

## **CHARACTERISTICS OF SUBSTANCE USE AND SELF-INJURY AMONG AMERICAN INDIAN ADOLESCENTS WHO HAVE ENGAGED IN BINGE DRINKING**

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*Abstract: Binge drinking appears to be a risk factor, facilitator, and method of suicidal and non-suicidal self-injury for some American Indian (AI) youth. We examined characteristics, patterns, and motivations for binge use among AI adolescents (N = 69; 10-19 years-old) who recently engaged in binge drinking. The majority used alcohol alone (53.7%) or a combination of alcohol and marijuana (31.3%) for their binge event. Gender differences emerged with boys more severely affected than girls. Forty-seven percent reported lifetime suicidal thoughts. This study represents one of the first in-depth examinations of substance use and related behaviors among AI adolescents who have engaged in recent binge use.*

### **INTRODUCTION**

Many American Indian (AI) youth and adults abstain from alcohol use (Pemberton, Colliver, Robbins, & Gfroerer, 2008; Whitesell et al., 2014), yet binge drinking is still a serious public health problem. Binge drinking is associated with injury, alcohol poisoning, cirrhosis, alcohol abuse and dependence, and even brain changes (Miller, Naimi, Brewer, & Jones, 2007; Spear, 2000). Studies have indicated higher binge drinking rates for AIs compared with other racial/ethnic groups, and this phenomenon has persisted in the most recent large national surveys of cross-racial alcohol/drug use (Chen, Balan, & Price, 2012; Miller, Stanley, & Beauvais, 2012; Stanley, Harness, Swaim, & Beauvais, 2014; Walls, Sittner Hartshorn, & Whitbeck, 2013; Whitbeck & Armenta, 2015). Forty-seven percent of AI adolescents (compared to 35.5% of non-Native adolescents) report past 30-day heavy episodic use (Chen et al., 2012). AI youth are also

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more likely to start using alcohol and other substances at an earlier age and use more frequently than non-Native youth (Friese, Grube, Seninger, Paschall, & Moore, 2011; Whitesell et al., 2007).

The odds of alcohol misuse more than double each year between ages 10 and 15 for AI youth (Walls et al., 2013). Previously identified alcohol misuse behaviors were concentrated among AI boys (Friese et al., 2011); however, in recent years, AI girls appear to be drinking earlier and are increasingly affected (Cheadle & Whitbeck, 2011; Heavyrunner-Rioux & Hollist, 2010; Walls et al., 2013; Whitesell et al., 2014). However, an often overlooked strength in AI communities is the high rate of alcohol abstinence among adolescents. Given abstinence rates range from 60%-70% (Pemberton et al., 2008; Whitesell et al., 2014), it may be that there is less drinking overall, but the type of drinking (i.e., amount and consequences) is more severe in AI adolescents compared to non-Native adolescents.

For the sub-group of AI adolescents who engage in alcohol misuse, these behaviors are likely to extend into early adulthood, lead to substance use disorders (SUDs), and impact other behavioral and mental health domains (Friese et al., 2011; Whitbeck et al., 2014; Whitesell et al., 2007). A prospective, longitudinal trial with approximately 600 AI adolescents over 8 years from a single culture in the Northern U.S. gives the most definitive information regarding early development of substance use risk and comorbidity. AI adolescents who initiated alcohol use between 11 and 13 years were at 5-9 times greater risk for alcohol misuse in later adolescence (Cheadle & Whitbeck, 2011). Over half (58.2%) had a mental or substance use disorder in their lifetime, and 37.2% had two or more disorders in young adulthood (Cheadle & Whitbeck, 2011). Gender differences also appear to persist across developmental stages—for adolescents with a past year SUD, boys were more likely to meet Conduct Disorder criteria (30.9% vs. 17.7%), while girls were more likely to meet Major Depressive Disorder criteria (12.8% vs. 6.2%) in young adulthood (Whitbeck et al., 2014).

However, there remain gaps in knowledge about the contextual factors that precipitate binge drinking among AI youth, such as how binge drinking episodes function as an internal or external response to personal or environmental factors or social norms, and, more broadly, how the community seeks to understand and address these behaviors. Due to known regional differences and the importance of community engagement, new understanding can be generated by tribal-specific approaches.

The White Mountain Apache Tribe applied an innovative approach to identify the scope of binge drinking in their community. It was designed as an extension from their community-

wide mandated surveillance system for suicide (Cwik et al., 2014; Mullany et al., 2009). The locally named “Celebrating Life Suicide Surveillance System” was developed in 2001 to track individuals reported for suicide ideation, attempts, and deaths as well as provide follow-up and case management for at-risk individuals (or their family members and peers in the case of a death) by trusted Apache community mental health workers. Through tribal initiation, the surveillance system grew to include non-suicidal self-injury in 2006. In 2010, the community identified binge-drinking on the spectrum of self-injury (Barlow et al., 2012) and included it in the system. Binge drinking came to the attention of the surveillance system because a number of events that were reported as suicide attempts (i.e., alcohol overdose) were identified as binge drinking upon in-person follow-up. In addition, it was discovered the co-occurrence of suicidal behavior and substance use among AI youth ages 15-24 was high, especially among boys (64% of youth were “drunk or high” at the time of suicide death; 75.7% during suicide attempt; and 49.4% during suicidal ideation; Barlow et al., 2012). Therefore, Apache stakeholders decided to conceptualize and prioritize binge drinking as a reportable (non-suicidal) self-injurious behavior.

The current study is the first step to understand the context, function, and consequences of binge drinking among Apache adolescents. The purpose of this paper is to examine the characteristics, patterns, and motivations for binge alcohol use among a sample of reservation based-adolescents who recently engaged in binge drinking. Unique, community driven aspects of the study design include identification via the surveillance system; implementation of assessments by Apache Research Assistants (RAs) in youth’s homes or other private, safe places; and collection of data close in time to the binge event. The goal of the study was to explore participants’: 1) substance use history and context for binge drinking behavior; 2) reasons for engaging in binge drinking; and 3) associated high risk behaviors, specifically suicide and non-suicidal self-injury, in order to inform early identification of at-risk youth and design prevention and intervention programs.

## **METHODS**

### **Design**

We used a cross sectional design with 68 AI youth who engaged in a recent binge episode identified by the Celebrating Life Suicide Surveillance System. The study represented a tribal-academic partnership between the White Mountain Apache Tribe (WMAT) and the Johns

Hopkins (JHU) Center for American Indian Health. The Community Advisory Board, comprised of key tribal stakeholders (e.g., youth, elders, traditional healers, parents, and community agency representatives), provided guidance on all aspects of the study design including measures for cultural acceptability, relevance, and language. The study was approved by the WMAT Tribal Council and Health Advisory Board and the JHU IRB; the manuscript was approved by the WMAT Tribal Council and Health Advisory Board.

### **Eligibility Criteria**

Participants were ages 10-19, residents of the WMAT Indian Reservation, and engaged in binge substance use documented by the Celebrating Life Suicide Surveillance System within 90 days prior to the assessment. Drinking that resulted in serious consequences, such as losing consciousness and/or required medical attention for complications associated with a high Blood Alcohol Count (BAC), were coded as binge by the hospital (one of the referral sources for the surveillance system) and used as eligibility criteria for recruitment.

### **Registration in the Celebrating Life Suicide Surveillance System**

The procedures for the Celebrating Life Suicide Surveillance System have been reported in detail elsewhere (Cwik et al., 2014). Briefly, Celebrating Life staff conducts regular in-service trainings at community gatherings, local schools, the police department, Indian Health Services facilities, and for local first responders. During in-service trainings, participants are provided with referral forms as well as instructed on which behaviors are reportable modeled on the Columbia Classification Algorithm for Suicide Assessment (C-CASA; Posner, Oquendo, Gould, Stanley, & Davies, 2007). The surveillance system functions as follows: 1) initial report on an individual made to Celebrating Life staff; 2) Celebrating Life staff conducts a follow-up visit with the individual; 3) Celebrating Life staff reviews all available information from intake and follow-up visit, consults with Apache Technical Assistance team, and reaches consensus on final coding of event; and 4) Celebrating Life staff refers individual to appropriate services (Cwik et al., 2014).

### **Recruitment and Consent**

When Celebrating Life staff encountered and verified a binge drinking case, they asked youth and families for their permission to refer them to RAs who later followed up to describe

the study and obtain voluntary assent/consent. Parent/guardian consent and youth assent were obtained for participants <18 years of age; consent was obtained directly for participants  $\geq$  18 years of age.

### **Data Collection**

Participants completed a one-time assessment at their home or a private location of their choice and used an Audio Computer Assisted Self-Interview (ACASI). Participants used headphones, and a recorded voice read the questions aloud. The assessment collected information across several domains, including socio-demographics, substance use, related high risk behaviors such as suicide and self-injury, and other psychosocial indicators. ACASI was used to collect data because in previous studies in the WMAT and other AI populations, it was found that self-reporting of sensitive behaviors was more reliable when ACASI technologies were used compared to pencil and paper self- or interviewer-administered questionnaires (Mullany et al., 2013; Vereecken & Maes, 2006). The audio-based technology also overcomes low literacy as a barrier to survey response. Participants received a \$75 gift card after completion of the assessment battery.

### **Measures**

The WMAT-JHU study team employed the following measures to describe the socio-demographic characteristics, current and past substance use, and suicidal and non-suicidal self-injurious behaviors of participants.

#### **Demographics**

A structured interview, designed by the study team and used in past studies with the WMAT tribe, collected information on age; socioeconomic, educational, and employment status; living situation; marital/partner status; and home environment.

#### **Alcohol and Drug Use**

Items were combined from the Youth Risk Behavior Survey, Voices of Indian Teens Survey, and Montana Meth Project with proven validity and reliability in this and other AI populations.

#### **Self-Injurious Thoughts and Behaviors Interview (SITBI)**

The SITBI is a brief structured interview that evaluates the presence, frequency, and characteristics of a wide range of suicidal and non-suicidal self-injurious thoughts and behaviors.

We modified the interview to ask participants these questions about their binge alcohol use. The original instrument has strong inter-rater ( $\kappa = .99$ ) and test-retest reliability ( $\kappa = .70$ ), as well as concurrent validity ( $\kappa = .54$ ) in other populations (Nock, Holmberg, Photos, & Michel, 2007); the psychometrics with AIs or the modified version have yet to be tested.

## **Analyses**

Scales and indices were scored according to standardized manuals. All analyses presented in this paper are descriptive in nature. Cross tabulations (categorical data), means, and medians (continuous data) were calculated to explore demographic characteristics among those who partook in binge alcohol or drug use, along with patterns and reasons for use. These variables were also compared by gender to determine whether there were differences between boys and girls using Chi-Square testing (categorical variables), Fisher-exact tests (categorical variables with small cell sizes), *t*-tests (continuous, normally distributed variables), and median tests (continuous, skewed variables). Two-tailed statistical significance was set at  $p < 0.05$ . As this was an exploratory study, we did not adjust our *p*-value for multiple comparisons.

## **RESULTS**

### **Demographic Characteristics of Study Participants (Table 1)**

A total of 72 individuals were identified in the surveillance system with a verified a binge drinking incident. Of these 72, 68 youth enrolled in the study, including 38 boys (55.9%) and 30 girls (44.1%). Mean age at enrollment was 16.44 years ( $SD = 1.96$ ); boy participants (16.97 years,  $SD = 1.81$ ) were about 1 year older than girls (15.77 years,  $SD = 1.96$ ;  $p = 0.0105$ ). The majority spoke only English at home (61.8%). Almost two-thirds (63.2%) reported living with both their mother and father, about one-third (32.4%) reported living in a multi-generational home, and the average number of individuals living in the home was 5.78 ( $SD = 2.74$ ). Twenty-three percent of boys reported living with neither parent, while 23% of girls reported living with their mother alone. Nearly half of participants (47.1%) also reported living in more than one home in the past year. Almost two-thirds (64.7%) of the sample were currently enrolled in school.

**Table 1**  
**Baseline Characteristics of Study Participants with History of Binging (Alcohol or Drug Use)**

<i>N</i> = 68	Total	Boys	Girls	<i>P</i> -value
Number of Participants	68 (100.0%)	38 (55.9%)	30 (44.1%)	-----
Mean Age ( <i>SD</i> )	16.44 (1.96)	16.97 (1.81)	15.77 (1.96)	0.011
Language Spoken at Home n(%) <sup>a</sup> :				
Navajo	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Apache	10 (14.7%)	6 (15.8%)	4 (14.3%)	
English	42 (61.8%)	23 (60.5%)	19 (63.3%)	
Native and English	15 (22.1%)	9 (23.7%)	6 (20.0%)	0.939
Lived in more than 1 home in the last year n(%)	32 (47.1%)	21 (55.3%)	11 (36.7%)	0.127
Number of people living in the home Mean( <i>SD</i> )	5.78 (2.74)	5.63 (2.83)	5.97 (2.66)	0.620
Household Items n(%) <sup>b</sup> :				
Air Conditioning	25 (36.8%)	17 (44.7%)	8 (26.7%)	0.179
Satellite Dish	41 (60.3%)	23 (60.5%)	18 (60.0%)	0.659
Car/Truck	53 (77.9%)	28 (73.7%)	25 (83.3%)	0.499
Motorcycle/ATV	3 (4.5%)	0 (0.0%)	3 (10.0%)	0.085
Computer	25 (36.8%)	12 (31.6%)	13 (43.3%)	0.439
Currently in enrolled school n(%)	44 (64.7%)	24 (63.2%)	20 (66.7%)	0.764
Reported living with n(%):				
Neither parent	12 (17.7%)	9 (23.7%)	3 (10.0%)	
Mother only	12 (17.7%)	5 (13.2%)	7 (23.3%)	
Father only	1 (1.5%)	1 (2.6%)	0 (0.0%)	
Mother and Father	43 (63.2%)	23 (60.5%)	20 (66.7%)	0.289
Living in a multigenerational household n(%)	22 (32.4%)	13 (34.2%)	9 (30.0%)	0.712

<sup>a</sup> One missing value

<sup>b</sup> One participant refused to answer these questions

### History of Suicide and Non-Suicidal Self-Injury (Table 2)

Almost half of the sample (47.1%) reported having suicidal thoughts at some point in their lifetime, but a smaller proportion reported ever making a plan (17.6%), attempting suicide (14.7%), or engaging in non-suicidal self-injury (16.9%). Girls were more likely to have reported suicidal thoughts than boys ( $p = 0.017$ ). For participants endorsing these behaviors, the median starting ages were 14.00 years old for ideation ( $IQR = 3.00$ ), 14.50 years old for plan ( $IQR = 3.50$ ), and 15.00 years old for both an attempt and non-suicidal self-injury ( $IQRs = 4.00$ ).

### Alcohol, Marijuana and Other Drug Use

#### Binge Event

The majority of the sample (53.7%) used alcohol only during their last binge event, followed by alcohol and marijuana together (31.3%). Boys were more likely than girls to use alcohol and marijuana together (43.2% vs. 16.7%,  $p = 0.006$ ; see Table 3). Binge use happened

most frequently between 6pm-12am (54.69%), followed by 12pm-6pm (20.32%), 6am-12pm (15.62%), and 12am-6am (9.37%). Regarding severity, more boys than girls reported that the event had greater potential lethal consequences (e.g., alcohol poisoning, death) on a Likert scale (5.06 vs. 3.34/10-point scale;  $p = 0.0173$ ). Thirty-three percent of boys also reported consequences for being found passed out compared to only 17.86% of girls; and 31.6% of boys reported receiving medical treatment compared to 17.8% of girls.

**Table 2**  
**History of Suicide and Non-Suicidal Self-Injury**

<b>N = 68</b>	<b>Total</b>	<b>Boys</b>	<b>Girls</b>	<b>P-value</b>
Number of times had thoughts of killing self (lifetime) n (%)				
Never	36(52.9%)	24(63.2%)	12(40.0%)	
1-5 times	26(38.2%)	9 (23.7%)	17(56.7%)	
5+ times	6 (8.8%)	5 (13.2%)	1 (3.3%)	0.017
Age first suicidal thought <sup>a</sup>				
Median (IQR)	14.00(11-17)	15.00(12.5-17.5)	13.50(10.5-16.5)	
Range	4.00-18.00	4.00-18.00	10.00-18.00	0.175
Number of times made plan to kill self (lifetime)				
Never	56(82.4%)	33(86.8%)	23(76.7%)	
1-5 times	12(17.7%)	5 (13.2%)	7(23.3%)	
5+ times	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.274
Age first suicide plan <sup>b</sup>				
Median (IQR)	14.50(11-18)	15.00(13-17)	14.00(11-17)	
Range	12.00-18.00	13.00-18.00	12.00-18.00	0.242
Number suicide attempts in lifetime				
Never	58(85.3%)	32(84.2%)	26(86.7%)	
1-5 times	8(11.8%)	5(13.2%)	3(10.0%)	
5+ times	2 (2.9%)	1 (2.6%)	1 (3.3%)	1.000
Age first suicide attempt <sup>c</sup>				
Median (IQR)	15.00(11-19)	15.00(11-19)	14.00(10-18)	
Range	12.00-18.00	12.00-18.00	12.00-16.00	0.895
Number times engaged in NSSI (lifetime) <sup>d</sup>				
Never	54(83.1%)	32(88.9%)	22(75.9%)	
1-5 times	6 (9.2%)	3 (8.3%)	3(10.3%)	
5+ times	5 (7.7%)	1 (2.8%)	4(13.8%)	0.222
Age first NSSI <sup>2</sup>				
Median (IQR)	15.00(11-19)	16.00(13-19)	13.00(10-16)	
Range	6.00-18.00	6.00-18.00	10.00-16.00	0.301

<sup>a</sup> 34 values missing for Age first suicidal thought: 22 boys, 12 girls

<sup>b</sup> 56 values missing for Age first suicide plan and Age first NSSI: 33 boys, 23 girls

<sup>c</sup> 58 values missing for Age first suicide attempt: 32 boys, 26 girls

<sup>d</sup> 3 values missing for Number times engaged in NSSI (lifetime): 2 boys, 1 girl



### Age at First Use (Table 3)

The median age at first alcohol use was 13.00 ( $IQR = 10.00-16.00$ ), with a wide range for initiation and young-starting age (6-19 years old). The median age for first binge was 14.00 years ( $IQR = 12.00-16.00$ , range: 7.00-19.00), and drinking regularly was 15.00 years ( $IQR = 13.00-17.00$ , range: 9.00-18.00). Marijuana use also started early: median age of first use was 13.00 ( $IQR = 9.50-16.50$ , range: 5.00-18.00).

### Frequency of Use (Table 3)

In their lifetime, the median number of times bingeing was 10 for boys and 5 for girls with more boys reporting binge use above the overall median than girls ( $p = 0.035$ ). In the past year, the median number of times bingeing was 5 for boys and 2 for girls with more boys, again, endorsing binge use above the overall median than girls ( $p = 0.014$ ). Almost half of the overall sample (47.8%) did not use alcohol in the past month. For more detailed information about frequency, see Table 3.

### Illicit Drug Use (Table 3)

Overall marijuana use was high and frequent, with 88.2% of the overall sample reporting they had used marijuana in their lifetime. Gender differences emerged for use in the past 6 months ( $p = 0.006$ ). For marijuana use in the past 6 months, 57% of girls compared to 18.4% of boys reported 0 days, whereas 13.3% of girls versus 44.7% of boys reported 2-7 days. Similarly, 30.4% of boys compared to 17.4% of girls reported using marijuana 8 or more days in the past month. Smaller percentages of youth had tried other illegal drugs (25.37% crack, cocaine, or heroin; 19.12% inhalants; and 16.42% methamphetamine).

### Reasons for Engaging in Binge Substance Use (Table 4)

Youth were asked to endorse potential reasons for engaging in their most recent binge drinking episode (*multiple responses possible*). The most frequently endorsed specific item was “stress/lot on mind” (32.3%). The next most frequent responses were interpersonal: “family problems” (27.7%), “fight with boy/girlfriend” (18.5%), and “peer pressure/copying” (18.5%). However, large proportions of the sample reported “can’t remember” (40.2%) and “no reason in particular” (18.5%). Youth were also asked to describe where they got the idea for their last binge event (*multiple responses possible*) and overwhelmingly reported their friends (73.5%), followed by acquaintance (29.4%), family (27.9%), and TV/music (26.5%). There were no

differences between genders in reported reasons for engaging in binge drinking; however, girls were more likely to report getting the idea from the internet compared to boys ( $p = 0.018$ ).

**Table 3**  
**Alcohol, Marijuana, and Other Drug Use**

	Total N = 68	Boys n = 38	Girls n = 30	P-value
<b>Age First Use</b>				
Age at first drink: <sup>a</sup>				
Median (IQR)	13.00(10-16)	13.50(10.5-16.5)	13.00(11-15)	
Range	6.00-19.00	6.00-19.00	6.00-17.00	0.770
Age started drinking alcohol regularly: <sup>b</sup>				
Median (IQR)	15.00(13-17)	16.00(14-18)	15.00(13-17)	
Range	9.00-18.00	9.00-18.00	13.00-17.00	0.314
Age at first binge: <sup>c</sup>				
Median (IQR)	14.00(12-16)	14.00(12-16)	13.50(11.5-15.5)	
Range	7.00-19.00	7.00-19.00	9.00-17.00	0.469
Ever used marijuana % (n)	88.2%(60)	92.1%(35)	83.3%(25)	0.265
Age of first marijuana use: <sup>d</sup>				
Median (IQR)	13.00(9.5-16.5)	13.00(9-17)	14.00(11-17)	
Range	5.00-18.00	5.00-17.00	8.00-18.00	0.458
<b>Multi-Drug Use</b>				
Substances used during last binge % (n) <sup>e</sup>				
Alcohol only	53.7%(36)	35.1%(13)	76.7%(23)	
Marijuana only	6.0% (4)	8.1% (3)	3.3% (1)	
Alcohol and marijuana	31.3%(21)	43.2%(16)	16.7% (5)	
Cocaine + alcohol, marijuana or both	4.5% (3)	8.1% (3)	0.0% 0)	
Other combinations	4.5% (3)	5.4% (2)	3.3% (1)	0.006
<b>Frequency of Use</b>				
Number of days used alcohol: Past Month % (n) <sup>e</sup>				
Never	47.8%(32)	43.2%(16)	53.3%(16)	
1 day	23.9%(16)	21.6% (8)	26.7% (8)	
2-7 days	22.4%(15)	29.7%(11)	13.3% (4)	
8-14 days	6.0% (4)	5.4% (2)	6.7% (2)	
15+ days	0.0% (0)	0.0% (0)	0.0% (0)	0.450
Number of times intoxicated: Past 6 Months %(n) <sup>f</sup>				
Never	28.8%(19)	24.3% (9)	34.5%(10)	
1 time	30.3%(20)	29.7%(11)	31.0% (9)	
2-7 times	30.3%(20)	32.4%(12)	27.6% (8)	
8-14 times	6.1% (4)	10.8% (4)	0.0% (0)	
15+ times	4.6% (3)	2.7% (1)	6.9% (2)	0.362
Number of times intoxicated: Past Month %(n)				
Never	61.8%(42)	52.6%(20)	73.3%(22)	
1 time	19.1%(13)	23.7% (9)	13.3% (4)	
2-7 times	16.2%(11)	18.4% (7)	13.3% (4)	
8-14 times	1.5% (1)	2.6% (1)	0.0% (0)	
15+ times	1.5% (1)	2.6% (1)	0.0% (0)	0.402

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**Table 3 Continued**  
**Alcohol, Marijuana, and Other Drug Use**

	Total <i>N</i> = 68	Boys <i>n</i> = 38	Girls <i>n</i> = 30	<i>P</i> -value
Number of times engaged in binge drinking or drug use: Lifetime %(n) <sup>g</sup>				
Never	0.0% (0)	0.0% (0)	0.0% (0)	
1 time	16.0% (8)	15.4% (4)	16.7% (4)	
2-7 times	42.0%(21)	26.9% (7)	58.3%(14)	
8-14 times	20.0%(10)	26.9% (7)	12.5% (3)	
15+ times	22.0%(11)	30.8% (8)	12.5% (3)	0.111
Number of times engaged in binge drinking or drug use: Past Year %(n) <sup>h</sup>				
Never	0.0% (0)	0.0% (0)	0.0% (0)	
1 time	24.5%(12)	20.0% (5)	29.2% (7)	
2-7 times	44.9%(22)	40.0%(10)	50.0%(12)	
8-14 times	20.4%(10)	24.0% (6)	16.7% (4)	
15+ times	10.2% (5)	16.0% (4)	4.2% (1)	0.484
Number of times engaged in binge drinking or drug use: Past Month %(n) <sup>i</sup>				
Never	0.0% (0)	0.0% (0)	0.0% (0)	
1 time	38.9%(14)	29.6% (8)	66.7% (6)	
2-7 times	55.6%(20)	63.0%(17)	33.3% (3)	
8-14 times	5.6% (2)	7.4% (2)	0.0% (0)	
15+ times	0.0% (0)	0.0% (0)	0.0% (0)	0.161
Number of times used marijuana: Past 6 Months %(n)				
Never	35.3%(24)	18.4% (7)	56.7%(17)	
1 time	5.9% (4)	5.3% (2)	6.7% (2)	
2-7 times	30.9%(21)	44.7%(17)	13.3% (4)	
8-14 times	4.4% (3)	5.3% (2)	3.3% (1)	
15+ times	23.5%(16)	26.3%(10)	20.0% (6)	0.006
Number of days used marijuana: Past Month %(n) <sup>j</sup>				
Never	42.9%(24)	36.4%(12)	52.2%(12)	
1 day	10.7% (6)	6.1% (2)	17.4% (4)	
2-7 days	21.4%(12)	27.3% (9)	13.0% (3)	
8-14 days	12.5% (7)	15.2% (5)	8.7% (2)	
15+ days	12.5% (7)	15.2% (5)	8.7% (2)	0.350

<sup>a</sup>2 values missing for Age at first drink: 2 boys, 0 girls

<sup>b</sup>10 values missing for Age started drinking alcohol regularly: 6 boys, 4 girls

<sup>c</sup>4 values missing for Age at first binge: 4 boys, 0 girls

<sup>d</sup>8 values missing for Age of first marijuana use: 3 boys, 5 girls

<sup>e</sup>1 value missing for Substances used during last binge & Number of days used alcohol, Past Month: 1 boy, 0 girls

<sup>f</sup>2 values missing for Number of times intoxicated, Past 6 Months: 1 boy, 1 girl

<sup>g</sup>18 values missing for Number of times engaged in binge drinking or drug use, Lifetime: 12 boys, 6 girls

<sup>h</sup>19 values missing from Number of times engaged in binge drinking or drug use, Past Year: 13 boys, 6 girls

<sup>i</sup>32 values missing from Number of times engaged in binge drinking or drug use, Past Month: 11 boys, 21 girls

<sup>j</sup>12 values missing from Number of days used marijuana, Past Month: 5 boys, 7 girls

**Table 4**  
**Reasons for Engaging in Binge Substance Use**

	Total	Boys	Girls	P-value
<b>N = 65</b>				
Stress/lot on your mind	32.3%(21)	30.6%(11)	34.5%(10)	0.736
Intoxicated	23.3%(21)	33.3%(12)	31.0% (9)	0.844
Fight/argument with boy/girlfriend/spouse	18.5%(12)	19.4% (7)	17.2% (5)	0.820
Peer pressure/copying	18.5%(12)	11.1% (4)	27.6% (8)	0.114
No reason in particular	18.5%(12)	19.4% (7)	17.2% (5)	0.667
Can't remember anything about event	16.9%(11)	13.9% (5)	20.7% (6)	0.467
Family/home situation/problems	15.4%(10)	8.3% (3)	24.1% (7)	0.096
Trouble at school	13.8% (9)	8.3% (3)	20.7% (6)	0.278
Depression	13.8% (9)	13.9% (5)	13.8% (4)	1.000
Fight/argument with parent/relative	12.3% (8)	8.3% (3)	17.2% (5)	0.450
Other	7.7% (5)	11.1% (4)	3.4% (1)	0.370
Suicide/death of loved one/friend/relative	4.6% (3)	2.8% (1)	6.9% (2)	0.582
Trouble with the law	4.6% (3)	2.8% (1)	6.9% (2)	0.582
Divorce/separation	3.1% (2)	5.6% (2)	0.0% (0)	0.498
Fight/argument with someone not already listed	3.1% (2)	2.8% (1)	3.5% (1)	1.000
Loss of job	3.1% (2)	5.6% (2)	0.0% (0)	0.498
Prolonged illness of (yourself)	1.5% (1)	2.8% (1)	0.0% (0)	1.000
<b>Idea for last binge drink/drug use came from:</b>				
<b>(N = 68)</b>				
Friend	73.5%(50)	65.8%(25)	83.3%(25)	0.103
Acquaintance	29.4%(20)	26.3%(10)	33.3%(10)	0.528
Family	27.9%(19)	21.0% (8)	36.7%(11)	0.154
TV or Music	26.5%(18)	26.3%(10)	26.7% (8)	0.974
Internet	14.7%(10)	5.3% (2)	26.7% (8)	0.018
Other	13.2% (9)	13.2% (5)	13.3% (4)	1.000
Books/newspaper/article	4.4% (3)	2.6% (1)	6.7% (2)	0.579

## DISCUSSION

This study represents one of the first examinations of substance use behaviors among AI adolescents who engaged in a recent binge drinking episode. Our indicated sample, which was uniquely identified through the community-based Celebrating Life Suicide Surveillance System and assessed by local, trusted Apache Research Assistants, appears representative of this at-risk population. Alcohol use was in line with other studies among AI youth (Friese et al., 2011), with 52.3% having used in the past month. However, this is higher than the 38.7% and 34.9% reported nationally among 9<sup>th</sup>-12<sup>th</sup> grade students across all races and ethnicities for the years 2011 and 2013 from the Youth Risk Behavior Surveys and Surveillance System (Kann et al.,

2014). In addition to alcohol, marijuana was the other most frequently used drug of choice for this sample (88.2% reporting lifetime use), which is consistent with cross-site survey research of AI youth over the past decade (Beauvais, Jumper-Thurman, Helm, Plested, & Burnside, 2004; Miller et al., 2012; Stanley et al., 2014), but substantially higher than national rates among 9<sup>th</sup>-12<sup>th</sup> grade students across all races and ethnicities reported during similar time periods from the Youth Risk Behavior Surveys and Surveillance System (39.9-40.7%; Kann et al., 2014). Data support several important conclusions with meaningful implications that could be generalizable to other AI communities with similar risk profiles.

Despite the finding that both boys and girls start bingeing at similar ages (13.5 and 13.0, respectively), it appears boys are more severely affected. Boys engaged in more bingeing which is consistent with recent large scale survey data from AI adolescents in grades 8, 10, and 12 (Stanley et al., 2014). Boys also reported experiencing more severe episodes—a unique contribution of this data set. More specifically, boys reported that their binge drinking event was more lethal than what girls reported and that they were more likely to have been found passed out and received medical treatment. Demographic factors also revealed some potentially important factors deserving of future study. Participants commonly reported histories of household instability (i.e., living in more than one home in the past year). While, the nature of the relationship between household instability and substance misuse in American Indian youth populations remains unclear (Eitle, Johnson-Jennings, & Eitle, 2013; Lonczak, Fernandez, Austin, Marlatt, & Donovan, 2007, Heavyrunner-Rioux & Hollist, 2010), our previous work in girls has shown that the most salient risk factors for substance use were household instability, deviant peers, and poor family functioning (results unpublished).

Several striking findings speak specifically to a potential developmental trajectory of substance use and suicidal behavior among AI teens who engage in binge drinking, which the Apaches view as related forms of self-injury targeted through their innovative surveillance and prevention system (Barlow et al., 2012; Cwik et al., 2014; Mullany et al., 2009). The average starting age for trying alcohol and marijuana was 13.0; binge drinking and suicidal ideation (for a portion) was 14.0; suicide plan was 14.5 (for a portion); and drinking regularly, suicide attempt (for a portion) and non-suicidal self-injury (for a portion) was 15.0. These data show an overlap of binge drinking and the onset of suicidal thoughts, given that youth started binge drinking and having suicidal ideation around the same age. Moreover, in our indicated sample, almost half (47.1%) reported lifetime suicidal thoughts, which is much higher than reported in large-scale

surveys of similar aged adolescents (Suicide Prevention Resource Center, 2013). Taken together, the data suggests a potentially heightened risk that binge drinking might convey to AI youth.

The current data parallels previous suicide prevention research with Apache youth, which shows that boys also engage in more serious self-injurious behavior, and they are much more likely to die from suicide and engage in substance use at the time of the act (Barlow et al., 2012; Mullany et al., 2009). In line with a prominent theory of suicide by Thomas Joiner, binge drinking may be functioning as a practice escape event (Joiner, 2005). Finally, Apache youth report similar reasons (e.g., conflict with family member or boy/girlfriend) for binge drinking and attempting suicide (Cwik et al., 2015), providing further support to the strong interrelationship between substance use and suicidal behavior, with the need for interventions that address both simultaneously. Programs that promote healthy relationships, as well as strengthen positive coping strategies such as communication, assertiveness, self-regulation, and conflict negotiation skills, could be useful in preventing both binge substance use and suicidal behaviors.

Data on age of first use from our sample indicates the importance of prevention before adolescence. Age of first drink and marijuana use was 13 years old, and youth reported first binge drinking episode about a year later (14 years old), consistent with other AI samples (Cheadle & Whitbeck, 2011; Walls et al., 2013) and earlier than the average for the U.S. population (SAMSHA, 2012). Thus, prevention must begin early (ages 10-12) and target both alcohol and marijuana use to delay initiation and foster trajectories away from more serious substance use patterns including binge drinking. Some participants reported very early starting ages. In previous work, earlier initiation of substance use among young expectant mothers was associated with high family conflict and low parental monitoring (Barlow et al., 2010). Key protective factors included ability to regulate emotions and having traditional AI values and practices. Therefore, very early prevention is indicated for local parenting programs. Additional studies by Apache-JHU research team have shown an early childhood home-visiting model effective in reducing adolescent mothers' substance use and reducing early childhood behavior risks that are predictive of childhood substance use risks (Barlow et al., 2015).

### **Study Strengths and Limitations**

The study has several limitations. First, data is limited to self-report of substance use. Second, the sample size is modest, particularly when examining sex differences. Multiple

pairwise comparisons increase the probability of a type I error. Third, the data is cross sectional; therefore, hypotheses regarding root causes of developmental trajectories are preliminary. Fourth, the sample is not representative, making comparisons to the general population suggestive only. Outweighing these limitations, this study provides an important first step for deepening our understanding of potential differential trajectories of binge drinking and comorbid substance use and self-injurious behaviors among AI girls and boys with implications for future research. A major strength of this paper is its reliance on community-based surveillance data in one specific tribe, capturing a sample of youth who are not generally included in standard epidemiologic assessments and as such may more accurately reflect the characteristics and contexts of binge drinking youth in this community. Next steps include examining what puts youth who engage in binge drinking at risk and what protects youth who do not engage in this behavior. Continued research will be aimed at developing models to address potential root causes of binge substance use and shared risks between substance use and suicide, including the interpersonal component with methods such as social network analysis.

## CONCLUSION

Binge alcohol use is a significant public health problem that affects adolescents of all ethnicities, their families, and communities. In-depth, community explorations of binge use behavior, such as this study, are needed to understand the context, motivations, and repercussions of this and other high risk behaviors to develop culturally meaningful prevention and intervention strategies.

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