESULTS

Tables 2, 3 and 4, respectively, show girls' life-time, 30-day and daily use of selected illicit drugs, alcohol and tobacco by ethnicity and grade level (the tables also include data for boys for comparison purposes). For each drug, the first row of data shows the percentage of the *total* population (by gender) that has used the specific drug in question, and the next rows show the percentages of students in each of the ethnic subgroups who have done so. The columns of data under each drug show the percentages of students who have used the drug, by grade level (and gender). The specific findings are described more fully below.

Illicit drugs

Marijuana is the illicit drug used most widely by American girls. Approximately 20% of 8th graders, 38% of 10th graders and 45% of 12th grade girls report that they have used marijuana at least once in their life-time (Table 2), between 9% and 19% indicate that they have used it within the last 30 days (Table 3) and between approximately 1% and 3% say they use it on a daily basis (Table 4). Life-time and 30-day prevalence of the other illicit drugs are relatively low for American girls (i.e. less than 10%).

Consistent with past research, the data suggest that there are important ethnic differences in girls' drug use. For example, life-time, 30-day and daily marijuana use (Tables 2, 3 and 4, respectively) are, on average, highest among Native American girls; somewhat lower among Mexican American, Puerto Rican and white girls; lower still among African American and other Latinas; and lowest among Asian American girls. Although the magnitudes of the ethnic differences vary across levels of use and across grades, the general pattern of differences just described is consistent, with the exception being that life-

Table 2 Gender and ethnic comparisons of life-time prevalence (percentages) of selected drugs for 8th, 10th and 12th graders (1996–2000 data combined).

	8th		*10th*		*12th*		*8th*		*10th*		*12th*		*8th*		*10th*		*12th*	
	G	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*
	Marijuana/hashish						**Inhalants**						**Hallucinogens**					
Total	19.8	24.5	37.9	43.4	44.8	51.5	21.0	19.0	17.5	18.6	13.6	17.8	4.5	5.5	8.7	11.0	11.8	15.9
White	18.4	22.7	38.4	42.4	46.8	51.6	22.6	21.5	19.5	20.7	15.7	20.2	5.0	6.0	10.1	12.3	14.0	17.8
Black	18.9	27.5	34.2	42.6	36.0	53.6	10.6	9.2	6.5	7.0	4.6	6.4	0.7	1.5	0.9	2.1	1.2	4.0
Mex Am	28.1	33.3	43.6	54.6	50.3	60.1	27.2	18.9	19.0	19.2	14.8	15.6	7.2	7.7	8.6	12.8	12.1	17.3
PR	23.7	29.9	40.2	43.1	47.4	55.5	18.9	16.8	13.7	11.7	10.5	13.5	4.6	4.7	6.4	7.3	12.5	13.8
Oth Lat Am	17.6	22.2	31.9	38.0	37.5	43.0	22.9	18.0	16.0	13.9	9.9	13.2	3.3	6.9	7.5	7.6	10.1	11.8
Asian Am	6.7	9.2	16.8	25.2	24.1	33.2	16.4	15.2	11.5	13.3	6.7	11.8	2.9	2.1	4.0	5.9	6.1	9.6
Am Indian	41.3	40.5	50.3	58.7	70.4	53.6	26.1	20.0	25.4	22.3	23.9	21.6	8.9	10.1	14.0	15.8	22.7	18.5
	Cocaine						**Heroin**						**Stimulants**					
Total	4.5	4.4	6.7	7.3	7.4	9.7	2.0	2.3	2.0	2.4	1.5	2.4	13.4	9.5	18.6	14.3	16.7	15.0
White	4.2	4.1	6.9	7.1	8.2	10.0	2.1	2.2	2.2	2.4	1.7	2.6	15.2	10.7	21.3	16.2	19.6	17.1
Black	1.1	1.6	1.0	1.6	0.9	2.5	0.6	1.1	0.2	0.8	0.3	0.9	5.4	4.7	5.7	5.2	5.3	5.0
Mex Am	10.7	9.2	14.3	16.2	13.1	18.6	3.3	3.8	2.1	3.2	1.8	3.2	16.3	9.2	17.3	13.0	16.3	14.4
PR	4.5	6.7	5.8	5.8	6.1	10.2	2.3	3.5	1.6	3.1	3.3	2.7	11.7	7.2	11.1	9.1	8.4	10.8
Oth Lat Am	5.4	5.6	6.5	7.5	4.4	10.1	2.1	2.3	1.0	2.7	0.8	0.7	13.2	7.7	16.8	10.7	12.4	9.3
Asian Am	2.2	2.4	3.2	3.3	3.6	5.5	1.3	1.2	1.2	1.4	1.2	1.5	5.9	6.2	8.7	7.6	9.1	8.8
Am Indian	12.4	10.1	10.3	14.3	22.0	14.0	4.7	4.3	3.9	6.0	4.3	3.0	18.7	13.7	30.3	22.4	35.7	21.9
	Tranquilizers						**Alcohol**						**Cigarettes**					
Total	5.2	4.0	8.0	7.1	7.6	8.8	52.2	54.1	71.5	71.1	80.5	80.8	45.0	46.0	58.7	58.4	63.2	65.2
White	5.6	4.4	9.3	8.0	9.1	10.3	51.2	55.5	72.9	72.7	83.0	82.5	45.6	47.2	62.2	60.3	68.4	67.8
Black	1.9	1.9	2.1	1.9	1.3	1.9	50.1	48.3	64.9	58.7	71.8	71.6	39.7	41.9	43.5	45.9	42.3	52.3
Mex Am	8.6	4.6	6.9	6.3	6.1	7.1	61.6	59.6	74.5	76.9	81.9	83.7	50.0	51.1	56.2	63.5	62.9	69.2
PR	6.2	3.9	5.9	3.7	6.7	6.9	60.1	54.9	73.4	72.4	81.1	81.1	51.5	44.8	58.8	53.3	64.2	59.8
Oth Lat Am	7.2	4.9	9.1	7.5	9.0	7.0	57.5	55.4	70.8	66.8	79.7	83.1	41.8	41.6	54.7	50.4	59.4	62.6
Asian Am	1.8	2.5	2.8	3.2	3.8	4.6	34.2	34.8	52.7	57.1	58.8	69.7	24.3	25.4	37.5	44.6	42.4	52.6
Am Indian	6.6	5.5	12.8	9.7	15.2	9.3	65.2	59.2	75.5	81.5	87.1	80.6	65.7	60.9	75.6	73.7	80.2	69.4

G = girls; B = boys.
The largest 95% confidence intervals around percentages are 1.5% for whites, 2.2% for blacks, 2.7% for Mexican Americans, 5.6% for Puerto Ricans, 4.7% for other Latin Americans, 3.3% for Asian Americans and 6.0% for Native Americans.

time, 30-day and daily use of marijuana is equally prevalent among black and white 8th grade girls.

The data on ethnic differences in life-time (Table 2) and 30-day (Table 3) use of other illicit drugs indicate that use is highest among Native American girls across all three grade levels, generally followed by Mexican American and white girls, Puerto Rican and other Latinas, and Asian American and African American girls.

Within the specific ethnic subgroups, life-time drug use prevalence rates are generally lowest among 8th graders, higher among 10th graders and higher still among 12th graders. For drugs other than marijuana, however, grade level differences within the specific subgroups are typically small or non-existent.

With respect to gender differences, the data indicate that in each grade boys are generally more likely than girls to have used marijuana at all levels of use. Similarly, among 12th graders, boys are more likely than girls to have used most of the other illicit drugs. Beyond marijuana, however, life-time and 30-day prevalence of illicit drug use are roughly comparable for 8th and 10th grade girls and boys, and stimulant use among 8th and 10th grade girls exceeds that of boys.

Alcohol

Nationally, 52% of 8th grade girls, 72% of 10th grade girls, and 81% of 12th grade girls have used alcohol at least once in their life-time (Table 2); between a quarter and nearly a half have done so in the last 30 days (Table 3); roughly 1–2% are daily drinkers; and between 14% and 24% have had five or more drinks (in a row, at a single sitting) at least once in the 2 weeks preceding the survey (Table 4).

On average, life-time alcohol use is highest among Native American girls across all three grades, followed by the Hispanic/Latina girls, white girls, black girls and Asian American girls. Thirty-day, daily and heavy alcohol use patterns are similar, except that by senior year

Table 3 Gender and ethnic comparisons of 30-day prevalence (percentages) of selected drugs for 8th, 10th and 12th graders (1996–2000 data combined).

	8th		*10th*		*12th*		*8th*		*10th*		*12th*		*8th*		*10th*		*12th*	
	G	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*
	Marijuana/hashish						**Inhalants**						**Hallucinogens**					
Total	9.0	11.0	17.5	22.1	19.1	25.9	5.5	4.7	2.6	3.1	1.8	3.0	1.2	1.7	2.3	3.4	2.2	4.5
White	8.5	10.2	18.8	22.1	20.8	26.0	6.1	5.5	2.9	3.6	1.9	3.4	1.3	1.8	2.7	3.8	2.6	5.1
Black	7.1	11.6	12.2	19.6	12.7	26.6	2.3	1.9	1.1	1.2	1.1	0.9	0.2	0.6	0.3	0.9	0.3	1.4
Mex Am	13.8	15.1	17.8	26.8	18.7	29.3	6.8	4.3	3.2	2.4	1.5	2.2	2.2	2.6	1.6	3.9	1.9	4.8
PR	10.4	15.4	17.3	23.0	20.7	26.7	4.5	4.3	1.7	1.7	2.4	3.0	2.1	1.4	2.4	4.5	3.8	3.5
Oth Lat Am	5.8	9.8	11.8	16.6	12.9	19.6	5.2	5.0	2.7	1.4	1.2	2.2	1.2	2.6	1.9	2.2	1.0	2.5
Asian Am	2.4	2.7	5.9	11.4	9.1	16.0	3.8	3.2	1.9	2.3	1.0	1.0	0.9	0.8	0.9	1.2	1.0	2.0
Am Indian	24.9	21.8	27.5	32.8	32.0	27.2	6.0	4.6	4.8	3.0	4.8	3.9	2.3	2.3	4.3	5.7	2.9	6.2
	Cocaine						**Heroin**						**Stimulants**					
Total	1.2	1.3	1.6	2.0	1.6	2.8	0.5	0.7	0.4	0.7	0.3	0.7	4.4	2.8	5.9	4.4	4.4	4.6
White	1.1	1.2	1.7	1.9	1.9	2.9	0.5	0.6	0.4	0.7	0.3	0.7	5.3	3.2	7.0	5.2	5.3	5.2
Black	0.2	0.6	0.3	0.7	0.3	1.0	0.3	0.5	0.1	0.3	0.2	0.6	1.2	1.4	1.5	1.1	1.3	1.4
Mex Am	2.8	2.7	3.2	4.6	2.1	5.7	0.5	1.0	0.4	0.9	0.5	0.8	4.5	2.6	4.6	3.4	3.5	4.3
PR	2.0	2.3	1.7	2.2	1.6	4.0	0.9	1.3	0.8	0.7	1.1	1.5	3.3	2.5	3.1	2.1	2.7	3.2
Oth Lat Am	1.4	1.5	1.8	2.0	0.7	1.9	0.5	1.2	0.2	0.7	0.0	0.1	3.3	2.7	3.5	3.8	2.9	2.8
Asian Am	0.9	0.6	1.0	0.8	0.7	2.0	0.3	0.4	0.7	0.4	0.3	0.2	1.5	1.2	2.2	1.8	2.3	2.2
Am Indian	2.4	2.4	2.1	3.9	2.4	5.8	1.2	0.6	0.8	1.2	0.1	1.1	5.9	4.7	10.3	5.6	9.6	5.9
	Tranquilizers						**Alcohol**						**Cigarettes**					
Total	1.4	1.1	2.1	2.1	1.6	2.8	23.4	24.7	38.3	42.2	47.3	55.9	18.7	18.0	28.4	26.9	33.0	35.6
White	1.6	1.1	2.5	2.4	2.0	3.3	24.2	26.5	41.6	44.8	52.6	59.7	21.2	19.7	33.5	29.6	39.4	39.7
Black	0.3	0.6	0.6	0.5	0.3	0.6	16.8	16.5	22.8	26.7	27.8	39.0	9.4	11.3	10.3	14.9	10.7	19.2
Mex Am	2.0	1.3	1.2	1.8	1.2	1.4	31.4	28.8	39.0	46.4	44.3	58.1	19.8	18.4	18.6	23.4	22.2	29.8
PR	2.6	1.0	1.6	0.7	1.5	2.0	23.8	23.9	37.0	36.6	40.5	50.1	19.5	17.3	21.9	21.6	28.6	30.8
Oth Lat Am	0.9	0.8	1.8	1.7	1.4	1.6	26.4	23.4	34.2	38.2	43.0	52.4	14.4	14.3	18.0	19.7	23.7	26.7
Asian Am	0.4	0.3	1.0	0.7	0.9	1.5	9.5	9.8	20.0	24.2	28.4	35.9	7.4	8.2	15.8	16.9	17.1	23.3
Am Indian	2.6	1.0	3.6	3.9	3.3	3.1	29.0	33.5	42.4	51.9	54.5	55.6	31.2	30.4	43.2	41.4	51.3	41.1

G = girls; B = boys.
The largest 95% confidence intervals around percentages are 1.5% for Whites, 2.2% for Blacks, 2.7% for Mexican Americans, 5.6% for Puerto Ricans, 4.7% for other Latin Americans, 3.3% for Asian Americans and 6.0% for Native Americans.

alcohol prevalence tends to be slightly higher among white girls than among girls in the three Hispanic/Latina groups. Part of the reason for this finding may result from the fact that Hispanic/Latinas have higher school dropout rates than do white girls, and thus by senior year the Hispanic/Latinas who are most likely to drink may be less likely to be in our school-based samples.

Within the various ethnic groups, life-time, 30-day and daily alcohol prevalence rates are lowest among 8th graders, at an intermediate level among 10th graders and highest among 12th graders. For heavy use, however, prevalence rates for 12th graders are typically similar to, or even lower than, those of 10th graders. This finding suggests that 10th grade might be a time in which experimentation with heavy drinking is likely to occur and/or that 10th graders who drink heavily are more likely to have dropped out of school prior to the end of 12th grade.

For the total sample, life-time alcohol use is nearly identical for 8th, 10th and 12th grade boys and girls; 30-day, daily and heavy use is comparable for 8th grade boys and girls; among 10th and 12th graders, girls generally report lower alcohol prevalences than boys. *Within* the specific ethnic groups, gender differences in life-time alcohol use are generally small and typically not statistically significant. More frequent alcohol use (i.e. 30-day, daily, heavy) tends to be higher for boys than for girls in most of the ethnic subgroups, particularly by senior year.

Cigarettes

Overall, 45% of 8th grade girls, 59% of 10th grade girls and 63% of 12th grade girls have smoked cigarettes at least once in their life-time (Table 2), roughly 20–33% are current smokers (Table 3), 9–22% smoke daily and

Table 4 Gender and ethnic comparisons of daily use in last 30 days (percentages) of selected drugs for 8th, 10th and 12th graders (1996–2000 data combined).

	8th		*10th*		*12th*		*8th*		*10th*		*12th*		*8th*		*10th*		*12th*	
	G	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*	*G*	*B*
	Marijuana/hashish						**Alcohol**						**Alcohol (5+/last 2 weeks)**					
Total	0.7	1.8	2.3	5.0	3.2	7.7	0.6	1.1	0.9	2.6	1.6	5.5	13.6	15.4	22.2	28.4	23.9	38.2
White	0.6	1.5	2.6	5.0	3.6	7.7	0.5	1.1	1.0	2.5	1.8	5.7	13.4	15.9	24.4	30.3	28.0	42.4
Black	0.5	1.8	1.2	5.2	1.6	8.0	0.4	0.9	0.4	1.7	0.5	3.2	9.4	10.2	11.3	14.5	8.3	18.0
Mex Am	1.2	2.8	1.7	5.4	3.2	9.7	0.9	1.4	0.7	3.9	1.6	9.4	22.4	21.3	24.5	34.1	23.4	40.6
PR	0.6	2.7	1.3	6.3	3.0	8.9	1.8	1.8	0.6	2.9	1.4	5.3	15.3	17.9	21.1	26.1	18.0	27.0
OLA	0.6	2.1	1.2	2.9	1.2	4.6	0.6	1.6	0.8	2.1	1.4	4.6	14.5	14.7	18.2	25.0	19.4	32.6
Asian Am	0.3	0.4	0.4	1.8	1.2	2.1	0.3	0.4	0.1	1.3	0.4	1.5	4.7	5.6	9.1	12.8	11.1	18.9
Am Indian	2.9	4.4	5.8	9.3	9.5	9.7	1.2	2.4	2.8	3.9	4.7	7.4	23.4	23.9	31.8	42.5	32.5	41.5
	Cigarettes						**Cigarettes (half-pack/day)**											
Total	8.8	8.5	16.9	16.0	21.9	23.1	3.2	3.6	7.6	8.3	11.7	13.8						
White	10.6	9.7	20.8	18.3	27.2	26.3	4.1	4.1	9.7	10.0	15.2	16.6						
Black	2.8	4.4	3.9	7.1	5.1	10.9	0.8	1.7	1.2	2.4	1.4	4.2						
Mex Am	8.1	6.8	7.7	10.4	11.0	15.1	2.1	2.1	2.0	3.5	3.1	6.3						
PR	9.4	9.6	11.5	12.6	17.9	23.4	2.7	4.6	4.0	5.2	8.6	15.2						
OLA	4.3	5.6	7.6	9.9	9.8	15.3	1.4	1.8	1.9	2.9	2.9	6.9						
Asian Am	2.6	3.8	8.6	9.9	10.1	14.3	0.8	1.6	2.8	3.8	3.5	6.2						
Am Indian	17.2	15.7	28.4	28.6	34.2	24.7	7.0	7.9	16.9	17.6	19.6	14.7						

G = girls; B = boys.
The largest 95% confidence intervals around percentages are 1.5% for whites, 2.2% for blacks, 2.7% for Mexican Americans, 5.6% for Puerto Ricans, 4.7% for other Latin Americans, 3.3% for Asian Americans and 6.0% for Native Americans.

approximately 3–12% smoke a half-pack or more of cigarettes per day.

The data on ethnic differences in girls' life-time, 30-day, daily and half-pack cigarette use indicate that prevalence is highest among Native Americans, followed by whites, Puerto Ricans, Mexican Americans, other Latin Americans, Asian Americans and blacks. Although ethnic differences at 8th grade tend to be smaller than those at 10th and 12th grade, the pattern of differences is largely the same across grade level.

In the total sample, girls and boys are equally likely to have smoked cigarettes in their life-time, in the last 30 days, daily and heavily (i.e. half-pack/day). Within the ethnic subgroups, the 8th and 10th grade boys' and girls' cigarette use prevalence rates are similar but by senior year, black, Mexican American and Asian American girls have lower prevalence rates than their male counterparts and Native American girls typically have higher prevalence rates than Native American boys.

TRENDS

Over the past 25 years, American adolescents' drug use has changed in important ways, described in great detail elsewhere (Johnston *et al*. 2001). Figure 1 documents the ways in which the girls' drug use has changed over time and the extent to which these changes have occurred across America's increasingly racially and ethnically diverse population. Specifically, Fig. 1 presents trends in 30-day marijuana use, heavy drinking (five or more drinks at a single sitting within the last 2 weeks) and daily cigarette use among 8th, 10th and 12th grade girls and boys by ethnicity from 1991 to 2000 for 8th and 10th graders and from 1976 to 2000 for 12th graders.

Marijuana

The first and third sets of trend lines in Fig. 1 show that there has been a general increase in marijuana use among 8th and 10th grade girls from 1991 to 2000 and that the ethnic differences in 30-day use have been relatively small but consistent over time, with use being highest among Native American girls, somewhat lower among white, Black and Hispanic/Latina girls and lowest among Asian American girls.

The figure shows further that, although marijuana use increased for most of the ethnic groups over time, the relative magnitude of the increase has varied across the ethnic groups. More specifically, although there has been a sharp increase in Native American girls' marijuana use during this period (i.e. more than 10%), the increase for other girls has been more modest (i.e. less than 5%) and for Asian American girls the change has been even smaller (i.e. less than 2%).

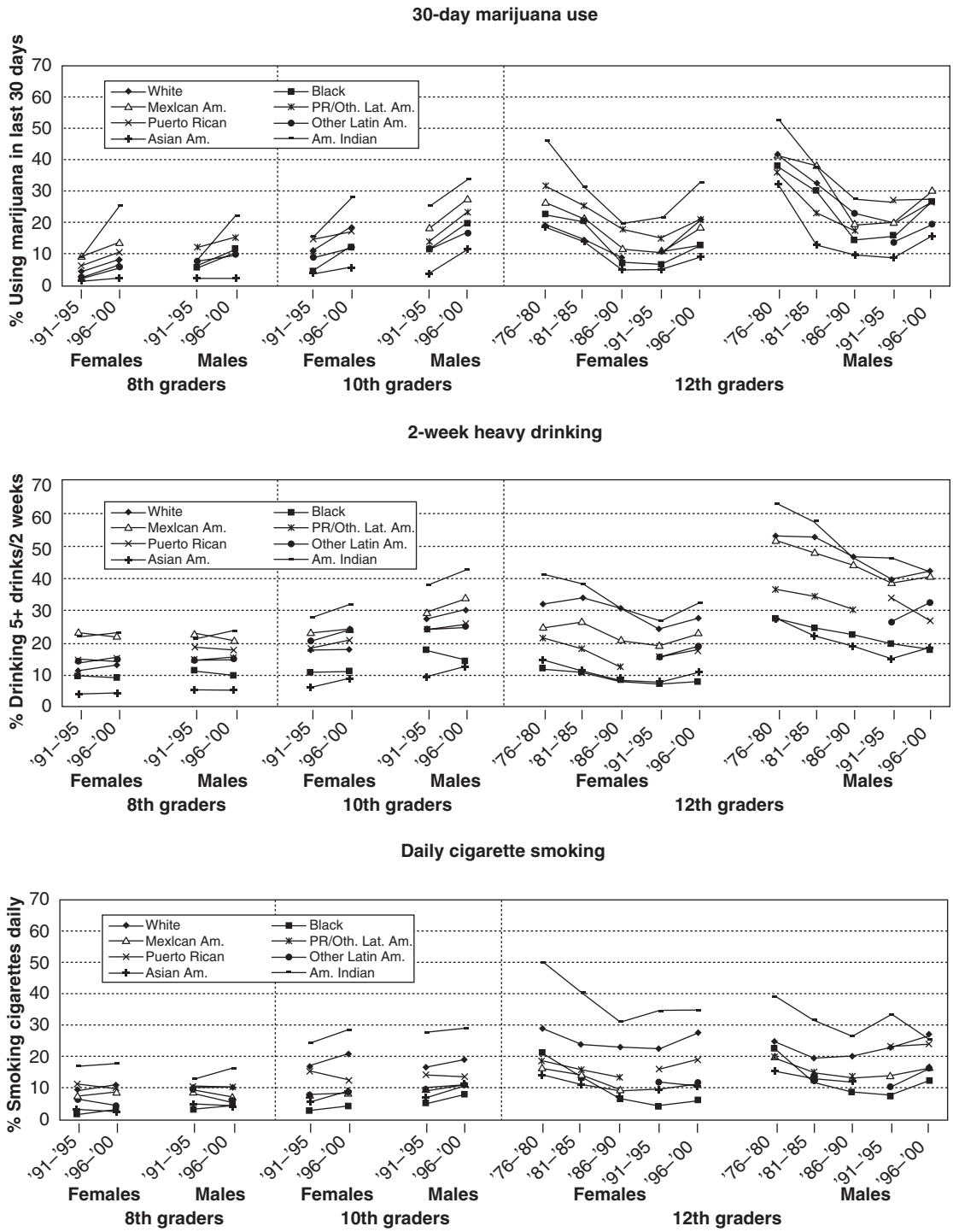

Figure 1 Trends in use of three drugs, 1976–2000, by grade, gender and ethnicity

The data for seniors, from 1976 to 1990, show a general downward trend for girls in all of the ethnic groups, with the decline being particularly sharp for Native American girls. After this long period of decline, use patterns stabilized for most groups between 1990 and 1995 and increased from 1995 to 2000. Overall, the figure reveals that the pattern of ethnic differences in girls' drug use has been relatively consistent over the past two-and-a-half decades. (It is important to note that the 5-year groupings from 1990 to 2000 mask a decline in drug use during the early 1990s, followed by a significant increase until around 1997 and a stabilizing or decline from then until the present, for marijuana and cigarettes) (Johnston *et al.* 2001).

Comparing trends in girls' and boys' 30-day marijuana use reveals that the general shape of the trend and

the pattern of ethnic differences have been similar. One exception to this general conclusion, however, is that although Native American girls' 30-day marijuana use increased from 1991 to 2000, Native American 12th grade boys' 30-day marijuana use was largely stable over the same period. Another important gender difference that the figure reveals is that boys' marijuana use has, over time, generally been higher than girls within each of the ethnic groups.

Alcohol

For most 8th grade girls, heavy drinking prevalence rates have been largely unchanged from 1991 to 2000 across the various ethnic groups. Among 10th grade girls there have been small increases in prevalence for white, Puerto Rican, Asian American and Native Americans. The data for 12th grade girls reveal that heavy alcohol use generally declined for girls in most of the ethnic subgroups between 1976 and 1995, and increased slightly between 1995 and 2000.

Compared to boys, the relative *pattern* of ethnic differences in girls' heavy alcohol use has been roughly similar across the three grade levels, but by 12th grade boys' prevalences exceed those of girls.

Cigarettes

Among 8th grade girls, cigarette use and the ethnic distribution of use remained virtually unchanged during the period from 1991 to 2000. Among 10th graders, the prevalence of cigarette use increased slightly during this period. For seniors, daily smoking declined among most girls from 1976 to 1995, with the decline being particularly sharp among black girls. Since 1995, however, there has been a slight resurgence in daily smoking among girls in most of the ethnic subgroups. Unlike most of the other drugs, girls are generally no less likely than boys to smoke, except that black 12th grade girls are less likely than black boys to smoke on a daily basis.

DISCUSSION

The purpose of this paper was to examine the epidemiology of tobacco, alcohol and illicit drug use among American 8th, 10th and 12th grade girls, with a particular focus on ethnic differences and similarities in current patterns and recent historical trends. Consistent with the findings of past research (USDHHS 1998, 2000, 2001; Wetherington & Roman 1998; Lex 2000; Johnston *et al.* 2001; Bachman *et al.* 1991), the results of the study reveal that drug use, both licit and illicit, is relatively widespread among American adolescent girls, with use being particularly high among Native American girls and relatively low among black and Asian American girls. Although alcohol is by far the drug used most widely by American girls (i.e. 52%, 72% and 81% life-time prevalence rates for 8th, 10th and 12th graders, respectively), substantial proportions of them have used illicit drugs and tobacco as well.

Our examination of trends in girls' substance use revealed that, over time, small but stable ethnic differences have existed for the past decade among 8th and 10th graders and for the past two-and-a-half decades among 12th graders. More specifically, the data revealed that use generally has been highest among Native American girls, somewhat lower among white, Hispanic/Latina and black girls and lowest among Asian American girls (a similar pattern is also observable for boys).

Regarding specific drugs, there was a general decline in marijuana use from 1976 to 1990 among 12th grade girls, across ethnic groups, and a general increase in use from 1991 to 2000 among 8th, 10th and 12th grade girls. Heavy alcohol use has largely been stable among 8th grade girls, across ethnic groups, but has shown some increases in recent years (i.e. 1995–2000) among 10th and 12th grade girls. Similarly, daily smoking prevalence rates have been relatively stable among 8th grade girls but have risen among 10th and 12th graders across most of the ethnic groups.

Consistent with the findings of past research (Johnston *et al.* 2001), comparisons of drug use trends among 8th graders by gender reveal that girls' and boys' drug use prevalence rates largely have been comparable between the early 1990s and 2000. Among 12th graders, however, alcohol and marijuana use are, on average, more prevalent among boys than among girls, particularly for the more frequent use measures of consumption examined here. Having said this, it should be noted that the *magnitude* of many of the gender differences among 12th graders has become smaller over time, suggesting that there has been some convergence in drug use prevalence rates among boys and girls across ethnic groups. In fact, the differences in boys' and girls' daily smoking prevalence rates over time have been small and, for a number of the ethnic groups, non-existent.

Several limitations of this study should be noted. First, the data are drawn from students. Accordingly, girls who have dropped out of school are not represented in the samples. For groups with high dropout rates this problem may be of particular concern for high school seniors. In fact, research that examines ethnic differences in drug use correcting for differential dropping out suggests that this correction significantly increases the magnitude of drug prevalence rates of Hispanic and Native American youth (Swaim *et al.* 1997). Because dropping out among 8th and 10th graders is relatively low, however, the find-

ings of this study should generalize to the majority of American middle and secondary school girls and boys, across ethnic subgroups.

Another limitation of the study is the aggregation of large, often distinct groups of girls (and boys) into socially constructed categories with broad labels such as 'white', 'Asian American' and 'Native American'. Even in the absence of more refined ethnic identifiers however, the data examined here and in other studies reveal that a variety of adolescent behaviors, including drug use, vary according to the ethnic group with which girls and boys self-identify (Warheit *et al*. 1996; Epstein, Botvin & Diaz 1998; Griesler & Kandel 1998; Ellickson, Collins & Bell 1999; Epstein *et al*. 1999; Wallace *et al*. 1999; Harachi *et al*. 2001).

A third potential limitation of this study concerns the use of self-reports of drug use and the extent to which they are equally valid and reliable across ethnic groups. There is a growing literature that attests to the validity of self-reported drug use and a smaller but also growing literature that generally supports both the reliability and validity of the findings of ethnic differences in drug use (Wallace & Bachman 1993; Harrison 1995; Wills & Cleary 1997).

Future research should continue to explore ethnic differences in girls' drug use and seek to identify the extent to which risk and protective factors identified in past research, based on predominantly white samples, are also important predictors for drug use among non-white girls. Future research should also control for those potential confounding factors (e.g. region, social class, religion) that when taken into account might reduce or completely eliminate the ethnic differences in drug use identified above. Finally, future research should also examine the extent to which differential rates of dropping out might confound ethnic differences in drug use across grade levels.

ACKNOWLEDGEMENTS

This paper was supported by research grant number R01DA01411 from the National Institute on Drug Abuse. The opinions expressed herein are those of the authors. We wish to thank Richard Erickson and Nicole Ridenour for their assistance with data analysis and preparation of the tables and Tanya Hart for her editorial assistance.

REFERENCES

Bachman, J. G., Wallace, J. M. Jr, O'Malley, P. M., Johnston, L. D., Kurth, C. L., & Neighbors, M. W. (1991) Racial/ethnic differences in smoking, drinking, and illicit drug use among American high school seniors, 1976–89. *American Journal of Public Health*, **81**, 372–377.

Caetano, R. (1994) Drinking and alcohol-related problems among minority women. *Alcohol Health and Research World*, **18**, 233–241.

Ellickson, P. L., Collins, R. L. & Bell, R. M. (1999) Adolescent use of illicit drugs other than marijuana: how important is social bonding and for which ethnic groups? *Substance Use and Misuse*, **34**, 317–346.

Epstein, J. A., Botvin, G. J. & Diaz, T. (1998) Ethnic and gender differences in smoking prevalence among a longitudinal sample of inner-city adolescents. *Journal of Adolescent Health*, **23**, 160–166.

Epstein, J. A., Botvin, G. J., Griffin, K. W. & Diaz, T. (1999) Role of ethnicity and gender in polydrug use among a longitudinal sample of inner-city adolescents. *Journal of Alcohol and Drug Education*, **45**, 1–12.

Griesler, P. C. & Kandel, D. B. (1998) Ethnic differences in correlates of adolescent cigarette smoking. *Journal of Adolescent Health*, **23**, 167–180.

Harachi, T. W., Catalano, R. F., Kim, S. & Choi, Y. (2001) Etiology and prevention of substance use among Asian American youth. *Prevention Science*, **2**, 57–65.

Harrison, L. D. (1995) The validity of self-reported data on drug use. *Journal of Drug Issues*, **25**, 91–111.

Johnson, R. & Gerstein, D. (1998) Initiation of use of alcohol, cigarettes, marijuana, cocaine, and other substances in US birth cohorts since 1919. *American Journal of Public Health*, **88**, 27–33.

Johnston, L. D., O'Malley, P. M. & Bachman, J. G. (2001) *Monitoring the Future National Survey Results on Drug Use 1975–2000*, Vol. I: *Secondary School Students.* NIH publication no. 01–4924. Rockville, MD: National Institute on Drug Abuse.

Kish, L. (1965) *Survey Sampling*. New York: John Wiley and Sons.

Lex, B. W. (2000) Gender and cultural influences on substance abuse. In: Eisler, R. M., ed. *Handbook of Gender, Culture, and Health*, pp. 255–297. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Swaim, R. C., Beauvais, F., Chavis, E. L. & Oetting, E. R. (1997) The effect of school dropout rates on estimates of adolescent substance use among three racial/ethnic groups. *American Journal of Public Health*, **87**, 51–55.

US Department of Health and Human Services (USDHHS) (1994) *Preventing Tobacco Use Among Young People.* A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

US Department of Health and Human Services (USDHHS) (1998) *Tobacco Use Among U.S. Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics*. A report of the Surgeon General. Atlanta, GA: USDHHS, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

US Department of Health and Human Services (USDHHS) (2000) Tenth Special Report to the U.S. Congress on Alcohol and Health. Atlanta, GA: Public Health Service, National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism.

US Department of Health and Human Services (USDHHS) (2001) *Women and Smoking.* A report of the Surgeon General. Atlanta, GA: USDHHS, Centers for Disease Control and Pre-

vention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

Wallace, J. M. & Bachman, J. G. (1993) Validity of self-reports in student based studies on minority populations: issues and concerns. In: De La Rosa, M. R & Adrados, J. R., eds. *Drug Abuse Among Minority Youth: Advances in Research and Methodology*, pp. 167–200. NIDA Research Monograph 130. Rockville, MD: National Institute on Drug Abuse.

Wallace, J. M., Forman, T. A., Guthrie, B. J., Bachman, J. G., O'Malley, P. M. & Johnston, L. D. (1999) The epidemiology of tobacco, alcohol, and other drug use among African American youth. *Journal of Studies on Alcohol*, **60**, 800–809.

Warheit, G. J., Vega, W. A., Khoury, E. L. & Gil, A. A. (1996) A comparative analysis of cigarette, alcohol, and illicit drug use among an ethnically diverse sample of Hispanic, African American, and non-Hispanic white adolescents. *Journal of Drug Issues*, **26**, 901–922.

Wetherington, C. L. & Roman, A. B., eds (1998) *Drug Addiction Research and the Health of Women*. DHHS publication no. 98–4290. Rockville, MD: US Department of Health and Human Services, National Institutes of Health, National Institute on Drug Abuse.

Wills, T. A. & Cleary, S. D. (1997) The validity of self-reports of smoking: analyses by race/ethnicity in a school sample of urban adolescents. *American Journal of Public Health*, **87**, 56–61.