

# Patterns and Correlates of Adult American Indian Substance Use

Journal of Drug Issues  
43(4) 497–516  
© The Author(s) 2013  
Reprints and permissions:  
sagepub.com/journalsPermissions.nav  
DOI: 10.1177/0022042613491100  
jod.sagepub.com  


Scott Akins<sup>1</sup>, Charles Lanfear<sup>1</sup>, Sarah Cline<sup>1</sup>,  
and Clayton Mosher<sup>2</sup>

## Abstract

There is substantial literature on the patterns and correlates of substance use across minority youth populations, but comparatively little attention has been directed to substance use among adults. This is particularly the case for adult American Indians, generally due to sampling challenges. This article provides multivariate analyses of the correlates of substance use across five racial/ethnic groups and highlights analyses focused on American Indian adults. In addition to marijuana use and binge drinking, our analyses consider hard drug use, which remains understudied in the literature, and include a first consideration of “bender drinking,” a form of alcohol consumption that is most likely to lead to health, social, and legal problems. Our results indicate that although American Indians report higher levels of substance use and abuse than do those from other racial/ethnic groups, these differences are attenuated when sociodemographic and individual-level/risk protective factors are taken into account.

## Keywords

substance use, drug, alcohol, American Indian, Native American, alcohol, binge

## Introduction

Each year, new reports from the Surgeon General, the Center for Disease Control and Prevention, and the U.S. Public Health Service make it abundantly clear: Health outcomes vary broadly across racial/ethnic groups in the United States. In part, this reality is grounded in disparate rates of substance use and abuse—an issue continually weighing upon the national health agenda. Unfortunately, as Whitesell, Beals, Mitchell, Keane, et al. (2007, p. 279, *italics added*) observe, “we know more about *what* disparities exist than we do *why* they exist, and thus we are not well poised to design programs that will significantly reduce these disparities” through prevention and treatment efforts.

To obtain information on adult disparities in drug use, researchers and policy makers typically turn to data from the National Survey on Drug Use and Health (NSDUH). Administered annually, the NSDUH conveys general patterns of substance use delineated by the age, sex, and race/ethnicity of survey respondents. According to the latest results, the rates of current (past 30-day) illicit drug use were highest for the American Indian/Alaska Native (AI/AN; American Indian used interchangeably from here for convenience of expression<sup>1</sup>) population, followed by Blacks,

---

<sup>1</sup>Oregon State University, Corvallis, USA

<sup>2</sup>Washington State University, Vancouver, USA

## Corresponding Author:

Scott Akins, Department of Sociology, Public Policy Program, Oregon State University, Corvallis, OR 97331, USA.  
Email: [sakins@oregonstate.edu](mailto:sakins@oregonstate.edu)

Whites, and Hispanics, with the lowest rates reported by Asians (Substance and Mental Health Services Administration [SAMHSA], 2010). For alcohol, Whites were more likely than any other racial/ethnic group to report current use, with American Indians tending to report relatively low rates of current use, but high rates of binge drinking and the highest rates of “heavy drinking” (five or more episodes of binge drinking in the past month; SAMHSA, 2010). These patterns reflect research findings that although American Indian adults report comparatively high levels of abstinence, a segment of this population drinks at very high rates yielding elevated alcohol-related morbidity and mortality (Beauvais, 1998; May, 1982, 1996). Such findings highlight the need for multivariate analyses of heavy/bender drinking such as those presented in the current study. While the data provided by the NSDUH help us determine differences in the nature and extent of substance use across racial/ethnic groups, they are less helpful in identifying the correlates and causes of substance use and abuse.

A shortcoming of the literature on American Indian substance use is that studies are heavily focused on adolescents (much easier to obtain via school samples), or where adults *are* included, the sample is generally limited to one to two tribes and/or rural reservations (Beals et al., 2005; Cheadle & Whitbeck, 2011; Kunitz, 2008; O’Connell et al., 2011; Whitesell, Beals, Mitchell, Keane, et al., 2007; Whitesell, Beals, Mitchell, Manson, & Turner, 2009; Whitesell, Beals, Mitchell, Novins et al., 2007). While this body of research is invaluable, it remains limited in terms of its ability to generalize findings across tribes and/or geographic location.

In this study, we present multivariate analyses of adult substance use among five racial/ethnic categories as well as race-disaggregated analyses of substance use focused on the White and American Indian subsamples. The data enabling our analyses were provided by a stratified sampling design that generated oversamples of hard-to-reach populations including persons living in poverty, rural residents, women, and, most important for the current analyses, members of four racial/ethnic minority groups—Hispanics, non-Hispanic African Americans, non-Hispanic Asians, and non-Hispanic American Indians. These data enable statistically meaningful comparisons of drug and alcohol use across racial/ethnic groups, while controlling for a number of variables that have been demonstrated to affect substance use. Key explanatory variables include educational attainment, poverty, unemployment, psychological health, and access to health insurance. Our analytical approach highlights the survey responses of American Indian adults, as a frequently undersampled and hard-to-reach population. Our analyses also consider hard drug use, which remains understudied in the available literature, and include an examination of “bender drinking”—episodes of drinking where the respondent keeps drinking for a couple days or more without sobering up—a form of alcohol consumption that is most likely to lead to alcohol-related morbidity and mortality, as well as social and legal problems (Mail & Johnson, 1993). To our knowledge, these are the first multivariate analyses of bender drinking by American Indian populations.

## Literature Review

Our review of the recent literature<sup>2</sup> on substance use among AI/AN populations indicates that empirical studies are increasingly using samples of adults and affording greater recognition to the broad cultural variation that exists across tribes. However, studies continue to lack generalizability, being confined to rural reservation-based populations (Beals et al., 2005; O’Connell et al., 2011; Whitesell, Beals, Mitchell, Keane, et al., 2007; Whitesell, Beals, Mitchell, Novins et al., 2007; Whitesell et al., 2009) or to case studies of a single tribe (Kunitz, 2008) due to the acknowledged difficulties of obtaining broad samples to enable analysis of adult AI/AN substance use. As aforementioned, multivariate analyses of adult American Indian substance use remain scarce.

In recent years, a data set comprised of American Indians aged 15 to 54 years randomly sampled from the tribal rolls of two reservation communities in the Northern Plains and the Southwest have generated the majority of recent findings on the correlates of adult AI/AN substance use (Beals et al., 2005; O'Connell et al., 2011; Whitesell, Beals, Mitchell, Keane, et al., 2007; Whitesell, Beals, Mitchell, Novins et al., 2007; Whitesell et al., 2009). Excepting a small study ( $n = 120$ ) conducted by Wiechelt, Gryczynski, Johnson, and Caldwell (2012), multivariate analyses on the correlates of substance use among AI/AN adults in urban centers are particularly rare.

What has been well-established by the literature is that AI/AN populations exhibit earlier and heavier use of virtually all substances compared with other racial/ethnic groups, excepting Whites in some studies/circumstances (Beals et al., 2005; Beauvais, 1992; Beauvais, Jumper-Thurman, Hlem, Plested, & Burnside, 2004; Beauvais, Oetting, & Edwards, 1985; Dickerson & Johnson, 2010; HeavyRunner-Rioux & Hollist, 2010; Kunitz, 2008; Mail & Johnson, 1993; May, 1982, 1986, 1996; Novins & Barón, 2004; O'Connell, 2011; Oetting, Edwards, Goldstein, & Garcia-Mason, 1980; Plunkett & Mitchell, 2000; Tann, Yabiku, Okamoto, & Yanow, 2007; Whitesell, Beals, Mitchell, Keane, et al., 2007; Whitesell, Beals, Mitchell, Novins, et al., 2007; Whitesell et al., 2009; Young, 1988). Recent research from Whitesell and colleagues (2009; see also Whitesell, Beals, Mitchell, Novins, et al., 2007) considers the relationships between the development of a substance use disorder (SUD), early initiation to substance use, and exposure to three types of "adversity": (a) major childhood events (e.g., separation from parents, parental divorce), (b) traumas (e.g., being the victim of a violent event or in a serious accident), and (c) witnessed violence (most commonly family violence). Results from the survey of roughly 3,000 tribal members living on two reservations in the Northern Plains and Southwest revealed that 68.4% of respondents reported facing some form of measured adversity (with the mean age of first exposure at 7.2) and 27% reported they witnessed violence (mean age at 11.2). In total, 85.5% reported substance use, with mean initiation being 15.2 years of age. Whitesell et al. (2009) ultimately concluded that all three indicators of adversity were significant, positive predictors of early initiation to substance use and that adversity was an important and significant independent predictor of the development of a SUD (total standardized  $\beta = .25$ ).

Looking to research on the geographic variations of substance use, Wiechelt and colleagues (2012) studied the relationship of historical trauma (discussed below) and substance use among a small urban sample of Lumbee and Cherokee tribal members. Their results revealed that urban Indians report higher levels of historical trauma compared with their reservation-based counterparts, and historical trauma was found to predict substance use (Wiechelt et al., 2012).

Much of the recent literature on substance use has focused on the context of initiation, sometimes associating this with subsequent abuse/dependence problems. For example, a recent study from Whitesell, Beals, Mitchell, Keane, et al. (2007) examined age at marijuana initiation and highlighted important similarities between AI populations (ages 15-54) and the general population. The peak risk period for marijuana initiation occurred between 16 and 18 years of age across race/ethnicity, although American Indian populations were at highest risk of initiating marijuana use. In their recent study, O'Connell et al. (2011) found American Indian adults (ages 18-54) who initiated alcohol use prior to age 14 were more than twice as likely to have alcohol or marijuana disorders, and those who used alcohol and marijuana simultaneously were 2 to 5 times as likely to report substance abuse or dependence as compared with those that used either substance in isolation. And regarding the progression to harder drugs, Novins and Barón (2004) found young AIs (ages 14-20) who initiated substance use with marijuana and inhalants to be more likely to use other forms of illicit drugs as compared with those who initiated with alcohol only. Kunitz's (2008) findings based on analysis of data from a survey of Navajo tribal members (ages 21-65) reinforce the predictive risk of early initiation to alcohol, finding "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" (p. 336).

These results universally underscore the importance of early prevention efforts with respect to AI/AN substance use (Beauvais et al., 1985; Kunitz, 2008; Whitesell et al., 2009). With recent research uniformly indicating high levels of illicit substance use by AI/ANs adults (and children/adolescents), yet with multivariate analyses remaining scarce, the need for further research on the topic is evident.

## **Theoretical Perspectives**

Although there have been many theoretical accounts offered for high rates of substance use and problems among extremely diverse American Indian populations (see Note 1), these explanations can be broadly grouped into three categorical types: (a) those theories that are grounded in an enhanced genetic susceptibility to substance abuse, (b) explanations considering the historical trauma associated with the multigenerational experience with and legacy of colonialization and forced assimilation, and (c) explanations grounded in structural characteristics, including the pronounced social and economic deprivation characterizing predominately minority communities.

### ***Genetic Susceptibility***

Theoretical accounts grounded in genetic predisposition propose that AI/ANs may possess inherited characteristics that render them more susceptible to substance use and abuse than other populations (Dingel & Koenig, 2008; Garcia-Andrade, Wall, & Ehlers, 1997). These explanations are predominately used to explain higher rates of alcohol abuse and negative consequences stemming from alcohol use among some American Indian populations. According to the “firewater gene” hypothesis, individuals of American Indian ancestry are supposedly genetically vulnerable to alcohol abuse, alcoholism, and negative behavior while under the influence of alcohol (Leland, 1976; Mail & Johnson, 1993). Early scientific work on the firewater hypothesis concluded higher rates of alcohol abuse by American Indian populations may stem from a slowed ability to metabolize the substance (Fenna, Mix, Schafer, & Gilbert, 1971). Although research has continually documented high rates of alcohol abuse, binge drinking, and problems related to alcohol use (as well as high rates of abstinence) among American Indian populations (Caetano, Clark, & Tam, 1998), the firewater gene hypothesis—at least in the form stated above—has largely been dismissed as a groundless “myth” (E. Duran & Duran, 1995; Garcia-Andrade, Wall, & Ehlers, 1997; May, 1996; Young, 1988) that has been used to reinforce stereotypes of the “drunken Indian” (Dingel & Koenig, 2008; May, 1996; Thatcher, 2004).

Juxtaposed against this body of work are extensive biomedical studies that conclude genetics is a moderate to strong predictor of problem drinking, alcoholism, and “responsiveness” to alcohol in the general population (Mayfield, Harris, & Schuckit, 2008; Prescott & Kendler, 1999; Schuckit et al., 2001). Although this remains (very) debated, some research goes so far as to suggest that a link to alcoholism may even be traced to a specific gene (Dick et al., 2004). Supporting genetic theories of addiction is a wide body of research indicating that alcoholism runs in families, with children of alcoholics having an increased risk of alcoholism even when adopted at birth and raised by nonalcoholics (Schuckit et al., 2001). The fairly extensive research that has been conducted on genetics and alcoholism has found heritability to account for roughly 50% of the variance in alcoholism or problem drinking in the general population (Enoch, 2011; Prescott & Kendler, 1999; Schuckit et al., 2001).

Recent biomedical research also suggests that although genetic and environmental factors are important to the development of addictive disorders, their relative importance may vary substantially across groups. Specifically referring to colonized aboriginal populations, some

biomedical research suggests that the experience of historical trauma likely far outweighs any genetic influence on alcoholism or other forms of addiction. This includes work by Enoch (2011) who notes, “in populations exposed to severe current and historical trauma such as some Native American tribes and Australian aboriginal groups, environmental stressors can swamp genetic influences” (p. 17). With no clear research findings indicating that genetics play any greater a role in American Indian substance use as compared with other groups, the literature focuses on work grounded in the legacy of colonization, historical trauma, and social and economic deprivation as the primary explanatory forces behind high rates of substance use by American Indian populations.

### *Cultural Explanations/Historical Trauma*

Cultural explanations provided for elevated rates of substance use and problems by American Indian populations are primarily grounded in the legacy of colonialism and historical trauma. Many social researchers consider the process of colonialization, its legacy, and present-day consequences to be the primary cause of the many social problems faced by American Indians, particularly with respect to substance abuse (Beauvais, 1998; Beauvais & LaBoueff, 1985; E. Duran & Duran, 1995). Work in this area conceptualizes historical trauma as “cumulative emotional and psychological wounding across generations, including the lifespan, which emanates from massive group trauma” (Brave Heart, Chase, Elkins, & Altschul, 2011, p. 283). Historical trauma is thought to originate primarily from the genocide, forced relocation, and assimilation practices (e.g., boarding schools) associated with colonialization. It may be seen manifest in disrupted (or eliminated) economic and sustenance practices, spiritual practices, kinship networks, and family ties—having the ultimate effect of diminishing American Indian cultural identity, sense of self-worth, support systems, and coping mechanisms<sup>3</sup> (Wiechelt et al., 2012).

The genocidal campaigns persisting from the Assimilation Era (1887-1945) of federal Indian policy making to the Termination and Relocation Era (1945-1961) are perhaps best embodied in the development of the residential school system. In the 1870s, in an attempt to forcibly assimilate American Indians, the U.S. Bureau of Indian Affairs established boarding schools with the express purpose of “reeducating” Indian children by eliminating their cultural identity and replacing it with White culture (similar programs existed in Canada<sup>4</sup> and Australia). Among other practices, children were forbidden from speaking their native language and from engaging in any cultural or religious practices as a means of weakening their traditional values, beliefs, and forms of culture (Beauvais, 1998; E. Duran & Duran, 1995). Although the schools reached their “heyday” in the 1930s, the coercive enrollment of Indian children in boarding schools persisted into the 1970s through the use of compulsory attendance laws.<sup>5</sup> As public schools were typically closed to Indians, some children were voluntarily sent to the schools, but others were forcibly removed from their homes by police or social service agents. Boarding schools were often located hundreds of miles from the child’s home and family, and assimilation was encouraged through punishment (Beauvais & LaBoueff, 1985). Physical and emotional abuse was common (Beauvais, 1998), and forced sterilization, sexual abuse, and murder was documented at some schools (Smith, 2007). Research has forged links between boarding school experiences and emotional trauma and problems (Kleinfeld & Bloom, 1977), disproportionately high rates of suicide (Berlin, 1987) and poor self-esteem (Ing, 1991). The multi-generational consequences of the boarding school experience are incalculable. Generations of Indians spent their impressionable developmental years in coercive environments—physically, emotionally, and culturally separated from their families (Colmant, 2000; Tafoya, 1989). Separation from parental role models at a young age has caused some boarded children to experience difficulties parenting once they assumed this role (Beauvais, 1998; Beauvais & LaBoueff, 1985; Bull, 1991). These children were exposed to an educational curriculum that

devalued their traditional culture and prohibited its expression (Beauvais & LaBoueff, 1985). The effects of this forced assimilation have persisted for generations as young American Indians seeking information on their traditional cultural identity and have often found their attempts thwarted as a result of the older generation(s) having had the “Indian beat out of them” in the boarding schools (Colmant, 2000; Tafoya, 1989).

The trauma associated with these experiences is carried today by generations of now adult Indians and is thought to be related to a number of negative behavioral and psychological outcomes, including unresolved/prolonged grief, posttraumatic stress disorder (PTSD), depression, and substance abuse (Brave Heart, 1999, 2003, 2007; E. Duran, 2006; B. Duran & Walters, 2004; Morgan & Freeman, 2009). Although work in this area is primarily qualitative in nature, an exception is recent work by Walls and Whitbeck (2012b), who found significant, negative effects of grandparent-generation government relocation on subsequent generation indicators of well-being (see also Walls & Whitbeck, 2012a). In terms of prevention and treatment, a growing body of theoretical and clinical research suggests that historical trauma and its effects should be incorporated in American Indian substance use programs (Brave Heart, 2001; Cole, 2006; E. Duran & Duran, 1995; Grant, 2008; Weaver & Brave Heart, 1999; Wiechelt et al., 2012). This is entirely consistent with literature concluding that cultural and/or spiritual components are important for the efficacy of prevention and treatment programs among Native populations (Allen, Mohatt, Fok, & Henry, 2009; Allen et al., 2006; Beauvais, 1998; Mohatt, Folk, Burkett, Henry, & Allen, 2011; Mohatt et al., 2008).

### *Structural Explanations/Social and Economic Deprivation*

A final theoretical account of American Indian substance use patterns emphasizes the social and economic deprivation experienced disproportionately by American Indians. This body of work is conceptually focused on variables such as poverty, diminished educational opportunity and attainment, and unemployment/underemployment—conditions frequently associated with the postcolonial experience (Cornell, 2006; Nelson, 2011). Compared with the general population, median income levels for employed American Indians are substantially lower and rates of poverty are more than doubled—with exceptionally high rates among AIs living on reservations (DeVoe & Darling-Churchill, 2008). Examining how variables such as poverty affect AI substance use is of obvious import, as previous research has shown that poverty is a salient factor in explaining differences in use patterns across other racial/ethnic groups. For example, research has shown that among Black and White males with annual incomes of at least US\$25,000, alcohol and drug use patterns were virtually identical; for impoverished Blacks, however, the rate of illicit drug use was more than 5 times the rate for impoverished Whites, and the rate of alcohol-related problems was 3 times that of impoverished Whites (Barr, Farrell, Barnes, & Welte, 1993).

Unemployment rates among American Indians are also especially high (Austin, 2010), a condition that has been present for decades and growing comparably worse (Devi, 2011). Since the start of the recent economic downturn, unemployment among American Indians has increased at a rate 1.6 times that of Whites (Austin, 2010). Latest employment data indicate that only slightly more than half of American Indians are working nationwide, and the employment situation is worst for those living in some of the same regions where it is best for Whites (Austin, 2010). With respect to substance abuse, these findings are important as research has consistently found substance abuse to be associated with unemployment in non-Indian populations (Kandel & Davies, 1991; Kandel & Yamaguchi, 1987; Wilson, 1996).

American Indians have also experienced considerable disadvantages in the area of education. Although the boarding school experience demonstrates this dramatically, now new challenges

exist. Today, there are approximately 650,000 public elementary and secondary students (including the roughly 1% of all students in the Bureau of Indian Education<sup>6</sup> [BIE] that identify as AI/AN; DeVoe & Darling-Churchill, 2008). Although American Indians have seen substantial gains across a number of important educational indicators over the last 30 years (e.g., completion of formal coursework, high school graduation rates, college graduation rates), there are still stark disparities in the education experiences of AI/AN and the general U.S. population. For example, a recent report released by the U.S. Department of Education found that compared with all other racial/ethnic groups, AI/AN preprimary, elementary, and secondary students displayed a higher rate of cognitive/developmental limitations at age 2, the lowest rates of computer access at home, a significantly larger percentage of students served by Individuals With Disabilities Act (14%, as compared with 9% in general population), and much higher rates of school absenteeism (DeVoe & Darling-Churchill, 2008).

There are myriad reasons for these disparities, but in part, this results from the isolation and attendant costs facing schools attended by American Indian students. A much greater percentage (46%) of AI/AN students attends schools located in rural areas as compared with Whites (30%) and Blacks (14%). In addition, just more than 33% of AI/AN students attend schools in “remote rural” areas, as compared with 15% of White students and 5% of Black students (DeVoe & Darling-Churchill, 2008).

Whether these schools are located on reservations or not, their isolation poses a substantial challenge for the quality of education. Although per-pupil expenditures are sometimes higher at American Indian schools than at public schools, these expenditure comparisons do not account for the different challenges and costs incurred. In addition to costs associated with the issues mentioned above (e.g., higher proportion of students with special needs), the isolation of many predominately AI schools may require bussing students from significant distances or boarding students for the duration of the school year. This is not comparable to the operation of mainstream public school systems (U.S. General Accounting Office, 2001). Teaching quality may also be affected, as the impoverished conditions and isolation of the AI schools may serve as substantial obstacles to teacher recruitment and retention (Beauvais & LaBoueff, 1985; U.S. General Accounting Office, 2001). Among the consequences of these many factors is that dropout rates for American Indian children are exceedingly high (Beauvais, 1996; DeVoe & Darling-Churchill, 2008)—a variable that has been found to predict substance abuse among Indian (Swaim, Beauvais, Chavez, & Oetting, 1997) and non-Indian populations (Mensch & Kandel, 1988; Wallace & Bachman, 1991).

The contribution of this article is to examine patterns of substance use by American Indian adults along with four other racial/ethnic groups. Our analyses highlight data drawn from a substantial American Indian subsample, providing focused analytical attention to this frequently undersampled and hard-to-reach population. In all analyses, we control for the influence of several demographic, socioeconomic, and individual-level risk/protective factors that are known to influence substance use and that may account for or attenuate racial/ethnic differences in use. Our analyses also consider hard drug use, which remains understudied in the available literature, and provide (to our knowledge) the first examination of racial/ethnic disparities in “bender drinking,” a form of alcohol consumption that is most likely to lead to negative health outcomes as well as social and legal problems (Johnson & Mail, 1993).

## Data and Method

The data for this study are derived from the 2003 Washington State Needs Assessment Household Survey, a telephone household survey of adults designed to measure the extent of drug use and to help the state assess the need for state-funded substance abuse treatment

**Table 1.** Race/Ethnic Differences in Reported Substance Use.

Lifetime use (%)	White	African American	Hispanic	Asian	American Indians
Alcohol use	88.2	79.5	71.4	51.0	86.7
Binge drinking	68.7	45.5	47.9	25.5	73.2
Bender drinking	6.5	4.7	4.7	1.6	22.3
Marijuana use	42.5	39.1	27.5	14.7	59.1
Cocaine (powder and crack)	15.6	11.5	10.9	2.8	25.5
Methamphetamine	6.7	2.3	2.5	1.1	11.6
Opiates	9.5	6.6	4.5	2.6	13.7
Heroin	2.0	2.4	0.8	0.1	3.6
Hallucinogens	17.4	8.6	8.2	4.4	23.3
	<i>n</i> = 1,785	<i>n</i> = 791	<i>n</i> = 1,690	<i>n</i> = 1,045	<i>n</i> = 674
Past-year use (%)	White	African American	Hispanic	Asian	American Indians
Alcohol use	72.5	57.3	58.9	43.2	58.3
Binge drinking	27.5	15.3	23.4	10.4	29.1
Bender drinking	1.3	1.1	1.7	0.4	3.9
Marijuana use	8.6	8.1	6.2	2.5	9.9
Cocaine (powder and crack)	1.5	0.9	1.7	0.2	2.1
Methamphetamine	0.5	0.3	0.5	0.0	1.8
Opiates	2.5	1.1	2.1	1.1	2.8
Heroin	0.1	0.1	0.0	0.0	0.3
Hallucinogens	1.2	0.8	1.2	0.6	1.5
	<i>n</i> = 1,785	<i>n</i> = 791	<i>n</i> = 1,690	<i>n</i> = 1,045	<i>n</i> = 674

services. The survey was implemented over a 13-month period from February 2003 through February 2004. Data on 5,985 adults from five race/ethnic groups—non-Hispanic American Indians, non-Hispanic Whites, non-Hispanic Blacks, non-Hispanic Asians, and Hispanics—are used for the analysis presented in this article. It is important to note that not all respondents answered every survey question, though 5,596 (93.5%) of the total sample provided answers for all dependent and independent variables in our models. Of the 389 respondents with missing responses, only 345 refused to answer the income question, and none refused to answer questions regarding ethnicity or use of particular substances. Consequently, we do not believe nonresponse bias has impacted our findings.

Telephone interviewing was completed by Washington State University's Social and Economic Sciences Research Center on behalf of the Washington State Department of Social and Health Services Division of Alcohol and Substance Abuse. Respondents were randomly chosen within the household by interviewing the adult with the most recent birthday. Considerable efforts were made to encourage survey respondents to participate, including translations of the instrument into six languages,<sup>7</sup> multiple call-backs, and letters of introduction to the survey sent to prospective respondents. The sampling strategy of this survey also oversampled for hard-to-reach populations, including young adults, persons living in poverty, and members of racial/ethnic minority groups, enabling the race-specific analyses conducted in the present study.

Table 1 presents lifetime and past-year use of selected substances by race/ethnicity from the 2003 Washington State sample of 5,985 households. Consistent with findings drawn from the



**Table 2.** Means and Standard Deviations for Independent Variables.

	Full sample		White		American Indian	
	M	SD	M	SD	M	SD
Age (18-99)	39.97	16.92	44.66	18.50	37.38*	14.06
Low income (0/1)	0.56	0.50	0.41	0.49	0.66*	0.47
Urban (0/1)	0.60	0.49	0.49	0.50	0.53	0.50
Education (1-8)	4.82	1.72	5.34	1.48	4.66*	1.36
Married/living with partner (0/1)	0.55	0.50	0.54	0.50	0.50	0.50
Unemployed (0/1)	0.07	0.25	0.04	0.20	0.08*	0.27
Female (0/1)	0.61	0.49	0.60	0.49	0.71*	0.45
Emotional health (1-5)	3.40	1.14	3.58	1.16	3.21*	1.14
Health insurance (0/1)	0.78	0.42	0.87	0.34	0.78*	0.41
n	5,985		1,785		674	

\*Significantly different from White at  $p < .05$ ,  $t$  test.

NSDUH described earlier, American Indians report the highest rates of lifetime and past-year use of all substances, excepting “any” alcohol use. Of particular note, at 22.3% of respondents, American Indians are nearly 4 times as likely as any other race/ethnicity to report lifetime bender drinking, defined as periods of drinking without sobering up lasting 2 or more days, and nearly 3 times as likely as any other group to report bender drinking in the past month. Reported lifetime cocaine and methamphetamine use are also approximately twice that of other groups, though only methamphetamine is notably higher in the past month. American Indians in our sample also display past-year alcohol use lower than Whites and similar to African American and Hispanic respondents, possibly indicating higher levels of recent, rather than lifetime, abstinence.

### Dependent Variables

Although the Washington State household survey provides multiple measures of substance use (described in Table 1) for brevity and theoretical clarity, we utilize four distinct measures of substance abuse in our multivariate analysis, with two of these measures focusing on illegal drug use and two on alcohol abuse. All the dependent variables are binary in nature. *Past-year marijuana use* is coded “1” if the respondent reports the use of marijuana in any form in the year prior to completing the survey.<sup>8</sup> *Past-year hard drug use* is coded “1” if the respondent reports the illicit use of cocaine, methamphetamine, stimulants other than cocaine or methamphetamine, heroin, opiate-based pain relievers, opiates other than heroin or opiate-based pain relievers, hallucinogens, tranquilizers, sedatives, or inhalants in the year prior to completing the survey. *Past-year binge drinking* is coded “1” if male respondents report having five or more drinks in 1 day in the previous year and if female respondents report having four or more drinks in 1 day in the previous year. *Past-year bender drinking* is coded “1” if respondents report “going on binges where you kept drinking for a couple of days or more without sobering up” during the past year (Table 2).

### Independent Variables

The literature reviewed earlier in this article has identified a number of variables that are associated with substance use and abuse; we include several of these variables in our analyses. *White*,

*Black*, *Asian*, and *Hispanic* are dummy variables coded as "1" if the respondent identifies belonging to that race/ethnic category (American Indians are treated as the reference category). *Low Income* is coded "1" for those reporting incomes below 200% of the U.S. federal poverty threshold for 2002 taking into account both income and number of persons in the household and those above that threshold are coded "0." *Education* is constructed into eight categories: 1 = none; 2 = first through eighth grade; 3 = some high school, no diploma; 4 = high school graduate or GED; 5 = some college, no degree; 6 = associate's degree; 7 = college graduate; 8 = advanced degree.<sup>9</sup> *Unemployment* is coded "1" for respondents that report being currently unemployed and *Health insurance* is coded as "1" if the respondent reports that they currently have some form of health insurance.

Our analyses examine the effect of emotional health as research has identified a strong relationship between emotional health and substance use (see, for example, Wills & Shiffman, 1985). *Emotional health* is derived from a question asking respondents to assess their emotional/psychological health during the previous 12 months. Responses are coded from 1 (*poor*) to 5 (*excellent*). We also control for urban residence as there are important differences in the urban and rural American Indian populations in Washington State that may influence levels of substance. *Rural* is coded "1" if the respondent reports living in a rural area based on their reported county and zip code.

Finally, our analyses also control for three variables known to be associated with substance use and abuse. As substance use decreases substantially over the life course, *Age* is included as a continuous variable as reported by respondents. *Married or living with partner* indicates whether a respondent reports being married or living with a partner in a "marriage like relationship," with married and cohabitating persons coded as "1" and those reporting never having been married or who are separated, divorced, or widowed coded "0." *Female* is coded "1" if the respondent reports being female and "0" if they report being male.

## Results

Table 3 presents the results of logistic regression analyses on past-year alcohol abuse across all race/ethnic categories. Model 1 examines the race/ethnic effect without any of the explanatory variables included, while Model 2 includes all available and relevant independent variables. As compared with the reference category of American Indians, Whites display similar rates of past-year binge drinking, whereas all others are significantly lower, particularly Black and Asian respondents. Under the second model, while "White" remains a nonsignificant predictor, the remaining race/ethnicity categories all become stronger negative predictors of binge drinking. Age, low income, female sex, marriage and cohabitation, and health insurance all negatively predict past-year binge drinking, whereas education and urban residence are positive predictors. Results for bender drinking indicate that American Indians are at least twice as likely as any other race/ethnic groups to report past-year bender drinking. As with binge drinking, age, marriage/cohabitation, and female sex are significant negative predictors of bender drinking.

In Table 4, we present the results of logistic regression analyses on past-year marijuana use and hard drug use measures across all race/ethnic categories. In both models in each regression, White respondents are not significantly different from American Indians in past-year illicit drug use, while the dummy variables for Black, Asian, and Hispanic race/ethnicity are all significantly and negatively related to use. For marijuana, all independent variables except unemployment are significant predictors. Urban residence is strongly associated with marijuana use, with use nearly twice as likely as compared with rural residence. Education also positively predicts illicit substance use. Age, female sex, emotional health, marriage/cohabitation, and health insurance all significantly and negatively affect marijuana use. When considering past-year hard drug use,

**Table 3.** Logistic Regression Results—Past-Year Alcohol Abuse Measures.

Variable	Past-year binge drinking odds ratios (95% CI)		Past-year bender drinking odds ratios (95% CI)	
	Model 1	Model 2	Model 1	Model 2
White	0.92 [0.76, 1.12]	0.97 [0.78, 1.20]	0.34** [0.19, 0.60]	0.47* [0.26, 0.88]
Black	0.44** [0.34, 0.57]	0.36** [0.27, 0.48]	0.29** [0.13, 0.62]	0.28** [0.12, 0.66]
Asian	0.28** [0.22, 0.37]	0.22** [0.17, 0.30]	0.10** [0.03, 0.28]	0.12** [0.04, 0.36]
Hispanic	0.75** [0.61, 0.91]	0.64** [0.52, 0.81]	0.42** [0.24, 0.72]	0.32** [0.17, 0.59]
Age		0.95** [0.95, 0.96]		0.96** [0.95, 0.97]
Low income (0/1)		0.71** [0.60, 0.83]		1.49 [0.86, 2.59]
Urban (0/1)		1.26** [1.08, 1.46]		1.49 [0.86, 2.59]
Education (1-8)		1.09** [1.04, 1.15]		0.96 [0.80, 1.13]
Married/living with partner (0/1)		0.71** [0.62, 0.82]		0.57* [0.36, 0.92]
Unemployment (0/1)		0.99 [0.76, 1.30]		1.13 [0.58, 2.20]
Female (0/1)		0.43** [0.37, 0.49]		0.21** [0.13, 0.34]
Emotional health (1-5)		0.95 [0.89, 1.01]		0.67** [0.55, 0.83]
Health insurance (0/1)		0.96 [0.81, 1.14]		0.64 [0.40, 1.04]
<i>n</i>	5,985	5,596	5,985	5,596
McKelvey and Zavoina <i>R</i> <sup>2</sup>	.06	.27	.11	.37
Model chi-square	168.41**	784.38**	31.6**	142.62**

Note. CI = confidence interval.

\**p* < .05. \*\**p* < .01.

**Table 4.** Logistic Regression Results—Past-Year Drug Abuse Measures.

Variable	Past-year marijuana use odds ratios (95% CI)		Past-year hard drug use odds ratios (95% CI)	
	Model 1	Model 2	Model 1	Model 2
White	0.86 [0.63, 1.16]	0.96 [0.69, 1.34]	0.72 [0.51, 1.03]	0.98 [0.67, 1.44]
Black	0.80 [0.56, 1.14]	0.61* [0.41, 0.90]	0.37** [0.23, 0.62]	0.32** [0.18, 0.55]
Asian	0.23** [0.15, 0.37]	0.16** [0.10, 0.27]	0.31** [0.19, 0.50]	0.29** [0.17, 0.50]
Hispanic	0.60** [0.44, 0.83]	0.51** [0.36, 0.73]	0.63* [0.44, 0.90]	0.59** [0.40, 0.88]
Age		0.93** [0.92, 0.94]		0.95** [0.94, 0.96]
Low income (0/1)		0.77* [0.60, 0.99]		0.98 [0.73, 1.32]
Urban (0/1)		1.78** [1.4, 2.27]		1.69** [1.27, 2.23]
Education (1-8)		1.15** [1.06, 1.25]		1.06 [0.97, 1.17]
Married/living with partner (0/1)		0.54** [0.43, 0.68]		0.70** [0.54, 0.91]
Unemployment (0/1)		1.24 [0.85, 1.82]		1.85** [1.25, 2.75]
Female (0/1)		0.49** [0.40, 0.61]		0.49** [0.38, 0.64]
Emotional health (1-5)		0.76** [0.69, 0.84]		0.69** [0.61, 0.77]
Health insurance (0/1)		0.75* [0.58, 0.96]		0.98 [0.72, 1.32]
<i>n</i>	5,985	5,596	5,985	5,596
McKelvey and Zavoina <i>R</i> <sup>2</sup>	.07	.39	.04	.27
Model chi-square	60.57**	458.43**	33.43**	240.429**

Note. CI = confidence interval.

\**p* < .05. \*\**p* < .01.

**Table 5.** Logistic Regression Results—Past-Year Alcohol Abuse Measures American Indians and Whites.

Variable	Past-year binge drinking odds ratios (95% CI)		Past-year bender drinking odds ratios (95% CI)	
	American Indian	White	American Indian	White
Age	0.95** [0.93, 0.97]	0.95** [0.94, 0.95]	0.99 [0.96, 1.02]	0.94** [0.90, 0.98]
Low income (0/1)	0.98 [0.65, 1.48]	0.81 [0.63, 1.06]	1.50 [0.46, 4.92]	3.03* [1.15, 8.00]
Urban (0/1)	1.03 [0.72, 1.48]	1.13 [0.90, 1.43]	1.05 [0.43, 2.53]	1.07 [0.45, 2.52]
Education (1-8)	1.10 [0.95, 1.27]	1.03 [0.95, 1.13]	0.59* [0.38, 0.90]	1.35† [0.97, 1.87]
Married/living with partner (0/1)	1.06 [0.73, 1.58]	0.73** [0.57, 0.93]	0.96 [0.39, 2.39]	0.43 [0.15, 1.23]
Unemployment (0/1)	1.74† [0.90, 3.34]	0.98 [0.55, 1.72]	3.08* [1.10, 8.60]	0.44 [0.05, 3.77]
Female (0/1)	0.68† [0.45, 1.01]	0.52** [0.41, 0.66]	0.21** [0.08, 0.53]	0.08** [0.02, 0.26]
Emotional health (1-5)	0.98 [0.82, 1.15]	0.94 [0.85, 1.04]	0.90 [0.60, 1.34]	0.61** [0.41, 0.89]
Health insurance (0/1)	0.94 [0.60, 1.46]	0.88 [0.63, 1.22]	0.90 [0.34, 2.33]	0.98 [0.30, 2.12]
<i>n</i>	632	1,662	632	1,662
McKelvey and Zavoina <i>R</i> <sup>2</sup>	.14	.26	.31	.55
Model chi-square	52.25**	277.68**	32.27**	64.40**

Note. CI = confidence interval.

†*p* < .10. \**p* < .05. \*\**p* < .01.

which does not consider marijuana, the relationships appear very similar, though unemployment is a strong positive predictor for hard drug use, while low income and health insurance are not significant predictors of hard drug use.

The second set of logistic regression analyses presented in Tables 5 and 6 focuses on the American Indian and White subsamples of the Washington State household survey. Table 5 indicates the factors predicting past-year binge drinking among American Indians and Whites are very similar. Two notable differences are present: Marriage and cohabitation appears, in this sample, to be a significant negative predictor of binge drinking only for Whites, whereas unemployment appears to be a strong positive predictor (albeit only at a significance of *p* < .10) only for American Indians. For past-year bender drinking, American Indians and Whites in our sample are remarkably different. Low income is a strong positive predictor, and emotional health a strong negative predictor, only for White respondents, whereas unemployment and education appear to have opposite effects for these groups. For American Indians, education has a strong negative impact on bender drinking, whereas the unemployed are 3 times as likely to report bender drinking. For Whites, the unemployed are roughly half as likely as the employed to report bender drinking, while additional years of education appear to increase reported bender drinking. Follow-up analysis conducted but not reported in table form indicate that the difference in the effect of education on bender drinking appears to be due to the majority of White bender drinkers reporting “some college” education, while most bender drinking American Indians have not attended any college (bender drinking is rare for the highly educated in both groups). This is consistent with research indicating the presence of a “party/heavy drinking subculture” in college, which is a disproportionately White, middle-class phenomenon (Hagan, 1991).

In Table 6, we examine past-year marijuana and hard drug use by Whites and American Indians. For past-year marijuana use, some of the independent variables in our model have very similar effects for both groups; age, emotional health, and health insurance (at .10 only) are negative predictors of use in both groups. Notable differences include a positive influence

**Table 6.** Logistic Regression Results—Past-Year Illicit Drug Use Measures American Indians and Whites.

Variable	Past-year marijuana use odds ratios (95% CI)		Past-year hard drug use odds ratios (95% CI)	
	American Indian	White	American Indian	White
Age	0.94** [0.92, 0.97]	0.94** [0.92, 0.95]	0.94** [0.91, 0.97]	0.94** [0.93, 0.96]
Low income (0/1)	1.24 [0.61, 2.50]	1.28 [0.86, 1.89]	2.93* [1.07, 8.04]	1.11 [0.70, 1.77]
Urban (0/1)	1.23 [0.70, 2.15]	1.71** [1.19, 2.48]	1.29 [0.66, 2.50]	1.51† [0.98, 2.35]
Education (1-8)	0.84 [0.66, 1.08]	1.16* [1.01, 1.34]	0.87 [0.64, 1.16]	1.12 [0.95, 1.33]
Married/living with partner (0/1)	0.93 [0.52, 1.66]	0.57** [0.39, 0.83]	1.16 [0.59, 2.29]	0.78 [0.49, 1.24]
Unemployment (0/1)	1.72 [0.78, 3.80]	1.77† [0.91, 3.46]	3.77** [1.66, 8.55]	2.49* [1.22, 5.05]
Female (0/1)	0.65 [0.36, 1.18]	0.43** [0.30, 0.63]	0.63 [0.32, 1.28]	0.40** [0.26, 0.63]
Emotional health (1-5)	0.63** [0.48, 0.83]	0.76** [0.65, 0.90]	0.62** [0.45, 0.86]	0.67** [0.55, 0.81]
Health insurance (0/1)	0.57† [0.32, 1.04]	0.65† [0.42, 1.00]	1.18 [0.56, 2.49]	0.74 [0.44, 1.24]
<i>n</i>	632	1,662	632	1,662
McKelvey and Zavoina <i>R</i> <sup>2</sup>	.27	.39	.34	.36
Model chi-square	57.39**	181.43**	56.95**	116.68**

Note. CI = confidence interval.

†*p* < .10. \**p* < .05. \*\**p* < .01.

of urban residence on marijuana use for Whites and a preventative effect of female sex and marriage/cohabitation for Whites (AI coefficients for these variables are in the same, expected, direction but are not statistically significant). Analyses of past-year hard drug use reveal the coefficients for age, unemployment, and emotional health to be significant and in the expected direction. Of particular note, low income appears to be an extremely strong predictor of hard drug use by American Indians but not Whites, with low income AI respondents nearly 3 times as likely to report hard drug use. Additional analyses examining interaction effects (reported in the appendix) provide further support for this finding: Low income has a substantially greater effect on hard drug use for American Indians as compared with Whites. These analyses also reveal the American Indian-unemployment interaction term to be in the hypothesized direction, but this finding was nonsignificant.<sup>10</sup> Unemployment also greatly increases the odds of hard drug use for both groups, though substantially more for American Indians; unemployed Whites are roughly 2.5 times as likely to use hard drugs, as compared with the employed, while unemployed American Indians are nearly 4 times as likely to report hard drug use. These results may suggest that while American Indians are largely similar to Whites in substance use, variables associated with economic disadvantage disproportionately affects their patterns of hard drug use.

## Conclusion

Our findings affirm that a substantial disparity exists in substance use rates between American Indians and other ethnic groups, particularly for the most harmful forms of substance use, such as bender drinking and hard drug use. Once controlling for a variety of social and environmental factors, however, we find Native American substance use rates mostly approximate those of White respondents, except in the notable and rarely studied case of bender drinking. In studying Native American use patterns, our findings fundamentally support Oetting and Beauvais's (1989) suggestion that "what has been lost in this quest for exotic answers is the recognition that

Indian people have much in common with non-Indians” (p. 88). The factors that best predict Native American substance use, which are primarily socioeconomic in nature, are similar in both strength and direction to those of Whites, and the majority of elevated substance use in this population is predicted by pervasive and enduring disadvantage rather than intrinsic ethnic characteristics.

The primary contributions of our analyses to the literature are the statistical power and regional generalizability of findings provided by our relatively large sample, the ability to consider race/ethnic differences in use while controlling for many common correlates of substance use that might otherwise confound findings, and the specificity of substance use dependent variables, including our examination of bender drinking. Although we review literature that examines American Indian substance use in the theoretical context of genetic factors or historical trauma, we are unable to explicitly test or control for these influences in our analyses as our data do not permit it. Note that the causal mechanisms proposed by work grounded in historical trauma are often correlated with the socioeconomic factors we examine in this study, but such explanations commonly include factors that are conceptually distinct from the socioeconomic variables that we focus on (e.g., loss of cultural identity).

While our data are limited to the state of Washington, and thus not generalizable across the great variety of Native American populations throughout the United States, they are not restricted only to specific tribes or rural populations as in the case of many earlier studies, and permit direct comparison of American Indians to other ethnic groups using the same theoretical predictors of substance use. Even given this substantial American Indian subsample, we suspect that the size of our subsample remains a limitation to the statistical power of our analyses when considering rare events such as bender drinking and hard drug use, given that the odds ratios for several variables were sizable and in the expected direction though statistically non-significant. Future work should continue to separate hard drugs, such as methamphetamine, inhalants, and narcotic pharmaceuticals, from marijuana as our results indicate significant race/ethnic differences in the patterns and predictors (particularly income, unemployment, and education) of use that are not captured when aggregating all forms of illicit use. Similarly, our dichotomous past-year measures of substance abuse, while commonly used in the literature, are not ideal in terms of capturing patterns of substance use most likely to result in harm to the individual and society (see Note 8). Ideally, substance use measures that capture “heavy use” (high frequency in the past month, the past week) would be preferable. Unfortunately, capturing statistically meaningful data on racial/ethnic differences in substance use frequency, particularly for American Indians use of hard drugs and bender drinking, would require a much larger sample than presented by the 2003 Washington State Needs Assessment Household Survey due to the rarity of these forms of substance use and relatively small population of American Indians in the United States.

Finally, we present findings on bender drinking, a rarely studied and disproportionately harmful form of alcohol use that disproportionately affects American Indian populations. This finding persists even after accounting for a variety of social and environmental risk factors and should serve to draw attention to bender drinking as a subject for additional research, both on American Indian as well as broader (especially college-aged) populations, as bender drinking is an understudied form of alcohol consumption that is most likely to lead to social problems, individual legal problems, and alcohol-related morbidity and mortality. Our understanding of American Indian substance use could be further facilitated by obtaining larger samples, particularly nationally representative samples, and more detailed measures of cultural and contextual variables, such as empirical measures of historical trauma, which may account for remaining substance use disparities between the American Indians and the general population.

## Appendix

### *Logistic Regression Results Including Interaction Terms—Past-Year Drug Abuse.*

Variable	Past-year marijuana use (odds ratios)	Past-year hard drug use (odds ratios)
American Indian	0.75 (0.39, 1.43)	0.37* (0.14, 0.99)
Black	1.06 (0.65, 1.73)	0.56 (0.27, 1.15)
Asian	0.24** (0.13, 0.45)	0.37** (0.19, 0.72)
Hispanic	1.06 (0.71, 1.58)	0.91 (0.56, 1.48)
Age	0.93** (0.92, 0.94)	0.95** (0.94, 0.96)
Low income (0/1)	1.23 (0.85, 1.79)	1.12 (0.72, 1.74)
Urban (0/1)	1.74** (1.36, 2.22)	1.68** (1.26, 2.23)
Education (1-8)	1.12** (1.03, 1.22)	1.04 (0.95, 1.15)
Married/living with partner (0/1)	0.57** (0.45, 0.72)	0.74* (0.57, 0.97)
Unemployment (0/1)	1.80 (0.93, 3.48)	2.64** (1.33, 5.23)
Female (0/1)	0.50** (0.40, 0.62)	0.50** (0.39, 0.66)
Emotional health (1-5)	0.77** (0.69, 0.85)	0.69** (0.61, 0.78)
Health insurance (0/1)	0.72* (0.56, 0.93)	0.95 (0.70, 1.29)
American Indian × Unemployment	0.97 (0.35, 2.65)	1.31 (0.47, 3.67)
Black × Unemployment	0.45 (0.13, 1.49)	0.18 (0.02, 1.57)
Asian × Unemployment	0.84 (0.16, 4.39)	0.43 (0.08, 2.27)
Hispanic × Unemployment	0.43 (0.15, 1.23)	0.45 (0.16, 1.27)
American Indian × Low income	1.27 (0.59, 2.70)	2.93* (1.01, 8.50)
Black × Low income	0.43* (0.22, 0.92)	0.51 (0.19, 1.36)
Asian × Low income	0.49 (0.19, 1.26)	0.77 (0.30, 2.00)
Hispanic × Low income	0.29** (0.16, 0.51)	0.56 (0.29, 1.08)
N	5,596	5,596
McKelvey and Zavoina R <sup>2</sup>	.40	.27
Model chi-square	490.38**	262.45**

\* $p < .05$ . \*\* $p < .01$ .

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### Notes

1. We acknowledge that the choice of labels used to identify racial and ethnic groups remain debated and refer to American Indians rather than Native Americans to remain consistent with recent research published in this journal. We also recognize that these racial/ethnic categories are by no means homogeneous. There are more than 560 federally recognized American Indian tribes with more than 200 distinct languages in the United States alone. However, even with the oversampling and the relatively large number of cases provided for our analyses, if one tries to break down specific groups within these categories, degrees of freedom in analyses are sacrificed. We thus feel it is most productive to analyze the data using the five broad racial/ethnic categories.

2. Please see Akins, Mosher, Rotolo, & Griffin (2003) for a review of older literature on adult American Indian substance use.
3. With respect to this, it is notable that the sacramental use of peyote in the context of the Native American Church has been found to be an effective treatment for alcoholism among American Indians and to be *negatively* related to the recreational use of all drugs, including peyote and alcohol (Beauvais, 1998).
4. In 2008, the Canadian Prime Minister Stephen Harper formally apologized to a group of Aboriginal Canadian delegates on behalf of the Government of Canada for the creation of the boarding schools and the abuses that transpired in them. Five billion dollars (Can\$) was allocated to compensate all living former boarding students, with more funds allotted if the individual was physically or sexually abused. It was estimated 29,000 claimants would ultimately come forward to make claims (Curry, 2011).
5. The boarding school model remains today in a reduced, altered, and voluntary form and many American Indian students report positive experiences with this model of education (Colmant, 2000).
6. Recent tabulations indicate there are slightly fewer than 50,000 American Indian students who attend Bureau of Indian Education (BIE) schools. There are no BIE schools in Alaska, and most Alaska Native children attend public schools (DeVoe & Darling-Churchill, 2008).
7. The survey was offered in English, Spanish, Chinese, Korean, Vietnamese, and Russian.
8. As our data contain measures of past 30 day marijuana and hard drug use, but only past-year binge drinking and bender drinking, we chose to utilize past-year measures for uniformity and statistical power.
9. We ran models with an ordinal income measure and dichotomous education measure to ensure that employing independent variables with limited response categories did not affect the results. The results of those analyses were not substantively different, so we use the current measures as they are more theoretically appropriate.
10. Similar interaction-effect analyses were run for bender drinking and binge drinking. They were not reported because (a) bender drinking was too rare to enable interaction analyses and (b) interaction effects for binge drinking yielded nothing of interest (nothing statistically significant) with respect to the coefficients for American Indian/poverty and American Indian/unemployment.

## References

- Akins, S., Mosher, C., Rotolo, T., & Griffin, R. (2003). Patterns and correlates of substance use among American Indians in Washington State. *Journal of Drug Issues*, 33, 45-74.
- Allen, J., Mohatt, G., Fok, C. C. T., & Henry, D. (2009). Suicide prevention as a community development process: Understanding circumpolar youth suicide prevention through community level outcomes. *International Journal of Circumpolar Health*, 68, 274-291.
- Allen, J., Mohatt, G. V., Rasmus, S. M., Hazel, K. L., Thomas, L., & Lindley, S. (2006). The tools to understand: Community as co-researcher on culture-specific protective factors for Alaska Natives. *Journal of Prevention & Intervention in the Community*, 32, 41-59.
- Austin, A. (2010). *Different race, different recession: American Indian unemployment in 2010*. Retrieved from <http://www.epi.org/publication/ib289/>
- Barr, K. E. M., Farrell, M. P., Barnes, G. M., & Welte, J. W. (1993). Race, class and gender differences in substance abuse: Evidence of a middle-class/underclass polarization among Black males. *Social Problems*, 40, 314-327.
- Beals, J., Manson, S. M., Whitesell, N. R., Spicer, P., Novins, D. K., & Mitchell, C. M. (2005). Prevalence of DSM-IV disorder and attendant help-seeking in two American Indian reservation populations. *Archives of General Psychiatry*, 62, 99-108.
- Beauvais, F. (1992). Trends in adolescent drug and alcohol use. *American Indian and Alaska Native Mental Health Research*, 5(1), 1-12.
- Beauvais, F. (1996). Trends in drug use among American Indian students and dropouts, 1975-1994. *The American Journal of Public Health*, 86, 1594-1598.
- Beauvais, F. (1998). American Indians and alcohol. *Alcohol Health and Research World*, 22, 253-259.
- Beauvais, F., Jumper-Thurman, P., Hlem, 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.



- Beauvais, F., & LaBoueff, S. (1985). Drug and alcohol abuse intervention in American Indian communities. *The International Journal of the Addictions*, 20(1), 139-171.
- Beauvais, F., Oetting, E. R., & Edwards, R. W. (1985). Trends in drug use of Indian adolescents living on reservations, 1975-1983. *American Journal of Drug and Alcohol Abuse*, 11, 209-229.
- Berlin, I. (1987). Suicide among American Indian adolescents: An overview. *Suicide and Life-Threatening Behavior*, 17, 218-232.
- Brave Heart, M. Y. H. (1999). Oyate Ptayela: Rebuilding the Lakota nation through addressing historical trauma among Lakota parents. *Journal of Human Behavior in the Social Environment*, 2(1/2), 109-126.
- Brave Heart, M. Y. H. (2001). Clinical interventions with American Indians. In R. Fong & S. Furuto (Eds.), *Culturally competent social work practice: Practice skills, interventions, and evaluation* (pp. 285-298). Reading, MA: Longman.
- Brave Heart, M. Y. H. (2003). The historical trauma response among natives and its relationship with substance abuse: A Lakota illustration. *Journal of Psychoactive Drugs*, 35, 7-13.
- Brave Heart, M. Y. H. (2007). The impact of historical trauma: The example of the native community. In M. Bussey & J. B. Wise (Eds.), *Trauma transformed: An empowerment response* (pp. 176-193). New York, NY: Columbia University Press.
- Brave Heart, M. Y. H., Chase, J., Elkins, J., & Altschul, D. B. (2011). Historical trauma among indigenous peoples of the Americas: Concepts, research, and clinical considerations. *Journal of Psychoactive Drugs*, 43, 282-290.
- Bull, L. (1991). Indian residential schooling: The native perspective. *Canadian Journal of Native Education*, 18, 1-63.
- Caetano, R., Clark, C., & Tam, T. (1998). Alcohol consumption among racial/ethnic minorities. *Alcohol Health and Research World*, 22, 233-238.
- Cheadle, J. E., & Whitbeck, L. B. (2011). Alcohol use trajectories and problem drinking over the course of adolescence: A study of North American indigenous youth and their caretakers. *Journal of Health and Social Behavior*, 52, 228-245.
- Cole, N. (2006). Trauma and the American Indian. In T. M. Witko (Ed.), *Mental health care for urban Indians* (pp. 115-130). Washington, DC: American Psychological Association.
- Colmant, S. (2000). U.S. and Canadian boarding schools: A review, past and present. *Native Americas Journal*, 17(4), 24-30.
- Cornell, S. (2006). *Indigenous Peoples, Poverty and Self-Determination in Australia, New Zealand, Canada and the United States. Indigenous Peoples and Poverty: An International Perspective* (JOPNA No. 2006-02). Tucson, AZ: Native Nations Institute for Leadership, Management and Policy.
- Curry, B. (2011, November). Cost to address native residential school abuses set to pass \$5 billion. *The Globe and Mail*. Retrieved from <http://www.theglobeandmail.com/news/politics/cost-to-redress-native-residential-school-abuse-set-to-pass-5-billion/article4251765/>
- Devi, S. (2011). Native American health left out in the cold. *The Lancet*, 377, 1481-1482.
- DeVoe, J. F., & Darling-Churchill, K. E. (2008). *Status and trends in the education of American Indians and Alaska Natives: 2008* (NCES 2008-084). Washington, DC: National Center for Education Statistics, Institute of Education, Sciences, U.S. Department of Education.
- Dick, D., Edenberg, H., Xuei, X., Goate, A., Kuperman, A., Schuckit, M., & Foroud, T. (2004). Association of GABRG3 with alcohol dependence. *Alcoholism: Clinical and Experimental Research*, 28, 4-9.
- Dickerson, D. L., & Johnson, C. L. (2010). Mental health and substance abuse characteristics among a clinical sample of urban American Indian/Alaska Native youths in a large California metropolitan area: A descriptive study. *Community Mental Health Journal*, 48(1), 56-62.
- Dingel, M. J., & Koenig, B. A. (2008). Tracking race in addiction research. In B. A. Koenig, S.-J. Lee, & S. S. Richardson (Eds.), *Revisiting race in a genomic age* (pp. 172-197). New Brunswick, NJ: Rutgers University Press.
- Duran, B., & Walters, K. L. (2004). HIV-AIDS prevention in "Indian country": Current practice, indigenist etiology models, and postcolonial approaches to change. *AIDS Education and Prevention*, 16, 187-201.
- Duran, E. (2006). *Healing the soul wound: Counseling with American Indians and other native peoples*. New York, NY: Teachers College Press.

- Duran, E., & Duran, B. (1995). *Native American postcolonial psychology*. Albany, NY: State University of New York Press.
- Enoch, M. A. (2011). The role of early life stress as a predictor for alcohol and drug dependence. *Psychopharmacology*, 214(1), 17-31.
- Fenna, D., Mix, L., Schaefer, O., & Gilbert, J. (1971). Ethanol metabolism in various racial groups. *Canadian Medical Association Journal*, 105, 472-475.
- Garcia-Andrade, C., Wall, T. L., & Ehlers, C. L. (1997). The firewater myth and response to alcohol in mission Indians. *American Journal of Psychiatry*, 154, 983-988.
- Grant, H. (2008). American Indians: Working with American Indians and historical trauma. *Illness, Crisis, & Loss*, 16(2), 125-136.
- Hagan, J. (1991). Destiny and drift: Subcultural preferences, status attainments, and the risks and rewards of youth. *American Sociological Review*, 56, 567-582.
- HeavyRunner-Rioux, A. R., & Hollist, D. R. (2010). Community, family, and peer influences on alcohol, marijuana, and illicit drug use among a sample of Native American youth: An analysis of predictive factors. *Journal of Ethnicity in Substance Abuse*, 9, 260-283.
- Ing, R. (1991). The effects of residential schools on Native child-rearing practices. *Canadian Journal of Native Education*, 18, 65-118.
- Kandel, D., & Davies, M. (1991). Friendship networks, intimacy, and illicit drug use in young adulthood: A comparison of two competing theories. *Criminology*, 29, 441-469.
- Kandel, D., & Yamaguchi, K. (1987). Job mobility and drug use: An event history analysis. *American Journal of Sociology*, 92, 836-878.
- Kleinfield, J., & Bloom, J. (1977). Boarding schools: Effects on the mental health of Eskimo adolescents. *American Journal of Psychiatry*, 134, 411-417.
- Kunitz, S. J. (2008). Risk factors for polydrug use in a Native American population. *Substance Use & Misuse*, 43, 331-339.
- Leland, J. (1976). *Firewater myths: North American Indian drinking and alcohol addiction*. New Brunswick, NJ: Rutgers Center for Alcohol Studies.
- Mail, P., & Johnson, S. (1993). Boozing, sniffing, and toking: An overview of past, present, and future of substance abuse by American Indians. *American Indian and Alaska Native Mental Health Research*, 5(2), 1-33.
- May, P. (1982). Substance abuse and American Indians: Prevalence and susceptibility. *International Journal of the Addictions*, 17, 1185-1209.
- May, P. (1986). Alcohol and drug misuse prevention programs for American Indians: Needs and opportunities. *Journal of Studies on Alcohol*, 47, 187-195.
- May, P. (1996). Overview of alcohol abuse epidemiology for American Indian populations. In R. Sandefur, R. Rindfuss, & B. Cohen (Eds.), *Changing numbers, changing needs: American Indian demography and public health* (pp. 235-261). Washington, DC: National Academy Press.
- Mayfield, R., Harris, R., & Schuckit, M. (2008). Genetic factors influencing alcohol dependence. *British Journal of Pharmacology*, 154, 275-287.
- Mensch, B., & Kandel, D. B. (1988). Underreporting of substance use in a national longitudinal youth cohort: Individual and interviewer effects. *The Public Opinion Quarterly*, 52(1), 100-124.
- Mohatt, G. V., Rasmus, S. M., Thomas, L., Allen, J., Hazel, K., & Marlatt, G. A. (2008). Risk, resilience, and natural recovery: A model of recovery from alcohol abuse for Alaska Natives. *Addiction*, 103, 205-215.
- Mohatt, N. V., Folk, C. C., Burket, R., Henry, D., & Allen, J. (2011). Assessment of awareness of connectedness as a culturally-based protective factor for Alaska Native youth. *Cultural Diversity and Ethnic Minority Psychology*, 17(4), 444-455.
- Morgan, R., & Freeman, L. (2009). The healing of our people: Substance abuse and historical trauma. *Substance Use & Misuse*, 44, 84-98.
- Nelson, T. (2011). Historical and contemporary American Indian injustices: The ensuing psychological effects. *Commonwealth Honors College Theses and Projects*, Paper 6.
- Novins, D. K., & Barón, 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.
- Oetting, E. R., & Beauvais, F. (1989). Drugs and Native American youth. *Drugs & Society*, 3, 5-38.

- Oetting, E. R., Edwards, R., Goldstein, G. S., & Garcia-Mason, V. (1980). Drug use among five southwestern Native American tribes. *The International Journal of the Addictions*, 15, 439-445.
- O'Connell, J. M., Novins, D. K., Beals, J., Whitesell, N. R., Spicer, P., & The Ai-Superpfp Team. (2011). The association between substance use disorders and early and combined use of alcohol and marijuana in two American Indian populations. *Journal of Substance Use*, 16, 213-229.
- Plunkett, M., & Mitchell, C. (2000). Substance use rates among American Indian adolescents: Regional comparisons with monitoring the future high school seniors. *Journal of Drug Issues*, 30, 575-591.
- Prescott, C. A., & Kendler, K. S. (1999). Genetic and environmental contributions to alcohol abuse and dependence in a population-based sample of male twins. *American Journal of Psychiatry*, 156, 34-40.
- Schuckit, M. A., Edenberg, H. J., Kalmijn, J., Flury, L., Smith, T. L., Reich, T., & Foroud, T. (2001). A genome-wide search for genes that relate to a low level of response to alcohol. *Alcohol Clinical and Experimental Research*, 25, 323-329.
- Smith, A. (2007, March 26). Soul wound: The legacy of Native American schools. *Amnesty International Magazine*. Retrieved from <http://www.amnestyusa.org/node/87342>
- Substance and Mental Health Services Administration. (2010). *Substance use among American Indian or Alaska Native adults*. Retrieved from <http://www.oas.samhsa.gov/2k10/182/AmericanIndian.htm>
- Swaim, R., Beauvais, F., Chavez, E., & Oetting, E. (1997). The effect of school dropout rates on estimates of adolescent substance use among three racial/ethnic groups. *American Journal of Public Health*, 87(1), 51-55.
- Tafoya, T. (1989). Circles and cedar: Native Americans and family therapy. In G. Saba, B. Karrer, & K. Hardy (Eds.), *Minorities and family therapy* (pp. 71-98). New York, NY: Haworth
- Tann, S. S., Yabiku, S. T., Okamoto, S. K., & Yanow, J. (2007). TRIADD: The risk for alcohol abuse, depression, and diabetes multimorbidity in the American Indian and Alaska Native population. *Journal of the National Center for American Indian and Alaska Native Mental Health Research*, 14(1), 1-23.
- Thatcher, R. W. (2004). *Fighting firewater fictions: Moving beyond the disease model of alcoholism in first nations*. Toronto, Ontario, Canada: University of Toronto Press.
- U.S. General Accounting Office. (2001). *BIA and DOD schools: Student achievement and other characteristics often differ from public schools*. Retrieved from <http://www.gao.gov/new.items/d01934.pdf>
- Wallace, J., & Bachman, J. (1991). Explaining racial/ethnic differences in adolescent drug use: The impact of background and lifestyle. *Social Problems*, 38, 333-357.
- Walls, M., & Whitbeck, L. (2012a). Advantages of stress process approaches for measuring historical trauma. *American Journal of Drug and Alcohol Abuse*, 38, 416-420.
- Walls, M., & Whitbeck, L. (2012b). The Intergenerational effects of relocation policies on indigenous families. *Journal of Family Issues*, 33, 1272-1293.
- Weaver, H. N., & Brave Heart, M. Y. H. (1999). Examining two facets of American Indian identity: Exposure to other cultures and the influence of historical trauma. *Journal of Human Behavior in the Social Environment*, 2(1-2), 19-33.
- Whitesell, N. R., Beals, J., Mitchell, C. M., Keane, E. M., Spicer, P., & Turner, R. J. (2007). The relationship of cumulative and proximal adversity to onset of substance dependence symptoms in two American Indian communities. *Drug and Alcohol Dependence*, 91, 279-288.
- Whitesell, N. R., Beals, J., Mitchell, C. M., Manson, S. M., & Turner, R. J. (2009). Childhood exposure to adversity and risk of substance-use disorder in two American Indian communities: The mediational role of early substance-use initiation. *Journal of Studies on Alcohol and Drugs*, 70, 971-981.
- Whitesell, N. R., Beals, J., Mitchell, C. M., Novins, D. K., Spicer, P., O'Connell, J., & Manson, S. M. (2007). Marijuana initiation in two American Indian reservation communities: Comparison to a national sample. *American Journal of Public Health*, 97, 1311-1318.
- Wiechelt, S. A., Gryczynski, J., Johnson, J. L., & Caldwell, D. (2012). Historical trauma among urban American Indians: Impact on substance abuse and family cohesion. *Journal of Loss and Trauma*, 17, 319-336.
- Wills, T., & Shiffman, S. (1985). Coping and substance abuse: A conceptual framework. In S. Shiffman & T. Wills (Eds.), *Coping and substance use* (pp. 1-24). Orlando, FL: Academic Press.
- Wilson, W. J. (1996). *When work disappears: The world of the new urban poor*. New York, NY: Vintage Books.
- Young, T. (1988). Substance use and abuse among Native Americans. *Clinical Psychology Review*, 8, 125-138.

### Author Biographies

**Scott Akins** is associate professor in the Public Policy Program, Sociology Department, at Oregon State University. His research interests include drug use and policy and the intersection of disadvantage, ethnicity, and crime. His recent work has been published in *Homicide Studies*, *Justice Quarterly*, *Sociological Perspectives*, and *Journal of Drug Issues*. Along with coauthor Clayton Mosher, he is author of *Drugs and Drug Policy: The Control of Consciousness Alteration*.

**Charles Lanfear** is a MPP candidate in the School of Public Policy at Oregon State University. His research interests include substance use and abuse, disadvantage, and the economics of crime.

**Sarah Cline** is a MPP candidate in the School of Public Policy at Oregon State University. Her research interests include crime and judicial sovereignty in Indian Country. Recently, she has undertaken grant-funded international rural policy research in Norway and Canada. She formerly served as the policy coordinator for the Northern Plains Initiative, a regional collaborative focused on state-tribal relations and rural economic development.

**Clayton Mosher** is professor of sociology at Washington State University at Vancouver. His research interests include racial profiling, the disparate impact of justice policy on disadvantaged populations, and drug use and policy. His recent work has been published in *Social Forces*, *Social Science Quarterly*, *Adolescence*, and *Police Practice and Research*.