A Community-based Approach to Preventing Alcohol Use Among Adolescents on an American Indian Reservation

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Synopsis

This paper examines the effectiveness of a 5-year community-based health promotion program to reduce the rate of substance use, particularly alcohol, by adolescents on a Plains State American Indian reservation. The program was part of the Kaiser Family Foundation Community Health Promotion Grants Program.

Since a reservation control group was not available, adolescents serving as control groups for other Community Health Promotion Grants Program communities, including a small sample of rural American Indians, were used as a basis for comparison. School-based surveys of 9th and 12th graders were carried out on the reservation and in five relevant California control communities—two suburban, three rural—in 1988, 1990, and 1992.

The results showed that the use of both alcohol and marijuana declined substantially among American Indian adolescents living on the reservation. Binge drinking (five or more drinks on an occasion) declined from 46 percent to 30 percent, and marijuana use (in the past month) declined from 46 percent to 29 percent over the 4-year period. However, there were similar, if smaller, declines in alcohol use in the comparison groups. Since there was no evidence of a relative increase in exposure to alcohol and drug programs on the reservation, the authors are cautious in attributing the significant and heartening declines in substance use among adolescents on the reservation to the community-based program.

THE PROBLEMS FACING YOUNG PEOPLE on American Indian (AI) reservations, particularly related to substance abuse and suicide, are well known (*1–9*). A number of solutions have been proposed, including regulatory approaches (*10*), education (*11*), skills enhancement (*12*), and stress reduction (*13*). Many authors have argued that comprehensive, community-based strategies offer the only effective long-term solution to the problems of alcohol and drug use on AI reservations (*3,4,10,14–17*). This focus on community-based programs is consistent with program trends in the general population, both for the prevention of substance abuse among adolescents (*18*) and for other health problems such as cardiovascular disease and cancer (*19–24*).

In 1987, the Kaiser Family Foundation (KFF) and funding partners launched a major initiative—the Community Health Promotion Grants Program (CHPGP)—to foster community-based health promotion activities directed at five leading health problems: cardiovascular disease, cancer, substance abuse, adolescent pregnancy, and injuries (*25*). Grants of $150,000 per year during 5 years were awarded to each funded community, and technical assistance was provided by the Stanford University Health Promotion Resource Center.

One of the 11 grantees was an American Indian reservation in a western Plains State, which listed alcohol abuse, particularly among youth, as its primary health target for intervention. This paper presents the results of baseline (1988) and two followup (1990,1992) surveys among AI youth on the reservation. Data from several comparison groups were used to examine whether favorable trends in

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Methods

Background and program description. In 1990, the reservation had a population of 21,900 (2,200 between the ages of 12 and 17 years) spread over 3,700 square miles. Ninety-one percent of residents are Native American; most are members of one of the two tribes that occupy the reservation and govern it via a Joint Business Council. The unemployment rate is close to 70 percent, and 35 percent live below the Federal poverty level. The initial impetus for the coalition that evolved into the KFF-funded program was an epidemic of suicides, more than 20 times the national rate, in 1985.

The overall goal of the program was to reduce the rate of alcohol and drug use among youth ages 21 and younger. Specific goals were all alcohol-related: (*a*) reduce the reported prevalence of binge drinking (5 or more drinks on an occasion) from 45 percent to 35 percent by 1992; (*b*) delay the reported onset of first use of alcohol by 1 year; and (*c*) decrease the number of 12th graders who drove a vehicle after drinking from 27 percent to 18 percent.

A community coalition formed as a result of the program included representatives from the health department, schools, private nonprofit organizations, and government. For a variety of reasons, the coalition played a minor role in developing and implementing interventions. However, all of the schools on the reservation sent representatives to the coalition, which helped program staff members secure access for the school-based interventions.

Interventions targeted youth, parents, and the community as a whole. Specific interventions are listed in the box, grouped by classes, skills-development programs, alcohol- and drug-free events, and public campaigns. Information collected from the program about the numbers of participants was not sufficiently detailed or accurate to measure participation in specific interventions, a data limitation that is described further in the Discussion section. Overall, program personnel reported that intervention activities involved more than 4,000 youth and adults each year. Since the number of people who attended multiple events is unknown, however, the total number of people exposed to program interventions is an estimate.

Evaluation design. The design of the overall evaluation for the Community Health Promotion Grants Program is described in detail elsewhere (*25*). The following brief description is included to show where the AI reservation program fit in the overall evaluation scheme. Eleven communities in all were selected by KFF to receive funding out of 18 finalist applicants. Fourteen finalists were subjected to a process of randomization to determine which were funded (7 funded, 7 control). Four sites, including the AI reservation, however, were selected for funding prior to randomization because of special merit. Because of this nonrandom selection, comparison groups were not readily available for the AI reservation, so we used five nonurban control communities in California as controls for the AI program. Four of the control communities were entire counties (three rural, one suburban) in northern California; the other (suburban) site covered parts of 3 southern California cities. An additional comparison group consisted of white students living near the reservation who were surveyed at the same time as the AI students.

Data. School-based surveys of 9th and 12th grade adolescents were carried out on the AI reservation and in the five control communities in 1988, 1990, and 1992. The survey used self-administered questionnaires to gather information about health-related attitudes and behavior, particularly sexual activity and alcohol and drug use. Most of the alcohol and drug items came from the Monitoring the Future questionnaire developed by the Institute for Social Research at the University of Michigan (*5*). The sampling frame for the survey consisted of 9th and 12th graders in public and private schools where at least 50 percent of enrolled students resided in the community as defined by the program. The total number of students surveyed per community in both grades ranged from 150 to more than 3,000 on each

Community Interventions Designed to Reduce Alcohol and Substance Abuse by Young People on an American Indian Reservation, 1988–92

Program Name	*Description*
Classes	
Children are People	Educational support group for children ages 6–12 from alcoholic-drug dependent families
Central Wyoming Substance Abuse Conference	Annual conference to raise public awareness and provide a forum for sharing of resources and expertise in the areas of substance abuse and parenting.
Home Education Parties	Small group setting in individual homes to discuss and learn about healthy life choices.
Just Say No Club	National club for children ages 7–14 who have pledged to lead a drug free life.
Preparing for the Drug Free Years	Education program for parents of children in grades 4–7.
School-Based Prevention Programs	Prevention education and skill building programs provided by program staff on request from local school districts.
Skills Development Programs	
Early Childhood STEP	Education program for parents of children ages 5 and younger.
STEP	Education program for parents of children ages 6–12.
STEP TEEN	Education program for parents of adolescents.
SMILE	Skill building program for junior and senior high school students.
Summer Youth Employment Program	High school youth hired to assist with summer youth activities.
Super Tots	Teaches healthy living skills to 3–4-year-olds through structured play activities.
Youth Leadership Training	1-day sessions providing information, education and training for local students on current issues.
Alcohol and Drug Free Events	
Proud to be Drug Free Carnival	Annual carnival co-sponsored by local school districts to raise community awareness about substance abuse issues.
Public Campaigns	
Community Fun Days	Family fun day planned and implemented by housing area committees.

survey occasion. The response rate for students in participating schools was slightly more than 80 percent in all 3 years. The reservation sample included five high schools, three of which were predominantly AI and located on the reservation; the remaining two high schools were just off the reservation and predominantly white (20 percent AI).

The survey was conducted with scannable forms filled in by the students. The forms were examined by the on-site survey administrator for stray marks and illegibly marked responses. Sources of missing data included very light marks, multiple responses (where not permitted) and, most frequently, omitted items. Missing data rates ranged from 1.5 to 3 percent for substance use questions; 3 to 15 percent for program exposure questions, and 8 to 10 percent for demographic information.

Statistical methods. Intervention effects were examined by comparing 9th and 12th grade American Indians on the reservation with whites attending schools on or near the reservation and 9th and 12th graders in the five California control communities. The overall sample was split into 15 ethnicity and

Table 1. Size of samples, by ethnicity, location, grade, and year in a survey of adolescents on an American Indian reservation and in California control communities, 1988–92

Ethnicity, location	9th grade			12th grade		
	1988	1990	1992	1988	1990	1992
American Indian:						
Reservation	80	97	94	69	66	57
Rural	23	32	29	17	43	31
White:						
Reservation area	134	131	139	105	119	107
Rural	734	770	855	648	650	659
Suburban	1,266	1,154	1,239	1,425	1,044	1,030
Hispanic:						
Rural	123	159	180	104	100	160
Suburban	431	429	548	296	263	402
Asian:						
Suburban	282	276	430	241	305	375
Totals	3,073	3,048	3,514	2,905	2,590	2,821

Table 2. Parent's education and family composition, by percentages, in a combined sample of adolescents surveyed on an American Indian reservation and in five control communities in California, 1988–92

Ethnicity, location	With some college		Single parent household
	Mother	Father	
Overall	63.5	69.5	28.7
American Indian:			
Reservation	50.1	46.8	56.0
Rural	45.3	43.1	39.7
White:			
Reservation area	63.0	65.6	25.0
Rural	64.7	66.9	29.8
Suburban	71.8	80.3	25.1
Hispanic:			
Rural	35.5	39.6	42.1
Suburban	41.2	46.6	34.4
Asian:			
Suburban	71.3	80.8	20.7

location subgroups—five ethnic groups (white, black, Hispanic, Asian, AI) and three locations (reservation, suburban, rural). Of the 15 possible ethnicity-location combinations (suburban whites, for example), only 8 had 50 or more respondents per occasion (9th and 12th graders combined) over the three survey occasions: whites in all 3 locations, reservation and rural AI, suburban and rural Hispanics, and suburban Asians. The other categories were deemed too small to obtain accurate prevalence estimates.

Grade- and sex-adjusted means for each of the eight groups were computed for variables measuring exposure to health promotion programs and substance use behaviors. A measure of relative change was created by dividing the absolute change over the 4-year period by the baseline value.

Tests for statistical significance were performed using logistic regression analysis. Three sets of regressions were run, each using a different ethnicity-location group as a comparator for the reservation AI: (*a*) all other students (that is, the other seven location-ethnicity groups combined), (*b*) rural American Indians (not on the reservation), and (*c*) reservation-area whites. The three variables of interest in each regression were time (defined as a continuous variable with values of 0,1,2, corresponding to each survey occasion), a dummy variable set equal to 1 if the observation was an AI from the reservation, and the interaction between time and reservation AI. The significance level on the interaction term indicated whether the time trend in the variable was significantly different for reservation AI versus the comparison group. In each analysis, we controlled for grade, sex, mother's and father's education (some college), and family composition (single-parent family).

Results

Table 1 gives the sample sizes for the ethnicity-location groups, by grade and survey occasion. There were approximately 150 respondents on each occasion among reservation American Indians (roughly 90 9th graders and 60 12th graders). The smallest group was American Indians living in rural communities, with roughly 30 per grade surveyed on each occasion.

Table 2 shows family demographic information by ethnicity and location. Overall, 63.5 percent of mothers and 69.5 percent of fathers had some college education; groups with the lowest education levels were American Indians and Hispanics, with 50 percent or less of parents having had some college. The percentage of reservation AIs not living in two-parent households was roughly twice that of the overall average—56.0 percent versus 28.7 percent.

Table 3 shows changes in health promotion program exposure and substance use behaviors, by ethnicity and location. The figures were adjusted for grade and sex, with the adjustment reflecting a balanced distribution across grade-sex cells. Although the baseline levels are averages of 9th and 12th graders only, they may provide a rough approximation of a high school average since in other CHPGP schools where we surveyed all four grades, the prevalences for the 10th and 11th graders fell in the middle for most substance-use behaviors.

To illustrate the data in table 3, the first row of figures shows 76.4 percent of American Indians surveyed on the reservation had drug education classes at baseline (1988). Four years later, that

Table 3. Increased or decreased percentages of exposure to drug and alcohol programs and use of alcohol, drugs and tobacco, by ethnicity and location[1] in a sample of adolescents on an American Indian reservation and in five control communities in California

Variable	Ethnicity, location								
	American Indian		White			Hispanic		Asian	
	Reservation	Rural	Reservation area	Rural	Suburban	Rural	Suburan	Suburan	Overall
Exposure to drug programs:									
Baseline	76.4	71.8	85.7	81.4	88.0	76.0	79.2	76.5	79.4
Absolute change	2.9	3.4	7.1	4.0	3.3	−1.6	0.7	8.9	3.6
Relative change	3.9	4.8	8.2	5.0	3.8	2.1	0.9	11.7	4.5
Information on alcohol use:									
Baseline	78.0	82.6	86.8	82.2	85.0	74.0	79.1	77.5	80.7
Absolute change	−0.6	−8.6	−9.0	−7.5	−6.7	−2.3	−5.8	−4.7	−5.6
Relative change	−0.7	−10.4	−10.4	−9.1	−7.8	−3.1	−7.4	−6.0	−6.9
Alcohol program participation:									
Baseline	43.9	17.7	24.2	26.1	23.4	24.4	22.6	19.7	25.2
Absolute change	−9.5	11.0	−0.4	−5.8	−3.4	−6.9	−2.2	−1.9	−2.4
Relative change	−21.7	62.5	−1.9	−22.3	−14.6	−28.1	−9.8	−9.8	−5.7
Alcohol use									
Drank alcohol in the past month:									
Baseline	55.3	65.6	42.1	56.0	56.8	51.1	58.0	27.2	51.5
Absolute change	−12.8	−15.4	0.6	−13.4	−13.4	−7.6	−15.5	−8.1	−10.7
Relative change	−23.2	−23.4	1.5	−23.9	−23.7	−14.9	−26.7	−29.6	−20.5
Binge drinking episode, past 2 weeks:									
Baseline	46.3	44.3	22.9	31.9	29.6	31.0	31.0	10.0	30.9
Absolute change	−15.9	−11.1	−6.5	−9.0	−7.7	−3.2	−8.2	−2.3	−8.0
Relative change	−34.3	−25.0	−28.3	−28.3	−26.0	−10.3	−26.3	−23.3	−25.2
Started getting drunk before 9th grade:									
Baseline	45.1	45.1	28.3	35.1	31.1	37.3	29.0	9.8	32.6
Absolute change	−5.3	−2.5	−3.2	−6.0	−7.9	−9.8	−7.6	−0.1	−5.3
Relative change	−11.7	−5.6	−11.3	−17.1	−25.3	−26.3	−26.2	−0.7	−15.5
Passenger in car when driver had been drinking:									
Baseline	43.2	36.1	30.0	29.3	27.0	33.9	32.2	18.0	31.2
Absolute change	−17.1	−15.1	−4.9	−6.5	−5.9	−1.5	−4.1	−4.2	−7.4
Relative change	−39.7	−42.0	−16.4	−22.1	−21.8	−4.4	−12.7	−23.4	−22.8
Drug use									
Used marijuana, past month:									
Baseline	46.3	21.9	9.1	16.7	15.3	19.7	17.4	4.4	18.9
Absolute change	−17.7	−2.0	2.5	−1.6	3.1	−2.1	−3.1	1.2	−2.5
Relative change	−38.1	−8.9	27.9	−9.5	20.2	−10.9	−18.1	26.9	−1.3
Used cocaine or crack, past year:									
Baseline	7.7	19.6	3.9	8.9	8.9	14.5	10.0	2.5	9.5
Absolute change	−2.7	−10.1	−0.4	−5.1	−4.7	−6.8	−5.2	−0.5	−4.4
Relative change	−35.5	−51.4	−11.3	−57.3	−52.2	−46.6	−51.9	−18.1	−40.5
Used inhalants, past month:									
Baseline	1.4	3.1	1.2	2.7	2.7	3.7	2.8	2.9	2.6
Absolute change	5.2	1.7	1.3	1.1	2.4	−0.5	2.0	0.5	1.7
Relative change	361.5	54.9	111.4	40.5	88.8	−13.2	70.3	17.0	91.4
Tobacco use									
Current smoker:									
Baseline	25.9	13.4	7.0	10.3	12.3	8.4	9.9	3.9	11.4
Absolute change	3.3	7.0	6.7	0.8	0.2	3.2	−0.9	1.6	2.7
Relative change	12.7	52.0	96.2	7.8	1.7	38.1	−9.3	40.3	29.9
Currently chew tobacco:									
Baseline	56.2	25.4	13.6	12.5	7.8	14.4	6.6	2.4	17.4
Absolute change	−17.7	−13.0	4.7	−0.0	0.7	−6.7	−2.0	−0.4	−4.3
Relative change	−31.5	−51.1	34.2	−0.0	8.8	−46.5	−30.3	−18.4	−16.8

[1]All figures are grade and sex adjusted.
NOTE: For each variable: baseline = baseline value of variable; absolute change = change in absolute terms from 1988 to 1992; relative change = absolute change divided by baseline.

Table 4. Testing for differences in time trends in program exposure and substance use between reservation American Indians and other groups[1]

Variable	Reservation American Indian versus: All others (N = 17,951) P[2]	Sign[3]	Rural American Indians (N = 638) P	Sign	Reservation area whites (N = 1,198) P	Sign
Program exposure						
Had any drug education courses	.47	–	.39	–	.05	–*
Seen information related to alcohol use	.59	–	.99	–	.81	–
Participated in programs related to alcohol use	.25	–	.15	–	.13	–
Alcohol use						
Drank alcohol in the past month	.49	–	.94	–	.29	+
Binge drinking episode, past 2 weeks	.90	+	.74	+	.89	+
Started getting drunk before 9th grade	.89	+	86	+	.52	+
Passenger in car when driver had been drinking	.59	+	.38	–	.71	+
Drug use						
Used marijuana, past month	.16	+	.99	+	.08	+
Used cocaine or crack, past year	.30	–	.31	–	.76	+
Used inhalants, past month	.27	–	.96	+	.40	–
Tobacco use						
Current smoker	.57	–	.94	+	.33	+
Currently chew tobacco	<.01	+*	.55	+	<.01	+*

[1]Based on a logistic regression controlling for grade, sex, mother's and father's education, family composition. Time was included as a continuous variable (0,1,2, corresponding to each survey occasion), along with a dummy variable for group and the interaction between group and time.

[2]*P*-value for interaction between group dummy variable and time (that is, test for difference in time trends between the two groups).

[3]+ indicates that the time trend favored reservation American Indians in the health promoting direction. For example, if binge drinking declined more among reservation AI than the comparison, the sign is +. Conversely — indicates an unfavorable trend for reservation AI.

*$P < .05$.

figure was 2.9 percent higher, or 79.3 percent. The relative change was computed by dividing 2.9 by 76.4, showing the relative increase to be 3.9 percent, roughly 1 percent per year during the 4 years. For all groups, the pattern for exposure to drug and alcohol courses and information was high baseline levels (75–85 percent) with both a slight increase over time in exposure to drug education courses (4.5 percent overall relative change) and a slight decrease over time in exposure to information related to alcohol use (–6.9 percent overall relative change).

Participation in alcohol programs was reported by 44 percent of AI youth on the reservation at baseline, compared with less than 25 percent for the other groups. Although program participation overall showed a slight decline over time (–5.7 percent relative change), the magnitude of the decline was substantial among reservation AI adolescents (–21.7 percent relative change).

For three of the four alcohol use variables (all except age at first use), the absolute declines in use were greater among reservation AI than the overall average, with the relative declines either comparable or somewhat larger than that of other groups. For example, there was a 15.9-percent absolute decline in binge drinking among AI youth on the reservation compared with a decline of 8.0 percent overall; the comparable figures for relative decline were 34.9 percent for AI youth and 25.2 percent overall. The smaller variation across groups in relative changes was due to the high baseline levels on the reservation. For example, for binge drinking, the reservation AI baseline level was 46.3 percent (versus 30.9 percent overall). It should be noted that rural AI results were virtually identical to reservation AI—high baseline levels and larger than average absolute and relative declines.

The results for drug use were mixed. Marijuana use (in the past month) declined substantially among reservation AI (17.7 percent absolute decline) compared with no change on average for the overall group. Cocaine or crack use in the past year declined for all groups (40–50 percent relative change) and the reservation AI were at the overall average for the relative change. Use of inhalants increased for all groups except rural Hispanics, and the absolute increase was largest for reservation AI.

Smoking increased both among reservation American Indians (3.3 percent absolute change) and overall (2.7 percent absolute change). The baseline level among reservation AI was much higher: 25.9 percent were current smokers at baseline on the reservation versus 11.4 percent overall, so the relative increase among reservation AI was smaller (12.7 percent versus 29.9 percent). The prevalence of students chewing tobacco declined in both groups of AIs, down by a third on the reservation and by half among rural AIs.

Table 4 examines the statistical significance of the differences in time trends between reservation AI and other groups. The signs indicate whether the trend favored the reservation AI in the health-promoting direction. A plus sign (+) for the exposure variables indicates that the increase among reservation AI was greater than for the comparison group (or the decline

was less); a plus sign for the behaviors indicates that the decline was greater for the reservation AI (or the increase was less). For example, table 3 showed that binge drinking declined more in absolute terms among AI on the reservation than for any other group. The plus signs in table 4 next to binge drinking confirm that this remained the case even after adjusting for age, sex, and family characteristics. However, the *P*-values next to binge drinking in table 4 (range: 0.74–0.90) indicate that these differences were not nearly statistically significant.

Several patterns emerge from table 4. First, very few differences were statistically significant, that is, reservation AI displayed trends in program exposure and substance use behavior similar to other groups. The significant differences occurred for smokeless tobacco, where use among reservation AI declined more than either the "all other" group or reservation-area whites. Compared with rural AI, the trends among reservation AI were similar. Looking at the variable categories separately, there were negative results for reservation AI in program exposure, greater relative improvements (that is, declines) in alcohol use, and mixed results for drugs and tobacco. Among the 12 alcohol use comparisons (4 variables times 3 comparison groups), in 9 cases the point estimates favored reservation AI, while among the 9 exposure comparisons only one favored reservation AI.

Discussion

We used a self-administered school survey to examine the effectiveness of a community-based strategy for reducing the rate of substance use, particularly alcohol, by adolescents on a Plains State American Indian reservation. Since a reservation comparison group was not available, adolescents in rural and suburban locations in California, including a small sample of rural American Indians, served as comparison groups. The results showed that alcohol, marijuana, and smokeless tobacco use declined substantially among American Indians living on the reservation. However, the declines for alcohol use were not significantly greater than in the other comparison groups. Furthermore, exposure to alcohol and drug programs did not increase on the reservation relative to the other groups, although baseline rates of participation in alcohol programs were much higher among reservation AI.

These results showing declining rates of alcohol and marijuana use among all groups are consistent with a recent longitudinal study by Bachman and coworkers (*5*) covering the period from 1976 to 1989, although, contrary to our results, they also found declining smoking rates. The increasing problem of inhalant use, particularly among AI youth has also been documented elsewhere (*26*).

Obviously, given these inconclusive results and the nonrandomized study design, it is not possible to reach a definitive conclusion about whether the reservation health promotion program was effective. The following are arguments for and against such a conclusion, including a discussion of study limitations.

The results for program exposure offer little evidence that the program increased the number of adolescents participating in drug and alcohol prevention activities. If a significant increase in health promotion activity was generated, some of the increase should have been reflected in the self-reported program exposure questions. However, as table 3 shows, increases in drug education courses were modest and in line with trends in other groups; and reported participation in alcohol-related programs actually declined. In the program's defense, participation in alcohol-related programs was substantially higher at baseline (43.9 percent versus 25.2 percent overall) than in all other groups. Even after an absolute decline of 9.5 percent over the course of the 4 years, the percent of AI on the reservation participating in programs was still higher than in all other groups. As noted earlier, program activity started in 1985, the result of a suicide epidemic, so the 1988 survey may not have been a true community baseline. Another possibility is that the survey questions on exposure may not have captured program activities, many of which were generic events—dances, sporting events, health fairs, and so forth—that students may not have viewed as being directly related to drugs or alcohol.

Two of the three substance use measures targeted by the program, binge drinking and driving after drinking, showed absolute declines nearly twice the overall average. The lack of statistical significance may have been due to the small sample sizes of reservation AI. In one other area, smokeless tobacco use, the decline among reservation AI was both large and statistically significant relative to two of the three comparison groups (table 4). Arguing against a program effect is the fact that while the absolute changes in binge drinking were much larger among reservation AI, the relative changes were only 30–50 percent higher, owing to much higher baseline levels. Furthermore, rural AI adolescents showed very similar baseline levels and time trends for both alcohol and smokeless tobacco, and they were not exposed to the community-based program.

'These results indicate that there were significant improvements, for whatever reason, among a population of youth recognized as having some of the worst alcohol and drug abuse problems in the nation.'

Some of the limitations of the study have already been mentioned. The evaluation of the AI reservation program was not part of the overall randomized design, and the comparison groups that were available did not include AI youth living on reservations. Because of cultural differences, AI youth may have responded differently to the survey questions than non-AI youth living in California. The sample sizes, both for reservation and rural AI were small, limiting statistical power.

Because of the small sample sizes, it was not possible to do detailed statistical analyses by grade and sex, although we did examine the trends in all variables separately by grade and sex. Where there were significant overall declines (for example, binge drinking) the results were consistent across grade and sex categories; variables with no clear time trend (for example, drug education courses) exhibited more variability when subgroups were examined.

Another limitation was that our survey questions about exposure were general and not tailored to the interventions developed and implemented by the community. A central feature of the CHPGP was the latitude granted communities in developing interventions; unfortunately for the evaluation, this strategy meant that the baseline survey had to be developed in virtual ignorance about what shape the interventions would finally take. Some process information was collected about the interventions and the number of people who participated, but this again suffered from the need to develop a standardized instrument for use in 11 culturally and geographically diverse sites. After several rounds of process-data collection, it became apparent that sites were interpreting both the intervention categories (for example, classes, skills development) and what constituted "exposure" differently. Some effort was made to go back and correct for these various interpretations, but staff turnover and the difficulty of recalling such details meant that a number of inconsistencies remained.

Another limitation facing all evaluations of community-based programs is the inability to identify true "control" communities (*27*). In particular, the control communities in this study were in no way limited in their ability to develop interventions similar to those planned by the CHPGP. Ideally, we would have collected detailed process information about program activities taking place in the control sites, as well as other activities, apart from the CHPGP, taking place in the intervention sites. However, budget limitations precluded this type of data collection, which is problematic anyway, given the many and diverse program activities taking place in even small communities.

Finally, the survey was administered only to students attending high school, so the behaviors of high school dropouts, typically high substance users, were not assessed. We were not able to obtain information about either the behavior of those dropping out or dropout rates and therefore could only speculate about how this omission might influence the results. If dropout rates were higher on the reservation, the prevalence of risk behaviors of AI youth on the reservation would be understated relative to other groups, but the estimates of the relative changes in risk behaviors might not be seriously biased.

These results indicate that there were significant improvements, for whatever reason, among a population of youth recognized as having some of the worst alcohol and drug abuse problems in the nation. The rate of binge drinking declined from nearly half of those surveyed in 1988 to slightly more than one-third in 1992. Marijuana use in the past month declined from 46 percent to 29 percent. There is some indication that a community-based program was at least partly responsible for this improvement, supporting the argument that community-based strategies offer an effective way of reducing risk-taking behavior.

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