

## Risk Factors: Ethnicity

# Risk Factors for Polydrug Use in a Native American Population

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*The Diagnostic Interview Schedule was used in 1993–1995 to collect information on the use of alcohol and other substances from 1,086 Navajo Indians living on or near their reservation in the southwestern United States. Bivariate and multivariate analyses are used to show that age of first alcohol use has declined over the past 50 years and is a significant risk factor for both alcohol dependence and polysubstance use. Limitations are noted.*

**Keywords** Navajo Indians; Native Americans; polysubstance use; alcohol dependence; conduct disorder; physical abuse; sexual abuse

### Introduction

Polydrug use is found in a variety of populations, including Native Americans, and much that is true among other groups is also true of Native Americans. Among high school students, both Native American and non-Native American, there was an increase in the use of illicit drugs from 1975 to 2000 (Beauvais, Jumper-Thurman, Helm, Plested, and Burnside, 2004). In a study of two Native American groups, the use of non-alcoholic substances was found to be at least as common as in non-Native American samples, but there was no evidence that abuse was widespread (Mitchell, Beals, Novins, and Spicer, 2003). Among Native American adolescents, alcohol, marijuana, and inhalants were all equally likely to precede cocaine and other illicit substances (Novins, Beals, and Mitchell, 2001). However, those whose first substance use involved inhalants or marijuana were more likely to proceed to other illicit drugs than those who began with alcohol use (Novins and Baron, 2004).

Thus, among Native Americans, as among other populations that have been studied, there have been large changes in the use and availability of a variety of substances; the sequence of use, while generally in accord with what has been described among other

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populations, is also not invariant; and while use of a variety of substances is common, it has been no more problematic than in many other populations that have been surveyed.

The present study is based upon data collected as part of a large study of alcohol use by Navajos between the ages of 21 and 65. It was done in two areas of the Navajo Reservation and in nearby border towns in Arizona and New Mexico in the mid-1990s. While the larger study was devoted primarily to the changing social epidemiology of alcohol use and abuse, the present article is concerned with examining the association between alcohol use and the use of other substances.

## **The Changing Context of Substance Use**

The late 1940s and 1950s saw the very end of the livestock economy as a major source of income for a significant proportion of the Navajo population, a decline that had begun before World War II. Young families left rural areas of the reservation at increasing rates and moved to rapidly growing towns on reservation and in nearby areas off the reservation, and to more distant cities. In these new settings, a peer group culture has emerged that is far different from the ways in which young people had been socialized in the pre-war and early post-war years (Henderson, Kunitz, and Levy, 1999; Kunitz and Levy, 2000); access to both alcohol and other substances has increased; alcohol use by women has become more common than in the past; and average age at which the first drink was consumed has declined, even though its use continues to be illicit on the reservation.

## **Methods**

### ***Sampling***

The study has been described in detail elsewhere (Kunitz and Levy, 2000). A brief description is provided here (adapted from Kunitz et al., 1999). The 1990 U.S. Census enumerated 225,298 Navajos, nearly two thirds of whom lived on reservation and other trust lands, comprising more than 24,000 square miles, under the jurisdiction of the Navajo Nation in northern Arizona, northwestern New Mexico, and southeastern Utah. The Indian Health Service (I.H.S.) has divided "Navajo Country" into eight service units, two of which are relevant to this study: Shiprock in the northeastern part of the reservation, with a population in 1990 of 26,710 Indians; and Tuba City in the western part of the reservation, with a population of 15,800.

Male and female alcohol-dependent cases and their controls were drawn from each of the two service units. Cases were drawn from alcohol treatment programs. Controls were matched by age, sex, and community of residence and were drawn from lists provided by the I.H.S. hospitals in Tuba City and Shiprock. A stratified random-sampling procedure was used to obtain controls in each service unit. In the Shiprock service unit the communities were grouped into 20 geographic areas: 16 chapters and 4 off-reservation areas. Within each geographic stratum, there were nine age categories in 5-year intervals for those born between 1927 and 1972, yielding 360 sampling strata, equally divided by sex. In Tuba City, eight chapters and one off-reservation area were used as the sampling areas, yielding 162 sampling strata, again equally divided by sex.

In Shiprock, controls were selected from lists of all Navajos who had been seen at an I.H.S. facility within the previous 10 years and had given an address within the Shiprock service unit. Within each sampling stratum the names were randomized and controls were sought by working down the list. In Tuba City the controls were selected from lists provided

by the local I.H.S. facility. As in Shiprock, the names were of all people with an address within the service unit who had been seen in an I.H.S. facility within the previous 10 years (since 1982). A random number table was used to select potential controls to match each case.

In each area it was intended that interviewing from these lists of potential controls would occur until a non-alcohol-dependent control was found for each case. This was not always possible, however, and attempts to locate one were ended after four interviews. In both Shiprock and Tuba City, estimates of the success with which individuals were first located and then interviewed ranged from 30% for the youngest age cohort to 65% for the oldest.

The resulting sample of controls is not biased in terms of alcohol dependence. On the other hand, the stratified sample of controls is representative of the age-sex-locality distribution of the cases and differs from that of the population at large. To adjust for these sampling strata, we include, in addition to age and sex, type of community of residence as a stratification variable in the regression analyses. In this article, only data from the controls are included as representative of the Navajo population aged 21–65 living on and adjacent to the Reservation.

A total of 1,086 women and men were interviewed, 352 cases (204 men and 148 women), 434 alcohol-dependent controls (374 men and 60 women), and 300 non-alcohol-dependent controls (157 men and 143 women). Among the men, 95.8% were full Navajo, 2.7% were mixed Navajo/other Indian, and 1.5% were Navajo/non-Indian. The comparable figures for women were 90.6, 6.6, and 2.8%. Essentially the same percentages were found among cases as among controls. Bivariate and multivariate analyses are used.

### ***Procedures***

The interviews included questions from the Diagnostic Interview Schedule (DIS) designed for the Epidemiological Catchment Area (ECA) Study (Robins and Regier, 1991). Items that were included allowed for the diagnosis of both alcohol dependence and conduct disorder, as well as the use of other substances and the age of first and last use. The version of the DIS used had been revised to match the criteria in DSM-III-R (American Psychiatric Association, 1987). To diagnose a lifetime history of alcohol dependence, treated as a dichotomous variable, a series of 26 questions was used from the DIS. In addition, in DSM-III-R the number of symptoms reported is considered a measure of severity. The variable ALCSUMAB is the total number of affirmative answers to this series of question: the greater the number of affirmative responses, the more severe the alcohol dependence. The various criteria do not need to have occurred at the same time, but may have occurred sequentially over a number of years. Both a lifetime history of alcohol dependence and severity of alcohol use are used.

The criteria for conduct disorder (CD) refer to the period before age 15 and, as with alcohol dependence, the number of affirmative answers is considered a measure of severity. When CD is treated as a dichotomous variable, the criterion is three or more affirmative responses. The variable ASYES is the total number of affirmatives answers which, because of its skewness (most values being zero), has been transformed into  $\log(\text{ASYES}+1)$ . The transformed variable is used in this article.

Interviewing took place between May 1993 and September 1995. Interviews ranged from 2 to 4 hours. The interviewers included one Navajo nurse and six non-Navajo Ph.D. social scientists, all with previous experience on the reservation. All interviewers were accompanied by Navajo interpreters, who were rarely used because virtually all respondents were bilingual in Navajo and English or monolingual English

speakers. Over 90% of the interviews were done by four of the social scientists (all anthropologists).

Interviewees were requested to sign a consent form that had been approved both by the University of Rochester's Research Subjects Review Board and an Institutional Review Board comprised of representatives of the Navajo Nation and the Indian Health Service. They were told that they as individuals were unlikely to benefit directly from participation in the study. A Certificate of Confidentiality had been obtained to protect informants who reported any illegal activities. At the end of the interview, each informant was paid \$30.

## Results

Table 1 displays the lifetime prevalence of use of illegal drugs (marijuana/hashish, cocaine/crack, heroin, hallucinogens), non-medical prescription psychotropic drugs (sedatives, tranquilizers, stimulants, analgesics), and/or inhalants by age and sex, compared to data from the National Comorbidity Survey done in 1990–1992, at about the same time as the present study (Warner, Kessler, Hughes, Anthony, and Nelson, 1995).

The results for Navajo men are strikingly similar to the results from the national sample whereas the rates for Navajo women are not. Navajo women have lower lifetime prevalence with the exception of the youngest age group. The data for the youngest age group are not comparable between the two samples because the youngest Navajo respondents were 21 and the youngest respondents in the national survey were 15. This undoubtedly explains the higher Navajo than national prevalence in the youngest age group. Among both men and women in each sample the tendency is for the lifetime prevalence to decline with increasing age.

Table 2 displays the results of multiple regressions of polysubstance use, extreme substance use (5 or more non-alcoholic substances), the use or non-use of several categories of substances (classification based upon Robins and McEvoy, 1990), and lifetime history of alcohol dependence onto several covariates. Type of community in which informant grew up is used as a measure of the larger social context in which non-alcoholic substances are most readily available.

In all the analyses in which age is significant, older people are less likely to have used the substances in question than younger people. In those in which sex is significant, men are always more likely than women to have used the substances. In all the analyses, the

**Table 1**  
Lifetime prevalence of non-alcoholic substance use, Navajo men and women compared to a national sample

Age group	Navajos		National Sample*	
	Men	Women	Men	Women
<24	59.5	56.5	46.4	38.9
25–34	73.4	46.3	69.8	60.4
35–44	64.6	31.3	64.1	48.6
45–54	31.9	3.7	35.5	27.4
>54	11.7	0		
Prevalence				
<54	61.0	36.7	55.8	46.4
All ages	56.3	35.5	—	

\*Source: Warner et al., 1995.

**Table 2**  
Regressions of use of various substances onto risk factors, controls only

Covariates	Total substances	Extreme use	Cannabinoid	Hard drugs	Pills	Tobacco	Alcohol	Denendence
	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	3.662*	-0.125	4.385*	0.715	-1.147	1.564***	0.648	
Age	-0.021**	-0.028	-0.084*	-0.059**	-0.011	-0.015	0.009	
Community in which raised								
Agency-rural	0.281	0.618***	0.29	0.479	0.049	0.157	0.073	
Comb-rural	-0.131	-0.302	-0.062	0.244	-0.041	-0.328	0.026	
Off res-rural	0.105	0.394	0.214	-0.18	0.573	-0.05	-0.146	
Age 1st drink	-0.074*	-0.146*	-0.109	-0.127***	-0.055***	-0.039***	-0.072***	
Physical abuse								
Yes-no	0.301**	0.157	0.256	0.046	0.363***	0.073	0.265	
logASYES	0.694*	0.898***	0.882*	0.918	0.846*	0.506***	0.744*	
Comm. Res.								
Agency-rural	0.07	0.062	-0.052	-0.242	0.174	0.072	0.216	
Border-rural	-0.005	-0.086	-0.2	0.236	0.096	-0.068	-0.136	
Sex								
Female-male	-0.556	-0.604***	-0.424***	-0.269	-0.483***	-0.882*	-0.713*	
R-Square	0.28	0.21	0.25	0.17	0.14	0.16	0.15	
	All substances excluding alcohol	5 or more substances	Marijuana and Peyote	Cocaine, crack heroin and Opiates	Sedatives, tranquilizers, stimulants, hallucinogens	Smoking and Chewing	Lifetime history of alcohol dependence among all those who have used alcohol	

\*  $p < 0.0001$ .

\*\*  $D < 0.002$ .

\*\*\*  $p < 0.05$ .

\*\*\*\*  $p < 0.0005$ .

N = 678.

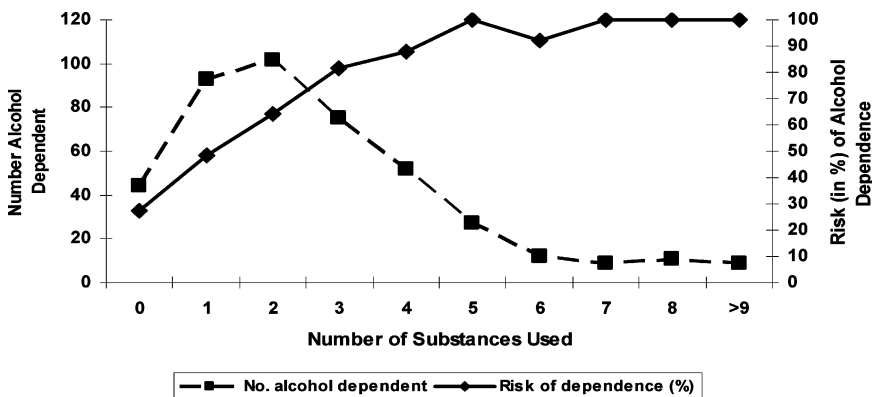
Abstainers from alcohol excluded.

measure of conduct disorder is associated with increased risk of substance use, and age at first drink is inversely related to the risk of substance use: the younger the age at first drink, the greater the number of substances used and the more likely is the use of each class of substances. In those analyses in which type of community in which the informant grew up is significant or marginally so, people raised in agency towns and off reservation are more likely to have used substances than people raised in rural reservation areas. Alcohol dependence is an important exception. Unlike the use of non-alcoholic substances, it is not associated with age of informants or even remotely with type of community in which informants were raised, indicating that like alcohol itself, a lifetime history of dependence is ubiquitous in the population. It is, however, associated with age at first drink and with conduct disorder.

Because alcohol dependence and the use of non-alcoholic substances share several important risk factors, most notably conduct disorder and age at first drink, it is not surprising that polysubstance use is associated with increased risk of alcohol dependence and with greater severity of alcoholism among those who are alcohol dependent. Figure 1 displays the risk of alcohol dependence at each level of substance use. Among those who have used five or more non-alcoholic substances (defined as extreme use in Table 2), the risk of alcohol dependence is essentially 100%. Moreover, among alcohol dependent people, there is a significant correlation between the measure of severity (ALCSUMAB) and the number of substances used ( $r = 0.35$ ,  $p < 0.0001$ ). Eighty percent of extreme users, both men and women, have been in fights while drinking, compared to 42% of other male drinkers and 18% of other female drinkers. However, as Figure 1 also demonstrates, the number of alcohol-dependent people who have used five or more non-alcoholic substances is substantially less than the number who have used none or one.

## Discussion

There are several drawbacks to the present study. One is the retrospective nature of the data and consequently the potential for (a) biases resulting from selective recall and (b) attrition due to premature to death. In respect of recall, the fact that several important risk factors (e.g., sexual and physical abuse; Kunitz and Levy, 2000) do not differ by age suggests that this is not a severe problem. In respect of attrition due to premature death, this is likely



**Figure 1.** The risk of alcohol dependence and the number of people alcohol dependent, by number of substances used.

to effect especially the age distribution of conduct disorder, for people with this condition are most at risk for premature death due to alcohol-related conditions and thus may be underrepresented among older informants. Elsewhere this has been examined by analyzing the age distribution of conduct disorder only among non-alcohol-dependent controls. Even in this sample there was an inverse association with age, supporting the inference that there has been a true, albeit slight, increase among young age groups (Kunitz and Levy, 2000).

Another drawback is that the only information available about non-alcoholic substances is the fact of use, not problems that may (or may not) have been associated with use. However, the lifetime prevalence figures for the substances included in this study are virtually identical to the figures reported by Mitchell et al. (2003) in a similar population, in which evidence of substance abuse was low.

Finally, the data were collected in the early 1990s, before newer forms of methamphetamine had emerged as an issue of concern on the Navajo Reservation. Thus, it is not possible to comment on the extent of their use. However, because the social context observed then is not radically different than now, it seems reasonable that risk factors found to be significant for the use of a wide variety of other substances, particularly hard drugs, continue to be important and contribute to the use of new forms of methamphetamine.

The large population shifts since World War II that were described at the outset are the most fundamental causes of the use of a variety of substances. The move from isolated rural areas of the reservation to towns on and near the reservation, not to mention to more distant cities, has been accompanied by improved roads, near universal school enrollment of young people, and increased access to mass media, and has improved access to alcohol and to non-alcoholic substances. Thus alcohol use has begun at an earlier age than in the past, and at the same time these demographic changes have also worked to create a peer culture that, at the extremes, involves the emergence of youth gangs (Henderson et al., 1999). This has profoundly influenced the increasing use of alcohol and other substances by women (Kunitz, 2006).

There is also suggestive evidence that in this changed social environment conduct disorder has increased among males as young people mimic the behavior of a core of delinquent peers (Henderson et al., 1999; Kunitz and Levy, 2000; Moffitt, 1993). Conduct disorder, among Navajos as well as in the general population (Robins and McEvoy, 1990), in turn increases the likelihood of alcohol use at an early age. Both early alcohol use and conduct disorder, together and separately, increase the risk of alcohol dependence and the use of other substances subsequently.

Thus, increasing access, changes in social organization, an increase in conduct disorder before age 15, and declining age at first use of alcohol are all implicated in the use of non-alcoholic substances. Perhaps most amenable to intervention is age at first use of alcohol. Because it is an important risk factor for both alcohol dependence and use of other substances, and because age of first use has declined among people born since World War II, interventions aimed at delaying the age of first use of alcohol may have broadly beneficial effects with respect to both subsequent alcohol dependence and substance use.

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article is an abbreviated version of a longer manuscript of the same title that was reviewed and approved by the Institutional Review Board of the Navajo Nation.

## RÉSUMÉ

### **Facteurs de risque pour l'usage de polysubstance ans une population américaine indigène**

Le programme diagnostique d'entrevue a été employé en 1993–1995 pour rassembler l'information sur l'utilisation de l'alcool et d'autres substances de 1.086 Indiens Navajo vivant dans ou pres de leur réservation dans le sud-ouest des Etats-Unis. Des analyses bivariante et multivariables sont employées pour prouver que l'âge de la première utilisation d'alcool a diminué au cours des 50 dernières années et est un facteur de risque significatif pour la dépendance d'alcool et l'usage de polysubstance. Les limitations sont notées. Soutenu par la concession RO1 AA09420 de l'institut national sur l'abus d'alcool et l'alcoolisme.

## RESUMEN

### **Factores de riesgo para el uso de polysustancia en una población americana nativa**

El horario de diagnóstico de la entrevista fue utilizado en 1993–1995 para recoger la información sobre el uso del alcohol y de otras sustancias de 1.086 indios Navajo que vivían en o acerca de su reservación en de sudoeste los E.E.U.U. al. Los análisis bivariante y multivariante se utilizan para demostrar que la edad del primer uso del alcohol ha declinado sobre los últimos 50 años y es un factor de riesgo significativo para la dependencia del alcohol y el uso del polysustancia. Las limitaciones son noladas. Apoyado por la concesión RO1 AA09420 del instituto nacional en abuso de alcohol y alcoholismo.

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## References

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., Rev.). Washington, DC: Author.



- Beauvais, F., Jumper-Thurman, P., Helm, H., Plested, B., Burnside, M. (2004). Surveillance of drug use among American Indian adolescents: Patterns over 25 years. *Journal of Adolescent Health*, 34, 493–500.
- Henderson, E., Kunitz, S. J., Levy, J. E. (1999). The origins of Navajo youth gangs. *American Indian Culture and Research Journal*, 23, 243–264.
- Kunitz, S. J. (2006). Life-course observations of alcohol use by Navajo Indians: Natural history or career? *Medical Anthropology Quarterly*, 20, 279–296.
- Kunitz, S. J., Gabriel, K. R., Levy, J. E., Henderson, E., Lampert, K., McCloskey, J., et al. (1999). Alcohol dependence and conduct disorder among Navajo Indians. *Journal of Studies on Alcohol*, 60, 159–167.
- Kunitz, S. J., Levy, J. E. (2000). *Drinking, conduct disorder, and social change: Navajo experiences*. New York: Oxford University Press.
- Mitchell, C. M., Beals, J., Novins, D. K., Spicer, P. (2003). Drug use among to American Indian populations: Prevalence of lifetime use and DSM-IV substance use disorders. *Drug & Alcohol Dependence*, 69, 29–41.
- Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, 100, 674–701.
- Novins, D. K., Baron, A. E. (2004). American Indian substance use: The hazards for substance use initiation and progression for adolescents aged 14 to 20 years. *Journal of the American Academy of Child and Adolescent Psychiatry*, 43, 316–324.
- Novins, D. K., Beals, J., Mitchell, C. M. (2001). Sequences of substance use among American Indian adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40, 1168–1174.
- Robins, L. N., McEvoy, L. (1990). Conduct problems as predictors of substance abuse. In L. N. Robins and M. Rutter (Eds.), *Straight and devious pathways from childhood to adulthood* (pp. 182–104). New York: Cambridge University Press.
- Robins, L. N., Regier, D. A. (Eds.). (1991). *Psychiatric disorders in America: The Epidemiologic Catchment Area Study*. New York: The Free Press.
- Warner, L. A., Kessler, R. C., Hughes, M., Anthony, J. C., Nelson, C. B. (1995). Prevalence and correlates of drug use and dependence in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry*, 52, 219–229.

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