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Prevalence of Substance Use Among White and American Indian Young Adolescents in a Northern Plains State

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Abstract—This article documents the prevalence of self-reported substance use among White and American Indian adolescents enrolled in seventh grade (ages 12 through 13) in 1997 in a Northern Plains state. Data were collected by self-administered questionnaire preceding adolescents' participation in a randomized field trial of Project Alert, a seventh and eighth grade substance use prevention curriculum. Rates of lifetime and past-month use of cigarettes and marijuana were higher among American Indians than among Whites of the same gender. American Indian girls exceeded American Indian boys as well as White girls and White boys on lifetime and past-month use of cigarettes and marijuana as well as alcohol and inhalants; differences on cigarette and inhalant use reached statistical significance. These findings add to the sparse literature on substance use among adolescents as young as 12 through 13 years old and underscore the importance of examining gender-specific substance use patterns early in adolescence.

Keywords—adolescents, American Indian, gender differences, substance use

A randomized field trial evaluating the Project Alert substance use prevention curriculum for adolescents in a Northern Plains state in the United States provided an opportunity to examine substance use among White and American Indian adolescents enrolled in seventh grade. This article documents the lifetime and past-month self-reported prevalence of cigarette, alcohol, marijuana, and inhalant use for boys and girls in each group. The purpose is twofold: to examine substance use in a sample of White and American Indian adolescents that is both age-specific and

younger than samples studied in most prior research and to determine whether there are gender differences in use of any substance among American Indians at this age. While many studies have found higher rates of substance use among American Indian adolescents compared to other groups (e.g., OAS 2001; Federman et al. 1997; Beauvais 1992; Oetting & Beauvais 1989), there is little research to date that explores how these rates may vary by region and gender.

Most research on substance use among American Indian adolescents has focused on older age cohorts (those in ninth through 12th grades) or, alternatively, has spanned a wider range (often seventh through 12th grade) without reporting age-specific results. One exception is the study by Federman and colleagues (1997), which found higher rates of lifetime prevalence of alcohol, cigarette, and marijuana use among American Indians than among Whites in

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seventh grade (age 12) in North Carolina. The difference in alcohol use was considerable (7% for Whites and 15% for American Indians). Differences in use of the two other substances were consistent with that pattern but not large. Lifetime use of cigarettes was reported by 5% of Whites and 6% of American Indians, and lifetime use of marijuana by 2% and 4%, respectively. In a study of elementary-age children enrolled in fourth through sixth grade (Beauvais 1992), American Indians reported higher lifetime prevalence of tobacco, marijuana, and inhalant use than Whites did. However, contrary to the pattern seen in the study by Federman and colleagues (1997), White children reported more experience with alcohol. Thus, the available evidence on substance use among younger American Indian adolescents is both sparse and inconsistent. This gap in the literature requires particular attention inasmuch as some evidence suggests that American Indian adolescents, compared to others, begin using alcohol and other drugs at an earlier age (Beauvais 1992; Okwumabua & Duryea 1987).

Regional variability in substance use by American Indians of high school age was documented by Novins and Mitchell (1998), who found higher prevalence of heavy marijuana use among those living in the Northern Plains region than among those living in the Southwest and South-Central regions. In a comparative study of Whites and American Indians in high school, Plunkett and Mitchell (2000) found that substance use among American Indians varied considerably by region. For example, lifetime cigarette use was reported by 59% of American Indians living in 12 North-Central states but only 43% of American Indians living in an 11-state Western region. Lifetime cocaine use was reported by 21% of American Indians in the North-Central region but only 9% of American Indians in the West. Moreover, prevalence rates for American Indians were often similar to those for Whites when these groups were compared within region.

There is mixed evidence on gender differences in substance use by American Indian adolescents. American Indian boys may begin using alcohol and other drugs at an earlier age than American Indian girls (May & Gossage 2001; Oetting & Beauvais 1989; Okwumabua & Duryea 1987). But alcohol use by American Indian girls may increase rapidly as they reach eighth grade and beyond (Oetting & Beauvais 1989). Beauvais (1992) found minimal gender differences in lifetime and past-month prevalence of alcohol and drug use among American Indians in eighth grade. For example, 76% of boys and 73% of girls reported lifetime alcohol use, whereas 38% and 39% respectively, reported past-month alcohol use. The exception to this pattern was lifetime cigarette use, found to be somewhat more common among eighth grade girls (71%) than among eighth grade boys (65%). A study of American Indian youth in the Southwest region of the United States found that lifetime rates of alcohol, marijuana, and inhalant use were similar for boys and girls. Rates of alcohol and marijuana use were

actually higher, though not dramatically so, for girls (Beauvais et al. 1996). The study spanned sixth through 12th grade and did not report age-specific findings. In short, most of the available data on gender and substance use among American Indian adolescents are from older samples, among whom the prevalence of substance use appears generally similar, with some suggestion of more use by girls. There is very little direct evidence on gender differences in American Indian adolescents younger than eighth-grade age.

METHODS

Sample

The sample was composed of seventh grade adolescents enrolled in 55 middle schools in 1997 in a Northern Plains state. Approximately 40% of the sample (enrolled in 14 schools) lived in cities of over 50,000 residents, whereas 30% (in 11 schools) lived in towns of 5,000 to 25,000 residents, and the remaining 30% (in 30 schools) lived in rural areas of the state. These adolescents were participating in a randomized field trial conducted at the RAND Corporation and led by the second author (DL) to evaluate the effectiveness of Project ALERT, a substance use prevention curriculum designed for seventh and eighth grade students (Ellickson et al. 2003). Data were collected by self-administered questionnaire in a baseline survey administered before delivery of the curriculum and in three annual surveys subsequently. Data employed in this analysis are from the baseline survey.

A total of 5,857 adolescents completed the baseline survey, amounting to 86% of those eligible (i.e., listed on the school rosters). The breakdown of the sample was 86% White non-Hispanic, 9% American Indian, and 5% other. About 51% of Whites were boys ($n = 2,590$), and 49% were girls ($n = 2,444$). Similarly, 52% of American Indians were boys ($n = 273$) and 48% were girls ($n = 252$). (The gender breakdown for adolescents in other racial/ethnic groups are omitted here because results were not reported for them.)

In findings reported below, the number of cases differs slightly across substances because of missing data. However, missing data rates did not exceed 5.9% for use of any substance reported by any subsample. In most cases, missing data rates were between 0.5% and 2%.

Data Collection Procedure

Surveys were monitored by Project ALERT staff (not the classroom teacher). Parents of about 10% of eligible adolescents declined to allow their children to participate in the survey. An additional 3% of eligible adolescents were not surveyed because they were absent from both the initial survey and one or more make-up sessions (1.4%) or they refused to participate (1.6%). Make-up sessions recaptured 78% of initial absentees.

TABLE 1
Prevalence of Lifetime Substance Use by Seventh Grade White and American Indian Adolescents

	White Boys (a)	White Girls (b)	American Indian Boys (c)	American Indian Girls (d)
Alcohol	65.4 ^b	56.0 ^{a,d}	58.4 ^d	70.9 ^{b,c}
Cigarettes	37.7 ^{b,c,d}	28.5 ^{a,c,d}	60.3 ^{a,b,d}	76.9 ^{a,b,c}
Marijuana	6.8 ^{b,c,d}	4.0 ^{a,c,d}	29.4 ^{a,b}	32.5 ^{a,b}
Inhalants	11.5 ^{b,d}	6.9 ^{a,c,d}	12.7 ^{b,d}	23.8 ^{a,b,c}

Note: Superscripts indicate column differences that are statistically significant, $p \leq .05$.

To motivate students to participate and to answer the survey truthfully, the second author obtained a United States Department of Health and Human Services (DHHS) Certificate of Confidentiality, which protects confidentiality in the unlikely event of a subpoena. Before survey administration in the classroom, survey monitors described procedures for ensuring confidentiality (e.g., no names on the survey forms, no access to completed surveys by teachers or parents, and the guarantee provided by the DHHS Certificate of Confidentiality); informed students of their right not to participate; and, for those who gave assent, collected saliva samples that students were told could be tested for drug use.

To assess the validity of self-reported substance use, we compared physiological test results and self-reports and examined the consistency of self-reports. Cotinine levels in saliva were tested for a random subsample of 654 students. Only 0.5% of the 560 students who reported not smoking (in either the prior month or the prior two days) and who produced enough saliva for an assay had a cotinine level above the 10 ng/ml cutoff typically used to identify smokers. In addition, self-reports were internally consistent. Only 1.7% of adolescents gave inconsistent responses to any of the substance use questions (e.g., an affirmative response to the question on past-month use but a negative response to the question on lifetime use).

Measures

Adolescents were asked to report lifetime use of cigarettes, alcohol, marijuana, and inhalants (yes or no); the number of times they used each substance in the past year (0 = none, 1 = once or twice, 2 = 3 to 10 times, 3 = 11 to 20 times, 4 = more than 20 times); and the number of days on which they used each substance in the past month (0 = none, 1 = 1 or 2 days, 2 = 3 to 5 days, 3 = 6 to 19 days, 4 = 20 or more days). (They were also asked about hard drugs such as cocaine and amphetamines. Lifetime use of hard drugs was extremely low and is not reported here.) In this article we report yes/no prevalence rates for lifetime and past-month use of cigarettes, alcohol, marijuana, and inhalants.

Analysis

Differences between prevalence rates for each racial/gender subsample were tested for statistical significance

through generalized estimating equations to allow for possible dependence in observations from students in the same schools. This approach was particularly important because, as noted above, American Indian students were clustered to some degree in four majority-Indian schools. For each measure of the prevalence of use, we fit a logistic regression model to predict use as a function of race/ethnicity, gender and their interaction and tested hypotheses that linear combinations of the model coefficients corresponding to subsample comparisons were zero. The model assumed independence among observations for estimating the coefficients and used empirical standard errors that adjusted for possible dependence of observations for students in the same school (Liang & Zeger 1986). Hypothesis tests were Wald F-tests, and all analyses were conducted using SAS PROC GENMOD (SAS Institute 1999).

RESULTS

Table 1 shows lifetime prevalence rates for White and American Indian boys and girls. White boys reported a significantly higher rate of lifetime alcohol use than White girls (65.4% and 56.0% respectively). The rate of lifetime alcohol use among American Indian girls (70.9%) was non-significantly higher ($p = .10$) than the rate reported by White boys and significantly higher than the rates reported by White girls and American Indian boys (58.4%).

Regarding cigarette use, American Indian boys and girls reported higher rates of lifetime use (60.3% and 76.9% respectively) than Whites of the same gender (37.7% of White boys and 28.5% of White girls). Similarly, prevalence of lifetime marijuana use was significantly different for American Indian boys and girls (29.4% and 32.5% respectively) compared to Whites of the same gender (6.8% and 4.0% for White boys and girls respectively). Finally, comparisons of gender differences within each racial group showed that lifetime cigarette use was significantly lower among White girls than among White boys but significantly higher among American Indian girls than among American Indian boys.

Lifetime inhalant use did not greatly differ among White boys, White girls, and American Indian boys, although the differences reached statistical significance for the comparison of Whites girls (6.9%) to White boys

TABLE 2
Prevalence of Past-Month Substance Use by Seventh Grade White and American Indian Adolescents

	White Boys (a)	White Girls (b)	American Indian Boys (c)	American Indian Girls (d)
Alcohol	14.9 ^{b,d}	11.0 ^{a,c,d}	19.1 ^b	25.8 ^{a,b}
Cigarettes	9.9 ^{c,d}	8.9 ^{c,d}	29.2 ^{a,b,d}	42.1 ^{a,b,c}
Marijuana	2.5 ^{b,c,d}	1.4 ^{a,c,d}	14.1 ^{a,b}	17.3 ^{a,b}
Inhalants	6.9 ^{b,d}	4.3 ^{a,c,d}	7.5 ^{b,d}	14.8 ^{a,b,c}

Note: Superscripts indicate column differences that are statistically significant, $p \leq .05$.

(11.5%) and American Indian boys (12.7%). The rate of lifetime inhalant use among American Indian girls (23.8%) was twice as high as the rates reported by American Indian boys and White boys.

Table 2 shows prevalence rates for past-month use. Alcohol use among American Indian girls (25.8%) was significantly higher than alcohol use among either White boys (14.9%) or White girls (11.0%) and nonsignificantly higher than alcohol use among American Indian boys (19.1%).

The rate of past-month cigarette use among American Indian girls (42.1%) was significantly higher than that reported by American Indian boys (29.2%) or Whites (9.9% by White boys and 8.9% by White girls). Rates of past-month marijuana use were higher among American Indian boys and girls (14.1% and 17.3% respectively) than among Whites of either gender (2.5% for boys and 1.4% for girls) but similar when gender subsamples were compared within each racial group (the small difference between White boys and girls reached statistical significance).

The pattern of past-month use of inhalants mirrored the pattern of lifetime use. Rates were similar for White boys, White girls, and American Indian boys, although the differences for Whites girls (4.3%) compared to White boys (6.9%) and American Indian boys (7.5%) were both statistically significant. The rate of past-month inhalant use among American Indian girls (14.8%) was twice as high as the rates reported by American Indian boys and White boys.

DISCUSSION

The purpose of this study was twofold. The first goal was to examine substance use in a sample of seventh grade (12 through 13 year old) White and American Indian adolescents. The distinctive value of this sample was that it is age-specific and younger than those studied in most prior research. The second was to determine whether there are differences in substance use among American Indian girls and boys at this age.

White boys reported higher prevalence for lifetime alcohol use than the American Indian boys, but alcohol use prevalence was highest among the American Indian girls. Lifetime prevalence for three other substances—cigarettes,

marijuana, and inhalants—was higher among American Indians than among Whites of the same gender. Past-month prevalence rates were higher among American Indians than among Whites for each of the four substances.

These results are consistent with those from other research documenting higher prevalence of substance use among American Indians than among Whites in older cohorts (ninth through 12th grade) or across wider ranges (seventh through 12th grade). However, because prior research has documented notable variation by age, substance, and region, it is important to move beyond this simple generalization. As noted above, Plunkett and Mitchell (2000) found the prevalence of substance use among American Indians of high-school age to be higher in the North-Central region of the U.S. than in other regions (see also Novins & Mitchell 1998). However, rates of inhalant use and cigarette use were similar when American Indians were compared to Whites within that region. Because our research location was one of the states included in their North-Central region, it is instructive to compare the present results to those of Plunkett and Mitchell (2000). Studying younger adolescents, we found more use of inhalants, cigarettes, and marijuana among American Indian youth than among White youth. This pattern raises the possibility, consistent with research on age of onset of use, that prevalence rates for most substances are higher for American Indians than for Whites—at least in the North-Central states—when the comparison is focused on adolescents as young as seventh-grade age.

Prior studies have produced mixed results regarding alcohol use. Plunkett and Mitchell (2000) found higher prevalence of lifetime alcohol use among older American Indians in the North-Central region. One study of younger adolescents found higher lifetime prevalence among American Indians (Federman et al. 1997), while another found it to be higher among Whites (Beauvais 1992). In the present sample, the lifetime prevalence of alcohol use was nonsignificantly higher among White boys than among American Indian boys, but lifetime drinking was most common among American Indian girls. Patterns in alcohol use prevalence may have been obscured in other studies, especially those focusing on younger adolescents, inasmuch as

alcohol use was not examined by gender as well as race. In addition, our results suggest that prevalence among younger American Indian adolescents may in fact be considerably higher than suggested by the limited prior evidence. In the North Carolina study by Federman and colleagues (1997), 5% of Whites and 6% of American Indians at age 12 reported lifetime cigarette use. The comparable figures in our sample (ages 12 and 13) were roughly 33% and 69%. The former study found lifetime use of marijuana by 2% of Whites and 4% of American Indians, whereas we found such use by about 5% and 31% respectively. Sample differences in region, reservation status, socioeconomic conditions, and possibly age (our sample included both 12 and 13 year-olds) may help to account for the divergence across these studies.

In both the lifetime and the past-month timeframes, use of alcohol, cigarettes, and marijuana was higher among American Indian girls than among any other race/gender subsample. While lifetime inhalant use did not greatly differ among White boys, White girls, and American Indian boys, the rate among American Indian girls was twice as high as rates reported by American Indian boys and White boys. Similarly, past-month use did not greatly differ among White boys, White girls, and American Indian boys, but past-month inhalant use among American Indian girls was twice as high as that reported by any other race/gender group. The nationwide study by Beauvais (1992) found minimal gender differences in substance use for American Indian adolescents in eighth grade. While Beauvais (1992) has documented higher rates of cigarette use among American Indian girls, there is no precedent for the gender difference we found among seventh grade American Indians in the use of alcohol, marijuana, and particularly inhalants.

Differences in past-month use cannot be read to mean definitively that American Indian adolescents, and Ameri-

can Indian girls in particular, are using substances more heavily than Whites. However, recency of use is indicative of heavy use, as well as persistent use and substance-related problems, in young people. Data from a sample of older American Indian youth attending a Bureau of Indian Affairs high school showed that alcohol use during school hours and alcohol-related blackouts were more common among girls than among boys (Dick et al. 1993). Also, Novins and Mitchell (1998) found low-frequency marijuana use to be indicative of "a more severe pattern of substance use" for girls than for boys. Additional research is needed to determine whether this pattern is replicable in other samples of American Indians, notably those who are younger than high-school age. Additional research is also needed to shed light on the frequency, quantity, circumstances, and consequences of substance use among Native American boys and girls. On the other hand, occurrence of any substance use—especially on an ongoing basis, as suggested by past-month use—is cause for concern in a sample as young as 12 and 13 years old.

In summary, these findings underscore the importance of examining substance abuse patterns in samples of younger adolescents, not just those of high-school age. When samples encompass adolescents of different ages, findings should be reported within age ranges defined as specifically as sample size will allow. Moreover, meaningful differences in substance abuse patterns may be obscured unless analyses focus on specific substances and compare patterns across groups defined on the basis of gender as well as race. Finally, substance abuse patterns by American Indian and White adolescents appear to differ significantly by region of the country. Conclusions regarding the nature and degree of such differences must therefore be specific to region rather than generalized to the overall United States.

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