

Nonsuicidal Self-Injury in an American Indian Reservation Community: Results From the White Mountain Apache Surveillance System, 2007–2008

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Objective: To describe characteristics and correlates of nonsuicidal self-injury (NSSI) among the White Mountain Apache Tribe. NSSI has not been studied before in American Indian samples despite associated risks for suicide, which disproportionately affect American Indian youth. **Method:** Apache case managers collected data through a tribally mandated surveillance system. Data from 2007 and 2008 (N = 182) were examined for rates, methods, precipitants, functions, past history of self-injury and service use, by age and gender. **Results:** The rate of NSSI among all ages was 600 in 100,000, with individuals 10 to 14 years old disproportionately affected at a rate of 3,000 in 100,000. More females (65%) reported NSSI, and cutting was the preferred method (98%) for both genders combined. Most frequently reported precipitants were peer pressure/copying, conflict with boy/girlfriend and “depression.” A substantial proportion (22%) was intoxicated/high at the time. More reported the function of NSSI was to “effect internal state” (45%) than “effect circumstances” (15%). More than one-third (39%) received ED treatment and referrals for aftercare (36%). Of those referred, only 30% followed up with services. Most (79%) reported past NSSI; 30% reported past suicidal ideation and 25% attempts. **Conclusions:** NSSI is a significant, largely unaddressed mental health problem among the White Mountain Apache Tribe and likely other reservation communities, especially as NSSI could serve as a precursor to suicide in this population. Interestingly, another self-destructive behavior, severe substance use, was reported to the surveillance system by Apaches and described in terms similar to NSSI, an important preliminary finding worth further exploration. *J. Am. Acad. Child Adolesc. Psychiatry*, 2011;50(9):860–869. **Key Words:** nonsuicidal self-injury, self-destructive behavior, alcohol use, drug use, American Indian

Nonsuicidal self-injury (NSSI)—the deliberate alteration or destruction of one’s own body tissue of a socially unacceptable nature without expressed intent to die^{1,2}—is a serious and poorly understood mental health issue. The seriousness of NSSI is heightened by its association with suicide and other high risk behaviors (Walsh and Frost, unpublished data, 2005),^{3,4} potential cost to emergency departments and other urgent care facilities, and a paucity of evidence-based treatments.⁵ NSSI is an emerging public health problem

as well; research suggests that rates of NSSI are increasing among individuals of all ages,^{6,7} with current prevalence for more severe forms of NSSI estimated at 14% for youth and young adults and 1% for adults.^{3,8-11} What is known today about NSSI has primarily been found through studies with Caucasian middle and upper class populations, using a range of sampling techniques (e.g., surveys in psychiatric, forensic, and school samples).¹ The most common method is skin cutting, followed by hitting and burning.^{8,12} NSSI begins early; the majority of persons report onset between ages 12 and 14 with a notable proportion (25%) beginning earlier.^{10,13} Some individuals self-injure once or a few times, whereas others self-injure repeatedly over time.¹¹ Females report more NSSI



An interview with the authors is available by podcast at www.jaacap.org.

than males; however, the ratio depends on the population studied.^{3,8-10}

To date, minority and socioeconomically disadvantaged groups have rarely been the focus of NSSI research. This fact is particularly concerning for American Indians, who have the highest youth and young adult suicide and substance abuse rates of any racial or ethnic group in the United States,¹⁴ both of which are associated with NSSI (Walsh and Frost, unpublished data, 2005).^{3,4} Youth with past NSSI more often report a history of suicidal ideation (83% versus 29%), suicide plan (40% versus 3%), and repeated suicide attempts (26% versus 6%) than youth without past NSSI.³ Very few adolescents who engage in NSSI (0%–5%) report being under the influence of alcohol or drugs when they self-injure¹⁵; however, a greater number of adolescents who have engaged in more severe versus less severe forms of NSSI were using substances during the incident (26.5% versus 3.4%).¹⁶ In addition, adolescents with both NSSI and suicidal behavior report higher substance abuse rates than adolescents with one or the other (Walsh and Frost, unpublished data, 2005).¹⁸

Behavioral scientists are increasingly attempting to understand the functions of NSSI to inform intervention strategies. A number of different functions have been identified^{1,2} and it appears that NSSI serves multiple functions simultaneously.^{16,18} Nock and Prinstein¹⁹ have conceptualized four main functions of NSSI along two dichotomous dimensions: 1) internally versus externally motivated, and 2) negative reinforcement versus positive reinforcement.¹⁹ NSSI that serves internal functions includes using NSSI to reduce overwhelming internal experiences, to reduce urges to attempt suicide, to reconnect with feelings, and to feel autonomous.^{1,17,20} NSSI that serves external functions includes engaging in NSSI to reduce criticism or rejection by others, to provide interpersonal distance, to enhance one's peer group status, and to strengthen relationships with friends who self-injure.^{1,17,20}

The purpose of this article is to present the first descriptive data regarding NSSI within an American Indian (AI) sample, the White Mountain Apache Tribe (WMAT). There are approximately 15,500 enrolled White Mountain Apache (Apache) tribal members who reside on the 1.6-million-acre Fort Apache Reserva-

tion in East-Central Arizona. Nearly one-half (54%) of the population is less than 20 years old compared with approximately 35% of the US all-races population.²¹ The WMAT has had a productive relationship to address health disparities for the past three decades with the Johns Hopkins Center for American Indian Health (JHU). This partnership's most recent achievement has been the establishment of a tribal surveillance system that mandates reporting by all local service agency providers and community members of any suicidal ideation, attempts, and deaths, as well as NSSI and severe use of alcohol or drugs on the reservation. Originally designed to track upward trends in youth suicidal behavior, the surveillance system recently helped describe high tribally specific suicide and suicide attempt rates. The annual suicide rate is highest for youth 20 to 24 years old at 151.9 in 100,000, which is approximately 13 times the U.S. and eight times all AI/AN youth rates.²² The average annual suicide attempt incidence rate—3.5%²²—is highest among youth 15 to 19 years of age and is 17 times the rate in methodologically similar studies.^{23,24} These data have generated important local resources for developing and evaluating prevention and intervention efforts against youth suicide.

This article reports on patterns of NSSI for Apache youth and adults during the period from January 1, 2007, to December 31, 2008. We used surveillance system data to answer the following questions in comparison to the literature: 1) What are the rates of NSSI among Apaches, including what age group is most at risk? 2) What are the demographic characteristics of Apaches who self-injure? 3) What are the characteristics of NSSI among Apaches, including the role of substance use? 4) What are possible precipitants and functions? 4) What services are used by Apaches who engage in self-injury? and, finally, 5) What is their past history of mental health problems, specifically nonsuicidal and suicidal self-injury?

METHOD

Study Design

The study design used Community Based Participatory Research methodology incorporating traditional and scientific expertise. The tribal surveillance system is led by community stakeholders and man-

aged by the “Celebrating Life” team of Apache paraprofessional case managers. JHU partners provide technical assistance in data management, coding, and analyses. Tribal stakeholders expanded the surveillance system in 2006 to include NSSI because many incidents originally reported as “attempts” were subsequently identified as NSSI by case managers after direct follow-up with individuals. JHU mental health experts assisted tribal stakeholders in redrafting surveillance forms to capture nature and function of NSSI incidents and trained case managers to differentiate between NSSI and suicidal behavior. Data interpretation was conducted through an iterative process between case managers, JHU and tribal stakeholders. This manuscript was reviewed and approved by the White Mountain Apache Tribal Council and Health Board.

Operational Definition and Coding of NSSI

The surveillance system protocol defines NSSI as direct, intentional self-injury without intent to die. The system gathers data on age, gender, tribal affiliation, date and location of behavior, type of behavior, method, reporter’s relationship to the individual, function of and precipitants for behavior, history of mental health problems and nonsuicidal and suicidal self-injury, and mental health referral and service use. Coding is based on the individual’s stated intent, congruence of method with intent, potential lethality of method, and perceived function of self-injury. An example of an event coded as NSSI would be skin cutting by a person who indicated that the self-injury was intended to relieve persistent anxiety without intent to die. When no other source of information contradicts the individual’s report (e.g., medical chart documenting cut deep enough to require stitches), this system’s protocol dictates classification based on the individual’s reported intent.

Data Collection, Validation, and Consensus Procedure

An identifying, case-finding report is received by the surveillance system. Typically reports are made by an observer or through second-hand information. Upon receipt, Apache case managers meet directly with the person about whom the report was made to gather details and to refer to treatment. Case managers and JHU clinical staff review the information gathered, in addition to available medical records, and reach consensus on final coding of the event. (Surveillance procedures post-reports are designed to minimize misclassification.) Case managers enter surveillance data into a secure electronic database.²³ Interestingly, some individuals reported to the surveillance system described alcohol and drug use

primarily, as well as hanging and jumping, in terms similar to those who cut or burn themselves. During follow-up meetings with case managers, individuals reported drinking/using drugs to injure themselves or had experienced severe medical consequence as a result (e.g., passed out in public location, taken to emergency department). They also indicated severe alcohol or drug use as serving functions similar to those of NSSI and denied any suicidal intent. With these particular cases, there were no contradictory outside sources of information. Despite the indirect nature of the self-injury in these cases, tribal collaborators saw great similarities between methods of NSSI such as cutting and the self-harm associated with severe alcohol and drug use. Thus, we did not restrict this article to events fitting standard definitions of NSSI and reported these preliminary data on other self-destructive behaviors separately. This decision allowed us to learn in an exploratory manner from those who engaged in severe alcohol and drug use and to explore the hypothesis that these behaviors may be a form of self-injury in this population.

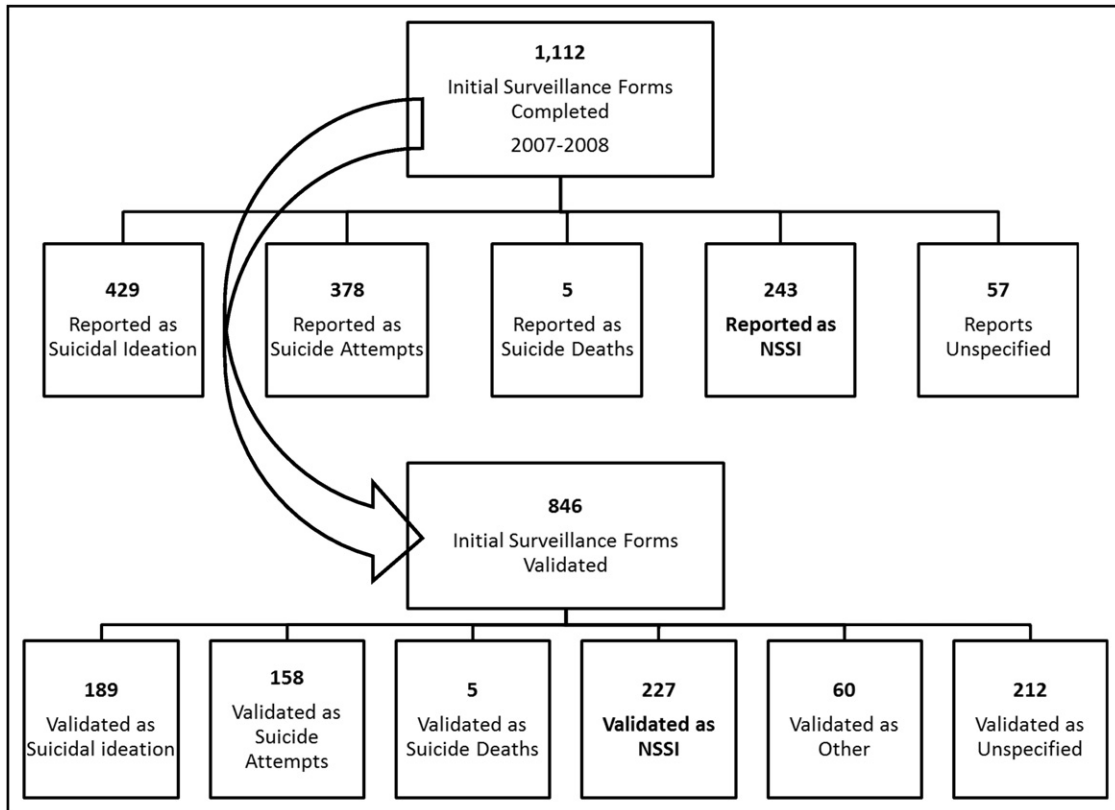
Study Participants

Study participants are summarized in [Figure 1](#). In 2007 and 2008, there were 1,112 initial surveillance forms for all types of self-injury. There were a total of 243 NSSI reports (125 in 2007 and 118 in 2008) on 183 individuals; 60 individuals had two or more NSSI events in this period. Of the initial forms, case managers were able to follow-up on 846 self-injury events, 227 were confirmed as NSSI (108 in 2007, 119 in 2008) for 173 individuals; 54 individuals had two or more NSSI events in this period. Some NSSI reports (7%) were not able to be verified because the individual could not be located, the record appeared to be false, or events were determined to be a different type of self-injury at follow-up. In addition, approximately 5% of events were originally reported as suicide attempts, but upon interview were coded as NSSI because it was determined that there was no intent to die and there was low lethality. Data reported here is from the in-person interview with the individual and any other available information (e.g., medical chart) unless otherwise noted. A total of 182 validated NSSI events met the accepted definition, and 25 were coded as other self-destructive behaviors through consensus; 20 were entered into the database as “unknown” method and were not included.

Data Analysis

Data were analyzed with Stata version 9.2 (Stata Corporation, College Station, TX). NSSI rates were calculated as reports per 100,000 using 2 years of data (2007–2008). The numbers of NSSI events (nu-

FIGURE 1 Surveillance System Flow Chart. Note: NSSI = nonsuicidal self-injury.



merators) came from the surveillance system. No surveillance system data were analyzed from non-AI/AN reservation residents. Numbers for the total and age-specific tribal population sizes (denominators) came from the most current (2007–2008) Indian Health Service estimates for the Whiteriver Service Unit (WRSU), serving the Apache reservation. The WRSU-User Population is limited to those who have

used WRSU services at least once in the past 3-years contemporaneous with study period.

Analyses were conducted separately for NSSI (Tables 1–3) and other self-destructive behaviors (Table 4). Descriptive statistics were calculated in the following domains: demographics, NSSI characteristics, service use, past history of NSSI, suicidal thoughts, suicide attempts, and mental health issues. Descriptive statistics were

TABLE 1 Demographic Characteristics of Self-Injury From Apache Surveillance Data for 2007 and 2008

Variable, n (%)	Female (n = 119)	Male (n = 63)	Total (n = 182)
Age in years, M (SD)	15.44 (5.77)*	17.42 (6.75)	16.13 (6.18)
Living Status (n, %)			
With mother	76 (63.87)	43 (68.25)	119 (65.38)
With brother/sister	77 (64.71)*	35 (55.56)	112 (61.54)
With father	35 (29.41)	19 (30.16)	54 (29.67)
With children	2 (1.68)**	8 (12.7)	10 (5.49)
With boy/girlfriend	4 (3.36)	4 (6.35)	8 (4.4)
With spouse	2 (1.68)	5 (7.94)	7 (3.85)
With nonrelative(s) (e.g., friend)	1 (0.84)	0	1 (0.55)
Other	62 (52.1)	26 (41.27)	88 (48.35)

Note: *p < .05; **p < .01.

TABLE 2 Selected Characteristics of Self-Injury From Apache Surveillance Data 2007 and 2008

Variable, n (%)	Age <25 Years			Age ≥ 25 Years			N = 182
	Female (n = 110)	Male (n = 56)	Total (n = 166)	Female (n = 9)	Male (n = 7)	Total (n = 16)	
Method of self-injury							
Laceration/cut	110 (100)*	52 (92.86)	162 (97.59)	9 (100)	7 (100)	16 (100)	178 (97.8)
Head banging	0	3 (5.77)	3 (1.8)	0	0	0	3 (1.6)
Burning	0	1 (1.79)	1 (0.60)	0	0	0	1 (0.55)
Drunk/high at time of self-injury	8 (7.27)***	18 (32.14)	26 (15.66)	9 (100)	5 (71.43)	14 (87.50)	40 (21.98)
Unknown	0	1 (1.79)	1 (0.60)	0	0	0	1 (0.55)
History of alcohol/drugs (if drunk/high at the time)	3 (37.5)	10 (55.56)	13 (50)	7 (77.78)	3 (60)	10 (71.43)	23 (57.5)
Unknown	0	1 (5.56)	1 (3.85)	0	0	0	0
Reported precipitant (not mutually exclusive)							
Intoxicated/blacked out	2 (1.82)*	10 (17.86)	12 (7.23)	4 (44.44)	3 (42.86)	7 (43.75)	19 (10.44)
Fight with significant other	8 (7.27)	9 (16.07)	17 (10.24)	2 (22.22)	3 (42.86)	5 (31.25)	22 (12.09)
Fight with parent	13 (11.82)	3 (5.36)	16 (9.64)	0	0	0	16 (8.8)
Depression	15 (13.64)	3 (5.36)	18 (10.84)	3 (33.33)	0	3 (18.75)	21 (11.5)
Peer pressure/copying	16 (14.55)	7 (12.5)	23 (13.86)	0	0	0	23 (12.64)
Anger	12 (10.91)	5 (8.93)	17 (10.24)	0	0	0	17 (9.34)
Family situation/problems	3 (2.73)	0	3 (1.81)	0	0	0	3 (1.65)
Fight with other	2 (1.82)	3 (5.36)	5 (3.01)	0	0	0	5 (2.75)
Stress/lot on the mind	4 (3.64)	2 (3.57)	6 (3.61)	0	0	0	6 (3.3)
Trouble at school	4 (3.64)	1 (1.79)	5 (3.01)	0	0	0	5 (2.75)
Suicide/death of loved one	6 (5.45)	2 (3.57)	8 (4.82)	0	0	0	8 (4.4)
Other	16 (14.55)	7 (12.5)	23 (13.86)	1 (14.39)	0	1 (6.25)	24 (13.19)
Unknown	5 (4.55)	2 (3.57)	7 (4.22)	0	0	0	7 (3.85)
No reason/can't remember	4 (3.64)	2 (3.57)	6 (3.61)	0	0	0	6 (3.3)
Function of self-injury							
To effect internal state	57 (51.82)**	16 (28.57)	73 (43.98)	5 (55.56)	3 (42.86)	8 (50)	81 (44.51)
To effect circumstances	11 (10%)	13 (23.21)	24 (14.46)	3 (33.33)	1 (14.29)	4 (25)	28 (15.38)
Other, unknown intent	42 (38.18)	27 (48.21)	69 (41.57)	1 (11.11)	3 (42.86)	4 (25)	73 (40.11)

Note: Unable to test differences in method between genders for individuals ≥25 years old.

* $p < .05$; ** $p < .01$; *** $p < .001$.

calculated by gender and age group (<25 years old [youth]; and ≥25 years old [adults]). We tested for significant gender differences within age groups. Chi-squared tests identified significant differences in dichotomous variables, and *t* tests were performed for continuous variables assuming unequal variance.

RESULTS

Demographic Characteristics

Demographic characteristics are listed in Table 1. The mean age of the entire sample was 16.1 years ($N = 182$, range 7–45 years); youth 10 to

TABLE 3 Service Use and Past History from Apache Surveillance Self-Injury Data for 2007 and 2008

Variable, n (%)	Age <25 Years			Age ≥ 25 Years			N = 182
	Female (n = 110)	Male (n = 56)	Total (n = 166)	Female (n = 9)	Male (n = 7)	Total (n = 16)	
Referral made	36 (32.73)	19 (33.93)	55 (33.13)	7 (77.78)	4 (57.14)	11 (68.75)	66 (36.26)
Unknown/unspecified	6 (5.5%)	6 (10.71)	12 (7.23)	0	0	0	12 (6.6)
Contacted referral agency (of those referred)	12 (33.33)	6 (31.58)	18 (32.73)	1 (14.23)	1 (25)	2 (18.18)	20 (30.30)
Unknown	8 (22.22)	5 (26.32)	13 (23.64)	1 (14.23)	0	1 (9.1%)	14 (21.21)
Past self-injury	103 (93.64)**	31 (55.36)	134 (80.72)	8 (88.89)*	2 (28.57)	10 (62.5)	144 (79.12)
Past suicidal ideations	38 (34.55)	15 (26.79)	53 (31.93)	2 (22.22)	0	2 (12.5)	55 (30.22)
Past suicide attempt	26 (23.64)	12 (21.43)	38 (22.89)	5 (55.56)	2 (28.57)	7 (43.75)	45 (24.73)
Mental health history	20 (18.18)	11 (19.64)	31 (18.67)	4 (44.44)*	0	4 (25)	35 (19.23)
Unknown	3 (2.73)	1 (1.79)	4 (2.41)	0	0	0	4 (2.2%)

Note: * $p < .05$; ** $p < .001$.

14 years old had the greatest number of NSSI events ($n = 86$; 47.3%), followed by youth 15 to 19 years of age ($n = 51$; 28%). Females had more events ($n = 119$, 65.4%) and were significantly younger than males (15.4 versus 17.4 years) at time of report ($t = 1.98$, $p = .0497$). These findings are similar to the existing literature documenting more NSSI in youth, young adults, and females, with the female:male ratio approximately 2:1.^{10,13} Most of the sample was living with their mother ($n = 119$, 65.4%) and sister(s)/brother(s) ($n = 112$, 61.5%). None reported living alone. Females were more likely to live with siblings ($n = 77$, 64.7%; $\chi^2 = 6.41$, $p = .04$), whereas males were more likely to live with their children ($n = 8$, 12.7%; $\chi^2 = 10.14$, $p = .006$).

NSSI Rates

The estimated rate of NSSI for all age groups was 600 in 100,000 annually; the rate was highest for those 10 to 14 years of age at more than 3,000 in 100,000 and 15 to 19 years old at roughly 1,500 in 100,000. The overall rate falls within the wide range described in the literature: 400 in 100,000 to 1,400 in 100,000.^{6,7} It is challenging to make a direct comparison since those methods are unknown, but one can hypothesize that rates among Apache youth are higher, given that surveillance data are known to produce lower rates than other types including self-report.²²

NSSI Behaviors

NSSI behaviors are listed in Table 2. Consistent with the literature,^{8,12} the vast majority of the sample ($n = 178$, 97.8%) used cutting as their method regardless of age and gender. Male youth were more likely to use other methods (e.g., head banging, burning; $\chi^2 = 8.05$, $p = .018$). Most Apache individuals self-injured between 12 and 9 PM ($n = 102$, 56%), with a sizable portion ($n = 55$, 30.2%) doing so during school hours, and teachers were common reporters ($n = 65$, 31.6%). Data were limited to initial surveillance reports about whether others were present at the time (total initial reports with NSSI = 206; $n = 60$, 29.1%); most ($n = 46$, 76.7%) reported "yes."

Substance Use

Many Apache individuals (total $n = 40$, 22%; youth $n = 26$, 15.7%; adult $n = 14$, 87.50%) were intoxicated/high when engaging in index NSSI episode in contrast to previous research (3.5%–5% of adolescents).¹⁵ Male youth were more likely (32.1% versus 7.3%) to report substance use at the time ($\chi^2 = 19.77$, $p = .000$). Alcohol was the most prevalent substance ($n = 38$, 95%), with marijuana ($n = 1$, 2.5%) and methamphetamine ($n = 1$, 2.5%) used less frequently. The majority of Apaches who were intoxicated or high during the event (total $n = 23$, 57.5%; youth $n = 13$, 5%; adult $n = 10$, 71.4%) reported a lifetime history of substance use.

TABLE 4 Other Self-Destructive Behavior From Apache Surveillance Data 2007 and 2008

	Age <25 Years			Age ≥25 Years			N = 25
	Female (n = 14)	Male (n = 3)	Total (n = 17)	Female (n = 4)	Male (n = 4)	Total (n = 8)	
Method, n (%)							
Drug overdose	9 (64.29)	0	9 (52.94)	2 (50)	0	2 (25)	11 (44)
Alcohol overdose	3 (21.43)	3 (100)	6 (35.29)	1 (25)	1 (25)	2 (25)	8 (32)
Strangling	1 (7.14)	0	1 (5.88)	0	3 (75)	3 (37.5)	4 (25)
Jump	1 (5.88)	0	1 (5.88)	1 (25)	0	1 (12.5)	2 (8)
Reported precipitant (not mutually exclusive)							
Intoxicated/blacked out	4 (28.57)	3 (100)	7 (41.18)	1 (25)	1 (25)	2 (25)	9 (36)
Fight with significant other	2 (14.29)	0	2 (11.76)	2 (50)	1 (25)	3 (37.5)	5 (20)
Fight with parent	3 (21.43)	0	3 (17.65)	1 (25)	1 (25)	2 (25)	5 (20)
Depression	1 (7.14)	0	1 (5.88)	0	0	0	1 (4)
Anger	1 (7.14)	0	1 (5.88)	0	0	0	1 (4)
Family situation/problems	1 (7.14)	0	1 (5.88)	0	0	0	1 (4)
Stress/lot on the mind	1 (7.14)	0	1 (5.88)	0	0	0	1 (4)
Other	1 (7.14)	0	1 (5.88)	0	1 (25)	1 (12.5)	2 (8)
Function of self-injury							
To effect internal state	3 (21.43)	0	3 (17.65)	2 (50)	1 (25)	3 (37.5)	6 (24)
To effect circumstances	8 (57.14)	1 (33.33)	9 (52.94)	2 (50)	2 (50)	4 (50)	13 (52)
Other, unknown intent	3 (21.43)	2 (66.67)	5 (29.41)	0	1 (25)	1 (12.5)	6 (24)

Precipitants for NSSI

For the total sample, Apaches' most common precipitants for NSSI were "peer pressure/copying" (n = 23, 12.6%), "fight with boy/girlfriend" (n = 22, 12.1%), and "depression" (n = 21, 11.5%). A substantial proportion (n = 19, 10.4%) did not remember precipitants because they were "intoxicated/blacked out", but relied on others' and physical (e.g., cuts) observations that they self-injured while using substances. There were some differences in precipitants for NSSI between Apache youth ($\chi^2 = 24.18, p = .030$). For females, the most frequently reported precipitants were "peer pressure/copying" (n = 16, 14.6%), "depression" (n = 15, 13.6%), and "fight with parent" (n = 13, 11.8%), whereas for males they were "intoxicated/blacked out" (n = 10, 17.9%), "fight with boy/girlfriend" (n = 9, 16.1%) and "peer pressure/copying" (n = 7, 12.5%). For adults, most common precipitants were "intoxicated/blacked out" (n = 7, 43.8%), "fight with boy/girlfriend" (n = 5, 31.3%), and "depression" (n = 3, 18.8%). Apache data corroborate past findings that most common NSSI precipitants are interpersonal, especially among young people.²⁵

Functions of NSSI

The data allow us to explore the first dimension of Nock and Prinstein model: internally versus

externally motivated NSSI. Apaches' most frequently reported function was "to effect internal state" (n = 81, 44.5%), consistent with the literature,^{1,18,21} followed by "other" (n = 73, 40.1%) and "to effect circumstances" (n = 28, 15.4%). There were differences between Apache youth ($\chi^2 = 9.94, p = .007$) with male youth most frequently reporting "other" (n = 27, 48.2%). Adults were most likely to report "to effect internal state" (n = 8, 50%), followed by "to effect external circumstances" (n = 4, 25%) and "other" equally (n = 4, 25%). Anecdotally, case managers reported "other" answers included to "try it/see how it feels, copying their friends/siblings, peer pressure and boredom"—many of which could fit into Nock and Prinstein's full model of behavioral functions.

Service Use

Service use is summarized in Table 3. A sizable proportion (n = 70, 38.5%) were treated in the emergency department for their NSSI and received a mental health referral (n = 66, 36.3%; youth n = 55, 33.1%; adult n = 11, 68.8%). Of those referred, only 30.3% (n = 20; youth n = 18, 32.7%; adult n = 2, 18.2%) reported making contact with aftercare at the time of surveil-

lance follow-up, similar to previous findings on youth suicide attempters.²⁶

Past History of NSSI

Past history of NSSI is summarized in Table 3. A large number of Apaches with an index report of NSSI reported past NSSI ($n = 144$, 79.1%); average number was 11.97 for females and 10.9 for males. More female than male youth (93.6% versus 55.4%) reported past NSSI ($\chi^2 = 34.94$, $p = .000$); similarly, female adults were more likely than male adults (88.9% versus 28.6%) to have past NSSI ($\chi^2 = 6.11$, $p = .013$). A sizable proportion reported past suicidal ideation ($n = 55$, 30.2%; youth $n = 53$, 31.9%; adult $n = 2$, 12.5%) and suicide attempts ($n = 45$, 24.7%; youth $n = 38$, 22.9%; adult $n = 7$, 43.8%)—lower than other samples for ideation (83%) but similar for attempts (26%)³—which may be due to low sensitivity of the surveillance system in detecting the full range of past ideation. Few Apaches overall reported “a history of mental health problems” ($n = 35$, 19.2%), likely reflecting reporting bias given other findings. Female adults were more likely (44.4% versus 0%) to have reported a past history of mental health problems ($\chi^2 = 4.15$, $p = .042$).

Other Self-Destructive Behaviors

Other self-destructive behaviors are listed in Table 4. A surprising finding was that 13.7% ($n = 25$) of the total sample of Apaches reported other self-destructive behaviors in terms similar to NSSI. The average age of this group was older (mean age = 22.6, $SD = 9.7$). The majority of this subgroup reported using alcohol or drugs ($n = 19$, 76%). Apache females and males in both age groups reported alcohol use ($n = 8$, 32%), whereas only Apache females reported drug use ($n = 11$, 44%). The majority reported overdose by prescription ($n = 6$, 55%) or over-the-counter medications ($n = 4$, 36%), compared with street drugs ($n = 1$, 9%). Apaches’ most common responses regarding precipitants for other self-destructive behaviors were “don’t remember because intoxicated/passed out” ($n = 9$, 36%), “fight with boyfriend/girlfriend” ($n = 5$, 20%), and “fight with parent” ($n = 5$, 20%). The majority in the alcohol use group did not recall their precipitants ($n = 7$, 88%), whereas the majority in the drug use group reported fights ($n = 7$, 64%). For other self-destructive behav-

iors, Apaches’ most frequently reported function was “to effect circumstances” ($n = 13$, 52%), with equal number “to effect internal state” and “other” ($n = 6$, 24% each).

DISCUSSION

Until now, NSSI has largely been ignored as a public health problem, especially for minority populations.⁵ WMAT-JHU research is bringing to light the substantial scope of this problem for Apaches, particularly among youth, which is even more serious given the context of related mental health disparities facing AIs.¹⁴ Rates of NSSI on this reservation appear to be higher than the general population (400 in 100,000 to 1,400 in 100,000),^{6,7} especially among youth (600/100,000 for all ages, with rates up to 3,000 in 100,000 for individuals 10–14 years old). Similar to other populations, the majority of NSSI reports were among youth and young adults, the most common reported method was “cutting,” and females were more likely to engage in NSSI than males.^{10,13} In terms of NSSI burden to the Apache health system, nearly 40% of NSSI incidents required ED care, with a similar percentage receiving referrals. Unfortunately, less than one-fourth reported receiving follow-up mental health services.

Perhaps the most sentinel finding is that NSSI peaks in Apaches less than 15 years old, earlier than suicide attempts and deaths, with one-half of all reported events among this age group. The distribution of suicide attempts peaks in individuals 15 to 19 years old and deaths in those 20 to 24 years old among AI youth compared with other U.S. non-AI populations²⁷; thus, NSSI could be a precursor to or facilitator of suicide in this population. Furthermore, most Apaches with an index NSSI event reported past NSSI, suggesting that the youngest Apaches may not only have higher rates but also may begin NSSI earlier than other populations. More than one-quarter of the sample reported past suicidal ideation and attempts, further supporting NSSI’s position on the continuum of suicidal behavior. Unfortunately, data on age of onset was not collected for either nonsuicidal or suicidal self-injury; future research should examine the developmental trajectory of different types of self-injury. The role of alcohol and drug use in NSSI also raises the question as to whether substance

use facilitates NSSI progression to suicidal behavior.

The authors of the current work believe that it important to share the preliminary finding that participants reported other self-destructive behaviors, mainly severe alcohol and drug use, in terms similar to those by individuals who cut and burn. The study sample—AI youth and adults—is unique, and it is possible that in communities with high rates of suicide, accidents, and self-injury, the self-described motivation for these behaviors also may be different and therefore worthy of reporting. Some, including our tribal partners, view the physical consequences resulting from severe alcohol and drug use just as harmful and “direct” as cutting one’s arm with a razor. Thus, tribal leaders recently decided to add severe substance use as a separate reportable event to their surveillance system. In addition, a greater proportion of this sample, especially younger males and adults of both genders with a past history of substance use, reported being inebriated or high during NSSI compared with previous findings.¹⁵ A large body of literature has documented the serious problem of severe alcohol/drug use within AI youth populations,^{14,28,29} but rarely has this behavior been conceptualized as a possible form of NSSI or on the spectrum of suicidality.¹⁷ Further research to determine how severe substance use might function as a facilitator or method of self-injury may yield new approaches to unraveling the interplay between what may be connected behavioral health disparities among AI youth (i.e., suicide, self-injury and severe substance use).

There are several limitations to this study. First, methods rely on individuals to report NSSI to the surveillance system. Incidents reported in this way tend to be more serious and to underestimate rates, making comparison with more common population survey-based estimates challenging. Second, one would not anticipate coding based on follow-up interview to be consistently congruent with initial reports, as any surveillance system using community reporting is necessarily prone to error; thus, initial reports are often “recoded.” The tribe does not place responsibility for accurate coding on the community, who are solely educated about types of behavior to report, but rather on the trained Apache case managers and JHU clinical staff. The strength of this

surveillance system’s approach is wider identification. Third, the number of data analyses required to answer our questions was large, given the size of the dataset. Some of the significance tests resulted in small cell sample size and should be interpreted with caution. However, exploratory descriptive analyses of this type are warranted given this is the first research on NSSI with an AI sample. Fourth, intent to die cannot always be determined with full confidence; this distinction can be especially challenging when drinking and drug use are involved, because many individuals do not remember the details of the event and may rely on others’ reports.

The current findings suggest a number of implications for prevention and intervention efforts. First, the overlap or correlation between NSSI and suicidal thoughts and behaviors suggest that NSSI should lead to further risk assessment and a concerted public health response. Second, the modest referral rates with very low follow-up reveal an important need to address service use and delivery, as well as stigma surrounding this behavior and related barriers to care, which may be more challenging in small, under-resourced communities such as AI reservations. Third, prevention and intervention strategies with this population should target interpersonal (e.g., fights with parents/significant others, peer imitation) and intrapersonal (“depression”) precipitants described for NSSI, and may include the following: peer conflict resolution and positive involvement strategies, communication, assertiveness, and social skills training; emotion identification and regulation skills; and family strengthening. Fourth, schools appear to be a key venue for early identification and prevention efforts, because of the age group most at risk and number of reports of NSSI occurring during school hours and coming from school staff. Finally, future research would greatly benefit from using Nock and Prinstein’s more refined behavioral model to tailor interventions targeting different functions of NSSI.¹⁹ The Apache Surveillance System provides a unique opportunity to better understand the public health significance and burden of NSSI, the continuum of intentional injuries, and the cross-cutting role of substance use as a potential form and promoter of self-injury in this and other similar populations. *ε*

Accepted June 6, 2011.

This article was reviewed under and accepted by ad hoc editor Bradley D. Stein, M.D., Ph.D.

Drs. Cwik and Walkup, and Ms. Barlow, Ms. Tingey, Ms. Larzelere-Hinton, and Ms. Goklish are with the Johns Hopkins Bloomberg School of Public Health, Center for American Indian Health. Drs. Cwik and Walkup are also with the Johns Hopkins University School of Medicine. Dr. Walkup's primary appointment is with the Cornell School of Medicine.

We are grateful to the national Native American Research Centers in Health initiative, through which grant support was received for this project from the National Institute of General Medical Science and Indian Health Service: grants U26IHS300013, U26IHS300286 (J.T.W.).

We respectfully acknowledge the White Mountain Apache youth, families, and community members for their courage in addressing nonsuicidal self-injury and their innovation in pioneering surveillance strategies. We are grateful to the White Mountain Apache Health Board and Tribal Council for their historic commitment to research and their critical review of this research project and manuscript. Finally, we acknowledge our Apache case managers for their tireless efforts and dedication to help people in their community.

The opinions expressed are those of the authors and do not necessarily reflect the views of the Indian Health Service.

Disclosure: Dr. Walkup receives grant or research support from the Tourette Syndrome Association (TSA). He received free drug and placebo for a National Institute of Mental Health (NIMH)-funded study from Eli Lilly and Co. He received free drug and placebo for a NIMH-funded study from Pfizer. He received free drug for a NIMH-funded study from Abbott. He serves on the advisory board of the TSA. He receives honorarium for an Educational Meeting from the TSA. He receives royalties from Guilford Press and Oxford University Press. He receives travel support for paid and unpaid activities from the TSA. Dr. Cwik, Ms. Barlow, Ms. Tingey, Ms. Larzelere-Hinton, and Ms. Goklish report no biomedical financial interests or potential conflicts of interest.

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DOI: 10.1016/j.jaac.2011.06.007

REFERENCES

1. Klonsky ED, Muehlenkamp JJ. Self-injury: a research review for the practitioner. *J Clin Psychol.* 2007;63:1045-1056.
2. Gratz KL. Risk factors for and functions of deliberate self-harm: an empirical and conceptual review. *Clin Psychol.* 2003;10:192-205.
3. Laye-Gindhu A, Schonert-Reichl K. Nonsuicidal self-harm among community adolescents: understanding the "whats" and "whys" of self-harm. *J Youth Adolesc.* 2005;34:447-457.
4. Muehlenkamp JJ, Gutierrez PM. Risk for suicide attempts among adolescents who engage in nonsuicidal self-injury. *Arch Suicide Res.* 2007;11:69-82.
5. Prinstein MJ. Introduction to the special section on suicide and nonsuicidal self-injury: a review of unique challenges and important directions for self-injury science. *J Consult Clin Psychol.* 2008;76:1-8.
6. Favazza AR. The coming of age of self-mutilation. *J Nerv Ment Dis.* 1998;186:259-268.
7. Pattison EM, Kahan J. The deliberate self-harm syndrome. *Am J Psychiatry.* 1983;140:867-872.
8. Briere J, Gil E. Self-mutilation in clinical and general population samples: prevalence, correlates, and functions. *Am J Orthopsychiatry.* 1998;68:609-620.
9. Klonsky ED, Oltmanns TF, Turkheimer E. Deliberate self-harm in a nonclinical population: prevalence and psychological correlates. *Am J Psychiatry.* 2003;160:1501-1508.
10. Ross S, Heath N. A study of the frequency of self-mutilation in a community sample of adolescents. *J Youth Adolesc.* 2002;31:67-77.
11. Whitlock J, Eckenrode J, Silverman D. Self-injurious behaviors in a college population. *Pediatrics.* 2006;117:1939-1948.
12. Nock MK, Joiner TE, Jr., Gordon KH, Lloyd-Richardson E, Prinstein MJ. Non-suicidal self-injury among adolescents: diagnostic correlates and relation to suicide attempts. *Psychiatry Res.* 2006;144:65-72.
13. Rodham K, Hawton K. Epidemiology and phenomenology of nonsuicidal self-injury. In: Nock MK, ed. *Understanding Non-Suicidal Self-Injury: Origins, Assessment, and Treatment.* Washington, DC: American Psychological Association; 2009:37
14. DHHS U. Trends in Indian health, 2002-2003. Rockville, MD: Public Health Service, Indian Health Service, US Government Printing Office; 2009.
15. Nock MK, Prinstein MJ, Sterba SK. Revealing the form and function of self-injurious thoughts and behaviors: a real-time ecological assessment study among adolescents and young adults. *J Abnorm Psychol.* 2009;118:816-827.
16. Lloyd-Richardson EE, Perrine N, Dierker L, Kelley ML. Characteristics and functions of nonsuicidal self-injury in a community sample of adolescents. *Psychol Med.* 2007;37:1183-1192.
17. Walsh BW. *Treating Self-Injury: A Practical Guide.* New York: Guilford Press; 2006.
18. Suyemoto KL. The functions of self-mutilation. *Clin Psychol Rev.* 1998;18:531-554.
19. Nock MK, Prinstein MJ. A functional approach to the assessment of self-mutilative behavior. *J Consult Clin Psychol.* 2004;72:885-890.
20. Klonsky ED. The functions of deliberate self-injury: a review of the evidence. *Clin Psychol Rev.* 2007;27:226-239.
21. Meyer J. Age: 2000, Census 2000 Brief. Washington, DC: US Census Bureau; 2001;C2KBR/01-12:1-12.
22. Mullany B, Barlow A, Goklish N, et al. Toward understanding suicide among youths: results from the White Mountain Apache tribally mandated suicide surveillance system, 2001-2006. *Am J Public Health.* 2009;99:1840-1848.
23. Andrus JK, Fleming DW, Heumann MA, Wassell JT, Hopkins DD, Gordon J. Surveillance of attempted suicide among adolescents in region, 1988. *Am J Public Health.* 1991;81:1067-1069.
24. Langlois S, Morrison P. Suicide deaths and suicide attempts. *Health Rep.* 2002;13:9-22.
25. Prinstein MJ, Guerry JD, Browne CB, Rancourt D. Interpersonal models of nonsuicidal self-injury. In: Nock MK, ed. *Understanding Non-Suicidal Self-Injury: Origins, Assessment and Treatment.* American Psychological Association; 2009:79
26. Daniel SS, Goldston DB, Harris AE, Kelley AE, Palmes GK. Review of literature on aftercare services among children and adolescents. *Psychiatr Serv.* 2004;55:901-912.
27. McKeown RE, Cuffe SP, Schulz RM. US suicide rates by age group, 1970-2002: an examination of recent trends. *Am J Public Health.* 2006;96:1744-1751.
28. Shaughnessy L, Jones SE. Tobacco, alcohol and other drug use among high school students in Bureau of Indian Affairs-funded schools—United States, 2001. *MMWR.* 2003;52:1070-1072.
29. Beauvais F, Jumper-Thurman P, Helm H, Plested B, Burnside M. Surveillance of drug use among American Indian adolescents: patterns over 25 years. *J Adolesc Health.* 2004;34:493-500.